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Final Tech. Rpt.

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# TECHNICAL ENFORCEMENT SUPPORT AT HAZARDOUS WASTE SITES

## U.S. EPA CONTRACT NO. 68-01-7331

**CDM** Federal Programs Corporation

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# FINAL REPORT
# TECHNICAL EVALUATION OF ZONE OF CONTAMINATION 2
# AMETEK, INC. SITE
# MONTGOMERY COUNTY, PENNSYLVANIA

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Waste Programs Enforcement
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300035

TABLE OF CONTENTS


| | | Page |
|---|---|---|
| 1.0 | EXECUTIVE SUMMARY | 1 |
| 2.0 | INTRODUCTION | 4 |
| | 2.1 History of Zone of Contamination | 4 |
| | 2.1.1 Ametek, Inc.-Hunter Spring Division | 5 |
| | 2.1.2 Waste Conversion, Inc. | 9 |
| | 2.1.3 A. Steiert and Son, Inc. | 10 |
| | 2.1.4 B&G Manufacturing, Inc. | 11 |
| | 2.1.5 SPS Technologies, Inc. | 11 |
| | 2.1.6 Brooks Instruments | 12 |
| | 2.2 Previous Environmental Investigations | 12 |
| | 2.2.1 Ametek | 12 |
| | 2.2.2 Waste Conversion | 20 |
| | 2.2.3 A. Steiert and Son, Inc. | 21 |
| | 2.2.4 B&G Manufacturing, Inc., SPS Technologies, and Brooks Instruments | 22 |
| | 2.3 Zone of Contamination Visit | 22 |
| | 2.4 Geological Setting | 23 |
| | 2.4.1 Ametek, Inc. | 23 |
| | 2.4.2 Waste Conversion, Inc., A. Steiert and Son, Inc., B&G Manufacturing, Inc., SPS Technologies, Inc. | 26 |
| 3.0 | TECHNICAL APPROACH TO EVALUATIONS | 27 |
| 4.0 | EVALUATION OF FACILITY CHARACTERIZATION INFORMATION | 28 |
| | 4.1 Background Information | 28 |
| | 4.2 Facility Features | 29 |
| | 4.2.1 Demographics and Land Use | 29 |
| | 4.2.2 Natural Resources | 30 |
| | 4.2.3 Meteorology and Climate | 31 |
| | 4.2.4 Topography | 32 |
| | 4.3 Hazardous Substances | 33 |
| | 4.3.1 Waste Types | 33 |
| | 4.3.2 Characteristics and Behavior of Waste Component | 34 |
| | 4.4 Hydrogeology | 35 |
| | 4.4.1 Geology and Soils | 35 |
| | 4.4.2 Ground-Water Hydrology and Quality | 39 |
| | 4.5 Surface Water | 41 |
| | 4.6 Air | 43 |
| | 4.7 Biota | 44 |
| | 4.8 Bench and Pilot Tests | 44 |
| | 4.9 Public Health and Environmental Effects | 46 |


300036

5.0 EVALUATION OF REMEDIAL ALTERNATIVES ..... 47
5.1 Development and Initial Screening of Alternatives ..... 47
5.1.1 General Response Actions ..... 47
5.1.2 Possible Technologies ..... 48
5.1.3 Screen Possible Technologies Based on Site Conditions ..... 49
5.1.4 Assemble Technologies into Remedial Alternatives ... 50
5.1.5 Eliminate Remedial Alternatives Based on Protection ..... 51
5.1.6 Eliminate Remedial Alternatives Based on Cost ..... 51
5.2 Detailed Analysis of Alternative ..... 52

6.0 CONCLUSIONS AND RECOMMENDATIONS ..... 54
6.1 Summary of Program Data Deficiencies ..... 54
6.1.1 Site Characterization ..... 54
6.1.2 Remedial Programs ..... 56
6.2 Summary of PRP Relationships to the Contamination ..... 56
6.3 Recommended Additional Studies ..... 56
6.3.1 Site Characterization ..... 56
6.3.2 Remedial Programs ..... 57
6.3.3 Characterization of PRP Relationships to the Contamination ..... 57

REFERENCES ..... 58

FIGURE

1. Monitoring Well Locations and Water Table Configuration ..... 17

APPENDICES

A - Hydrogeology of Montgomery County, Pennsylvania

B - Reference Package

300037

## 1.0 EXECUTIVE SUMMARY

Versar has reviewed the available information concerning an area of ground-water contamination in the North Penn Water Authority (NPWA) area of Pennsylvania known as Zone of Contamination 2. The information consisted of documents provided by the U.S. Environmental Protection Agency (EPA) Region III, NPWA, and the Pennsylvania Department of Environmental Resources (PADER). The information included CERCLA 104(e) responses for the potentially responsible parties (PRPs), inspections performed by PADER and NPWA on the PRPs, soil and ground-water contamination assessment for Ametek, Inc., and correspondence available in NPWA and PADER files.

In 1982, NPWA discovered volatile organic compounds (VOCs) in their NP-15 well. The VOCs included trichloroethylene (TCE) and tetrachloroethylene (PCE). Release into the ground water reportedly could affect thousands of persons using private wells and municipal sources for potable water from the aquifer of concern (Ref. 2, pp. 6, 7, HRS refs. 9 to 12, and 17). U.S. EPA has identified five PRP facilities (Ametek, Inc., Waste Conversion, Inc., SPS Technologies Inc., A. Steiert and Son, Inc., and B&G Manufacturing, Inc.) to date for this zone (Ref. 1, p. 4-6). Two of these PRP facilities (Waste Conversion, Inc., B&G Manufacturing, Inc.) were originally identified as PRPs by the NPWA (Ref. 1, p. 4-6). Waste Conversion was identified because they are a known handler of VOCs and have been reported to have sloppy operations. SPS Technologies is also a known user of trichloroethylene (TCE) (Ref. 1, p. 4-6). It is unknown whether A. Steiert & Son uses trichloroethylene (TCE), but the facility was identified as a PRP because of its sloppy operations (Ref. 1, p. 4-6). Justifications for why NPWA identified B&G Manufacturing as a PRP and why EPA identified Ametek as a PRP were not presented in the available information.



300038

Versar's review of raw material purchase orders included in Ametek's 104(e) response to EPA revealed that Ametek used TCE in their operations (Ref. 26). In addition, Ametek's wells are contaminated with TCE (Ref. 2, p. 2, HRS Refs. 2 to 7 and 25).

Versar studied the data and information described above to characterize their extent and quality with respect to data guidelines and needs stipulated in the National Oil and Hazardous Substance Contingency Plan (NCP), and EPA guidance documents for remedial investigations (RI) and feasibility studies (FS) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (Refs. 27 and 28). Also, the hydrogeologic features of Zone of Contamination 2 were characterized as much as possible based on existing information. The zone-specific geologic setting is described in Section 2.4 of this report. The hydrogeology of Montgomery County, Pennsylvania is described in Appendix A. Versar's evaluation of data and information is presented in Sections 4.0 and 5.0 of this report. Results of this evaluation are discussed in Section 6.0 of this report.

In conclusion, Versar's evaluation identified deficiencies regarding NCP requirements because neither an RI nor a FS have been conducted for any of the Zone of Contamination 2 PRPs. These deficiencies, which include demographics, land use, natural resources, meteorology, climate, topography, waste characteristics, hydrogeology, surface water, air, biota, public health, and environmental effects, are discussed in detail in Sections 4.0, 5.0, and 6.0 of this report. Versar feels that the available technical information, especially on the hydrogeology of Zone of Contamination 2, is not sufficient to develop relationships of PRP facilities in the zone to the contamination.

Additional studies are necessary to allow thorough assessment of contamination and development of remedial alternatives according to EPA's guidelines and criteria. Once a comprehensive and sound RI is completed for each of the PRPs, then a FS should be performed to develop and



300039

evaluate remedial alternatives for alleviating site problems while attaining clean up standards.

The scope of this work assignment did not stipulate that Versar identify or investigate other facilities in the zone which have not been identified as PRPs, but may have contributed to the contamination. Identification of additional PRPs in the future could prompt generation of new information requiring Versar's evaluation within the scope of this work assignment. The results of this study were developed from evaluating only data and information made available to Versar by EPA Region III, PADER, and the North Penn Water Authority (NPWA).



300040

## 2.0 INTRODUCTION

This report presents the results of Versar's evaluation of available technical information and data concerning Ametek, Inc., Waste Conversion, Inc., A. Steiert and Sons, Inc., SPS Technologies, Inc., and B and G Manufacturing, Inc. All these facilities are located within an area of ground-water contamination in the North Penn, Pennsylvania area known as Zone of Contamination 2. This section summarizes the history of the zone of contamination, previous environmental investigations concerning PRP facilities, results of the site visit for zone of contamination No. 2 performed by Versar, and the geological setting of the zone of contamination. The technical approach to the evaluation is discussed in Section 3.0, and the evaluation is presented in Sections 4.0 and 5.0. Section 6.0 presents the conclusions and the recommendations of the evaluation, emphasizing data deficiencies and recommendations for additional evaluations or studies.

Limited technical information concerning facility processes and chemical uses for B and G Manufacturing, Inc., is not discussed in this report because B and G claimed this information as Confidential Business Information (CBI). Versar's evaluation of these documents can be found in the Addendum to the Technical Evaluation of Zone of Contamination No. 2 prepared for EPA.

### 2.1 History of Zone of Contamination

The North Penn area is located in central Montgomery County and includes the townships of Lansdale, Souderton, Unionville, Harleysville, Kulpville, Colmar, Hatfield, and Skippack. The area consists of low hills and ridges belonging to the Piedmont Province of the Appalachian Highlands physiographic division (Ref. 29). Several creeks, including Neshaminy, Skippack, and Wissahickon, flow south through the study area and into the Schuylkill River which flows southeast to the Delaware River (Ref. 3, p. 2-3).



300041

NPWA uses ground water to supply potable water to a major portion of Montgomery County. In 1979, NPWA discovered VOCs in nine of their production wells (Ref. 2, HRS reference 12A). The VOCs included TCE and PCE. These wells were shut down and a program was initiated to locate the potential source and responsible parties. The site discovery report identified 12 zones of ground-water contamination, of which 9 contain NPWA wells. The 12 zones lie within an 8.5 mile radius with the center located 1,000 feet south of the Lansdale Interchange of the Pennsylvania Turnpike (Ref. 1, p. 2-1).

This report examines Zone of Contamination 2 which lies within the Hatfield Township. This zone is located southwest of Route 309 extending eastwardly to Orvilla Road and westwardly to Township Line Road. Three distinct ground-water plumes contaminated with VOCs have been identified by NUS. A NPWA well (NP-15) is located within the southernmost plume (Ref. 1, pp. 4-6, 4-7). It is of concern in this study because it supplies residents in the Hatfield area with their only source of potable water and because VOCs have been detected by NPWA at the following concentrations: 4.4 ppb of 1,1-dichloroethylene (September 16, 1985), 19.2 ppb of 1,1-dichloroethane (December 30, 1985), and 4.9 ppb of 1,1,1-trichloroethane (October 21, 1985) (Ref. 1, p. 4-8). Well NP-15 was installed in 1972, is 500 feet deep, and is presently active, yielding 144,000 gallons per day (Ref. 1, Appendix D).

U.S. EPA has identified the following PRP facilities to date for the Zone of Contamination No. 2: Ametek, Inc.-Hunter Spring Division (Ametek); A. Steiert and Son, Inc. (Steiert); B&G Manufacturing, Inc. (B&G); Waste Conversion, Inc. (Waste Conversion); SPS Technologies, Inc. (SPS); and Brooks Instruments (Ref. 1, p. 4-6 and Ref. 37). The following sections provide background on these PRP facilities.

2.1.1 Ametek, Inc.-Hunter Spring Division

Ametek is located at latitude 40 17' 35" and longitude 75 17' 40" on Bergey Road between the communities of Souderton, 1.2 miles west, and Hatfield, 5 miles south, in the northeastern portion of Montgomery



300042

County, Pennsylvania (Ref. 1, p. 2-3). The site consists of 87 acres. About one-third of the site's 87 acres are wooded to the south and to the east. Most of the remaining land is active farm land except for the land that is occupied by the plant itself. The most notable of the site's structures is the main manufacturing plant which lies in the northwest portion of the site. Other structures onsite include storage sheds, well houses, and the foundations and rubble of an abandoned farm located to the northeast of the plant. An abandoned settling basin and two backfilled sludge lagoons lie to the south of the plant. A stream flowing south transects the property (Ref. 3, Figure 1-2). It is an intermittent stream whose volume is increased by water flowing from rills (a series of straight surficial depressions) in the wooded area of the property (Ref. 3, pp. 1-1).

Ametek began operations in 1962 and ceased operations in September 1986. Ametek manufactured precision springs, reels, and measuring and controlling apparatus using the following operations: degreasing, cadmium and zinc plating, organic plating, chemical surface cleaning, pickling, zinc phosphate conversion coating, and passivating (Ref. 6).

Ametek was classified by PADER as a small quantity generator of TCE from degreasing operations and of wastewater treatment sludge from electroplating operations (2,600 gallons per week) (Refs. 6 and 30). Ametek also stored paints in a storage shed behind the plant. Soils contaminated with TCE and toluene have been found in this area (Ref. 4, p. 1-4). The available information about Ametek's wastes is presented below.

TCE reportedly was the primary degreasing solvent used at Ametek since 1962. Prior to 1975, incoming TCE was stored in drums at an unidentified site location. After 1975, incoming TCE was stored in a 1,500-gallon above-ground tank located in front of the manufacturing building (Ref. 4, p. 1-1, Figure 1-2). In June 1986, when Ametek ceased operations at this site, the storage tank was removed (Ref. 4. p. 1-1).



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Approximately 4,500-gallons per year of TCE were used in site degreasing operations. Prior to May 1984, waste degreasing solvent was transported for disposal from Ametek to U.S. Gauge (which is another division of Ametek). However PADER discovered during a May 1984 inspection of Ametek that U.S. Gauge was not a licensed transporter or treatment facility. Since this time, Ametek used Marisol Incorporated (as evidenced by manifests dated August 15, 1984; and April 4, 1985) and Chemclene Corporation (as evidenced by manifests dated November 11, 1985; January 20, 1986; and April 30, 1986) to recycle used degreasing solvents collected and transported in drums (Refs. 7 and 8). For periods of time in 1972, 1975, and 1976, 1,1,1-trichloroethane (TCEA) was used as a degreaser by the facility (Refs. 6 and 26). Reportedly, 4,500 gallons per week of this solvent were used. The used TCEA was transported offsite for disposal by U.S. Gauge (Ref. 2, HRS Ref. 5).

Cadmium (5,663 lb/yr), cadmium oxide (5 lb/wk or 1200 lb/yr), zinc, cyanide (40 lb/wk or 8,000 lb/yr), and sodium hydroxide (18,000 lb/yr) were used in plating operations (Ref. 9). To handle these contaminants, Ametek integrated a Lancy waste treatment system into their operations in 1963. The Lancy system consists of a cyanide treatment tank following the cadmium and zinc plating tanks. The cyanide treatment tank contains sodium hypochloride to destroy the cyanide, and sodium hydroxide to provide alkalinity and to precipitate the cadmium and zinc. After the parts have been plated, they are dipped in the cyanide treatment tank to destroy the cyanide residue remaining from the plating baths and rinsed in a water rinse tank (Refs. 9, 35).

Ametek operated approximately 20 water rinse tanks in its production lines. Prior to September 1973, the overflow from these rinse tanks went to a settling basin and from this point to the stream located behind the plant (Ref. 3, Figure 1-2). The settled solids (i.e., wastewater treatment sludges from electroplating operations) and residual liquid



AR300044

solutions were removed at the rate of 2,600-gallons per week from the settling basins to two lagoons along side the settling basin (Ref. 3, Figure 1-2).

In addition to the wastewater treatment sludges, the following wastes went to the lagoons (Ref. 6):

- tumbling sludges (50 gal/wk);
- used phosphoric acid solutions (180 gallons per week, 2 percent to 25 percent solutions) from acid cleaning;
- used nitric acid solutions (75 gallons per week, 20 percent to 50 percent solutions) from passivating and deleading;
- used alkaline solutions (75 pounds per week of Cleanite #74, 25 percent solution) from chemical cleaning;
- used Du-Lite 3.0 (50 gallons per month) from blacking;
- used oil (20 gallons per week of Haughto 853) from lubricating; and
- used conversion coating solutions containing zinc and phosphoric acid (4.5 gallons per week of Haughto Phosphate to create 154 gallons of solution).

Most likely, these lagoons-if unlined-may have allowed liquid wastes to percolate into underlying soils. Also, rainwater passing through the sludges in an open lagoon may have generated liquid wastes which could then have percolated into the soil. Once a year the liquids from the lagoons were pumped out and sprayed onto the property. Every three to four years the sludge was removed for use as fill.

In 1973, Ametek began discharging rinse waters to the Hatfield Township Municipal Sewer Authority. Also, liquids and sludges were removed from the lagoons and the lagoons were closed with PADER approval in 1974 by backfilling with dirt to natural grade. After 1973, the sludges were stored in drums in storage sheds behind the building (Ref. 10).



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Used hydrochloric, sulfuric, and muriatic acids from pickling operations were mixed with alkali. Sodium bichromate (9,600 lb/yr) was used in organic plating. Once a year, during cleaning of process equipment, the sodium bichromate residue generated from heating process tanks is collected in 55-gallon drums for offsite disposal (Ref. 9).

There are two production wells onsite. Well 1 is 400 feet deep and pumped 105 gallons per minute from a depth of 105 feet below the ground surface before manufacturing activities ceased in September 1986. Well 1 is located in the gatehouse in the northwest portion of the facility (Ref. 3, Figure 1-2). Well 2 is 395 feet deep and pumped 190 gallons per minute from 226 feet below the ground surface before manufacturing activities ceased. Well 2 is located to the southeast of the plant (Ref. 3, Figure 1-2, Ref. 4, pp. 1-1, 3-5, 4-9). In April 1980, Ametek purchased cartridge water filter to treat the water from these production wells (Ref. 11). Since the plant shutdown in September 1986 the two wells are pumping at approximately 20 percent of their normal rate (Ref. 10).

Ametek has characterized levels of organics in the ground water and soil, but has failed to characterize the levels of inorganics (e.g., cadmium, cyanide, phosphorus, nitrogen, or zinc) (Ref. 5, Attachment B, C, p. 4-18 to 4-23, p. 4-41). Ametek has not disclosed the exact types of organics stored in the paint shed at their plant.

2.1.2 Waste Conversion, Inc.

Waste Conversion is located in the Line Lexington Industrial Park in Hatfield, Pennsylvania. It was identified as a PRP because of its proximity to the contaminated well NP-15, and because of reported sloppy handling techniques (Ref. 1, p. 4-6). NP-15 is also located in the Line Lexington Industrial Park approximately 500 yards from the facility.



AR300046

Waste Conversion began operation in 1977 using approximately 8,000 square feet of a 24,000 square foot building. The facility consists of a plant building, a sump, a shed, and a large driveway. In addition nine ground-water monitoring wells (installation dates unknown) are present onsite (Ref. 13). The owner of Waste Conversion was facing the threat of litigation over abuse to the premises and managed to sell the business (date unknown). The new owner procured the entire building (Ref. 12).

Waste Conversion is a hazardous waste treatment and storage facility, and a hazardous waste transporter. It accepts wastes for treatment or disposal offsite from Pennsylvania, New Jersey, Delaware, and Maryland; discharges treated wastewater to the Hatfield Township Authority Sewage Treatment; and ships waste offsite. The types of wastes accepted include acids, chromic acids, pickling acids, caustics, cyanides, paints and inks, waste oil, commercial chemical products, nonmetallic inorganics, metallic inorganics, spent solvents, and contaminated soil. Select Generator Quarterly Hazardous Waste Reports are provided from January 1984 through June 1986 (Ref. 14). The exact handling procedures including locations, components, and containment were not provided. The onsite processes include chemical fixation, chemical oxidation (chlorination), chemical precipitation, chemical reduction, neutralization, coagulation/clarification, decanting, filtration, flotation, thickening, activated carbon, and blending (Ref. 14, 32).

2.1.3 A. Steiert and Son, Inc.

Steiert is located on Bergey Road approximately 2 miles north of Hatfield. The plant is no longer operating and burned down six months ago. Steiert was a hair and wire brush manufacturer (Ref. 2, HRS Ref. 27). It is unknown if Steiert used volatile organics, but their operation was reported to be sloppy (Ref. 1, p. 4-6). Lagoons and uncovered drums are randomly located throughout the property, and stressed vegetation has been noted (sketch of facility not available).



AR300047

The facility used sodium hydroxide, hydrochloric acid, lead, naphthalene, and propane. The lead waste material created during the manufacturing of brushes was sent back to the supplier for reclamation (Ref. 1, p. 4-6, Ref. 2, HRS Ref. 27). Sodium hydroxide produced from plant processes is neutralized with hydrochloric acid, then filtered through sawdust. Approximately 3 gallons of diluted sodium hydroxide is disposed of per week. Hydrochloric acid used to neutralize the sodium hydroxide is first used as an acid bath to remove oxides which form on the wires. A portion of the acid evaporates; the remaining portion is put in tanks to neutralize sodium hydroxide (Ref. 2, HRS Ref. 27). Napthalene is used to kill grubs that are found in the horsehair. Propane is burned as fuel, leaving no waste for disposal.

2.1.4 B&G Manufacturing, Inc.

B&G, previously Jed Manufacturing, is located near NPWA well NP-15 in Line Lexington Industrial Park in Hatfield, Pennsylvania. The facility transported 3,828 pounds of hazardous waste liquid identified as waste coolant and D008 (characteristic of EP Toxicity for lead) to Waste Conversion (Ref. 14). Limited information was available to Versar for B and G Manufacturing Company, and what information that was available was claimed CBI. Versar's summary and technical evaluation of this information is provided in the Addendum to the Technical Evaluation of Zone of Contamination No. 2 prepared for EPA.

2.1.5 SPS Technologies, Inc.

NUS (1986) reports that SPS is a known user of TCE (Ref. 1, p. 4-6). However, SPS states that they do not purchase TCE nor do they generate hazardous waste materials (Ref. 16). Information on the nature of SPS Technologies' manufacturing business was not provided in available documents.

300048

2.1.6 Brooks Instruments

The Brooks Instruments response to the EPA 104(e) letter states that Brooks Instruments does not own the property attributed to them on the map attached to the EPA 104(e) letter (Reference 36). Brooks Instruments' current facility location is 407 West Vine Street in Hatfield Township, Pennsylvania. Based on results of an EPA-sponsored PRP Search in zone of contamination 2, EPA considers Brooks Instruments to be a PRP in zone of contamination 2, despite the facility's remote location compared to other PRP facilities in the zone (Reference 37).

Brooks Instruments owned at one time the Leeds and Northrup property on Church Road in Lansdale, Pennsylvania. This property is the site of an analytical building where, reportedly, Brooks Instruments used TCE (Reference 36). Information was not available regarding dates for the change in ownership of the Leeds and Northrup property and any remedial measures which may have been implemented at the site to mitigate the TCE contamination found on the property. However, based on results of an EPA-sponsored PRP Search in Zone of Contamination 7 ( the Spra-Fin site), EPA does not consider Brooks Instruments to be a PRP in Zone of Contamination 7 (Reference 37).

2.2 Previous Environmental Investigations

Since the discovery of contamination of NPWA well NP-15 in 1982, the PRPs have been investigated by NPWA, PADER, and EPA. This section summarizes the available information on previous investigations and studies (e.g., ground water, surface water, soil, and air monitoring) at the sites of the PRPs.

2.2.1 Ametek

PADER and NPWA conducted the following investigations at the Ametek facility:



300049

- On June 8, 1971, PADER visited Ametek to evaluate the company's compliance with the Industrial Waste Permit (#76218). PADER discovered that Ametek was discharging rinse water contaminated with cyanide into a tributary of the Neshaminy Creek (Ref. 3, Figure 1-2). Ametek responded by promoting more effective treatment in the Lancy system cyanide treatment tank, testing barrels for chlorine residual prior to the fresh water rinse, and purchasing new equipment to permit detection of small amounts of cyanide (Refs. 16 and 17).

- On February 23, 1972, an investigation at the facility was conducted by PADER to further characterize the cyanide in the plant discharge. Samples of the rinse water were taken for chemical analysis and the results indicated a cyanide concentration of 0.22 ppm thus violating Ametek's Industrial Waste Permit. Ametek responded with a letter (March 24, 1972) indicating a complete inspection of their facility had been performed and that no trace of cyanide from the rinse water was detected greater than 0.05 ppm (Refs. 18 and 19).

- On March 22, 1984, PADER conducted an inspection of Ametek's hazardous waste activities and concluded that waste sludge was manifested with an incorrect hazardous waste number, and waste TCE was being transported by an unlicensed hauler to a facility which did not have a permit to accept waste from offsite sources (Ref. 2, HRS Ref. 5).

- On October 23, 1985, a representative from the North Penn Water Resource Association (NPWA) conducted an air monitoring survey using an HNu. There were two areas at the facility where High readings were measured; area where empty drums were temporarily being stored, and the area near the TCE storage container. It was recommended by the NPWA to remove the contaminated soil from these two areas and renovate the areas (Ref. 20).

Facility records indicate that from March 1980 to June 1986, Ametek collected water samples from their production wells 1 and 2, drinking fountain, lobby fountain, and employee fountain. The samples were analyzed for trichloroethylene, tetrachloroethylene, trichloroethane, and 1,1,1-trichloroethylene. The highest concentrations were 818 ppb trichloroethene and 970 ppb trichloroethane in well 1 and 31.7 ppb tetrachloroethene in well 2 (Ref. 31).

A Hazardous Ranking System (HRS) dated October 10, 1986, was completed for Ametek, Inc. described the basic structures and activities



300050

at the facility; contaminants detected in the two onsite wells and four offsite production wells (A. Steiert & Son, Inc., Richmond Ring, B&G Manufacturing Co., Inc., and Eastern Prestressed Concrete); general hydrogeologic information; waste characteristics; and populations served by ground-water wells within a 3-mile radius (Ref. 1, p. 4-7). The purposes of this study were to evaluate potential areas of contamination at the site, and identify surrounding environments and local receptor populations (Ref. 1). The numerical results of this study prompted designation of the Ametek site as a proposed NPL site.

The largest and most thorough of the investigations at the Ametek facility was conducted by Environmental Resource Management for Ametek, Inc., Hunter Springs Division (Refs. 3, 4, 5). The investigation was conducted in three phases, with evaluation reports submitted to EPA on August 15, 1986, September 19, 1986, and January 5, 1987. The objectives of the phase I study were to evaluate the previous measurement of organic solvents in the soil and ground water, survey the site to determine possible areas of contamination, conduct a water quality assessment of the stream which runs through the facility property, and assess the soil contamination in the TCE storage tank area. ERM's first step in their phase I investigation was to evaluate the existing data for the Ametek facility. Water data records including pump rates and production rates from the two onsite production wells were collected. In addition, aerial photographs, regional well records, topographic maps, and plant layout maps were obtained from Federal, state, and other local agencies (Ref. 3, p. 3-1).

ERM chronologically listed the water quality data available to them and plotted it against climatological data to identify any trends of increasing or decreasing degree of contamination related to seasonal events. They concluded that contamination did not fluctuate because of seasonal variations (Ref. 3, p. 4-3). ERM also performed a fracture trace analysis using aerial photographs and topographic maps. This study revealed three major sets of lineaments with parallel orientation (Ref. 3, p. 4-3, Figure 4-2).



300051

Onsite, in areas previously reported to have high VOC levels, 70 samples were analyzed with a soil gas sampler. In addition, soil samples from areas reflecting the highest volatile organic concentrations were collected for laboratory analysis along with samples from areas that were suspected of high concentrations. The soil samples were analyzed for priority pollutant volatile organics (Ref. 3, pp. 3-2, 4-7, Figures 4-4, 4-5, 4-6, Tables 4-1, 4-2).

A well and surface water survey was also conducted in the phase I study. Samples from the two plant production wells and the stream which flows through the southeast portion of the facility were collected for analyses. The stream was sampled in three locations and the production wells were sampled after three well volumes of water were removed. Parameters sampled for in well 1 were priority pollutant volatile organics, chemical oxygen demand (COD), specific conductance, and pH. Parameters sampled for in well 2 were selected priority pollutants, volatile fractions, base neutral extractable fractions, acid extractable fractions, specific conductance, COD, and pH. Stream samples were analyzed for priority pollutant volatile organics, specific conductance, COD, and pH (Ref. 3, Figure 4-1, Table 4-2).

ERM concluded the following in their phase I study (Ref. 3, p. 6-1).

- Four known areas of soil contamination listed below exist (Ref. 3, Figure 1-2).
  - the TCE storage tank area, southwest of the manufacturing building, which has TCE, PCE, and toluene contamination to a depth of 3.5 feet;
  - the paint storage area south of the building which has TCE and toluene contamination to a depth of 4 feet;
  - the disturbed ground bordering the tree line southeast of the plant which has trans-1,2-dichloroethene, TCE, and toluene contamination to a depth of 4 feet; and
  - the east neutralizing lagoon which has toluene contamination to a depth of 4 feet.
- The area along the stream bordering the woods contains empty drums and disturbed soils.



300052

- No degree of contamination trends are associated with seasonal events.
- Three major sets of lineaments were revealed in the site vicinity.
- High organic vapor measurements were obtained in the TCE storage tank area, the paint storage area, the area near the backfilled neutralizing lagoons, and the area bordering the tree line

The second phase of ERM's investigation was completed September 19, 1986. The objectives of the phase II study were to define the vertical and horizontal distribution of the soil contaminations; establish the presence of a fragipan layer; install ground-water monitoring wells; and perform percolation tests to define the direction of ground-water flow onsite, the degree of hydrologic interconnections between the shallow and deep water-bearing zones, ground-water contamination and permeabilities below and above the fragipan layer (Ref. 4, p. 1-8).

A total of 158 soil samples from 39 borings were collected for analysis to further define the horizontal and vertical extents of soil contamination. The soil borings varied from 3.9 to 13 feet. When the borings were completed, a complete round of water levels were taken (Ref. 4, p. 3-1, Figure 3-1).

Twelve monitoring wells were installed to define the direction of ground-water flow and the degree of contamination (see Figure 1). Three of the twelve wells were installed to depths ranging from 122-398 feet (MW-4D, MW-8D, MW-9D). The remaining nine wells were installed to depths ranging from 31-38 feet. Ground-water samples were collected for analysis from the 12 monitoring wells and the 2 production wells after 3 volumes of water were withdrawn from the monitoring wells. The production wells were run for one-half hour prior to sample collection. The soil and water samples were analyzed for priority pollutant VOCs (Ref. 4, Tables 4-2, 4-3).

Percolation tests were performed on three pairs of shallow monitoring wells to determine the hydraulic conductivity and transmissivity of the soils. Each pair consisted of a well installed



300053

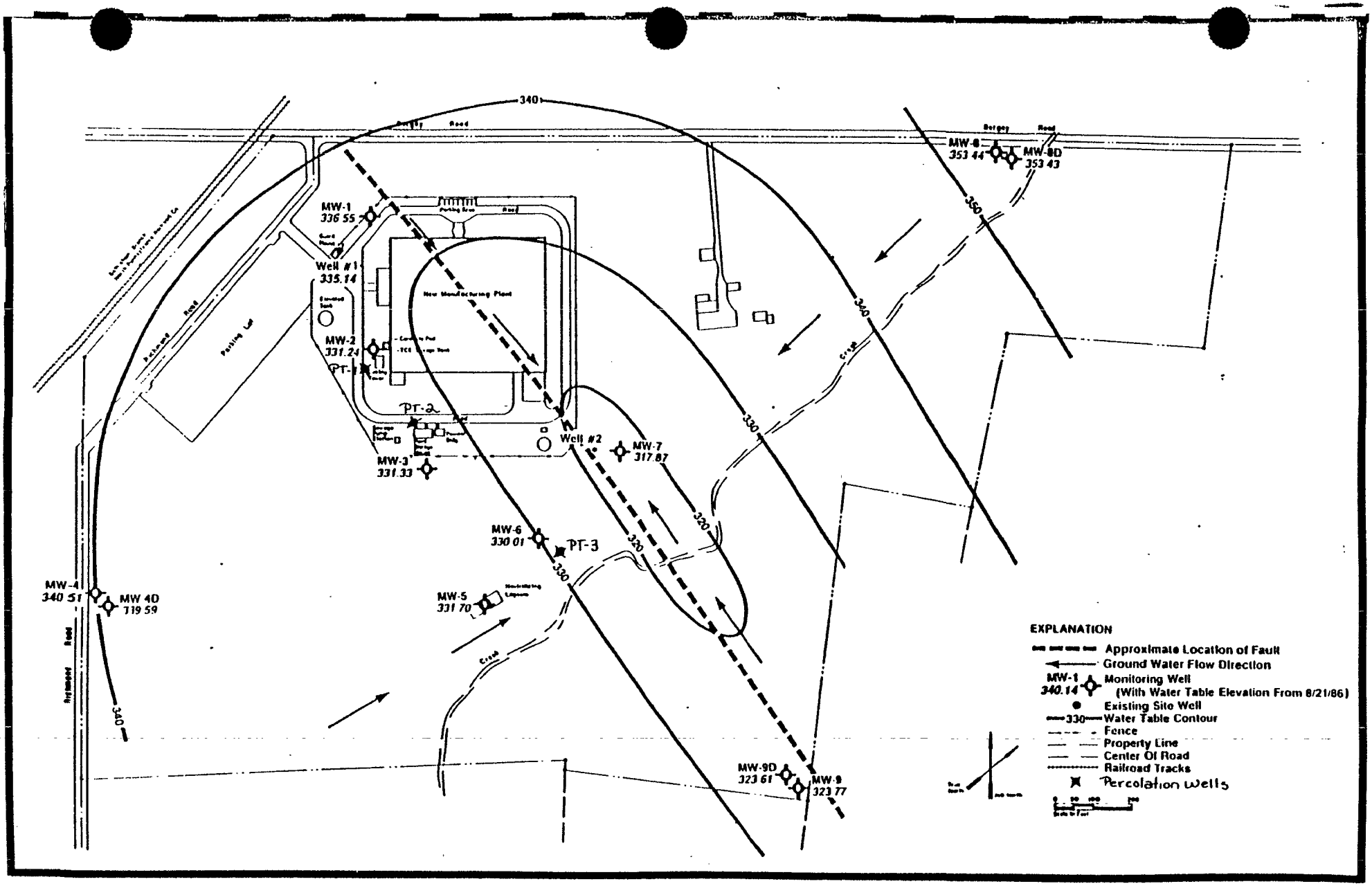


FIGURE 1
MONITORING WELL LOCATIONS AND WATER TABLE CONFIGURATION,
AMETEK, INC. (8/21/86)
(Developed from ERM, 1986b)



300054

above the fragipan layer (3-4 feet below ground surface) and within the fragipan layer (7-9 feet below ground surface) (Ref. 4, p. 3-10, Table 3-3).

Water level measurements were taken from the 12 monitoring wells, the 6 percolation test wells, and production well 1 on 3 different occasions (Ref. 4, Table 3-4).

The results of ERM's phase II field investigation in their phase II study indicated that hydraulic conductivity and transmissivity for the soils above and below the fragipan layer were similar, except for at PT-2 and PT-2D where the deeper soils were less conductive than the shallower soils. Percolation tests also indicated less conductive soils near the TCE storage area, with increasing conductivity near the paint storage shed. The area with the highest hydraulic conductivity was located along the wooded area behind the plant.

Information obtained from the monitoring wells revealed the presence of deep water-bearing zones onsite. Therefore, the area underlying the Ametek facility contains two water-bearing zones, which are a shallow water table perched above bedrock and a deep aquifer within the underlying bedrock. The flow of the perched water generally follows the topographic gradient toward the stream. This information was confirmed by the static water levels measured in the percolation test wells and soil borings. Results from the monitoring wells indicate the water flow in the deeper aquifer is controlled by the site's production wells and the large scale fault which transects the facility. A cone of depression is created when the wells are pumping and ground water in the deep aquifer flows radially inward towards the center of the site (Ref. 4, p. 3-14, 4-9, Figure 4-6).

ERM identified the following three areas of soil contamination: the area around the TCE storage tank, the area behind the paint storage shed, and the area along the tree line southeast of the facility (Ref. 4, pp. 4-12, 5-1). The results from the ground-water sampling survey indicated contamination of onsite ground water within the center of the facility.



300055

Wells MW-6, MW-3, MW-5, 1, and 2 contained TCE levels of 1,700 ppb, 5,300 ppb, 540 ppb, 90 ppb, and 570 ppb, respectively. In addition, 1,1,1-TCEA was present in these same wells at levels ranging from 20-2,300 ppb. VOCs were not detected in the hydraulically upgradient monitoring wells MW-8, MW-8D, MW-9, MW-9D, MW-4, and MW-4D located along the perimeter of the facility, except for well MW-8, which contained 10 ppb of toluene (Ref. 4, p. 5-1, Table 4-3, Figure 4-6).

The third phase of ERM's study was completed January 5, 1987. The objectives of this study were to explore the wooded area where drums are possibly buried, further define the extent of contamination in the wooded area, confirm the water quality and flow patterns already defined, define the water quality of the perched water table, and develop a feasibility plan for ground-water and soil remediation (Ref. 5, p. 1-1).

ERM's field investigations in the third phase of their study consisted of a magnetometer study of the wooded area behind the plant, where several half-buried drums were discovered; measuring the static water levels for the deep bedrock wells; drilling six additional soil borings in the wooded area behind the plant; and installing eight shallow monitoring wells to define water quality of the perched water table (Ref. 5, pp. 1-1 to 1-3, Figures 1, 2, 4).

Several areas of high metallic content were detected in the wooded area (Ref. 5, Figure 4). This could suggest the presence of buried drums. The results of the six additional soil borings indicated soil contamination does not extend south (Ref. 5, Table 2). ERM concludes from the second round of ground-water sampling analyses that contaminants are not migrating offsite because volatile organic results were similar between the first and second rounds of sampling (Ref. 5, p. 3-1, Tables 3, 4).

An attempt was made to define the water quality of the perched water table, but only two of the newly installed shallow wells (S-1, S-9) contained enough water to sample. Therefore insufficient data was obtained (Ref. 5, p. 1-3, Table 5, Figure 2).



300056

2.2.2 Waste Conversion

To date, there is no record of an environmental study performed at Waste Conversion. However, ground-water and surface water sampling events have been documented (Ref. 13). In December 1981, water samples from Waste Conversion's waste stream were collected by the County of Bucks, Department of Health. Analytical results of these samples were compared to the chlorinated effluent and chlorinated overflow from the Hatfield Township Authority Sewage Treatment Plant (HTASTP) which accepts the water from the waste stream (Ref. 22). Bucks County Department of Health reported that the effluent from the HTASTP had different compositions than the overflow and the waste discharge stream (Ref. 23). Also in December, ground-water samples were taken from the ground-water sump located on the facility west of the main building. Trichloromethane, 1,1,1-trichloroethane, benzene, trichloroethene, and 1,2-dichloroethane were detected at 160 ppb, 200 ppb, 940 ppb, 188 ppb, and 140 ppb, respectively (Ref. 21). On the same day, samples were taken from the open channel below the storm sewer outfall. Trichloromethane, 1,1,1-trichloroethane, benzene, trichloroethene, tetrachloroethene, and toluene were detected at 2 ppb, 3 ppb, 7 ppb, 8 ppb, 13 ppb, and 130 ppb, respectively (Ref. 21).

On December 21, 1981, PADER concluded the following from their visual site inspection of the Waste Conversion facility: discharges of waste material to the ground surface have contaminated the ground water, and tank trucks unloaded liquid wastes into a collection pit, where the waste was allowed to accumulate (Ref. 24). Location of the above areas is not provided in the inspection report. PADER requested the retention of a hydrogeologist to define the extent and impact of soil and ground-water contamination at and in the vicinity of the subject site (Ref. 24).

At some time between 1981 and 1984, nine ground-water monitoring wells were installed on the facility. Monthly reports from these wells were submitted to Versar by PADER. Ground-water samples were, for the



300057

most part, taken monthly from March 1984 through January 1986. Results did not indicate volatile organic contamination of the wells (Ref. 13).

2.2.3 A. Steiert and Son, Inc.

A formal hydrogeological study has yet to be conducted at the A. Steiert and Son facility. However, limited sampling activities have occurred in 1977 (Ref. 2, HRS Ref. 27).

On March 24, 1977, Purity Standard Laboratories sampled the well water from the office sink for hardness, total bacteria, coliform, iron content, and pH. The results indicated a hardness of 14.0 grams per gallon (gpg) and a pH of 7.2. In addition, a sample was collected from the onsite pond. Analysis was conducted on the same parameters as the well water analysis, excluding iron content and pH. The results indicated a hardness of 8.0 gpg (Ref. 2, HRS Ref. 27).

An industrial waste inspection was conducted on September 12, 1980, by PADER. Rinse water from the treating operations was being discharged without a permit to the ground surface (Ref. 2, HRS Ref. 27).. On January 9, 1981, A. Steiert and Son responded by constructing a holding tank so that the rinse water would no longer be discharged to the ground, but stored in the tank and recirculated (Ref. 2, HRS Ref. 27). Information about site features is not provided in documents reviewed by Versar.

On April 1, 1981, a waste discharge inspection was conducted by PADER, and at this time the newly installed tank was inspected. Although the use of the tank had eliminated the problem of discharging rinse water to the ground, other conditions at the facility needed to be corrected. The conditions requiring correction included the discharge of quench oil to the ground surface, the discharge of contact cooling water to the pond, and the contamination of soil below the acid rinse discharge (Ref. 2, HRS Ref. 27). A. Steiert and Son repaired their quench oil cooler and set up a system to recirculate the oil so that discharge to the ground surface could be eliminated. Water from the pond would still be needed



300058

to cool the quench oil, so Steiert applied for a water quality management permit which was needed to discharge the water into the pond. William Steiert agreed to remove the contaminated soil once the weather conditions became more favorable (Ref. 2, HRS Ref. 27).

### 2.2.4 B&G Manufacturing, Inc., SPS Technologies, and Brooks Instruments

B&G Manufacturing, Inc., SPS Technologies, Inc., and Brooks Instruments have not been formally investigated. However, an air monitoring survey using an HNu was conducted at SPS Technologies by NPWA on October 28, 1985. NPWA concluded from the monitoring study that SPS was not posing a threat to the local groundwater from their site operations and activities (Ref. 25).

## 2.3 Zone of Contamination Visit

Versar visited Zone of Contamination 2 on May 8, 1987, to become familiar with site conditions and to gather additional information. Versar obtained the following information about the PRP facilities from Versar's visual observation and/or personal communications with Ametek and ERM personnel:

- Locations of major areas of contamination at Ametek including the paint storage shed, the TCE storage area, and the wooded area along the stream, were reported correctly in the file documents.
- Locations of the settling basin, abandoned backfilled lagoons, and monitoring and production wells at Ametek were identified.
- The onsite stream at Ametek, located south of the manufacturing building, did not show evidence of foul or organic odor, soil discoloration, or oily slicks floating on water.
- Ametek is attempting to sell the site property. A potential buyer has been identified (Ref. 10).
- The TCE storage area at Ametek showed areas of dead vegetation. Reportedly leakage from the storage tank did not cause this; rather, accidental spillage during tank refilling may have killed vegetation around the tank (Ref. 10).



300059

- A. Steiert and Son is located about one-quarter mile north of the Ametek facility. This facility appeared to have burned severely and was not in operation. Reportedly, A. Steiert and Son's facility burned down about six months ago (Ref. 10).

- B & G Manufacturing is located in the Line Lexington Industrial Park, close to NPWA's well NP 15.

- Versar noticed a strong organic odor in the street area adjacent to the Waste Conversion facility. Also, a small stream running directly off the facility on Coldesac Court appeared to be discolored and absent of vegetation. Waste Conversion appeared to be in operation at this time, as evidenced by a number of trucks and employees within the fenced-in property.

## 2.4 Geological Setting

### 2.4.1 Ametek, Inc.

#### Location

Ametek occupies 87 acres and is situated on the lower side of a gently sloping hill. The topographic relief across the site ranges from 340 to 400 feet above main sea level with the northeast section of the site at the highest relief and the south section at the lowest relief. One-third of the 87-acre site is wooded. The remaining two-thirds comprise the plant building and active farmland (Ref. 3, p. 4-1).

A small unnamed intermittent stream flowing south transects the property approximately 500 feet east of the plant. Its volume is increased as it flows across the site by a series of rills that are scattered throughout the wooded area (Ref. 3, p. 4-1).

#### Geology

The Ametek facility is located within the Piedmont province of the Appalachian Highlands physiographic division (Ref. 3, p. 2-1). The bedrock formations that underlie the facility belong to the Newark Group consisting of the Brunswick and Lockatong, which are formations of Triassic Age. The Brunswick formation is encountered 2-12 feet below the ground surface on a major portion of the site as evidenced by the well logs in the ERM study. The Lockatong formation outcrops in the northeast



300060

corner of the facility. It was uplifted above the Brunswick by the Chalfont fault which transects the site in an east-west direction. The average dip of the beds in the Brunswick and Lockatong formations are north-northwest at approximately 20 degrees. Nearly vertical joints and fractures are present in many beds of the Brunswick and Lockatong formations. They provide a main pathway for ground-water flow. The joints and fractures vary in number and in size from a few inches to a few feet. In the Brunswick formation, the joints are an average of 6 inches apart. Those present in the Lockatong formation are smaller in size and spaced further apart (Ref. 3, p. 2-4).

High permeability occurs in the bedrock at depths between 200-500 feet below the ground surface. An area of lower permeability exists above 200 feet because the joints and fractures are plugged with clay and various weathered material. Bedrock below 500 feet also has a lower permeability because the joints and fractures at that depth are closed. Semiartesian conditions, characterized by slow recharge percolation to the aquifer, can be found to a depth of 200 feet; thus allowing contamination to slowly percolate to the deeper aquifer (Ref. 33).

Soils

The soils in the vicinity of the site range in thickness from 4-13 feet and are composed of a red clay silt which with depth becomes mixed with the red shale of the Brunswick formation (Ref. 4, p. 4-1). They are deeper underneath the plant, becoming thinner near the paint storage area, and thickening towards the woods and again thinning near the stream where the soils are absent. A layer of dense soil 1-2 feet thick occurs 2-4 feet below the surface. It is relatively denser than surrounding soils yet still conducts at a similar rate (Ref. 4, 4-2)).

Ground Water

Two separate water-bearing zones are present onsite: a perched water table which lies above the bedrock, and a deeper bedrock aquifer. The perched water flow toward the stream in an easterly direction,



300061

generally following topographic grade. A shallow perched water table is also present on the west side of the stream and flows easterly toward the stream. These configurations are evidenced by the static water levels measured in the percolation test wells and the water levels in the nearby soil borings. The monitoring wells installed in ERM phase II study indicate the presence of a deeper bedrock aquifer. The static water levels in the wells indicate ground water flows inward toward the center of the facility. Static water levels were measured on three different occasions: both production wells pumping at capacity, well 1's production reduced, and both wells inactive for three days. The measurements indicated the ground-water flow within the pore spaces, joints and fractures and is greatly influenced by the two production wells onsite (Ref. 4, 4-9). There is no evidence to support an interconnection between the perched water table and the bedrock aquifer. However, it has been observed that the direction of ground-water flow in the bedrock aquifer and the perched aquifer is dissimilar.

Both bedrock formations, Brunswick and Lockatong, have a small amount of interconnected voids (primary permeability) but contain a significant amount of joints and fractures (secondary permeability). The ground water flows primarily through the secondary openings, which are the major conduit for water flow in this area (Ref. 2, p. 3). Because the secondary openings vary with depth and aerial extent, the ground-water flow rate can be variable.

Ametek has two production wells onsite. The first well is located in the northwest corner of the site. It is 400 feet deep and pumps up to 105 gpm from a depth of 105 feet. The second well is located in the east corner of the site. It was drilled to 395 feet and pumps 190 gpm from a depth of 226 feet. Both of these wells were completed in the Brunswick formation. The NPWA well NP-15 is the closest known active well to Ametek's two production wells. It is located approximately one-half mile east of Ametek. It is 500 feet deep and yields 101,500 gpm (Ref. 4, p. 4-9).



300062

Results of chemical analyses of monitoring and production well samples indicate that the ground water at the Ametek facility is contaminated with 1,1,1-trichloroethane, trichloroethene, 1,1-dichloroethene, and fluorotrichloromethane. Contamination is limited to the center of the facility as evidenced by chemical analyses of the ground water from monitoring wells MW-8, MW-8D, MW-9, MW-9D, MW-4, and MW-4D which are located along the perimeter of the site. ERM believes these perimeter wells are not contaminated because of a cone of depression created at the center of the facility by the pumping of the production wells (see Figure 1) (Ref. 4, Table 4-2).

2.4.2 Waste Conversion, Inc., A. Steiert and Son, Inc., B&G Manufacturing, Inc., SPS Technologies, Inc., and Brooks Instruments

The specific geologic setting of these PRP facilities cannot be characterized from available information, which is limited or nonexistent.



300063

## 3.0 TECHNICAL APPROACH TO EVALUATIONS

Versar's evaluation of technical data and information for Zone of Contamination 2 is likely to identify deficiencies regarding CERCLA criteria and guidelines because neither a remedial investigation (RI) nor a feasibility study (FS) have been conducted for any of the zone PRP facilities in this zone. Versar's evaluation is intended to assess the available data, to identify data needs, and to recommend additional studies to remedy data gaps or further characterize hydrogeologic settings of PRP facilities.

Versar's evaluation is based on data concerning Zone of Contamination 2 which were obtained from file documents at EPA Region III, NPWA, and PADER. The available data included responses to CERCLA 104(e) Request letters (e.g., manifests, purchase orders, analytical data, and correspondence); studies conducted for EPA (i.e., site discovery and hazard ranking system); studies conducted for Ametek; and general correspondence.

The available data was analyzed and reviewed against criteria outlined of the NCP in 40 CFR Subpart Sec. 300.61 to 300.70 and EPA's guidance documents for remedial investigations and feasibility studies under CERCLA (Refs. 27, 28).

300064

## 4.0 EVALUATION OF FACILITY CHARACTERIZATION INFORMATION

This section presents Versar's evaluation of available information on the Zone of Contamination 2. The information is divided into technical categories consistent with the Chapter 9 outline in "Guidance for Remedial Investigation under CERCLA. The evaluation of each technical category is composed of two parts: review of the technical criteria for a Remedial Investigation under CERCLA and the evaluation of the available data for each PRP facility (Ametek, Waste Conversion, Steiert, B & G, and SPS). Information was available predominantly for Ametek while only limited information was available for the other PRP facilities.

### 4.1 Background Information

#### Needs

Background information is needed to introduce basic facility characteristics. The information should address the following areas: facility locations, size, ownership, existing structures, history of activities, operations, waste types, and incidents.

#### Evaluation

The available information on Ametek's site background is fairly extensive including location, size, structures, history of activities, operations, and waste types. The deficiency in the available information is that it is in several different documents and difficult to assemble. Also, very little information is available on the operations in the paint shed.

The available information on site background for Waste Conversion includes some information on location, structures, history of activities, operations, and waste types. The information is sufficient only to establish the likelihood of release, but insufficient to determine points of accidental discharge or potential remedies.



300065

Very limited information is available on site background for Steiert, B&G, SPS, and Brooks Instruments. The information is insufficient to determine the potential for release.

4.2 Facility Features

The facility feature data should include sufficiently detailed information on past activities so that technical, public health, and environmental analyses can be conducted during a feasibility study. The data should also be sufficient in scope and quantity to enable technically sound evaluation of alternative remedial measures.

The data and information to be developed or considered during the facility feature investigation include demographics, land use, natural resources, meteorology and climate, and topography.

4.2.1 Demographics and Land Use

Demographics and land use data are needed to address the past, present, and future changes in the characteristics of the population and land use in the area; changes in the hydrogeology; the population at risk to exposure from the facility (including municipal water supplies); the potential socioeconomic effects of contaminant releases; and the observed effects on the local ecosystem.

Needs

The following demographic information is pertinent to an assessment:

- Community characteristics - Socioeconomic setting relative to public, cultural, and scientific resources; the local economic structure; and the population density.
- Familiar characteristics - Household stability, housing tenure, ethnic composition, age distribution, local geographic distribution of the population, and economic status of families.

The following land use information is also pertinent to an assessment:



300066

- Past, present, and projected uses of the site and environs including urban, industrial, commercial, agricultural, recreational, forest, barrier, and wetlands.
- Location of the 100-year flood plain.
- Fraction of the land covered by impermeable surfaces (e.g., parking lots and buildings).

Evaluation

The only demographic information available for Ametek is population density (Ref. 2, p. 7); therefore, the available information is insufficient to determine the potential socioeconomic impacts of contaminant release. There is no information available on demographics for the other PRPs; therefore, the information is insufficient to determine the potential population at risk and socioeconomic impacts of contaminant release.

The only land use information available for Ametek is broad generalizations on distances to types of land use (Ref. 2, pp. 6, 10, 14). There is no information available on land use for the other PRPs. The available information on land use for all PRPs is insufficient to determine the effects on the local environment of contaminant release.

4.2.2 Natural Resources

Needs

The natural resources of an area must be sufficiently characterized to determine what influence, if any, contamination of the resources may have on the lifestyle and economic stability of the local inhabitants. Therefore a baseline of natural resource information should be established for the local ecosystems. This information must be sufficiently detailed to determine, analyze, and describe the extent of effects on human and nonhuman receptors as a result of the contaminants discharged from the site. Specific concerns should focus on regional natural resources and their relationships to commercial, residential, and recreational needs, and aesthetic considerations. In addition, another



300067

purpose of obtaining natural resource data and information is to aid in determining and evaluating impacts of effective remedial alternatives for the zone of contamination during the feasibility study.

Evaluation

The ground water in Zone of Contamination 2 is the only source of drinking water for Telford Borough Authority, Hatfield Borough Water Authority, and NPWA. The west branch of the Neshaminy Creek and the Neshaminy Creek could be potentially affected by contamination (Ref. 2, p. 6).

Information on natural resources other than ground water and surface water is not available. It is not clear whether other natural resources exist in Zone of Contamination 2 or whether they were omitted due to inadequate research. Therefore, the information on natural resources may be insufficient to determine what influence, if any, contamination may have on the lifestyle and economic stability of the local inhabitants.

4.2.3 Meteorology and Climate

Needs

Meteorological and climatological data are necessary to determine the potential pathways and dispersion characteristics of known contaminants released from the facility to the atmosphere or to water supplies (ground water or surface water). Local meteorological and climatological information should address precipitation, temperature, evaporation (including evapotranspiration), wind (velocity), seasonal climate variations and weather extremes. This information should make it possible to define aeolian and fluvial erosion, evaporation potential, particulate deposition, and ground-water recharge. This data should then be used to assess the potential effects of weather patterns on selection, timing, and implementation of remedial actions.

300068

Evaluation

The climate information available for Zone of Contamination 2 includes precipitation, temperature, evaporation, and seasonal variations (Ref. 2, Attachment 3). Information on wind speed and direction is not available. The available information makes it possible to determine potential pathways and dispersion characteristics to water supplies, but not to the atmosphere.

4.2.4 Topography

Needs

A topographic map of the area should be prepared to a scale of 1 inch equals 200 feet, showing elevations with respect to sea level. The map should show surface features such as buildings, fences, power lines, roads, railroads, surface impoundments, lakes, and rivers. For ease of use in correlating stratigraphy and water-level elevations, locations of wells, piezometers, and boreholes should also be identified.

Evaluation

Topographic maps are available for the North Penn area, but no topographic maps were available showing site features for each of the PRP facilities. Site maps were available showing site features for Ametek and Waste Conversion (Ref. 3, Figure 1-2, Ref. 13).

The available information for Ametek contains general information on the topography of the area and site maps. The topographic maps do not contain the detail needed for proper evaluation of geology and hydrogeology and location of site features. The available information on topography for the other PRPs is insufficient for engineering design, proper evaluation of geology and hydrogeology, and location of site features.



300069

## 4.3 Hazardous Substances

Information on hazardous substances present at each source in the environmental matrix at each facility is needed to identify the potential contaminants, to estimate the quantities of contaminants, to predict the chemical behavior and potential for migration of specific contaminants and to set reasonable limits and goals for subsequent sampling and analysis during a remedial investigation.

### 4.3.1 Waste Types

Needs

Information on the types and physical forms (i.e., solid, liquid, or gas) of wastes disposed of, or released at each facility over time should be collected. This data should help determine what contaminants may be present, the amounts and origin (source) of contaminants present or released, the method of storage of the hazardous constituents, and the potential for contaminants to migrate. This information is the technical basis for exposure assessments and evaluations of interim remedial measures and remedial alternatives proposed in feasibility studies.

Evaluation

The available information on wastes for Ametek includes types and amounts purchased (Ref. 26) and current disposition (Ref. 4, Table 4-2). Two deficiencies exist: 1) not enough information (e.g., compounds present and their uses) on the paint shed is presented, and 2) information that is presented is in several documents and difficult to assemble.

Also, Ametek has characterized only the levels of organic contaminants present in the soil, water (surface and ground), and air; not the levels of inorganics (e.g., cadmium, cyanide, phosphorus, nitrogen, or zinc) in these media (Ref. 3, Appendix A, Ref. 4, Table 4-2). Considering the types of wastes disposed of in the neutralizing lagoons, Ametek should verify that inorganics are not present in the environment.



300070

Information is available on the types, amounts, and disposition of wastes handled by Waste Conversion (Ref. 14). Information is not available on the exact components and handling practices. The available information is insufficient to perform an exposure assessment and to determine potential treatment options.

Insufficient information is available on waste quantities, locations, components, and containment for Steiert, B&G, SPS, and Brooks Instruments. The available information is insufficient to support the needs of a feasibility study. For example, the information is insufficient to select a remedial alternative, to design a remedial alternative, and to perform an exposure assessment.

4.3.2 Characteristics and Behavior of Waste Component Needs

Information on the individual hazardous chemical components of the waste, including physical, chemical, behavioral, and to some extent toxicological characteristics, is needed to determine the potential for migration. This information helps to establish the technical basis of exposure assessments and evaluations of remedial alternatives in a feasibility study.

Information on sampling and analytic activities conducted at each facility should also be provided in a facility characterization. This data will include, sampling locations, and protocol, media sampled, analytical methods, and concentrations and detection limits of contaminants found at a facility. The data set should be sufficient to define the extent, source, direction, and rate of movement of compound-specific contaminant plumes.

Quantitative fate and transport models may have also been used at a facility to further characterize contaminant plumes. If utilized, models should be described as to their appropriateness, assumptions, limitations, and theoretical conclusions.



300071

Evaluation

Limited information on characteristics and behavior of waste components found in NPWA supply well NP-15 is provided. Insufficient information is available to support a feasibility study for each of the PRP facilities. For example, the information is insufficient to design remedial alternatives or perform public health and environmental assessments.

4.4 Hydrogeology

The collection of hydrogeologic information is a necessary part of a remedial investigation because of the interrelations between geology, ground-water occurrence and flow, waste sources and characteristics, and the migration of contaminants. Versar recommends that the amount of hydrogeologic information collected be sufficient to identify and characterize all potentially impacted subsurface water-bearing zones or aquifers, surface water bodies, and barriers to or conduits of ground-water flow. This information is necessary to properly place ground-water monitoring wells. The ground-water quality components of the recommended hydrogeological data set must be sufficiently detailed to evaluate the occurrence and the distribution of contaminants in the water-bearing zones or surface waters potentially at risk from contamination. This is particularly important when an aquifer or surface water body provides a local or regional source of potable water. The investigation should outline the dimensions of any contaminant plume as well as its flow direction and estimated speed of migration.

4.4.1 Geology and Soils

Needs

Information on the lithologic and structural characteristics of the local and regional subsurface should be obtained to adequately describe the geology at each facility and in particular the zone of contamination. Regional geologic information obtained from literature should not be the



300072

sole sources of information available and utilized for a remedial investigation, as defined under CERCLA. However, this supplemental information may be used to enhance or verify new information collected by direct means, such as onsite borings, soil tests, and geophysical studies.

An adequate interpretation of geologic data includes (1) a review of available drilling logs to identify major rock and soil types and water-bearing zones, (2) the construction of representative geologic cross sections from drilling log data, (3) the identification of any zones of suspected high permeability or structures (e.g., fractures and faults) likely to influence contaminant migration through the saturated zones, (4) the definition of the local stratigraphic structure and its lateral and vertical heterogeneities, (5) the acquisition of mineralogical and geochemical information on the subsurface materials, and (6) the determination of facility-specific soil properties including soil composition and geochemistry, and hydraulic and engineering properties. Any available geophysical survey information (e.g., seismic refraction and inductive electromagnetic conductivity) should also be evaluated at each facility to assist in the characterization of the subsurface environment.

Evaluation

Stratigraphic characteristics including mineral composition, grain size, aerial extent, correlation of units, and relative thickness of the Brunswick and Lockatong formations underlying Zone of Contamination 2 were discussed thoroughly in the "Soil and Ground-Water Contamination Assessment for Ametek/Hunter Spring Division of Hatfield, Pennsylvania;" prepared by ERM (Ref. 3, p. 2-3, 2-4, Figure 2-2, 4-3 to 4-5).

Regional structural features, including folds, faults, and joints and factures, were also presented in this study. ERM's study characterized strikes and dips of area features, the superimposition of anticlines and synclines on the regional strikes and dips, the joints present in the Brunswick and Lockatong formations, the small scale faults displacing the Brunswick and Lockatong, the large scale normal fault



AR300073

(Chalfont) which passes east-west through Hatfield and Souderton, and fractures in the subsurface media (Ref. 3, pp. 4-3 to 4-5). The information on the structural features and stratigraphic characteristics was sufficiently detailed to allow determination of the basic geometry, productivity, and occurrence of the aquifer in Zone of Contamination 2. NUS Corporation (Ref. 2) presented a cross section of the Wissahickon well field, which depicts the inter-relationships between the lithologies ranging from 150 feet below mean seal level (msl) to 400 feet above msl (NUS, 1986b). They also presented a map showing the aerial extent of formations.

The structure of the bedrock underlying the Ametek facility, along with its composition, grain size, strike, dip, and highly fractured nature, were discussed in detail in the ERM three phase studies. Well logs for the 12 monitoring wells, 6 percolation test wells, and 39 soil borings were presented (Ref. 4, Appendix A, Ref. 5, Attachment A). The type and properties of the soil and the depths to bedrock and ground water could be determined from these logs. This information is detailed enough to determine the natural flow of the ground water, predict the major boundaries of ground-water flow, and define the geometry of the aquifer and its confining layers.

However, the discussion of the geology underlying the Ametek facility is incomplete. Unsaturated zone properties such as permeability, degree of compositional variability, porosity, and moisture content, were not characterized.

The geology underlying the other PRP facilities (e.g., Waste Conversion, Steiert, B&G, SPS, and Brooks Instruments) was not characterized. Information on the structural features (e.g., folds and faults, joints and fractures, interconnected voids) and stratigraphic characteristics (e.g., thickness of rock units, unit correlation, mineral composition, and grain size) is therefore needed for these PRP facilities. These data can be generated from well logs.



300074

A general soil description, which included the composition and relative thickness of the soils of the Montgomery County area was discussed in ERM's investigation of Ametek. In addition, ERM characterized soil types and locations for the Ametek site (Ref. 3, p. 2-4).

Thirty-nine soil borings were taken at various localities on the Ametek facility (Ref. 4, p. 3-1). One conclusion drawn from these borings was the presence of soil layer at 2-4 feet below the ground surface. This layer reportedly is 1-2 feet thick, very dense, and of low permeability. However, the existence of this soil layer does not appear to be supported by the boring logs or the results of the percolation tests conducted in ERM's phase II study. Therefore, the possible presence of a fragipan layer should be questioned.

Soil quality was measured by ERM using a number of methods, including organic vapor analysis, soil gas surveying, and laboratory analysis of soils from the soil gas survey and soil borings. ERM's overall approach to characterizing and locating onsite soil contamination was successful. However, the discussion of the soils is incomplete. More information on soil characteristics (e.g., water holding capacities, chemical sorptive properties, biological activity) is needed. Also soil chemistry (e.g., solubility, ion exchange capacity, mineral partition coefficients, and adsorption/desorption coefficients) should be characterized. These data are necessary to predict contaminant movement through the soils, and to estimate the effects of soil properties on infiltration and retardation of leachates. This information can be obtained by laboratory measurements (ASTM methods), leaching tests of the borehole logs, and geophysical surveys.

Information on soil characteristics is not available for Waste Conversion, Steiert, B&G, SPS, and Brooks Instruments.



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### 4.4.2 Ground-Water Hydrology and Quality

Needs

An adequate characterization of ground-water hydrology involves locating laterally and vertically the water-bearing zones, confining layers, and fractures; providing and correlating well and boring log data to determine the interrelationships of aquifers; determining the distribution of ground-water elevations and developing flow nets (horizontally and vertically, and preferably on a seasonal basis) to determine flow directions; determining hydraulic conductivity (or transmissivities), porosity, aquifer thickness and boundaries, and storage coefficients to determine specific discharge and flow velocities; and determining ground-water discharge and recharge rates, including localized sources and sinks of ground water.

Regional and local ground-water extraction for municipal, domestic, agricultural, or industrial use should also be assessed in this section. The characterization of ground-water quality involves identifying and quantifying the contaminants present in each aquifer, mapping their lateral and vertical distribution, and determining the flux of the contaminants from the study area to the regional ground or surface waters. While characterizing water quality, the investigator should give detailed attention to the drilling, installation, and development of monitoring wells; sample collection, preservation, and processing procedures; and methods of chemical analysis.

Evaluation

Basic information on the ground-water hydrology for Zone of Contamination 2 is discussed in ERM's three phase study, NUS's site discovery of ground-water contamination in the North Penn area, and NUS's Hazard Ranking System (Ref. 2). The potential pathway for the migration of ground water was discussed in these reports. However, more information is needed on the rate of movement and recharge.



300076

The hydrologic information for the Ametek facility was discussed in detail in the ERM's studies (Ref. 3, 4, 5). The presence of interconnected void spaces and joints and fractures was confirmed. The ERM studies characterized ground-water flow direction, hydraulic conductivity in soils between 3-9 feet below ground surface, static water levels in the onsite wells, and drawdown effects due to variable pumping conditions. Lateral and vertical variations in hydraulic conductivity should be discussed in more detail. However, information on the rate and location of recharge and discharge, hydraulic interaction between ground water and surface water, and the degree of fracturing and its influence on ground-water migration and rate of ground-water flow is lacking sufficient detail to be useful for evaluation of remedial alternatives.

ERM sufficiently characterized ground-water quality for organics at Ametek. This information could be used to determine exposure via ground water, and to define the contaminant plume.

Limited ground-water information is available at this time for the Waste Conversion facility. The information that was available included results of monthly chemical analysis (Monthly Monitoring Report) for the nine onsite monitoring wells and the sump located behind the plant building (Ref. 13). However, the Monthly Monitoring Report did not include the name of the person or company sampling the wells, the procedures taken, or the name of the laboratory which performed the analyses.

The results define the quality of the ground water at Waste Conversion, but this alone does not define the quality of the ground water in the vicinity of the plant site nor the potential for contaminants to migrate offsite. In an area like North Penn where the ground water is the major source for water and production wells are located near one another, information on the depths, yields, and drawdown of wells is needed. Because the Waste Conversion facility is located near the



300077

contaminated NP-15 NPWA well, the following ground-water information should be developed:

- Aquifer boundaries and locations.
- Aquifer hydraulic conductivity and transmissivity.
- Direction of ground-water flow, including drawdown effects created by area wells.
- Rate of flow
- Locations and rates of discharge/recharge.

Very limited ground-water information is available for the Steiert and B&G facilities. A volatile halocarbon analysis using EPA Method 502.1 was conducted by the NPWA (Ref. 2, HRS Refs 2 to 7, and 25). However, the sampling location and source (i.e., production well, monitoring well, faucet) was not provided. Submitted along with the analysis was a copy of the quality assurance program that was followed. More details are needed on the location of the sample source. Existing data are insufficient to define the ground-water quality and the lateral and vertical extent of the water-bearing zones. The information needed to characterize Waste Conversion also is needed for the Steiert and B&G facilities.

Information on ground-water hydrology and quality for the Brooks Instruments site was not available.

## 4.5 Surface Water

### Needs

The characterization of local and regional surface water is extremely important for a facility remedial investigation.

Surface runoff may carry contaminants in dissolved or suspended form; therefore runoff is a major potential pathway for the migration of contaminants from a facility to nearby drainage channels where biota may be adversely impacted as a result of water quality degradation. The hydrologic characteristics of the drainage basin in which site runoff occurs will influence the timing and magnitude of runoff events that can



300078

scour potentially contaminated stream bed sediments. The amount of potentially contaminated ground water that discharges to a surface water body may be affected by the interaction between the surface water and ground water (particularly during storm events), bed material transport, and flood potential. These issues should be discussed in each facility's characterization.

Evaluation

The information concerning surface water for Zone of Contamination 2 is incomplete. Information on the regional drainage pattern, stream stage of the local streams, ground-water and surface water interactions, flood stage tendencies, average velocities, stream widths and depths, channel elevations and surface water quality is not presented in any of the filed documents for Zone of Contamination 2. This information should be developed to allow determination of offsite contaminant loading rates and dilution factors in the receiving water (e.g., Neshaminy Creek, Schuylkill River).

ERM presented information on the water quality of the stream and presence of manmade structures (Ref. 3, Table 4-2). However, ERM did not characterize (i.e., depth, width, flow rate) the stream that transects the facility

A limited amount of surface water information was available for Waste Conversion. This information characterized the quality of the discharge stream just outside the facility's boundaries. However more information is needed on the topography, channel flow pattern, tributary relationships, surface water ground-water relationships, and surface water quality to predict contaminant migration pathways and dilution effects.

Information concerning surface water occurrence and characteristics in proximity to Steiert, B&G, SPS, and Brooks Intruments was not presented in the documents.



300079

## 4.6 Air

### Needs

A major potential pathway for the discharge of volatile and dustborne contaminants from any facility is via the release of vapors or particulates to air. Information on the specific contaminants present, their concentrations and volatility, potential for release by fire, explosion, evaporation, or industrial process, and the meteorological and climatological conditions at the time of sampling is recommended at each facility. This data is needed to assess the impact of hazardous constituent releases on local air quality and the potential health and environmental effects on receptors.

### Evaluation

Ambient air monitoring using an HNu was performed by NPWA at Ametek and SPS (Ametek 1986, SPS 1986). Two areas of concern for air emissions at Ametek included the TCE storage tank and the area next to the paint storage shed (behind the building) where empty drums were temporarily being stored. However, NPWA concluded that these areas at Ametek did not present a threat to the local ground water. Ambient air monitoring was also performed at SPS (Ref. 25) where no major areas of concern were identified. Versar feels that the data generated from this air characterization study is sufficient to have identified the two areas of concern at Ametek as potential "hot spots" for airborne VOC emissions. However, data generated from this monitoring effort are not sufficient to assess environmental or public health risks associated with these emissions, or to evaluate potential for VOC contamination of the ground water at Ametek and SPS.

No ambient air monitoring has been performed at Waste Conversion, Steiert, B&G, and Brooks Instruments.

300080

## 4.7 Biota

### Needs

The collection of biological and ecological information is essential to properly conduct the endangerment and environmental assessments performed either at the end of a remedial investigation or during a feasibility study. These assessments should include information on the local fauna and flora (especially endangered species and those consumed by humans or found in the human food chain). The analysis of floral and faunal information should concentrate primarily upon the dominant species and their sensitivity/resistance to environmental change, the presence of rare or endangered species, and any important interrelationships.

### Evaluation

The available information identifies no critical environments within the North Penn area. The bald eagle (Haliaeetus leucocephalus) and the peregrine falcon (falco peregrinus), federally endangered birds, may be found as transient visitors in the area. There are no critical habitats for these birds in the North Penn area. The small whorled pogonia (Isotria medeoloides), an endangered plant, may exist in the North Penn area. No information is available on the contaminant levels found in area flora or fauna; therefore, it is not possible to assess contamination of the food chain in the area.

## 4.8 Bench and Pilot Tests

### Needs

The specific need for bench and pilot studies is defined from an assessment of what is known and what is required to establish the feasibility of applying a technology. Considerations may include the following (EPA, 1985a):

300081

- What is the level of development of the technology? Has the process, technique, or material been studied or used previously? If so, what are the results?;

- What are the characteristics of the wastes/contaminants of concern?

- What is the cost savings anticipated from minimizing the risk of failure at full scale?

Bench and pilot studies may be performed in the RI. Here, tests may range from limited treatability studies, to screening of general technology types in the FS to full evaluations of particular FS remedial alternatives. In the FS phase, full-scale pilot studies may be needed to determine design and operating standards for the selected remedial alternatives.

Bench and pilot tests are sometimes required in a remedial investigation so that sufficient data can be gathered to select and implement the appropriate remedial action. Examples of these include physical testing of soil, aquifer tests, toxicological tests of local biota, and leaching tests on soil and sludge samples.

Evaluation

Bench and pilot scale testing has been proposed but not performed for several of the remedial alternatives under consideration at Ametek. Ametek should evaluate the need for testing remedial alternatives or technologies prior to their implementation.

Remedial alternatives have not been proposed at the secondary PRP facilities in this zone. Consequently, no bench or pilot scale testing has been proposed or performed. Again, the need for testing remedial alternatives at these facilities should be assessed.



300082

## 4.9 Public Health and Environmental Effects

### Needs

The remedial investigations should discuss the potential public health and environmental impacts resulting from facility contamination. The discussion on public health should summarize public health concerns resulting from known hazardous constituents and contaminated areas or resources at each facility in the zone of contamination. The discussion on environmental impacts should include a review of the actual or potential environmental damage from releases of contaminants from the site. Each discussion should address the relevant potential receptors that may be adversely affected by site contamination, such as human, fauna, and flora (including endangered species), and the types of exposure risks associated with each.

### Evaluation

The available data are not sufficient for assessing the public health and environmental effects of multi-media contamination emanating from any PRP facility in Zone of Contamination 2. The concentration of organics in soil at Ametek was characterized in ERM's Soil and Ground-Water Contamination Assessment (ERM, 1986a, 1986b, 1987). However, much more information is needed to perform exposure or risk assessments. This information might include concentrations, exposure pathways and routes, dosage rates, and toxicological data. Also, environmental concentrations of inorganic substances and their possible effects were not characterized at any PRP facility in the zone.

300083

## 5.0 EVALUATION OF REMEDIAL ALTERNATIVES

The feasibility study should be performed in three phases: (1) development of alternatives (40 CFR Sec. 200.68 (f)); (2) initial screening of alternatives (40 CFR Sec. 300.68 (g)); and (3) detailed analysis of alternatives (40 CFR Sec. 300.68 (h)). The following discussion presents the technical requirements for a feasibility study and an evaluation of the available information concerning Ametek against the technical requirements. No information was available for the other PRP facilities.

### 5.1 Development and Initial Screening of Alternatives

The FS Guidance Document recommends that the development of alternatives and the initial screening during each feasibility study should, at a minimum, include each of six elements and that the feasibility study should concisely summarize the results of each step. The elements are discussed below.

#### 5.1.1 General Response Actions

Needs

The feasibility study should identify general response actions to address site problems and pathways identified during the remedial investigation and to meet cleanup goals and objectives. General response actions considered should include the "no action" alternative as a baseline against which other actions can be measured. Examples of general response actions include: containment, pumping, collection, diversion, complete removal, partial removal, treatment, disposal, alternative drinking water supply, and relocation of receptors.

Evaluation

The potential response actions for contaminated soil might include removal, treatment, containment, offsite disposal, and no action. For contaminated ground water, the potential response actions might include removal, containment, treatment, restrictions on use, offsite disposal,



300084

and no action. The ERM assessment does not identify response actions for remediating soil and ground-water contamination at Ametek; however, ERM did consider numerous technologies which fall into different general response action categories (Ref. 3, p. 5-1).

5.1.2 Possible Technologies

Needs

Possible technologies should be identified in each general response action. The FS Guidance Document provides a list of remedial technologies to help ensure that all remedial technologies are considered. The NCP (40 CFR Sec. 300.61(c)5) requires that response actions rely on established technology, but also consider alternative and innovative technology when feasible and cost effective.

Evaluation

The ERM assessment identified the following possible technologies for remediating contaminated soil and ground-water at Ametek:

- Soil excavation.
- Drying/volatilization beds involving the spreading of contaminated soil on a pad and periodically exposing new surface area to accelerate volatilization.
- In situ soil washing involving periodic flushing of the contaminated area with water to mobilize the contaminants out of the soil and into the ground water for subsequent pumping to a treatment system.
- In-vessel air stripping of soil involving packing of contaminated soil into a stripping tower where, air is forced through the soil to accelerate TCE volatilization.
- Soil vacuuming involving installation of air wells into areas of local contamination and subsequent drawing of ambient air through the soil to accelerate the volatilization of organics.
- In-vessel microbial degradation of the soil involving anaerobic digestion of contaminated soils in a bio-reactor.



300085

- In situ microbial degradation of the soil involving microbial degradation within the soil column.
- Offsite disposal.
- Air emission controls, including carbon adsorption and thermal oxidation.
- Ground-water pumping
- Ground-water treatment, including at a Publicly-Owned Treatment Works; or onsite using air stripping trickling filters, or carbon adsorption.

The identified possible technologies included both established technologies and innovative technologies.

5.1.3 Screen Possible Technologies Based On Site Conditions

Needs

Possible technologies should be screened to eliminate inapplicable and infeasible technologies based on site conditions. The NCP (40 CFR Sec. 300.68 (g) 2) requires that alternatives must be feasible for the location and conditions of the release, applicable to the problem, and represent a reliable means of addressing the problem. The FS Guidance Document provides site and waste characteristics which may affect selection of possible technologies. For example, if a contaminant in ground water is of low volatility and relatively soluble in water, then air stripping of the ground water may not be a feasible remedial technology.

Evaluation

The Phase I ERM Assessment (Ref. 3) performed a technical feasibility evaluation of each of the technologies/alternative for remediating soil and ground-water contamination. The technical feasibility evaluation was based on qualitative information, literature reviews, and engineering judgment. ERM concluded that all of the



300086

technologies/alternatives are technically feasible for the site. Their conclusions appear valid based on the available information.

5.1.4 Assemble Technologies into Remedial Alternatives

Needs

The remaining feasible technologies should be assembled into remedial alternatives that address all site problems and pathways and attain specific cleanup goals. The NCP (40 CFR Sec. 300.68(f)) requires to the extent that it is both possible and appropriate, at least one remedial alternative shall be developed as part of the feasibility study in each of the following categories:

(i) Alternative for treatment or disposal at an offsite facility;
(ii) Alternative that attains applicable or relevant and appropriate Federal public health and environmental requirements;
(iii) Alternative that exceeds applicable or relevant and appropriate Federal public health and environmental requirements;
(iv) Alternative that does not attain applicable or relevant environmental requirements, but will reduce the likelihood of present or future threat from the hazardous substances; and
(v) Alternative for no action.

Evaluation

The ERM assessment presented the following alternatives for remediating soil and ground-water contamination at Ametek (Ref. 3, p. 5-1):

- No action
- Soil drying/volatilization bed, carbon adsorption unit for volatilized chemicals, containment using clay or synthetic lining under the bed, and diversion of runoff.
- In situ soil flushing, ground-water pumping and treatment (offsite, air stripping, trickling filters, or carbon adsorption) of the ground water.
- In-vessel air stripping of soil, air emission control and air emission control (carbon adsorption or thermal oxidation).



300087

- Soil vacuuming, air emission control, ground-water pumping and treatment.
- Anaerobic digestion of contaminated soil and air emission control.
- In situ microbial degradation.
- Offsite disposal of soil, and ground-water pumping and treatment.

The no action alternative and the offsite disposal alternative were considered as required by the NCP. It appears, based on available data that alternatives were developed in accordance with EPA's criteria and guidelines.

5.1.5 Eliminate Remedial Alternatives Based On Protection Needs

The remedial alternatives that obviously do not adequately protect the environment, public health, and public welfare, and that have significant adverse impacts should be eliminated. The NCP (40 CFR Sec. 300.68(g)3) requires that alternatives must effectively contribute to the protection of public health and public welfare, and of environment without significant adverse effects or limited environmental benefits.

Evaluation

The phase I ERM assessment performed a environmental limitations and constraints evaluation of each of the alternatives (Ref. 3, pp. 5-1 to 5-10). The evaluation was based on qualitative information, literature reviews, and engineering judgment. ERM identified the limitations and constraints and suggested valid solutions. This screening study appears valid based on the available information.

5.1.6 Eliminate Remedial Alternatives Based On Cost

Needs

The remedial alternatives that are an order of magnitude higher in cost than other alternatives but do not provide significantly greater environmental or public health benefits or technical reliability should



300088

be eliminated. The NCP (40 CFR Sec. 300.68(f)1) requires that the cost of implementing the remedial alternative be considered during the initial screening of alternatives.

Evaluation

The phase I ERM assessment evaluated each of the alternatives based on cost-effectiveness (Ref. 3, pp. 5-1 to 5-10). The evaluation was qualitative and did not provide support for the generalizations.

5.2 Detailed Analysis of Alternative

Needs

The NCP (40 CFR Sec. 300.68(h)) requires a detailed evaluation of the limited number of alternatives remaining after the initial screening. The NCP specifies that the detailed analysis of each alternative shall include the following:

- refinement and specification of alternatives in detail;
- detailed cost estimation;
- engineering evaluation in terms of implementation, reliability, and constructability;
- evaluation of effectiveness to protect public health, public welfare, and environment; and
- evaluation of any adverse environmental impacts.

The FS Guidance Document addresses this requirement with the evaluation of five elements: (1) technical feasibility, (2) institutional concerns, (3) public health, (4) environmental concerns, and (5) cost.

Evaluation

The ERM assessment did not provide a detailed analysis of alternatives. Unfortunately, the phase III ERM assessment concluded that alternative 4 (in-vessel air stripping of soil) was most feasible based on economics, risk, and technical issues and that further assessment



300089

would be made. A remedial alternative chosen on this basis may not be the most technically feasible and cost-effective. The other possible alternatives should be further evaluated.

# 6.0 CONCLUSIONS AND RECOMMENDATIONS

## 6.1 Summary of Program Data Deficiencies

Versar evaluated available information concerning an area of ground-water contamination in the North Penn, Pennsylvania known as Zone of Contamination 2. The following sections summarize the deficiencies detected by Versar from the available information and discussed earlier in this report. The evaluation was likely to identify deficiencies regarding CERCLA guidelines because neither a remedial investigation (RI) nor a feasibility study (FS) have been conducted for any of the Zone of Contamination 2 PRP facilities.

### 6.1.1 Site Characterization

Versar's evaluation of available information and data on site characterization for PRP facilities in Zone of Contamination 2 generated the deficiencies listed below. These deficiencies apply to the entire Zone of Contamination, unless denoted otherwise by specific mention of a PRP facility.

- The site background information on Waste Conversion, Steiert, B&G, SPS, and Brooks Instruments is insufficient to determine the potential for release.
- The available information on demographics and land use is insufficient to determine populations at risk and the effects on the local environment of contaminant releases from PRP facilities.
- The available information on natural resources may be insufficient to determine what influence, if any, contamination may have on the lifestyle and economic stability of the local inhabitants.
- The available information on climate makes it possible to determine potential pathways and dispersion characteristics to water supplies, but not to the atmosphere.
- The available information on topography is insufficient for engineering design, proper evaluation of geology and hydrogeology, and location of site features.
- The available information on organic wastes for Ametek is adequate. Further characterization of the paint shed and of metal wastes is required, however.



300091

- The available information on wastes for Waste Conversion is adequate.

- The available information on wastes for Steiert, B&G, SPS, and Brooks Instruments is insufficient to select and design a remedial alternative or to perform an exposure assessment.

- The concentrations of organics in the ground water are adequately defined at Ametek.

- Information on the variability of bedrock composition for Ametek is lacking.

- Information on soil, such as water holding capacity, chemical sorptive properties, solubility, and mineral partition coefficients for Ametek is lacking.

- Information on soil is not available for Waste Conversion, Steiert, B&G, SPS, and Brooks Instruments.

- Interactions between surface water tributaries and between surface water and ground water are not addressed.

- Rate & location of recharge and discharge, and the rate of ground-water flow, needs to be addressed at Ametek.

- Information on hydrogeology is not available for Waste Conversion, Steiert, B&G, SPS, and Brooks Instruments.

- The information on the stream that transects Ametek is incomplete including the distance from this stream to the nearest tributary and the stream's width and depth.

- Information on surface water is not available for Waste Conversion, Steiert, B&G, SPS, and Brooks Instruments.

- Air monitoring at Ametek identified two areas of concern at the facility, but was not adequate to predict exposures/risks for receptor populations.

- No ambient air monitoring has been performed at Waste Conversion, Steiert, B&G, and Brooks Instruments.

- No information is available on the contaminant levels found in zone flora or fauna to assess contamination of the food chain.

- Bench and pilot tests of remedial technologies or alternatives at Ametek have not been performed.



300092

- Insufficient information is available to complete environmental and public health assessments for any PRP facilities in Zone of Contamination 2.

6.1.2 Remedial Programs

Though the remedial assessment appears to have chosen a remedial alternative for Ametek, a detailed feasibility study has not been performed to determine the most technically sound and cost-effective remedial alternative. Remedial assessments have not been conducted at Steiert, SPS, Waste Conversion, B & G, and Brooks Instruments.

6.2 Summary of PRP Relationships to the Contamination

Six PRPs have been identified in Zone of Contamination 2 (NUS 1986a). Ground water from wells on Ametek's property is contaminated with volatile organics (ERM, 1986a), but the contamination has probably not migrated off site because of a ground water cone of depression created by the pumping of Ametek's production wells. The available information for Waste Conversion, Steiert, B&G, SPS, and Brooks Instruments is not sufficient to identify a relationship to the contamination in Zone of Contamination 2.

6.3 Recommended Additional Studies

Based on Versar's evaluation, Section 6.3.1 and 6.3.2 contain recommendations to help the PRPs supply the additional information necessary to comply with the NCP requirements and the RI/FS guidance. In addition, Section 6.3.3 presents possible components of Versar's proposed comprehensive hydrogeologic study of Zone of Contamination 2.

6.3.1 Site Characterization

The recommendations concerning site characterization are summarized below:

- Steiert, B&G, SPS, and Brooks Instruments should provide additional information on site background addressing all the deficiencies cited in Section 6.1.1 of this report. In addition, a site hydrogeologic study identifying ground-water flow rates and direction and soil and bedrock characteristics should be conducted so that the actual potential for contaminant release can be determined.



300093

- Waste Conversion should provide additional information on site background addressing all the deficiencies cited in Section 6.1.1 of this report and perform a site hydrogeological study determining direction of ground-water flow, soil characteristics, and depth to bedrock. The actual potential for contaminant release and migration can then be determined. This information may be obtained from soil boring logs, depth to water measurements in the existing monitoring wells, pump rate of the NPWA NP-15 well which is close to the Waste Conversion facility.

- Ametek should develop a concise history of activities and operations, collect the missing site characterization information, characterize the environmental concentrations of inorganics, and characterize soil parameters.

6.3.2 Remedial Programs

A detailed feasibility study is needed for Ametek, after the deficiencies outlined earlier in Section 6.1.1 are addressed, to determine the most technically sound and cost-effective remedial alternative. For the secondary PRP facilities in Zone of Contamination 2, feasibility studies may be needed after comprehensive RIs are performed.

6.3.3 Characterization of PRP Relationships to the Contamination

Further hydrogeologic studies are needed to relate PRPs to the contamination.

The hydrogeologic study of the Zone of Contamination 2 should identify existing municipal and private production wells in Zone of Contamination 2 which would effect the ground-water flow. For each well identified, the exact locations, pumping rates, depth of pumping intake, construction, parameters, and date of installation should be determined. Topographic maps and aerial photographs should be obtained to perform a fracture trace analysis. A stratigraphic survey should be performed to determine stratigraphic variations in the contaminated zone.



300094

## REFERENCES


| Reference Number | Document Title |
|---|---|
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| 2 | NUS Corporation (NUS). 1986b. A Hazard Ranking System for Ametek, Incorporated. October 10, 1986. (Appendices 04, 05)* |
| 3 | Environmental Resources Management (ERM). 1986a. Soil and Ground Water Contamination Assessment for Ametek/Hunter Spring Division of Hatfield, Pennsylvania Phase I. August 15, 1986. (Appendix 02)* |
| 4 | Environmental Resources Management (ERM). 1986b. Soil and Ground Water Contamination Assessment for Ametek/Hunter Spring Division of Hatfield, Pennsylvania Phase II. September 19, 1986. (Appendix 03)* |
| 5 | Environmental Resources Management (ERM). 1987. Data Summary for Soil and Ground Water Contamination Assessment for Ametek/Hunter Spring Division of Hatfield, Pennsylvania Phase III. January 5, 1987. (Appendix 06)* |
| 6 | Ametek Environmental Control Survey. Dated 2/1/72. |
| 7 | Hazardous Waste Manifests dated 8/15/84 and 4/4/85. Generator: Ametek, TSD Facility: Marisol, Inc. |
| 8 | Hazardous Waste Manifests dates 11/11/85, 1/20/86, 4/30/86. Generator: Ametek, TSD Facility: Chemclene Corp. |
| 9 | Ametek Interhouse correspondence dated June 14, 1979, from W. J. Panzeter, Manufacturing/Engineering Office, to W. C. Schulze. Subject: Quantity, usage, and disposal of cyanide, sodium bichromate, cadmium, cadmium oxide, and tri-chlor. |
| 10 | Site Visit Trip Report, Ametek, Inc., Hunter Springs Division/Zone of Contamination No. 2, Camp, Dresser, McKee, Inc., August 26, 1988. |


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300095

REFERENCES
(Continued)

| Reference Number | Document Title |
|---|---|
| 11 | Ametek, Hunter Springs Division. Purchase order for compact housing cartridge water filters, 4/1/80. |
| 12 | Letter dated September 11, 1981, from George W. Neff and Son, Associates, to various state and federal officials. Subject: Complaint of regulatory violation and ownership history. |
| 13 | Hand drawn sketch of site features, Waste Conversion sketch accompanies laboratory results for samples taken from the nine monitoring wells. Map presented to NPWA from DER on 4/1/86. |
| 14 | Selected Generator Quarterly Hazardous Waste Reports for Waste Conversion, Inc., Hatfield, Pennsylvania (January 1984 through June 1986). |
| 15 | Letter dated July 9, 1986, from John Benz, Jr., of SPS Technologies, Inc., to Lorie Hacker, U.S. EPA Region III. Subject: Chemicals used in SPS Technologies plant operations and maintenance, and results of soil contamination survey. |
| 16 | Letter dated July 6, 1971, from E.W. Sayer of Pennsylvania Department of Environmental Resources (PADER) to M. Pignataro of Ametek, Inc. Subject: Inspection of industrial waste treatment facility at Ametek, Hatfield, Pennsylvania. |
| 17 | Letter dated July 16, 1971 from C. R. Brandt of Ametek, Inc., to E. W. Sayer of PADER. Subject: Corrective action measures taken by Ametek to comply with industrial waste permit. |
| 18 | Letter dated March 15, 1972, from J. F. Dally, Jr., of PADER to H. Schaider of Ametek, Inc. Subject: Inspection conducted February 23, 1977, of industrial waste treatment facility. |

(Continued)



300096

REFERENCES
(Continued)

| Reference Number | Document Title |
|---|---|
| 19 | Letter dated March 24, 1972 from R. C. Allen of Ametek, Inc., to J. F. Daly, Jr., of PADER. Subject: Corrective measures taken by Ametek to comply with industrial waste permit. |
| 20 | Letter dated October 23, 1985, from Jerry Coyle of North Penn Water Resource Association (NPWRA) to Ron Askin of Ametek, Inc. Subject: Air surveying at Ametek, Inc., using an HNu protoionization detector. |
| 21 | Pennsylvania Department of Environmental Resources (PADER) Water and Waste Quality Reports for Waste Conversion, December 22, 1981 (five reports). |
| 22 | Letter dated January 25, 1982, from J. Austin and J. Slayton of U.S. EPA Region III to D. Donnelly, U.S. EPA Laboratory Section. Subject: Analyses Waste Conversion effluent to Sewer, Hatfield Borough, influent and effluent, Philadelphia Suburban Water Company influent and effluent. A handwritten table illustrating sample results accompanies this letter. |
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(Continued)



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* Appendices found in Table of Contents for Documents Concerning Potentially Responsible Parties in Zone of Contamination 2 in Montgomery County, Pennsylvania (contained in U.S. EPA Region III files).



300099

# APPENDIX A

## HYDROGEOLOGY OF MONTGOMERY COUNTY, PENNSYLVANIA

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TABLE OF CONTENTS


| | | Page |
|---|---|---|
| EXECUTIVE SUMMARY | | iii |
| 1.0 | INTRODUCTION | 1 |
| | 1.1 Location | 1 |
| | 1.2 Physiography | 1 |
| | 1.3 Climate | 1 |
| 2.0 | REGIONAL GEOLOGY | 4 |
| | 2.1 General Features | 4 |
| | 2.2 Stratigraphy | 4 |
| | 2.2.1 Triassic Water-Bearing Formations | 4 |
| | 2.2.2 Diabase Dikes and Sills | 8 |
| | 2.3 Hydrogeology | 9 |
| | 2.3.1 General Features | 9 |
| | 2.3.2 Stockton Formation | 10 |
| | 2.3.3 Lockatong Formation | 10 |
| | 2.3.4 Brunswick Formation | 11 |
| | 2.4 Structural Features | 11 |
| | 2.5 Geomorphology | 12 |
| | 2.5.1 General Features | 12 |
| | 2.5.2 Drainage | 14 |
| | 2.5.3 Soils | 14 |
| 3.0 | HYDROGEOLOGY OF NORTH-CENTRAL MONTGOMERY COUNTY | 17 |
| 4.0 | SUMMARY | 18 |
| 5.0 | REFERENCES | 19 |


FIGURES


| | | |
|---|---|---|
| 1. | Location of Montgomery and Surrounding Counties in Southeastern Pennsylvania | 2 |
| 2. | Geologic Section for Montgomery County, Pennsylvania | 5 |
| 3. | Generalized Geologic Map of Montgomery County | 6 |
| 4. | Geologic Map of the Newark Group in Southeastern Pennsylvania | 13 |
| 5. | General Soil Map of Montgomery County, Pennsylvania | 15 |


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## EXECUTIVE SUMMARY

To properly understand and evaluate the nature and extent of ground-water contamination in Montgomery County, Pennsylvania, a review of the local geology and hydrogeology is necessary. Stratigraphy, aquifer characteristics, and the structural and geomorphic qualities of the subsurface environment are important in interpreting ground-water flow.

The following report provides an overview of regional hydrogeologic parameters of concern with respect to known contamination of the North Penn Water Supply. Rock strata are characterized by lithologic properties, and by water-bearing characteristics. Structural features are also outlined, and surface water and soil properties are discussed in a section on regional geomorphology. Aside from a regional hydrogeological picture, the importance of any localized subsurface characteristics which may affect regional ground-water flow patterns is emphasized.



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# 1.0 INTRODUCTION

## 1.1 Location

Montgomery County is located in southeastern Pennsylvania and occupies an area of 491 square miles. The county is situated northwest of the city of Philadelphia and is surrounded by Berks, Bucks, Philadelphia, Chester, and Delaware Counties. The Schuylkill River, the county's major drainage basin, forms its southwestern border (see Figure 1).

## 1.2 Physiography

Montgomery County lies within the Piedmont Physiographic Province, a region of low hills and ridges with a topography that gently slopes to the southeast. The county is further separated into two physiographic sections of the Piedmont: the Piedmont Upland in the southern third of the county, and the Triassic Lowland in the northern two-thirds. Surface elevations within the county range from 200 feet to about 600 feet above mean sea level. The topography is a result of both stream erosion and differential resistance to weathering of the underlying bedrock (Rima, 1955). Resistant lithologies form the ridges, which trend northeast-southwest. Lowlands, comprising the majority of the county, are underlain by less resistant bedrock.

The area is drained by the Schuylkill River and several smaller tributaries. Streams generally follow the northeast-southwest trend of the ridges. However, where a water gap exists in a ridge, stream flow is to the southeast (Rima, 1955).

## 1.3 Climate and Vegetation

The climate of Montgomery County has been termed humid-continental, with warm, humid summers and moderately cold winters. Average annual temperature is 57°F, with an average monthly range from 32°F in January to 77°F in July. Average annual precipitation ranges from 42 inches



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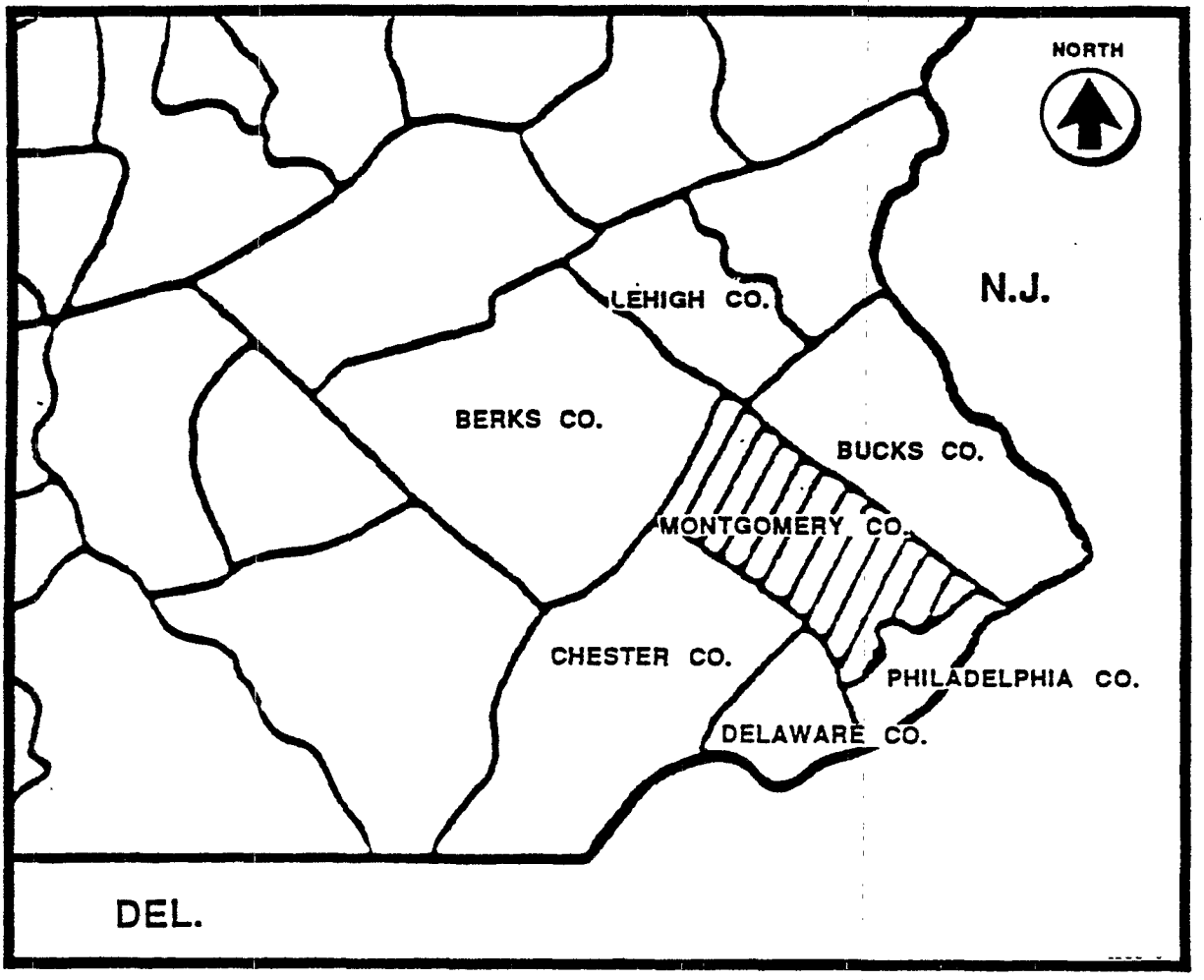


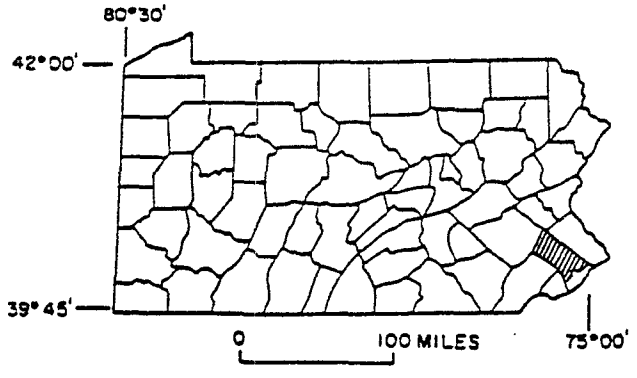


Figure 1. Location of Montgomery and Surrounding Counties in Southeastern Pennsylvania. (From Newport, 1973)

300104

in the southern portion of the county to 47 inches in the north, and is generally evenly distributed throughout the year (Biesecker, 1968). At times, however, heavy thunderstorms will occur. Because soils in the area have low infiltration capacities, much of the storm water runs off and local flooding and considerable erosion can occur (USDA, 1967).

In terms of land use, most of the county has seen industrial and residential development, but some farmland is still present. The dominant vegetation is oak, hickory, and yellow poplar, and contributes to considerable evapotranspiration. As much as 26 inches of the water that falls annually is lost through evaporation or transpiration (Newport, 1973).

300105

## 2.0 REGIONAL GEOLOGY

### 2.1 General Features

The bedrock of Montgomery County is exposed over much of the area and represents a large portion of the geologic time scale, as the stratigraphic column in Figure 2 indicates. Most of the county, however, is underlain by Triassic formations of the Newark Group, the largest Triassic basin in the United States, extending from the Hudson River in New York to Northern Virginia. It is these Triassic formations which are most significant from a hydrologic standpoint. Their stratigraphy is detailed in the following subsections. Water-bearing properties, well yields, and water quality are discussed in Section 3.

### 2.2 Stratigraphy

The Triassic formations described are conformable units of alternating sandstones and shales, with diabase intrusions in the northern portion of the county. All formations bear water and are named from oldest to youngest, the Stockton Formation, the Lockatong Formation, and the Brunswick Formation (Figure 3). In these units, the strata dip to the west or northwest an average gradient of 20°, except near diabase dikes, where dips up to 50° have been recorded (Hall, 1934). Based on dip and outcrop width, the total thickness of the Triassic formations is estimated to be greater than 18,000 feet (Rima, 1955).

#### 2.2.1 Triassic Water Bearing Formations

##### 2.2.1.1 Stockton Formation

The Stockton Formation consists of interbedded layers of sandstone and shale, with an overall thickness of 6,000 feet near the Montgomery County-Bucks County border. The beds dip to the northeast between 5° and 25°, and contain small normal faults and vertical joints scattered throughout the county. Because of the varying lithology among beds, the Stockton Formation has been divided into three members (Rima, 1962; Newport 1973), each with slightly different stratigraphic characteristics.



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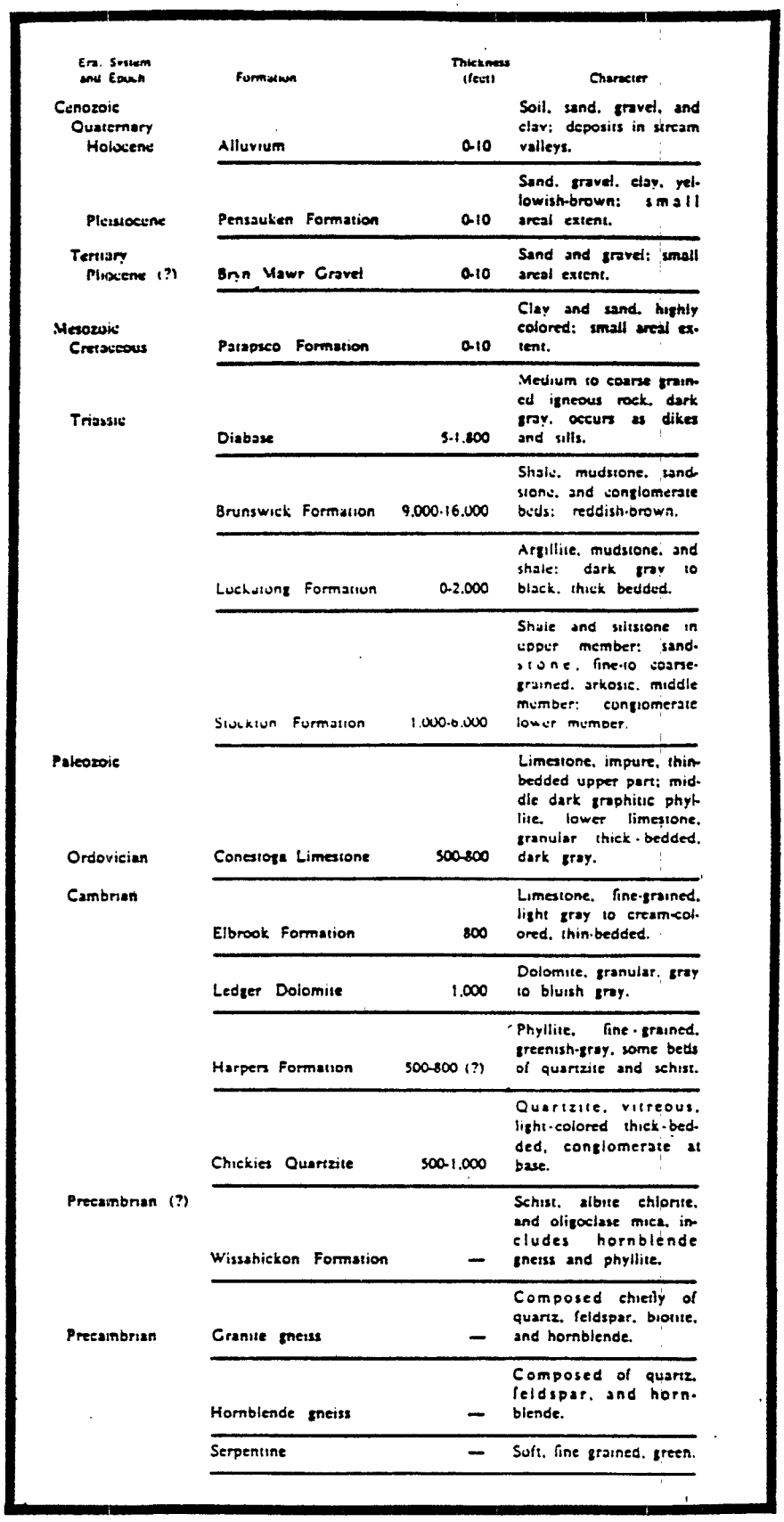

| Era, System and Epoch | Formation | Thickness (feet) | Character |
|---|---|---|---|
| Cenozoic<br>Quaternary<br>Holocene | Alluvium | 0-10 | Soil, sand, gravel, and clay; deposits in stream valleys. |
| Pleistocene | Pensauken Formation | 0-10 | Sand, gravel, clay, yellowish-brown; small areal extent. |
| Tertiary<br>Pliocene (?) | Bryn Mawr Gravel | 0-10 | Sand and gravel; small areal extent. |
| Mesozoic<br>Cretaceous | Patapsco Formation | 0-10 | Clay and sand, highly colored; small areal extent. |
| Triassic | Diabase | 5-1,800 | Medium to coarse grained igneous rock, dark gray, occurs as dikes and sills. |
| | Brunswick Formation | 9,000-16,000 | Shale, mudstone, sandstone, and conglomerate beds; reddish-brown. |
| | Lockatong Formation | 0-2,000 | Argillite, mudstone, and shale; dark gray to black, thick bedded. |
| | Stockton Formation | 1,000-6,000 | Shale and siltstone in upper member; sandstone, fine-to coarse-grained, arkosic, middle member; conglomerate lower member. |
| Paleozoic<br>Ordovician | Conestoga Limestone | 500-800 | Limestone, impure, thin-bedded upper part; middle dark graphitic phyllite, lower limestone, granular thick-bedded, dark gray. |
| Cambrian | Elbrook Formation | 800 | Limestone, fine-grained, light gray to cream-colored, thin-bedded. |
| | Ledger Dolomite | 1,000 | Dolomite, granular, gray to bluish gray. |
| | Harpers Formation | 500-800 (?) | Phyllite, fine-grained, greenish-gray, some beds of quartzite and schist. |
| | Chickies Quartzite | 500-1,000 | Quartzite, vitreous, light-colored thick-bedded, conglomerate at base. |
| Precambrian (?) | Wissahickon Formation | — | Schist, albite chlorite, and oligoclase mica, includes hornblende gneiss and phyllite. |
| Precambrian | Granite gneiss | — | Composed chiefly of quartz, feldspar, biotite, and hornblende. |
| | Hornblende gneiss | — | Composed of quartz, feldspar, and hornblende. |
| | Serpentine | — | Soft, fine grained, green. |

Figure 2. Geologic Section for Montgomery County, PA (From Newport, 1973)

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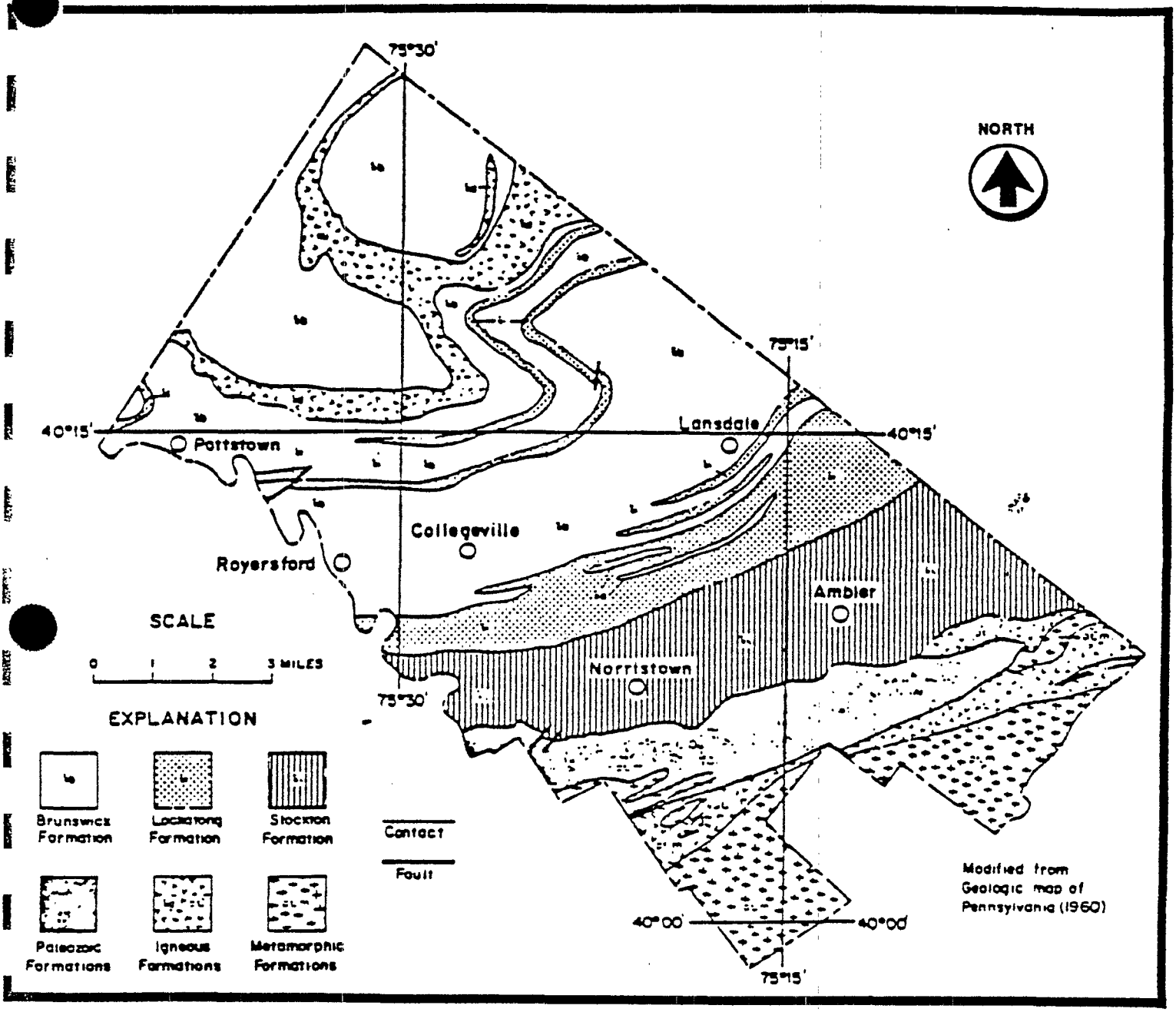


Figure 3. Generalized Geologic Map of Montgomery County, PA (From Newport, 1973).

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Lower Member

The lower, and thus oldest, member of the Stockton Formation consists of red to gray, medium-to-coarse-grained arkosic sandstone and conglomerate. Interbedded with this sandstone are numerous lenses of silty, sandy red shale. The member is about 1,500 feet thick at the Montgomery-Bucks County border, and gradually thins eastward.

Middle Member

The middle member of the Stockton Formation is comprised of brown, red, and gray, fine and medium-grained arkosic sandstone, and thick beds of red shale and siltstone. The largest member, this unit reaches a maximum thickness of 4,200 feet near the Montgomery-Bucks County border, and thins towards the west.

Upper Member

Quite different from the lower two members, the upper member contains very fine-grained arkose and siltstone and is capped by an extremely hard and resistant layer of red and gray shale (argillite). Thinning westward, the upper member has a total thickness of approximately 600 feet at the Montgomery-Bucks County border.

2.2.1.2 Lockatong Formation

Interfingering with the upper shale member of the Stockton Formation, the Lockatong Formation contains massive beds of medium to dark gray argillite interbedded with thin beds of gray to black shale, siltstone and marlstone. Large amounts of analcime (up to 40 percent) are present along with dolomite, feldspar, clay, quartz, and scattered pyrite (Longwill and Wood, 1965). Calcite is also quite common in joints, of which there are not many and are narrower and more widely spaced than in the other Triassic formations (Newport, 1973). In Montgomery County, the Lockatong Formation reaches a maximum thickness of 4,000 feet at the Montgomery-Bucks County border, and thins to



300109

approximately 1,500 feet at the Schuylkill River on the southwestern border of Montgomery County. Beds dip to the northwest an average of 20 degrees.

2.2.1.3 Brunswick Formation

The Brunswick Formation is the most extensive unit in the Triassic basin. Dipping 20° to the north and northwest, it underlies over 300 square miles of Montgomery and Berks Counties. At the Montgomery County-Bucks County border, it is approximately 9,000 feet thick and thickens westward to a maximum of 16,000 feet. The formation consists of thin, discontinuous beds of reddish-brown shale interbedded with siltstone and mudstone. Marble-sized calcareous concretions and thin layers of limestone are present in the Lansdale area (Rima, 1955).

The base of the Brunswick Formation interfingers with the Lockatong and is composed of thick-bedded red argillite. The upper beds grade into limestone breccias beyond Montgomery County's northern border.

As in the Lockatong Formation, fractures and joints in the Brunswick are partially filled with calcite, but are wider and more extensive. There are also several faults and diabase intrusions throughout the formation (Rima, 1955).

2.2.2 Diabase Dikes and Sills

In the northern part of the county, diabase dikes and sills of Upper Triassic age intrude the Brunswick Formation. Dikes, igneous intrusions which cut across bedding planes, are thin, between 5 and 100 feet, but may extend as much as 75 miles laterally across the county. Sills follow the bedding planes into which they were intruded. In Montgomery County, sills have been documented to be greater than 1,000 feet thick in some locations (Rima, 1955). Both dikes and sills are composed of very dense, fine-grained black diabase containing 90 to 95 percent augite and labradorite (Longwill and Wood, 1965).

## 2.3 Hydrogeology

### 2.3.1 General Features

All the formations in the Newark Group of Montgomery County are considered aquifers. Each unit produces some amount of water, although some lithologies are much better aquifers than others. Because these formations are composed of consolidated rock rather than unconsolidated sediments, ground water is present in secondary porosity features such as joints, fractures, and faults. Those aquifers which are the best water producers generally have the greatest amount of secondary porosity.

Confined (artesian) aquifers are the most extensive type of aquifer in Montgomery County. Unconfined (water table) aquifers are also present, but to a lesser extent, and normally occur in valleys. The water table in shallow unconfined aquifers is usually close to the surface in the valleys and rises toward the ridges, although at a lower gradient than the rise in land surface. Hence, water levels are much deeper below land surface in the ridges than in the valley areas (Longwill and Wood, 1965).

As a result of the humid climate, seasonal evapotranspiration is the biggest factor affecting water level fluctuations. Under typical seasonal weather patterns, confined and unconfined water table elevations decline during the growing season (April to October), and are recharged during the remainder of the year. Recharge points may occur locally along ridgetops or over broad areas where bedrock is close to the surface. Deep artesian aquifers in the Triassic formations vary in size and ground-water storage. Confined aquifers are normally perched between leaky silt or clay aquitards, drawing some of their water yield from thin confining beds when pumped (Biesecker, 1968).

Formations in the Newark Group in Montgomery County are all conformable units and interfinger with one another in gradational contacts. As a result, the Stockton, Lockatong, and Brunswick Formations are in good hydraulic connection. Ground water, and possible



300111

contaminants along with it, can migrate across the entire region because confining beds also transmit water, although at slower rates than the more permeable beds. Diabase dikes and sills are impermeable, except in zones near the surface where weathering and fracturing have produced solution channels. Impermeable zones of diabase intrude only small portions of Triassic aquifers and do not have a large effect on ground-water migration (Rima, 1955).

### 2.3.2 Stockton Formation

Although secondary porosity dominates water yields of this formation, the degree of sorting and cementation in the three members of the Stockton Formation also affects yields and capacities of water-bearing units.

The middle member is the best water producer due to the presence of well sorted sandstone beds with a high porosity. Wells penetrating the middle Stockton member have an average yield of 131 gallons per minute (gpm) (Newport, 1973).

The lower member is poorly sorted compared to the middle member and, as a consequence of reduced porosity, yields from wells are lower, averaging 106 gpm. The upper shale member of the Stockton Formation is the poorest water producer, with yields from wells only averaging 19 gpm. The low-permeable sediments are too fine and compacted to have greater yields (Newport, 1973).

Water quality for the Stockton Formation is generally good. Waters are hard to very hard, with a medium hardness of 130 mg/l, and are of the calcium-bicarbonate type, reflected by their neutral-to-alkaline pH (ranging from 7.2 to 8.5). Median total dissolved solids (TDS) content is 200 mg/l (Koester and Miller, 1982).

### 2.3.3 Lockatong Formation

The Lockatong Formation is the poorest source of ground water in the sedimentary rocks in the Triassic Basin of Montgomery County. The shales



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and mudstones of the formation are fine-grained and too densely compacted to have any significant permeability. In addition, the joints and fractures that can hold water (secondary porosity) are narrow and widely spaced (as outlined in Section 2.2.2). As a result, wells tapping the Lockatong shale yield only 4 to 40 gpm of water (Newport, 1973). Furthermore, because the Lockatong Formation is a resistant shale and forms the ridges in the area, unconfined water tables are naturally low, and also cannot receive direct recharge from the low-lying streams. The quality of water from the Lockatong Formation is generally good, however the water is hard (median hardness 220 mg/l) and moderately alkaline as in the Stockton Formation. Total dissolved solids content averages 300 mg/l and values for pH average 7.8 (Koester and Miller, 1982).

### 2.3.4 Brunswick Formation

The Brunswick Formation also has small grain size and low primary porosity, but secondary porosity from fractures and joints makes the unit a good source of ground water. Joints are wide and extensive and many are vertical, which allows for good recharge percolation (Newport, 1973). Well yields in the Brunswick vary between 100 and 200 gpm due to variable bed thickness (affecting transmissivities) and variable degrees of jointing. Lens-type deposition also causes variability on an areal extent. Generally, production wells penetrating the Brunswick Formation deeper than 200 feet will have yields between 100 and 200 gpm, and as high as 350 gpm. It is believed that above 200 feet, joints are often plugged with clay, thereby reducing permeability (Longwill and Wood, 1965). Water quality of the Brunswick is similar to that of the Lockatong Formation, with median TDS content at 300 mg/l and a median hardness of 220 mg/l. Average pH is 7.3 (Koester and Miller, 1982).

## 2.4 Structural Features

The structural geology of Montgomery County is not complex. Rock strata dip uniformly to the north and northwest between 10° and 35°, except where diabase dikes have intruded, increasing the dips of



300113

sedimentary strata up to 50° (Hall, 1934). These zones of igneous intrusion are found principally in the northern part of the county, where several broad synclines and anticlines are also present, creating alternating outcrops of the Brunswick and Lockatong Formations. The axes of the synclines and anticlines trend northwest-southeast.

The rock units contain many scattered, relatively small faults, and three major fault zones (see Figure 4): (1) a fault running east-west along the southern boundary of the Stockton Formation running into Bucks County, (2) a series of faults displacing the basal contact of the Stockton Formation, and (3) the Chalfont Fault, an east-west normal fault with a 3,000 foot displacement, running between Hatfield and Souderton.

Joints and fractures, as mentioned earlier, are the most extensive structural features of the Montgomery County rocks. Vertical jointing is prominent in the Brunswick Formation, where they intersect in vertical planes and are on the average only 6 inches apart. It is this extensive jointing that as generated the high secondary porosity of the Brunswick Formation. Joint systems are similar in the Lockatong shale, but are narrower and more widely spaced. The Stockton Formation has joints and fractures both perpendicular and parallel to bedding planes, and are well distributed in the formation (NUS Corporation, 1986).

## 2.5 Geomorphology

### 2.5.1 General Features

The principal geomorphic features of Montgomery County are gently rolling hills and low-lying areas, with an overall gentle slope to the southeast. Resistant lithologies form the ridges throughout the county. In the southern portion of the county, ridges in the Stockton Formation run parallel to strike and are underlain by conglomerates. Depending on the thickness of the underlying resistant beds, the ridges may be broad or narrow (Rima, 1962). In the northern part of Montgomery County, the resistant argillite of the Lockatong Formation and intrusive diabase form the ridgetops in a series of northeast-southwest-trending anticlines.



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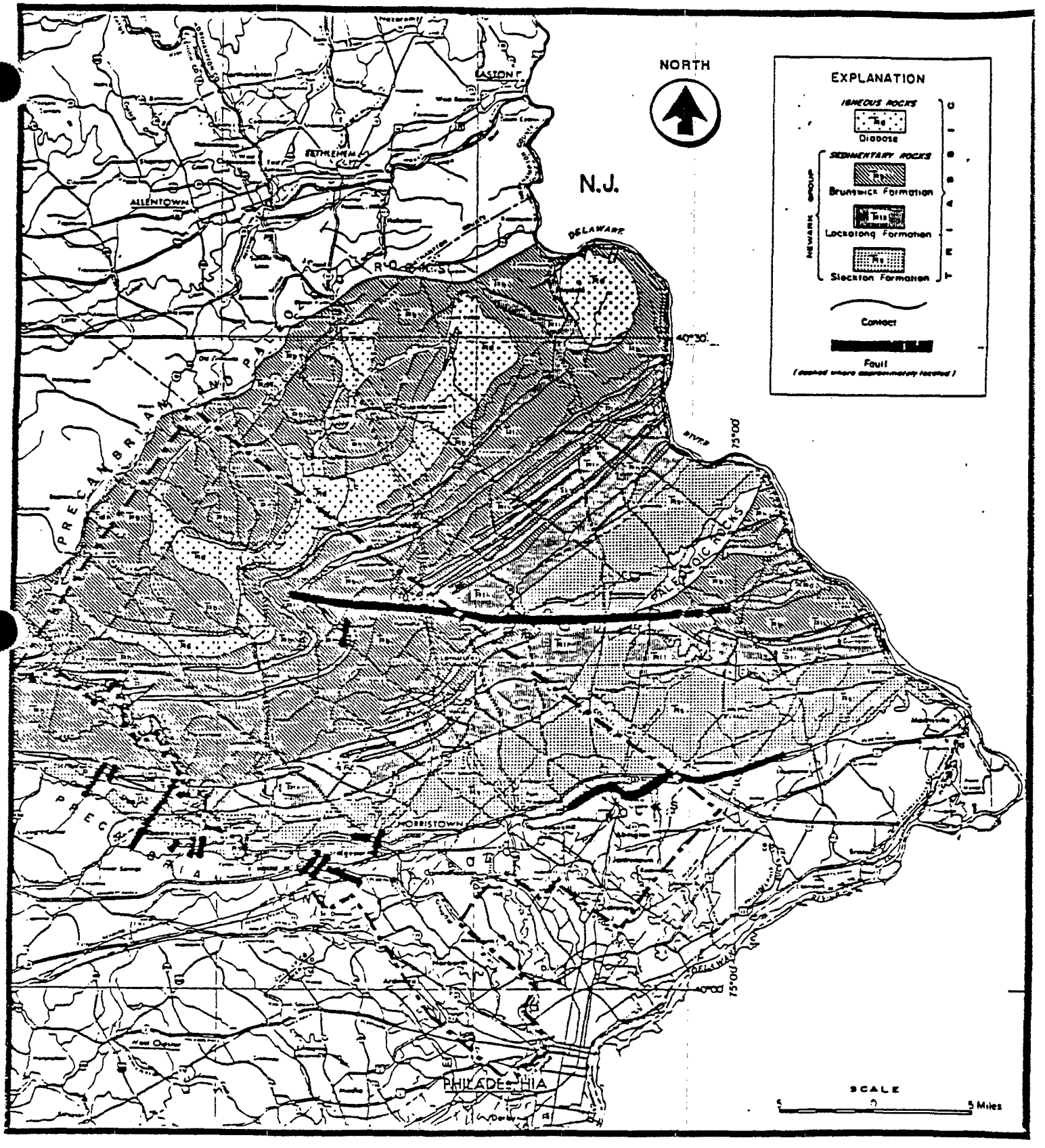


Figure 4. Geologic Map of the Newark Group in Southeastern Pennsylvania (From Rima, 1962)

300115

Lowlands occupy most of the county and indicate the former presence of less resistant lithologies now eroded by fluvial, alluvial, or aeolian erosion processes.

### 2.5.2 Drainage

Montgomery County is drained by tributaries of the Delaware River (Figure 6). As much as 15 to 21 inches of annual precipitation (approximately 33 percent) goes to streamflow (Rima, 1955). In the southern two-thirds of the county, Wissahickon and Towamencin Creeks flow to the southwest and empty into the Schuylkill River. The Schuylkill River forms the southeastern border of Montgomery County.

In north-central Montgomery County near the Bucks County border, Neshaminy Creek flows to the northeast and then turns southwest, ultimately emptying into the Delaware River. Most of the northern and central portions of the county are drained by the Perkiomen Creek and Skippack Creek drainage basins which flow southwest, combine, and discharge into the Schuylkill River.

Because of the county's erosional topography, which is directly related to folding of the underlying bedrock, drainage patterns run parallel to the ridges, generally trending northeast-southwest. In some areas within Montgomery County where ridges are breached (water gaps), streams flow to the southeast.

### 2.5.3 Soils

As the soil map in Figure 5 illustrates, county-wide soil characteristics vary greatly. In the study areas of north-central Montgomery County, however, two soil associations predominate. In Lansdale and Souderton Townships, the Reaville-Penn-Klinesville Association is found. These soils, weathered from red shales, are reddish brown in color. Slopes range from level to steep (up to 25 percent) and depth to bedrock ranges from 10 inches to 3 feet where this soil association dominates. Permeability is low due to clay content, and these soils remain saturated during much of the year (USDA, 1967).



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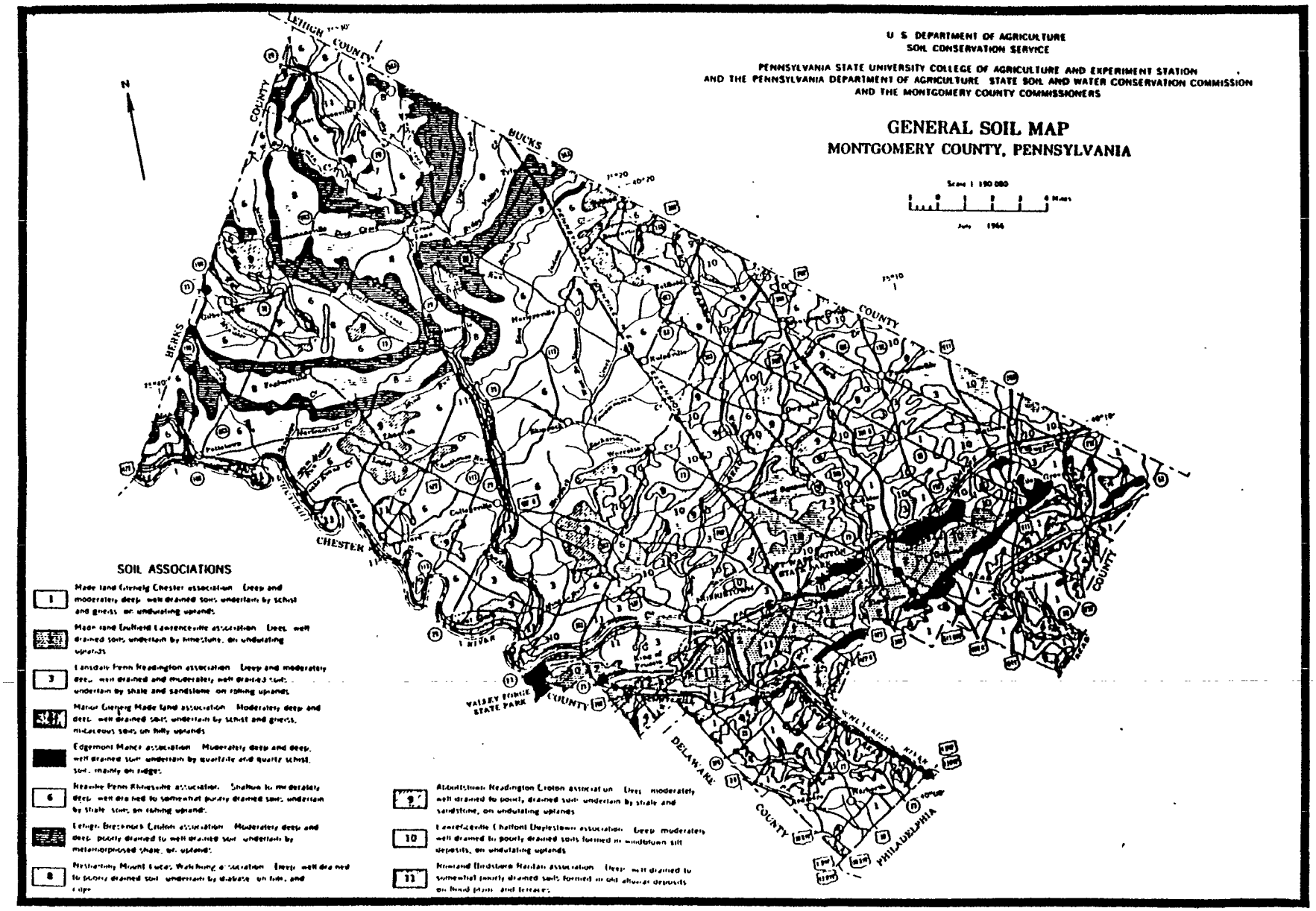


**Figure 5. (From USDA, 1967)**



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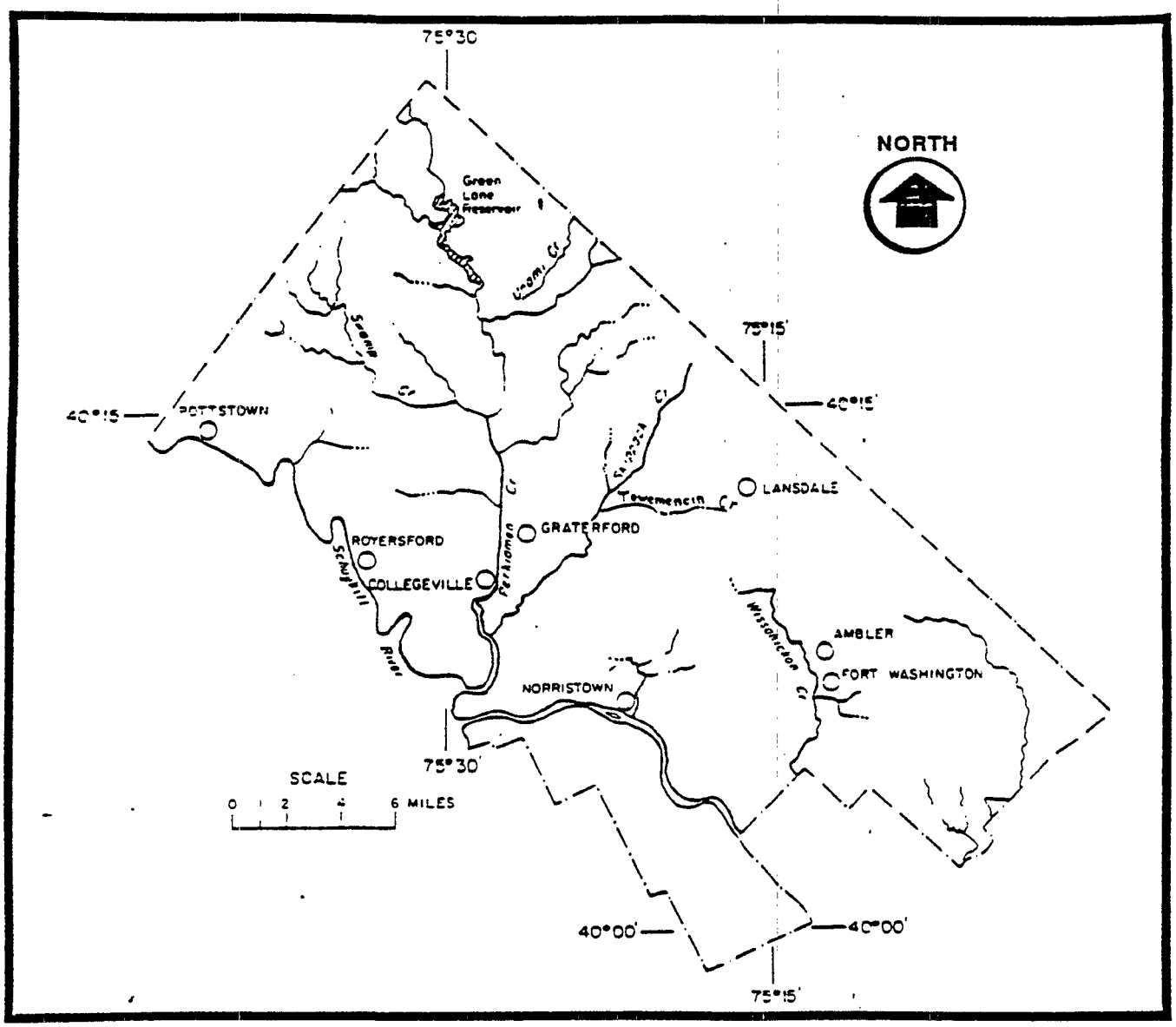


Figure 6. Drainage map for Montgomery County (From Newport, 1973)



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The second predominant soil group in the north-central part of the county, the Abbottstown-Readington-Croton Association, occupies irregularly shaped regions. Soils of this group are also reddish brown, weathered from red, black, and brown argillites of the Lockatong Formation, and contain coarse shale fragments. Slopes are gentle or nearly level, and depth to bedrock varies between 3 to 8 feet. As with the previous soil association, the Abbottstown-Readington-Croton soils have moderate to low permeability and often have a high moisture content. Vadose zone ground-water flow is further hindered by fragipans, densely compacted layers in the soil profile that are virtually impermeable to infiltrating water, and even root growth (Brady, 1974). Fragipans in the soil zone are scattered throughout the study area in north-central Montgomery County and do not seem to have any consistent spacial distribution within the study area. However, where known to be present, they should be considered when determining local hydrogeological conditions. Fragipans result mainly from heavy compaction rather than high clay content or cementation. They occur in lenses and can be several inches to several feet thick. Fragipans block vertical water movement. On slopes, ground water can flow along the surface of a fragipan (Buol, 1980).



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## 3.0 HYDROGEOLOGY OF NORTH-CENTRAL MONTGOMERY COUNTY

On a regional scale, Montgomery County can be considered a single watershed that discharges into the Delaware River. The drainage pattern empties into one source and, ignoring some spatial variability in well yields, the three Triassic formations (Stockton, Lockatong and Brunswick) can be considered as an interconnected aquifer system with no significant aquicludes or aquitards. However, a more localized hydrogeologic assessment is necessary when studying specific contamination sites in north-central Montgomery County, as ground-water flow is likely to be affected by local heterogeneities. Joints and fractures in the bedrock and fragipans in the soil zone may be widespread throughout the study areas. Due to thin soil zones and the presence of macropores in the bedrock from joints and fractures (secondary porosity), there may be direct hydraulic pathways for contaminants at the surface to infiltrate down to the deeper bedrock aquifers. Similarly, proximity to a fault will likely distort water elevations and ground-water flow directions and ultimately affect contaminant migration pathways.

Contamination problems close to a stream would need to take into account site-specific ground water-surface water hydraulic interactions. Variability of soils over smaller areas could affect the local hydrogeological framework and is a further variable in the characterization of contamination in a specific area. Consequently, although regional geology and hydrology will be fairly similar in the region, the hydrogeology of each zone of contamination should be interpreted and evaluated on a local level with available site data and then related to a regional perspective. Available relevant site-specific geology for each zone of contamination has been outlined in Section 2.4 of the main report.



300120

## 4.0 SUMMARY

Montgomery County, Pennsylvania, in the Triassic Lowland and Piedmont Upland Physiographic Sections, is a well-drained region of undulating ridges and valleys. The county is underlain by shales and sandstones of the Newark Group, namely the Stockton Formation sandstones and conglomerates, the Lockatong Formation argillite, and the Brunswick Formation shale, with diabase intrusions in the northern regions of the county.

All three sedimentary formations are aquifer units with water storage predominately in joints and fractures. Water-bearing capacity varies among the formations due to the variability in sediment sorting and compaction and the degree of jointing and fracturing. The Brunswick Formation is the most extensively jointed of the three sedimentary formations. Wells tapping the Brunswick Formation produced water yields in excess of 200 gpm. The Stockton Formation has well-sorted lithostatigraphic beds and fairly extensive jointing. Yields from production wells tapping the Stockton Formation average 130 gpm. The Lockatong Formation is densely compacted and joints are generally narrow and widely spaced; consequently yields from wells are much lower, averaging less than 40 gpm.

The aquifer characteristics of each formation (hydraulic conductivity, porosity, storage) are fairly consistent county-wide, yet local differences related to fracture density and soils require that site-specific hydrogeologic investigations be performed when characterizing a zone of contamination. Local relationships such as proximity to faults, streams or pumping centers and variability of soils may vary from the regional hydrogeologic parameters discussed here.



300121

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300122

[redacted]

[redacted]

**CDM** Federal Programs Corporation

13135 LEE JACKSON MEMORIAL HIGHWAY
FAIRFAX, VIRGINIA 22033

AR300123

REFERENCE 1
Site Discovery of Groundwater Contamination
in the North Penn Area
July 7, 1986

300124

NUS CORPORATION
A Halliburton Company

R-3B3-3-6-28
SITE DISCOVERY OF
GROUNDWATER CONTAMINATION IN THE
NORTH PENN AREA
PREPARED UNDER

TDD NO. F3-8512-31
EPA NO.
CONTRACT NO. 68-01-6699

# PROJECT FOR PERFORMANCE OF REMEDIAL RESPONSE ACTIVITIES AT UNCONTROLLED HAZARDOUS SUBSTANCE FACILITIES—ZONE 1

NUS CORPORATION
SUPERFUND DIVISION

300125

R-585-3-6-28

# SITE DISCOVERY OF GROUNDWATER CONTAMINATION IN THE NORTH PENN AREA

PREPARED UNDER

TDD NO. F3-8512-31
EPA NO.
CONTRACT NO. 68-01-6699

Area #1 - Gentle Cleaners
Area #2 - Ametek
Area #5 - AEL
Area #6 - Keystone Hydraulics
Area #7 - Spra-fin, Inc.
Area #12 - Transicoil, Inc.

J
NCY

[illegible]
SUPERFUND DIVISION

| SUBMITTED BY | REVIEWED BY | APPROVED BY |
|---|---|---|
| Timothy Silar | Thomas W Fromm | |
| TIMOTHY SILAR | THOMAS FROMM | GARTH GLENN |
| GEOLOGIST | ASSISTANT MANAGER | MANAGER, FIT III |

300126

# TABLE OF CONTENTS


| SECTION | | PAGE |
|---|---|---|
| 1.0 | INTRODUCTION | 1-1 |
| 1.1 | AUTHORIZATION | 1-1 |
| 1.2 | SCOPE OF WORK | 1-1 |
| 1.3 | SUMMARY | 1-1 |
| 2.0 | THE SITE | 2-1 |
| 2.1 | LOCATION | 2-1 |
| 3.0 | ENVIRONMENTAL SETTING | 3-1 |
| 3.1 | WATER SUPPLY | 3-1 |
| 3.2 | SURFACE WATERS | 3-2 |
| 3.3 | GEOLOGY AND SOILS | 3-2 |
| 3.4 | GROUNDWATERS | 3-6 |
| 3.5 | CLIMATE AND METEOROLOGY | 3-8 |
| 3.6 | LAND USE | 3-8 |
| 3.7 | POPULATION ANALYSIS | 3-9 |
| 3.8 | CRITICAL ENVIRONMENTS | 3-9 |
| 4.0 | AREA OF CONTAMINATION | 4-1 |
| 4.1 | INTRODUCTION | 4-1 |
| 4.2 | AREA 1 | 4-2 |
| 4.3 | AREA 2 | 4-6 |
| 4.4 | AREA 3 | 4-9 |
| 4.5 | AREA 4 | 4-15 |
| 4.6 | AREA 5 | 4-17 |
| 4.7 | AREA 6 | 4-21 |
| 4.8 | AREA 7 | 4-30 |
| 4.9 | AREA 8 | 4-34 |
| 4.10 | AREA 9 | 4-37 |
| 4.11 | AREA 10 | 4-40 |
| 4.12 | AREA 11 | 4-43 |
| 4.13 | AREA 12 | 4-45 |
| 5.0 | SUMMARY AND CONCLUSION | 5-1 |


300127

APPENDICES


| | | |
|---|---|---|
| A | 1.0 COPY OF TDD | A-1 |
| B | 1.0 NORTH PENN WATER AUTHORITY (NPWA) DISTRIBUTION MAP | B-1 |
| C | 1.0 REFERENCES | C-1 |
| D | 1.0 NORTH PENN WATER AUTHORITY WELL SUMMARY AND WELL LOGS | D-1 |


300128

SECTION 1

300129

SECTION 2

## 2.0 THE SITE

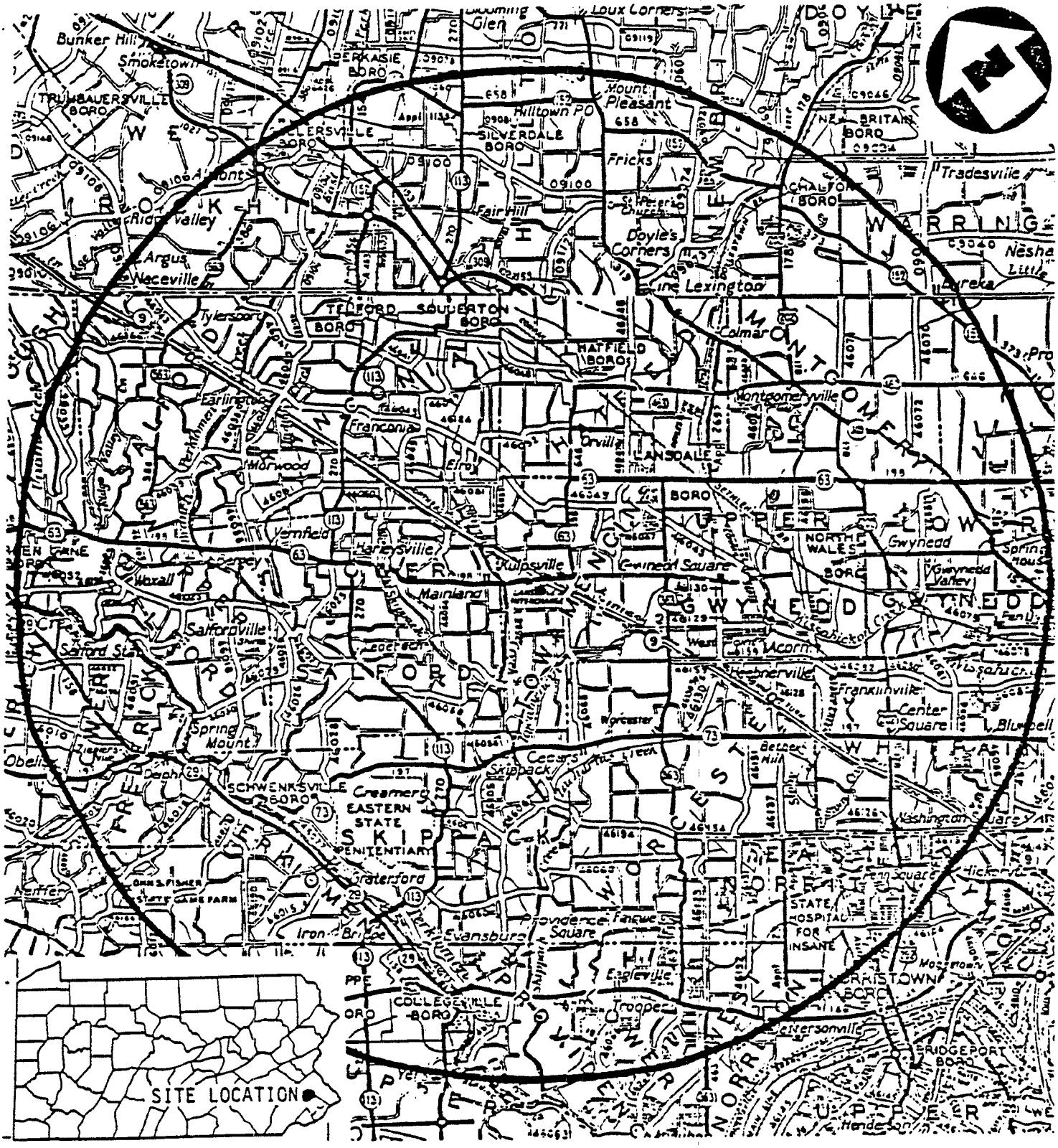
### 2.1 Location

The North Penn area is located primarily in central Montgomery County. The area includes the Perkiomenville, Collegeville, Lansdale, and Telford quadrangles. An 8.5-mile radius is utilized to encompass the study area. The center point of the radius is located about 1,000 feet south of the Pennsylvania Turnpike, Lansdale Interchange (see map, page 2-2). The radius includes the above-mentioned area plus a portion of south central Bucks County, and the eastern portion of the Doylestown and Ambler quadrangles. These areas are not served by NPWA but are of concern since they lie within a 3-mile radius of several contamination plumes (see map, page 2-3). The total area of concern is 227 square miles.[10]

The study area includes the metropolitan areas of Lansdale, Souderton, Unionville, Harleysville, Mainland, Kulpsville, Colmar, Fortuna, Skippack, Creamery, and Center Point. These towns are of primary concern since NPWA supplies water to these towns. Rural areas lie between these towns. Some are supplied by NPWA and some rely on private wells (see appendix B).[1,10]

Other metropolitan areas within the 8.5-mile radius include Norristown, Trooper, Collegeville, and Sellersville. These areas are within the area of concern but rely on groundwater sources other than NPWA for water.[1,10]

300131




SITE LOCATION MAP

approximate scale

1"=2.25 miles

FROM REFERENCE 10

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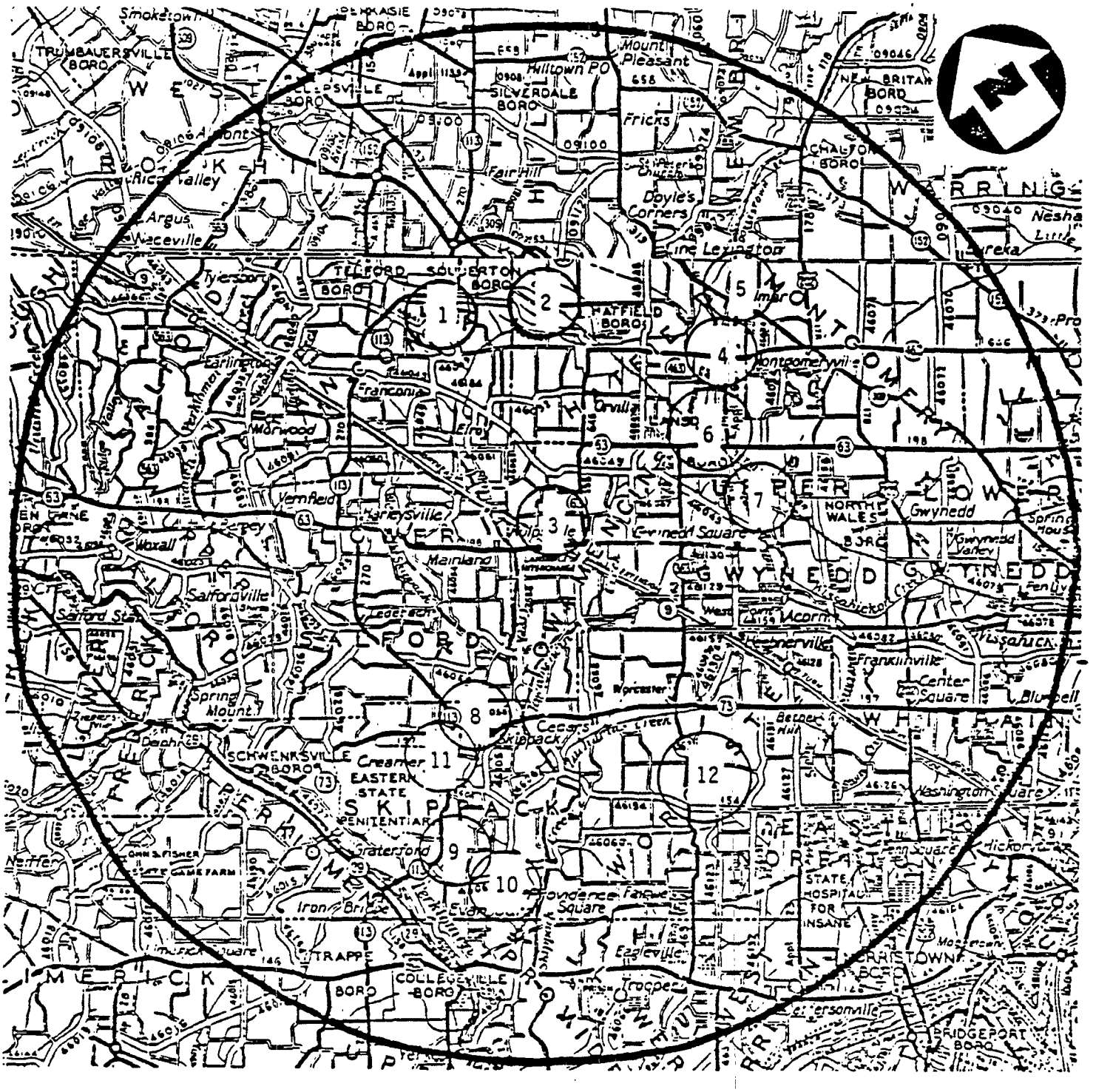
300132




SITE LOCATION MAP WITH AREAS OF CONTAMINATION

approximate scale

1"=2.25 miles

FROM REFERENCE 10

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SECTION 3

300134

## 3.0 ENVIRONMENTAL SETTING

### 3.1 Water Supply

This study involves NPWA; therefore, their service district is of major concern. A distribution map of NPWA is included in appendix B. Areas between NPWA distribution lines rely on private wells for water, except for Hatfield Borough, which has a municipal supply utilizing groundwater. NPWA presently utilizes 53 wells, which produce an average yield of 3.6 million gallons per day (mgd). An additional 1.6 mgd are purchased from Keystone Water Authority and North Wales Water Authority to meet daily demands. In 1984, NPWA customers included 13,384 domestic, 557 commercial, 164 industrial, 78 public, and 1 utility, with an average demand of 5.2 mgd. The majority of the NPWA distribution system is interconnected; however, there are 6 satellite systems within the NPWA distribution system (see appendix B).[1]

NPWA has 18 wells that are contaminated with VOCs. Nine of the 18 wells have VOC concentrations above the proposed limits of 5 ug/l for TCE and 10 ug/l for PCE, suggested by EPA. Five of the 9 wells that are over the proposed limit are inactive. The remaining 4 wells are either treated or mixed with cleaner water to bring the VOC concentration level below the proposed limit. NPWA loses approximately 0.6 mgd of available water due to VOC contamination.[1]

Other public water suppliers in the 8.5-mile radius study area include Hatfield Water Department, North Wales Water Authority, Telford Borough Water Authority, Schwenksville Borough Water Authority, Lower Frederick Township Water Company, Collegeville-Trappe Joint Water Works, and Keystone Water Company. These municipalities primarily use groundwater for public water supply, with the exception of Keytone Water Company, which has surface water intakes outside the study area.[20]



300135

## 3.2 Surface Water

The study area is situated in the Schuylkill River drainage basin. Major creeks which flow through the study area into the Schuylkill River include Perkiomen Creek, Skippack Creek, Neshaminy Creek, Wissahickon Creek, Towamencin Creek, and Indian Creek. These creeks flow predominantly south to the Schuylkill River, which in turn flows southeast to the Delaware River. Surface water is not used for public water supply in the study area.[12]

## 3.3 Geology and Soils

The North Penn area lies entirely within the Triassic Lowland Section of the Piedmont Physiographic Province. Topography of the area is characterized by a gently sloping upland ranging from an altitude of 500 to 200 feet above mean sea level (MSL). The relief in the area probably reflects the resistance to weathering of the underlying bedrock. This differential weathering formed northeast-southwest trending ridges of resistant rock and intervening lowlands from the less resistant rock. The majority of the study area occupies the lowlands. Streams in the area are found in topographic low areas and collectively form a dendritic drainage pattern. Stream flow is generally northeast-southwest, parallel to the principal topographic features.[17,18]

Rocks of Triassic age underlie the study area (see map, page 3-4). These rocks, known as the Newark Group, form the largest Triassic Basin in the eastern United States, extending from Nova Scotia to North Carolina. The basin was formed in a postorogenic depositional environment. Rocks of the Newark Group are generally red conglomerate, arkose, sandstone, siltstone, argillite, and shale, locally, with interbedded basaltic lava flow and intruded diabase dikes and sills. The Newark Group has been divided, proceeding from oldest to youngest, into the Stockton, Lockatong, and Brunswick Formations. The Brunswick and Lockatong Formations are of primary concern in the study area, since all contaminated areas are underlain by these 2 formations.[11,18]



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The Brunswick Formation consists generally of soft reddish-brown shale, interbedded with reddish-brown sandstone, and siltstone. The shale beds are locally sandy and silty and interbedded with gray, brown, and greenish shale. Shales of the Brunswick Formation consist primarily of feldspar, illite, chlorite, quartz, and calcite and are locally micaceous. The fractures within the Brunswick are commonly filled with calcite and quartz, with occasional occurrence of barite and pyrite. Beds are generally thin with irregular and discontinuous bedding planes.[15,17,18]

The Brunswick Formation is relatively uniform, although some facie changes have been documented. In the Lansdale area, thin limestone conglomerate, limestone pebbles in a shaly matrix, subcrop. In addition, some beds of calcareous sandstone have been reported to occur within the Brunswick. The limestone conglomerate and calcareous sandstone units are unimportant to this study since they are very localized and discontinuous.

The Brunswick Formation is reported to reach a thickness of 9,000 to 16,000 feet in the area. The rocks generally strike N 45° E to N 55° E and dip 5 to 15 degrees northwest in the study area. Near the base of the Brunswick Formation, the rock is a tough, thick-bedded red argillite and is interbedded with dark-gray argillite of the Lockatong Formation. The Brunswick also grades laterally into the Lockatong Formation.[15,17,18]

The Lockatong Formation subcrops over a small portion of the study area, principally south and southeast of Lansdale, in the Souderton area, and in 2 thin bands in Salford Township. The Lockatong Formation consists principally of medium to dark gray argillite, interbedded with thin beds of gray to black shale, siltstone, and marlstone. The Lockatong consists of up to 40 percent anacline, along with dolomite, feldspar, and clay. Fractures are commonly filled with quartz, calcite, or pyrite. Bedding is generally massive, with an average dip of 10 degrees toward the northwest. The Lockatong is up to 4,000 feet thick.[15,17,18]



300137

TRIASSIC

GEOLOGIC MAP OF SITE AREA (no scale)
FROM REFERENCE 11

Diabase

Brunswick Formation or Gettysburg Formation

Lockatong Formation

Stockton Formation or New Oxford Formation



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300138

The Stockton Formation subcrops in the southernmost section of the study area. The Stockton Formation, which underlies the Lockatong Formation, consists of 3 distinct members: the lower member consists of coarse, arkosic sandstone and arkosic conglomerate; the middle member consists of medium-grained arkosic sandstone; and the upper member consists of red shale, siltstone, and very fine-grained arkosic sandstone. The thickness of the Stockton Formation ranges from 1,000 to 6,000 feet.[15,16]

A diabase sill intrudes the Brunswick Formation in the northwestern portion of the study area. The diabase is medium to coarse grained, greenish gray, and consists of 90 to 95 percent labrodorite and augite. The sill is estimated to be in excess of 1,000 feet thick. Near the diabase sill, local metamorphism of the Brunswick Formation has occurred. The shales of the Brunswick Formation are altered to dark, tough hornfels in the metamorphic zone. The width of the altered zone in the study area averages about 1 mile.[15,18]

A major structural feature in the study area is the Chalfont fault. This fault is about 4.5 miles north of Lansdale and generally trends east-west. The Chalfont fault and its associated faults appear to have significant vertical and lateral displacement, as seen by the truncation of the Lockatong Formation along the fault (see geologic map, page 3-4).[11,18]

Soils

General soil associations in the study area include the following:

Reaville-Penn-Klinesville Association is a shallow to moderately deep, well drained to somewhat poorly drained soil, which is generally underlain by shale and found on rolling uplands.[12,13]

Abbottstown-Readington-Croton Association is a deep, moderately well drained to poorly drained soil, generally underlain by shale and sandstone, and found on undulating uplands.[12,13]



300139

Lawrenceville-Chalfont-Doylestown Association is a deep, moderately well drained to poorly drained soil that is generally formed in wind-blown silt deposits and found on undulating uplands.[12,13]

Lehigh-Brecknock-Croton Association is a moderately deep to deep, poorly drained to well drained soil, which is generally underlain by metamorphosed shale and found on uplands.[12,13]

These 4 associations are generally level to sloping and are found on undulating uplands. The location of the 4 associations does not correlate with the location of the contaminated areas or possible responsible parties.

### 3.4 Groundwaters

Groundwater in the North Penn area is obtained primarily from the Brunswick Formation. The Brunswick Formation is composed of very fine-grained rock; therefore, primary porosity is very low.[14,17]

Groundwater flow is largely through secondary openings that were developed after the deposition of the strata. These secondary openings are usually bedding planes, fractures, and joints. Bedding plane fractures are usually narrow and contribute little to the total permeability of the formation. Of greater importance are joints and fractures which criss-cross throughout the beds. These openings comprise a network through which water may flow. The number and size of these openings vary laterally from bed to bed. Lithologic differences within the lens-shaped deposits of the Brunswick Formation also contribute to lateral changes in flow. Therefore, the interconnected network of openings provided by joint, fractures, and bedding planes may be locally altered by structural anomalies and/or lithologic differences.[14,17]

Therefore, aquifer parameters of the Brunswick Formation may vary greatly from place to place. Depth to water-bearing zones and direction of groundwater flow are 2 factors which vary from place to place throughout the Brunswick Formation. The variable nature of Brunswick aquifers is shown in well depths (65 to 668 feet) and yields (4 to 55 gallons per minute (gpm)).[14,15,17]

The lithology and structure of the Lockatong Formation are similar to the Brunswick Formation. Groundwater flow is largely through secondary openings, bedding-planes, fractures, and joints. Since fractures are smaller and more widely spaced in the Lockatong Formation than in the Brunswick Formation, wells drilled into the Lockatong generally have lower yields than those drilled in the Brunswick.[15,16]

There is substantial formation contact and interfingering between the Lockatong and Brunswick in the North Penn area. These contact areas generally have a greater number of fractures. Fractures enhance secondary porosity; thus, there is more groundwater flow. Wells drilled in these areas generally have greater yields than those drilled solely in the Brunswick Formation.[14,15,17]

NPWA wells in the study area penetrate the Brunswick and/or Lockatong Formations. Well depths range from 216 to 668 feet. All wells are constructed as "open holes," which means that the well is cased only from the surface to 20 to 50 feet into bedrock. The rest of the well (bottom of casing to total depth) is not cased; therefore it is "open." This method of well construction allows the well to draw groundwater from all saturated openings encountered by the borehole in the uncased (open) zone. A summary of NPWA wells and some well logs can be found in appendix D.[1,14]

Two additional formations are encountered in the study area, diabase and the Stockton Formation. The water-bearing characteristics of these rocks will be discussed briefly, since they are of lesser concern for the purposes of this study.[11]

Groundwater flow in the diabase is also through secondary porosity. The best water-bearing area in the diabase is in the highly weathered upper zone, generally less than 100 feet below the surface. Well yields from the diabase range from 0.1 to 50 gpm; the average yield is 3 gpm.[14]

Groundwater flow in the Stockton Formation occurs in pore spaces between the grains and secondary openings in the rock. The lithology and sorting of the Stockton contribute to the primary porosity. This primary, intergranular porosity enables the Stockton Formation to be the most productive aquiferous formation in the study area.[15,16]



300141

In general, groundwater flow is difficult to predict throughout the study area due to variable secondary porosity. The difficulty of predicting groundwater flow is enhanced by industrial and municipal wells which pump large quantities of water. A cone of depression generally forms around these wells, interfering with the normal movement of groundwater. However, with proper data collection and testing, groundwater flow on a local level may be predicted.

## 3.5 Climate and Meteorology

This area of Pennsylvania is generally considered to have warm humid summers, moderately cold winters, and ample rainfall. Temperatures generally range between 0°F to 100°F, with an average yearly temperature of 54°F. Summers are warm, with an average of 25 days per year when temperatures rise above 90°F. In general, winters are comparatively mild, with an average 101 days with minimum temperatures below the freezing point.[12,13]

Precipitation is well distributed throughout the season. The greatest monthly variation in precipitation (2 inches) occurs between the wettest month, August, and the driest month, October. Annual precipitation ranges from 43 to 47 inches in the study area. This yields a net average annual precipitation of 17 inches per year.[12,13]

## 3.6 Land Use

Land use throughout the 227-square-mile study area varies. Most of the land is still farmed, although an increasing number of new housing developments is depleting the farm land. Some recreational and undisturbed woodlands are also located in the study area. In addition, there are metropolitan and industrial pockets located throughout the area, such as the boroughs of Lansdale and Souderton.



300142

## 3.7 Population Analysis

The greatest population densities in the study area are found within town and borough limits. These areas include, but are not limited to, Lansdale, Souderton, Telford, Hatfield, Harleysville, Collegeville, North Wales, and Norristown. The NPWA serves approximately 52,000 people.[1]

## 3.8 Critical Environments

There are no critical environments within the study area. Two federally endangered birds may be found as transient visitors in the area. They are the bald eagle (Haliaeetus leucocephalus), and peregrine falcon (Falco peregrinus). There are no critical habitats for these birds in the study area.[19]

In addition, the small whorled pogonia (Isotria medeoloides), an endangered plant, may exist in the study area.[19]



300143

SECTION 4

300144

# 4.0 AREAS OF CONTAMINATION

## 4.1 Introduction

Through the available information search, 12 areas of VOC contamination have been identified. The contaminated areas were identified by employees of NPWA. EPA and PA DER performed work at some of the contaminated areas following the initial discovery by NPWA. Therefore, NPWA resources, along with EPA and PA DER files, were utilized to identify contamination plumes and potentially responsible parties.

NPWA has 18 contaminated wells throughout 9 of the 12 contaminated areas. The remaining 3 areas were discovered and mapped solely by testing private wells. All 12 areas are discussed in the following sections. The discussion includes location and mapping of contaminated areas, wells located in each area, and potentially responsible parties of VOC contamination.



300145

## 4.2 Area 1

Area 1 lies within the Souderton Borough limits in the Telford quadrangle (see map, page 4-3). The area is served by NPWA and there are no known home wells in the area. PCE contamination was discovered in this area in August 1979. Service of NPWA well S-9 was discontinued at that time. Present PCE concentrations in well S-9 are up to 24.7 ug/l, exceeding the proposed PCE limit of 10 ug/l. During a recent pump test, PCE concentrations fell from 24.7 ug/l to 10.6 ug/l after 24 hours of pumping (see page 4-4). In addition, NPWA well S-10 is contaminated with PCE with concentrations ranging from 1.2 ug/l to 2.6 ug/l (see page 4-5)[1].

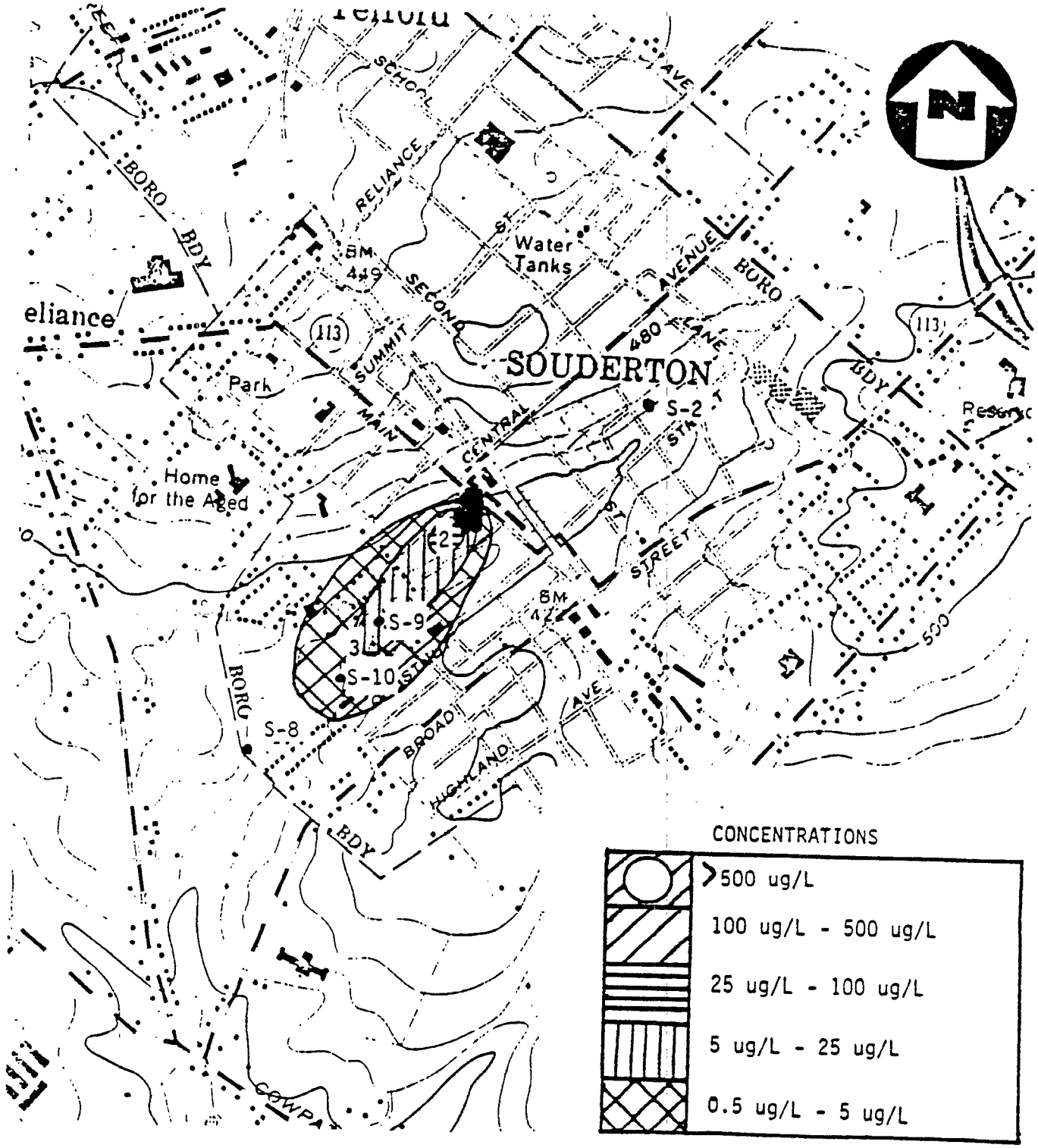
Both wells S-9 and S-10 are 300 feet deep. Well S-9 has a permitted capacity of 144,000 gallons per day (gpd), while S-10 is permitted for 115,200 gpd. NPWA wells S-2 and S-8, located north and south, respectively, of the contamination plume, are not contaminated to date (see page 4-2).[1]

According to NPWA officials, potentially responsible parties for the PCE contamination include Gentle Cleaners, Incorporated, Granite Knitting Mills, Incorporated, and the Parkside Apartments. Gentle Cleaners, a dry cleaning service, is a known user of PCE. Gentle Cleaners is located at the topographic high north of the plume, thus establishing a natural pathway for contaminant movement to the low-lying areas of S-9 and S-10. Granite Knitting Mills, Incorporated is also a known user of PCE. The well on their property is reported by NPWA to be contaminated with 61 ppb of PCE. In addition, a dry cleaning service, now Parkside Apartments owned by Paul Derstein, is believed to be a potentially responsible party. The dry cleaners may have had an underground storage tank for PCE. Field identification of this tank was not verified by NUS FIT III. The Parkside Apartments are located about 100 feet south of S-9; thus, they are a likely additional source of the contamination problem.[1]

Considering the topography of the area, it can be hypothesized that there is a natural pathway for contaminant movement from Gentle Cleaners and Granite Knitting Mills to S-9 and S-10. Considering the concentrations of PCE in the Granite Mills well, there is a decreased concentration gradient moving downslope from the Granite Mill well. This supports the theory of contaminant movement from upslope (Gentle Cleaners and Granite Knitting Mills) to low-lying areas (S-9 and S-10).



300146




1 GENTLE CLEANING INC.

AREA 1
(no scale)

2 GRANITE KNITTING MILLS INC.

3 PARKSIDE APARTMENTS

FROM REFERENCE 5

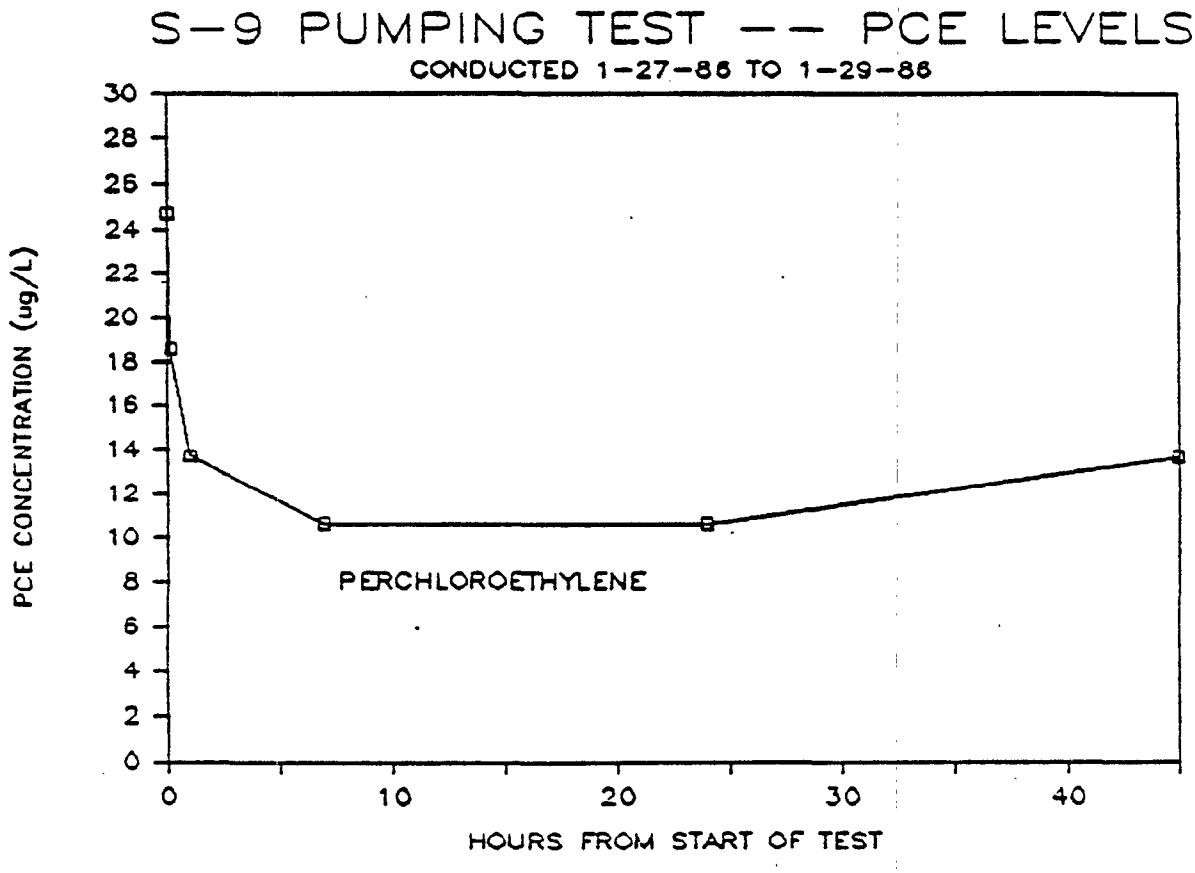
NUS CORPORATION
A Halliburton Company



300147

S-9 PUMPING TEST, 1986

| LOCATION | DATE | MIN FR START | SAMP # | ug/L PCE | C-1,2-DCE | TCE | 1,1,1-TCA |
|---|---|---|---|---|---|---|---|
| S-9 TEST, 1 MIN | 27-Jan-86 | 0.017 | 261 | 24.7 | 0.7 | 0.7 | <0.5 |
| S-9 TEST, 10 MIN | 27-Jan-86 | 0.17 | 262 | 18.6 | 0.6 | 0.6 | <0.5 |
| S-9 TEST, 1 HOUR | 27-Jan-86 | 1 | 263 | 13.7 | 0.5 | 0.5 | <0.5 |
| S-9 TEST, 7 HRS | 28-Jan-86 | 7 | 272 | 10.6 | 0.5 | <0.5 | 0.5 |
| S-9 TEST, 24 HRS | 28-Jan-86 | 24 | 275 | 10.6 | <0.5 | <0.5 | 0.6 |
| S-9 TEST END | 29-Jan-86 | 45 | 282 | 13.6 | <0.5 | <0.5 | 0.6 |




Area #1

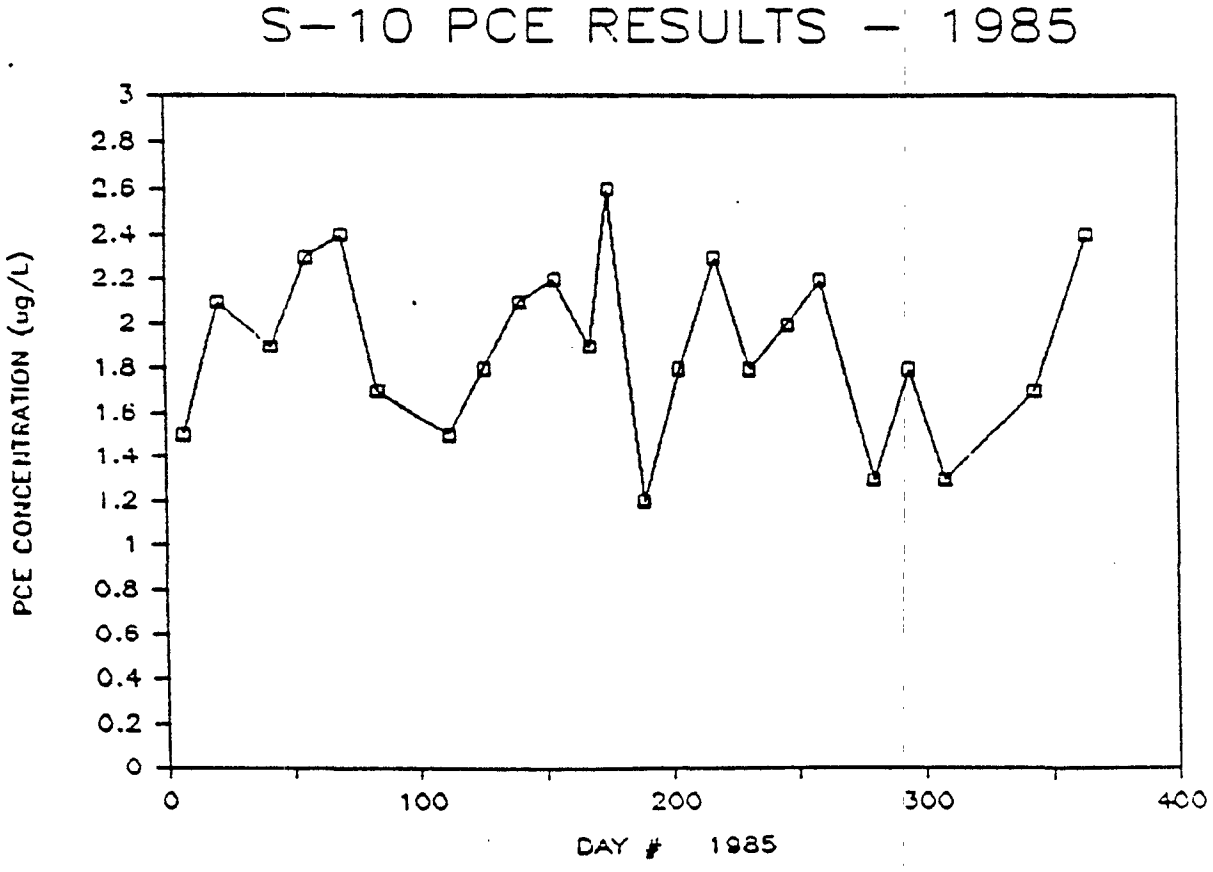


From Reference 1

300148

S-10 RESULTS FOR 1985

| DATE | DAY # | SAMPLE # | TCE ug/L | PCE ug/L | 1,1,1-TCA ug/L |
|---|---|---|---|---|---|
| [illegible]-Jan-85 | 7 | 63 | 0.7 | 1.5 | <0.5 |
| [illegible]-Jan-85 | 21 | 148 | <0.5 | 2.1 | <0.5 |
| 11-Feb-85 | 42 | 354 | <0.5 | 1.9 | <0.5 |
| 25-Feb-85 | 56 | 443 | <0.5 | 2.3 | <0.5 |
| 11-Mar-85 | 70 | 532 | <0.5 | 2.4 | <0.5 |
| 25-Mar-85 | 84 | 682 | <0.5 | 1.7 | <0.5 |
| 22-Apr-85 | 112 | 834 | <0.5 | 1.5 | <0.5 |
| 06-May-85 | 126 | 971 | <0.5 | 1.8 | <0.5 |
| 20-May-85 | 140 | 1063 | <0.5 | 2.1 | <0.5 |
| 03-Jun-85 | 154 | 1160 | <0.5 | 2.2 | <0.5 |
| 17-Jun-85 | 168 | 1247 | <0.5 | 1.9 | <0.5 |
| 24-Jun-85 | 175 | 1286 | <0.5 | 2.6 | <0.5 |
| 08-Jul-85 | 189 | 1351 | <0.5 | 1.2 | <0.5 |
| 22-Jul-85 | 203 | 1466 | <0.5 | 1.8 | <0.5 |
| 05-Aug-85 | 217 | 1534 | <0.5 | 2.3 | 0.6 |
| 19-Aug-85 | 231 | 1645 | <0.5 | 1.8 | 0.6 |
| 03-Sep-85 | 246 | 1759 | <0.5 | 2.0 | <0.5 |
| 16-Sep-85 | 259 | 1853 | <0.5 | 2.2 | 0.5 |
| 07-Oct-85 | 280 | 1954 | <0.5 | 1.3 | <0.5 |
| 21-Oct-85 | 294 | 2123 | <0.5 | 1.8 | <0.5 |
| 04-Nov-85 | 308 | 2202 | <0.5 | 1.3 | <0.5 |
| 09-Dec-85 | 343 | 2539 | <0.5 | 1.7 | <0.5 |
| 30-Dec-85 | 364 | 2670 | <0.5 | 2.4 | <0.5 |




Ref #1 From Reference 1



300149

## 4.3 Area 2

Area 2 lies within Hatfield Township in the Telford quadrangle (see map, page 4-7). This area is served by NPWA and some residents rely on private wells. Three distinct contamination plumes have been discovered within plume boundaries. Of major concern in area 2 is NPWA well NP-15. VOCs were first reported in this well in 1982. In 1985, the highest contaminant levels in NP-15 were 4.4 ug/l 1,1-dichloroethylene, 19.2 ug/l 1,1-dichloroethane, and 4.9 ug/l 1,1,1-trichloroethane (see page 4-8). 1,1-Dichloroethane is a transformation product of 1,1,1-trichloroethane. Well NP-15 is 500 feet deep and permitted for 144,000 gpd.[1] The proposed limit for 1,1-dichloroethylene is 7 ug/l and for 1,1,1-trichloroethane it is 200 ug/l. The proposed limit for 1,1-dichloroethane has not been set.

Potentially responsible parties for the VOC contamination around NP-15, as identified by NPWA, include Waste Conversion, Incorporated and B and G Manufactures Company. Waste Conversion is a known handler of these VOCs and has been reported, by previous employees, to have a sloppy operation. B and G Manufactures, which was previously Jed Manufacturing, is also believed to be a contributor to the contamination problem near NP-15.[1,3]

Another problem in this area exists around the Ametek Corporation facility. Wells on Ametek property are contaminated with TCE in excess of 500 ug/l. An additional identified contamination plume exists along Township Line Road. This plume is located northwest of SPS Technologies, Incorporated and west of A. Steiert and Sons, Incorporated. SPS Technologies is a known user of TCE and may be contributing to the contamination problem in this area. It is unknown if Steiert and Sons, Incorporated, a brush manufacturer, uses VOCs. They have been identified as a potentially responsible party because their operation is very sloppy. Lagoons and uncovered drums are randomly located throughout the property, and stressed vegetation has been noted. This area is of concern because it is near NP-3 which, to date, is contaminated with 4 ug/l of TCE.[1]

Area 2 is a large area of contamination. Of major concern is NP-15, which is an important production well. The contaminants found in NP-15 suggest Waste Conversion, Incorporated is the major responsible party in this area.



300150

NP-15 RESULTS FOR 1985

| DATE | DAY # | SAMPLE # | 1,1-DCE | 1,1-DCA | 1,1,1-TCA |
|---|---|---|---|---|---|
| | | | ug/L | | |
| Feb-85 | 42 | 345 | 1.5 | --- | 1.6 |
| Mar-85 | 66 | 493 | 2.5 | --- | 2.6 |
| 11-Mar-85 | 70 | 529 | 2.3 | --- | 2.6 |
| 14-Mar-85 | 73 | 545 | 2.1 | --- | 2.0 |
| 15-Mar-85 | 74 | 546 | 1.3 | 8.3 | 2.4 |
| 18-Mar-85 | 77 | 564 | 1.0 | 8.2 | 2.0 |
| 25-Mar-85 | 84 | 675 | 1.4 | 8.8 | 2.3 |
| 15-Apr-85 | 105 | 768 | 1.7 | 9.8 | 2.7 |
| 22-Apr-85 | 112 | 826 | 1.5 | 8.5 | 2.3 |
| 06-May-85 | 126 | 964 | 2.1 | 10.1 | 2.7 |
| 20-May-85 | 140 | 1056 | 2.5 | 11.2 | 3.2 |
| 03-Jun-85 | 154 | 1153 | 2.9 | 12.5 | 3.5 |
| 17-Jun-85 | 168 | 1239 | 3.3 | 12.4 | 3.3 |
| 24-Jun-85 | 175 | 1278 | 3.0 | 12.5 | 3.6 |
| 08-Jul-85 | 189 | 1345 | 4.1 | 13.8 | 3.6 |
| 22-Jul-85 | 203 | 1459 | 1.7 | 11.8 | 3.9 |
| 05-Aug-85 | 217 | 1527 | 2.4 | 11.9 | 3.7 |
| 19-Aug-85 | 231 | 1638 | 2.5 | 11.3 | 3.5 |
| 03-Sep-85 | 246 | 1752 | 3.6 | 15.8 | 4.2 |
| 16-Sep-85 | 259 | 1845 | 4.4 | 16.6 | 4.7 |
| 07-Oct-85 | 280 | 1947 | 3.3 | 16.5 | 4.5 |
| 21-Oct-85 | 294 | 2115 | 4.3 | 17.2 | 4.9 |
| 04-Nov-85 | 308 | 2192 | 3.1 | 16.0 | 3.7 |
| 09-Dec-85 | 343 | 2529 | 3.9 | 17.4 | 4.0 |
| 30-Dec-85 | 364 | 2664 | 4.3 | 19.2 | 4.3 |

# NP-15 RESULTS - 1985

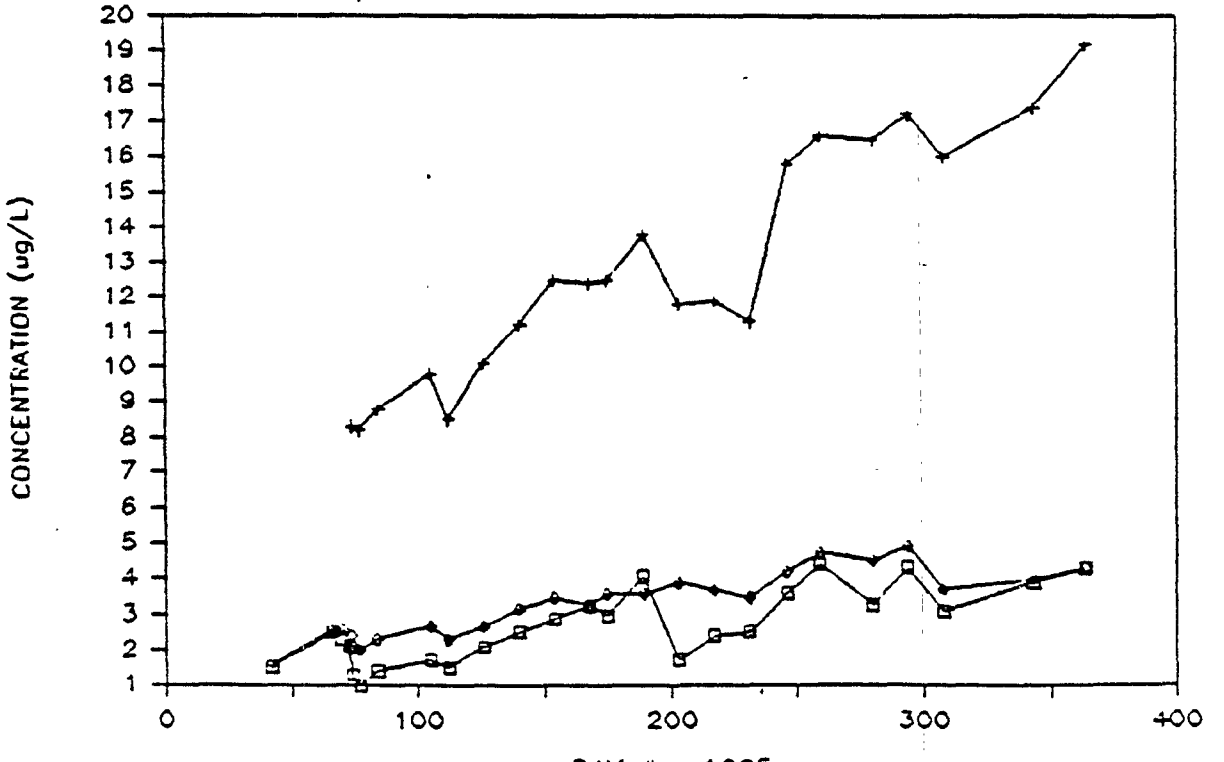



Fig #2

4-8

From Reference 1

# 1.0 INTRODUCTION

## 1.1 Authorization

NUS Corporation performed this work under Environmental Protection Agency Contract No. 68-01-6699. This specific report was prepared in accordance with Technical Directive Document No. F3-8512-31 for the North Penn Area site located in north-central Montgomery County, Pennsylvania.

## 1.2 Scope of Work

NUS FIT III was tasked to perform a high priority site discovery using available information, from the North Penn Water Authority (NPWA), EPA, and the Pennsylvania Department of Environmental Resources (PA DER). Presented herein are the findings of the available information search.

## 1.3 Summary

NPWA is a major water supplier in central Montgomery County. In 1979, NPWA discovered that 8 of their production wells were contaminated with the volatile organic chemicals (VOC) trichloroethylene (TCE) and tetrachloroethylene (PCE). These contaminated wells were shut down to prevent additional contamination of the distribution system. The discovery led to the initiation of an extensive research program by NPWA to locate the potential sources and responsible parties of the VOC contamination. In addition, PA DER and EPA have conducted studies in the North Penn area.

It was determined by FIT III that there are 12 distinct areas of groundwater contamination in the North Penn area. NPWA has wells in 9 of the 12 contaminated areas. To date, 18 of 53 NPWA wells are contaminated by VOCs. After reviewing EPA and PA DER files, meeting with officials from NPWA, and conducting a reconnaissance of the study area, a list of 51 potentially responsible parties was compiled. The areas of groundwater contamination, NPWA contaminated wells, and potentially responsible parties for the VOC contamination are presented herein. Section 4 discusses each contamination plume area in detail, and section 5 presents a summary of the contaminated NPWA wells and the potentially responsible parties identified.



300152

## 4.4 Area 3

Area 3 is situated in Towamencin Township in the Telford and Lansdale quadrangles (see map, page 4-10). Three distinct plumes exist within the proposed plume boundary for area 3. Two NPWA wells are contaminated in this area.

Contamination of NPWA well NP-5 was discovered in 1980. PCE concentrations in NP-5 ranged from 1.5 ug/l to 5 ug/l in 1984 and 1985 (see pages 4-11 and 4-12). NP-5 is 630 feet deep and has a permitted capacity of 504,000 gpd.[1]

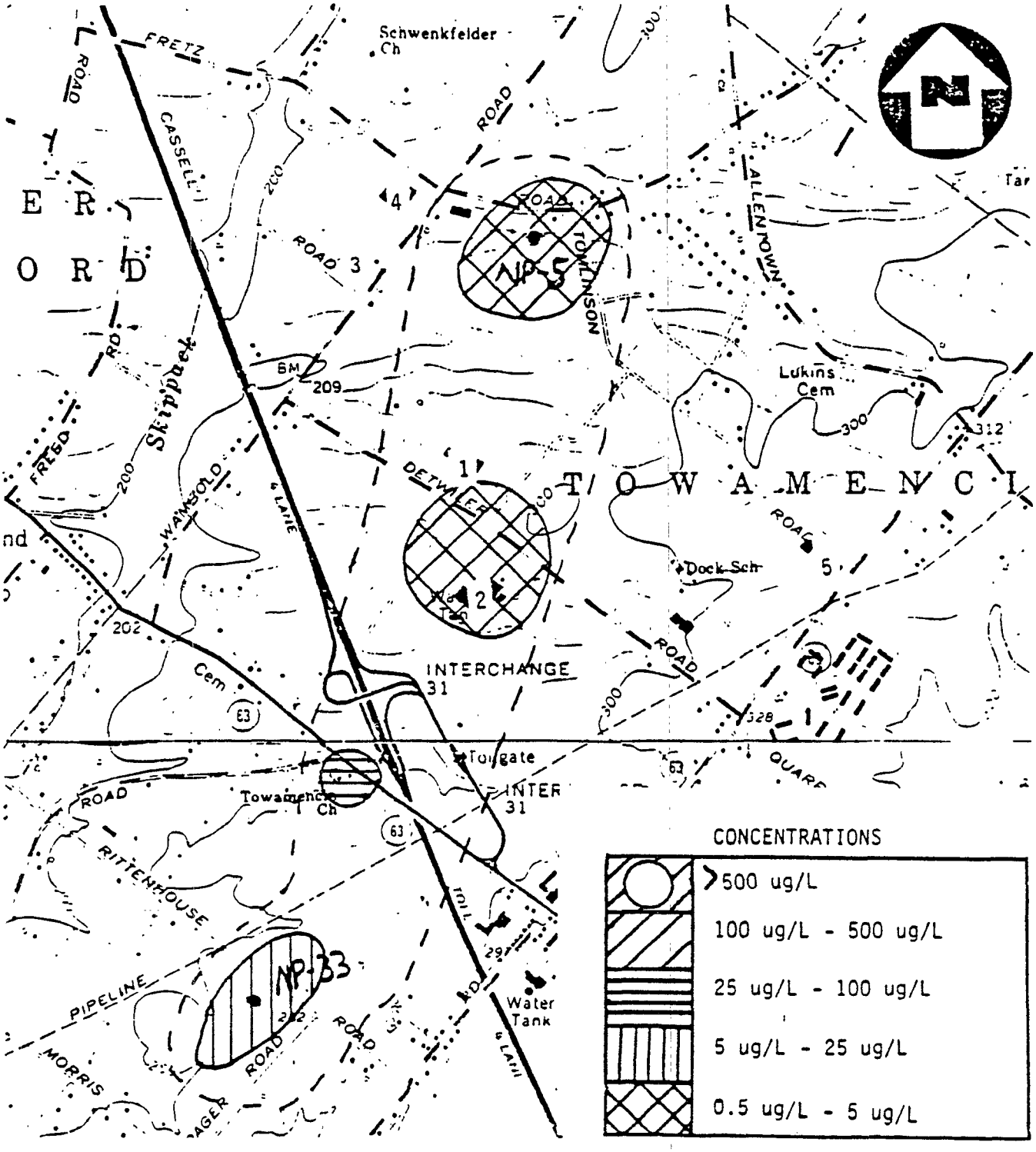
Contamination of NPWA well NP-33 was also discovered in 1980. TCE concentrations in NP-33 have ranged from 6.6 ug/l to 13.2 ug/l in 1985, well above the proposed limit of 5 ug/l (see pages 4-13 and 4-14). NP-33 is 560 feet deep and has a permitted capacity of 216,000 gpd. The concentration of TCE in NP-33 has been increasing steadily in this past year.

Another known contaminated area lies between NP-5 and NP-33. This area is located in an industrial park area. Known users of TCE and/or PCE in the area are Greene Tweed Company and Nice Bearings. At this time, it is difficult to attribute the contamination at NP-33 and NP-5 to Greene Tweed or Nice Bearing. However, considering the topographic high of these industries and the fact that Nice Bearing has a surface discharge pipe in the rear of their building (toward NP-33), these industries could be the responsible parties for the VOC contamination of the NPWA wells. In addition, NPWA feels Met-Pro Corporation, Pecora Chemical Company, and Penn Fishing Tackle Company may be potentially responsible parties in area 3.[1]

Additional study of this area is being conducted by NPWA. They are sampling wells between Green Tweed Company and Nice Bearings Division and NP-5 and NP-33 to better establish the contamination plume and concentrations. The compilation of these data should give NPWA a better understanding of contaminant movement and potentially responsible parties in the area.



AR300153




AREA 3
(no scale)

1 GREENE TWEED COMPANY
2 NICE BEARING DIVISION OF SKF INDUSTRIES
3 MET-PRO CORPORATION
4 PECORA CHEMICAL COMPANY
5 PENN FISHING TACKLE COMPANY

FROM REFERENCE 5 and 8

NUS CORPORATION
A Halliburton Company



300154

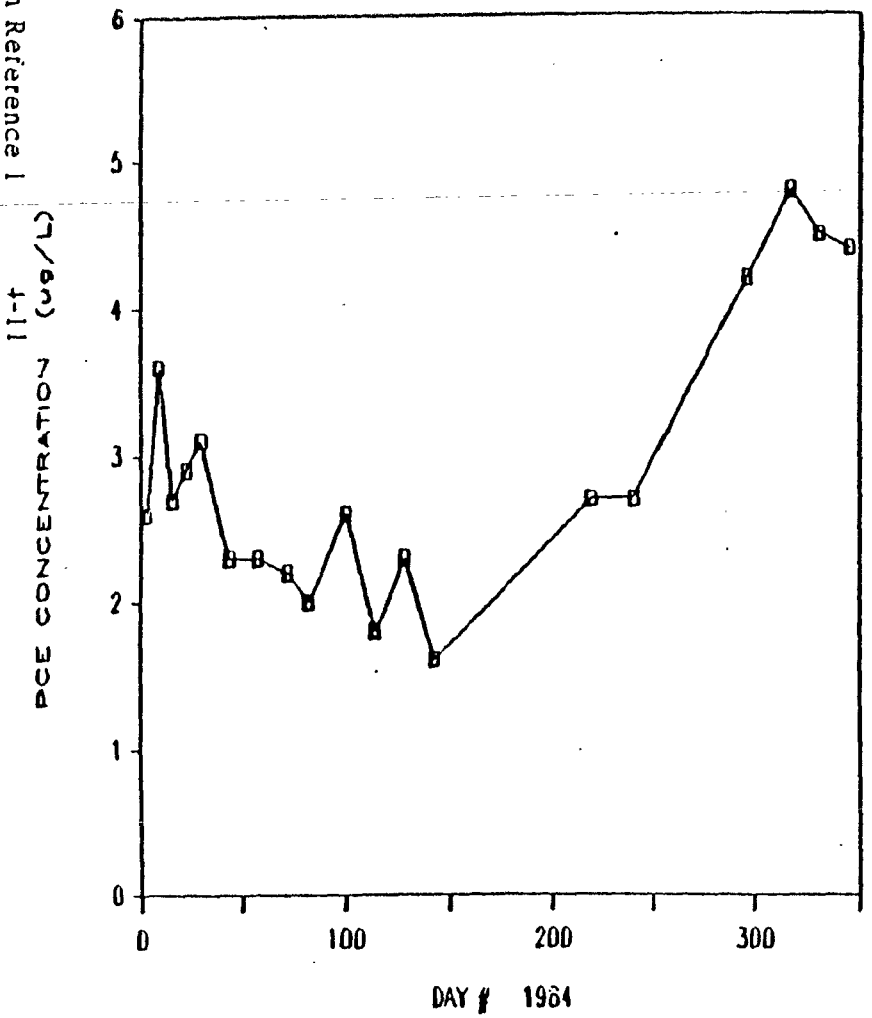
Area #3

From Reference 1

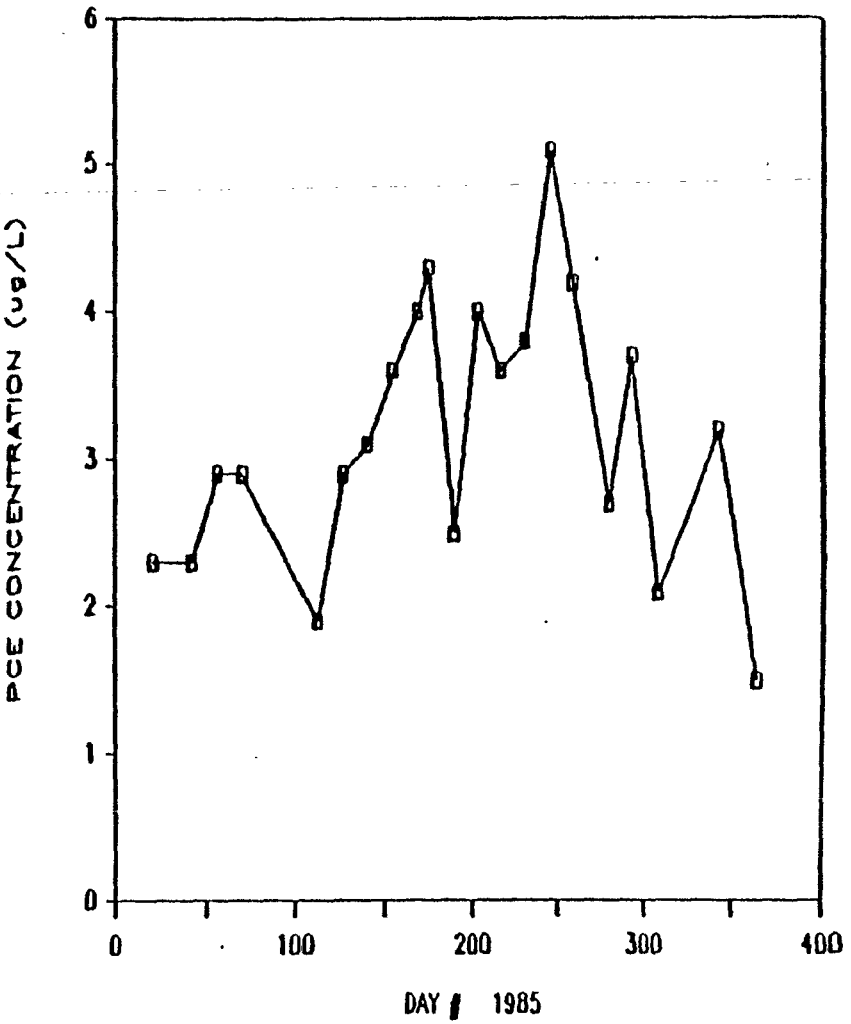


300155

## NP-5 PCE RESULTS - 1984




## NP-5 PCE RESULTS - 1985



NP-5 RESULTS FOR 1984 ug/L

| DATE | DAY # | SAMPLE # | TCE | PCE |
|---|---|---|---|---|
| -Jan-84 | 3 | 4 | 0.3 | 2.6 |
| -Jan-84 | 9 | 28 | 0.3 | 3.6 |
| 16-Jan-84 | 16 | 60 | 0.4 | 2.7 |
| 23-Jan-84 | 23 | 93 | <0.3 | 2.9 |
| 30-Jan-84 | 30 | 115 | 0.4 | 3.1 |
| 13-Feb-84 | 44 | 181 | 0.3 | 2.3 |
| 27-Feb-84 | 58 | 234 | <0.3 | 2.3 |
| 12-Mar-84 | 72 | 264 | 0.6 | 2.2 |
| 22-Mar-84 | 82 | 322 | 0.4 | 2.0 |
| 09-Apr-84 | 100 | 455 | 1.5 | 2.6 |
| 23-Apr-84 | 114 | 539 | 0.2 | 1.8 |
| 07-May-84 | 128 | 605 | 0.3 | 2.3 |
| 21-May-84 | 142 | 696 | 0.2 | 1.6 |
| 06-Aug-84 | 219 | 987 | 0.3 | 2.7 |
| 27-Aug-84 | 240 | 1103 | <0.5 | 2.7 |
| 22-Oct-84 | 296 | 1316 | <0.5 | 4.2 |
| 12-Nov-84 | 317 | 1448 | <0.5 | 4.8 |
| 26-Nov-84 | 331 | 1548 | 0.8 | 4.5 |
| 10-Dec-84 | 345 | 1665 | 0.8 | 4.4 |

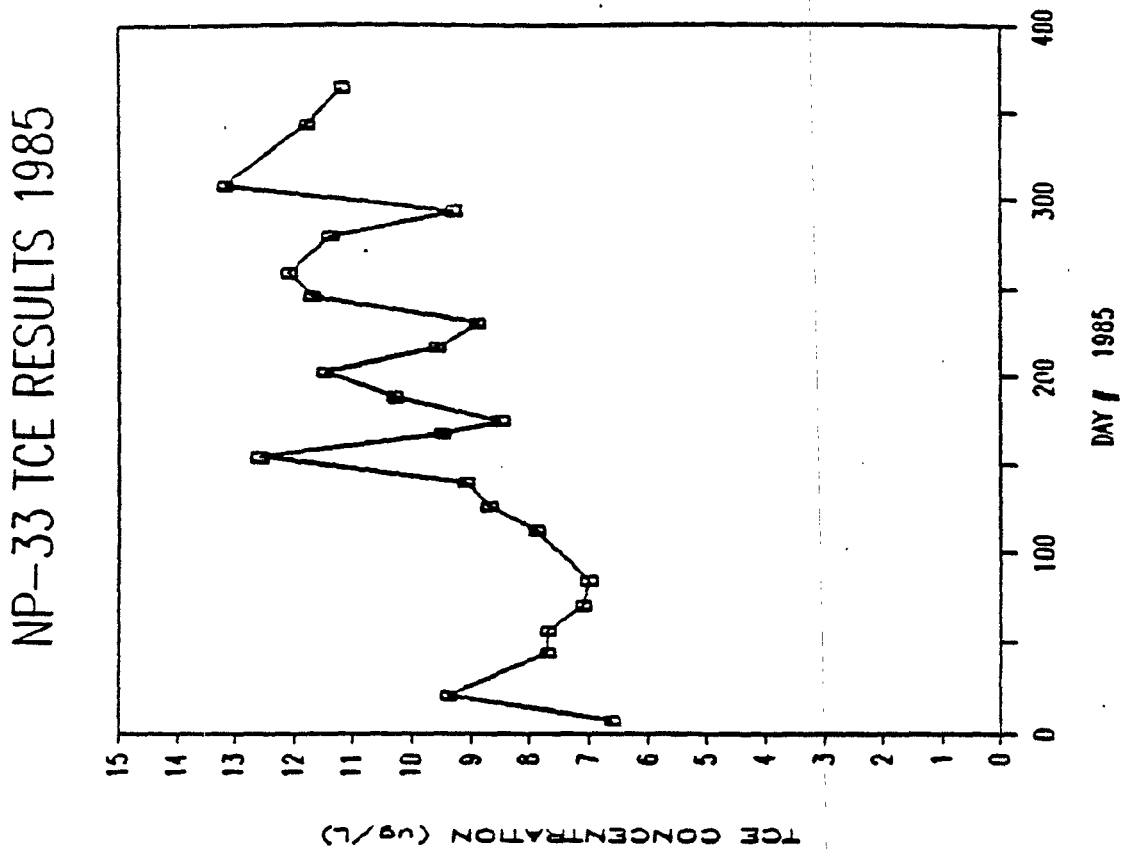
NP-5 RESULTS FOR 1985 ug/L

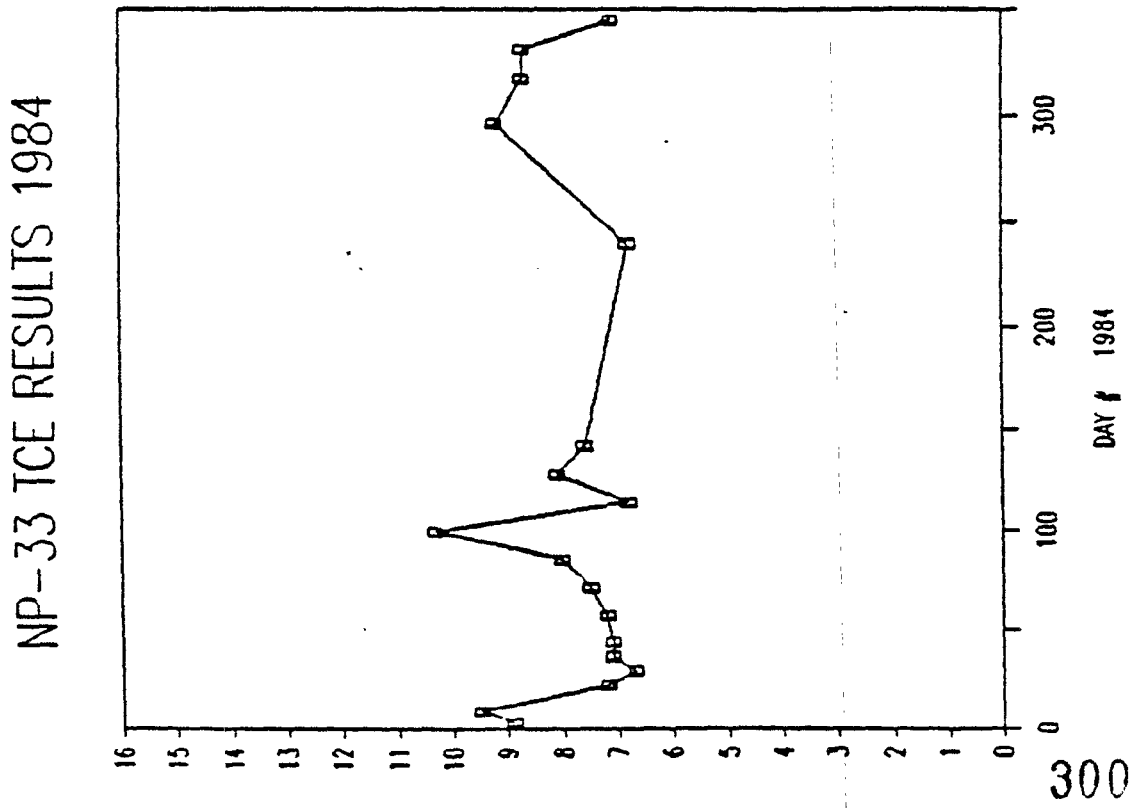
| DATE | DAY # | SAMPLE # | TCE | PCE |
|---|---|---|---|---|
| -Jan-85 | 21 | 133 | <0.5 | 2.3 |
| Feb-85 | 42 | 343 | <0.5 | 2.3 |
| -Feb-85 | 56 | 438 | <0.5 | 2.9 |
| 11-Mar-85 | 70 | 528 | <0.5 | 2.9 |
| 22-Apr-85 | 112 | 825 | <0.5 | 1.9 |
| 06-May-85 | 126 | 963 | <0.5 | 2.9 |
| 20-May-85 | 140 | 1055 | <0.5 | 3.1 |
| 03-Jun-85 | 154 | 1151 | <0.5 | 3.6 |
| 17-Jun-85 | 168 | 1238 | <0.5 | 4.0 |
| 24-Jun-85 | 175 | 1277 | <0.5 | 4.3 |
| 08-Jul-85 | 189 | 1344 | <0.5 | 2.5 |
| 22-Jul-85 | 203 | 1458 | <0.5 | 4.0 |
| 05-Aug-85 | 217 | 1526 | <0.5 | 3.6 |
| 19-Aug-85 | 231 | 1636 | <0.5 | 3.8 |
| 03-Sep-85 | 246 | 1751 | <0.5 | 5.1 |
| 16-Sep-85 | 259 | 1844 | <0.5 | 4.2 |
| 07-Oct-85 | 280 | 1946 | <0.5 | 2.7 |
| 21-Oct-85 | 294 | 2144 | <0.5 | 3.7 |
| 04-Nov-85 | 308 | 2201 | <0.5 | 2.1 |
| 09-Dec-85 | 343 | 2528 | <0.5 | 3.2 |
| 30-Dec-85 | 364 | 2683 | <0.5 | 1.5 |

300156

From Reference 1

Area #3




300157

Area #3

From Reference 1

NP-33 RESULTS FOR 1984 ug/L

| DATE | DAY # | SAMPLE # | TCE | PCE |
|---|---|---|---|---|
| -Jan-84 | 3 | 7 | 8.9 | <0.3 |
| -Jan-84 | 9 | 31 | 9.5 | 0.3 |
| 23-Jan-84 | 23 | 95 | 7.2 | <0.3 |
| 30-Jan-84 | 30 | 119 | 6.7 | <0.3 |
| 06-Feb-84 | 37 | 148 | 7.1 | <0.3 |
| 13-Feb-84 | 44 | 182 | 7.1 | <0.3 |
| 27-Feb-84 | 58 | 238 | 7.2 | 0.5 |
| 12-Mar-84 | 72 | 266 | 7.5 | 0.3 |
| 26-Mar-84 | 86 | 325 | 8.0 | 0.3 |
| 09-Apr-84 | 100 | 458 | 10.3 | 0.3 |
| 23-Apr-84 | 114 | 542 | 6.8 | <0.3 |
| 07-May-84 | 128 | 608 | 8.1 | 0.3 |
| 21-May-84 | 142 | 699 | 7.6 | <0.3 |
| 27-Aug-84 | 240 | 1106 | 6.8 | <0.3 |
| 22-Oct-84 | 296 | 1318 | 9.2 | 0.8 |
| 12-Nov-84 | 317 | 1451 | 8.7 | <0.5 |
| 26-Nov-84 | 331 | 1551 | 8.7 | <0.5 |
| 10-Dec-84 | 345 | 1608 | 7.1 | 0.8 |

NP-33 RESULTS FOR 1985 ug/L

| DATE | DAY # | SAMPLE # | TCE | PCE |
|---|---|---|---|---|
| 07-Jan-85 | 7 | 61 | 6.6 | <0.5 |
| 21-Jan-85 | 21 | 137 | 9.4 | <0.5 |
| 13-Feb-85 | 44 | 392 | 7.7 | <0.5 |
| -Feb-85 | 58 | 441 | 7.7 | <0.5 |
| -Mar-85 | 70 | 530 | 7.1 | <0.5 |
| 25-Mar-85 | 84 | 678 | 7.0 | 0.5 |
| 22-Apr-85 | 112 | 829 | 7.9 | <0.5 |
| 06-May-85 | 126 | 967 | 8.7 | <0.5 |
| 20-May-85 | 140 | 1059 | 9.1 | <0.5 |
| 03-Jun-85 | 154 | 1155 | 12.6 | <0.5 |
| 17-Jun-85 | 168 | 1241 | 9.5 | <0.5 |
| 24-Jun-85 | 175 | 1282 | 8.5 | <0.5 |
| 08-Jul-85 | 189 | 1348 | 10.3 | <0.5 |
| 22-Jul-85 | 203 | 1462 | 11.5 | <0.5 |
| 05-Aug-85 | 217 | 1530 | 9.6 | <0.5 |
| 19-Aug-85 | 231 | 1641 | 8.9 | <0.5 |
| 03-Sep-85 | 246 | 1755 | 11.7 | <0.5 |
| 16-Sep-85 | 259 | 1848 | 12.1 | <0.5 |
| 07-Oct-85 | 280 | 1950 | 11.4 | <0.5 |
| 21-Oct-85 | 294 | 2119 | 9.3 | 0.5 |
| 04-Nov-85 | 308 | 2195 | 13.2 | <0.5 |
| 09-Dec-85 | 343 | 2533 | 11.8 | <0.5 |
| 30-Dec-85 | 364 | 2666 | 11.2 | <0.5 |

300158

Area #3 From Reference 1

## 4.5 Area 4

Area 4 is situated in Hatfield Township within the Telford quadrangle (see map, page 4-16). The area does not involve any NPWA wells. Residents within the contamination plume rely on private wells or are supplied by NPWA. Several residential wells have concentrations of TCE above the proposed limit of 5 ug/l.[1]

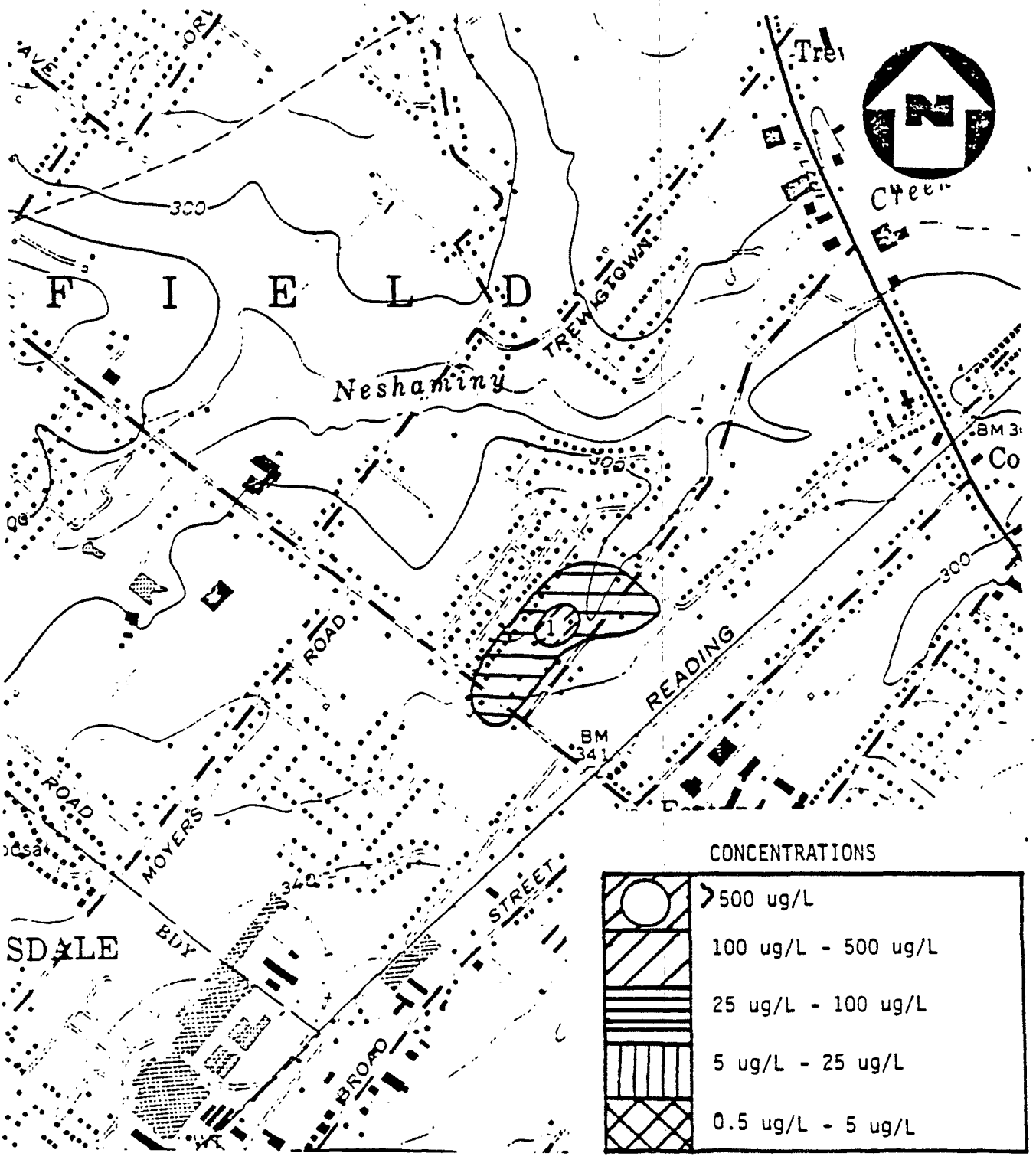
The potentially responsible party in this area is Reclamation Resources. Reclamation Resources was operated by Leroy Beaver as a waste conversion and disposal operation. Mr. Beaver has recently sold the property to Gunther Regan, who built apartments on the property.[1,2,3]

In April 1983, NPWA tested the well at Reclamation Resources and 2 other home wells. The well at Reclamation Resources was contaminated with 180 ug/l TCE, and 16 ug/l PCE. Both home wells were above the limit for TCE of 5 ug/l.[1]

It appears Reclamation Resources has contaminated residential wells in the area. The public water system is readily available to individuals still utilizing private wells for their water supply.



300159




AREA 4

(no scale)

1 RECLAMATION RESOURCES

FROM REFERENCE 5

NUS CORPORATION

A Halliburton Company



300160

## 4.6 Area 5

Area 5 is situated in Hatfield Township and Montgomery Township within the Telford quadrangle (see map, page 4-18). The majority of the area is not served by NPWA, but relies on private wells or is served by North Wales Water Authority. NPWA well NP-21 lies within the contamination plume. Contamination of NP-21 was first discovered in August 1979. TCE concentrations ranged from 1.6 to 19.8 ug/l during 1984 to 1985 (see pages 4-19 and 4-20). NP-21 is 500 feet deep and has a permitted capacity of 854,000 gpd.[1]

Several potentially responsible parties have been identified in this area including American Electronic Laboratories (AEL), Gas Spring Company, Brown, Boveri Electric, and Linberg Company.[1,2]

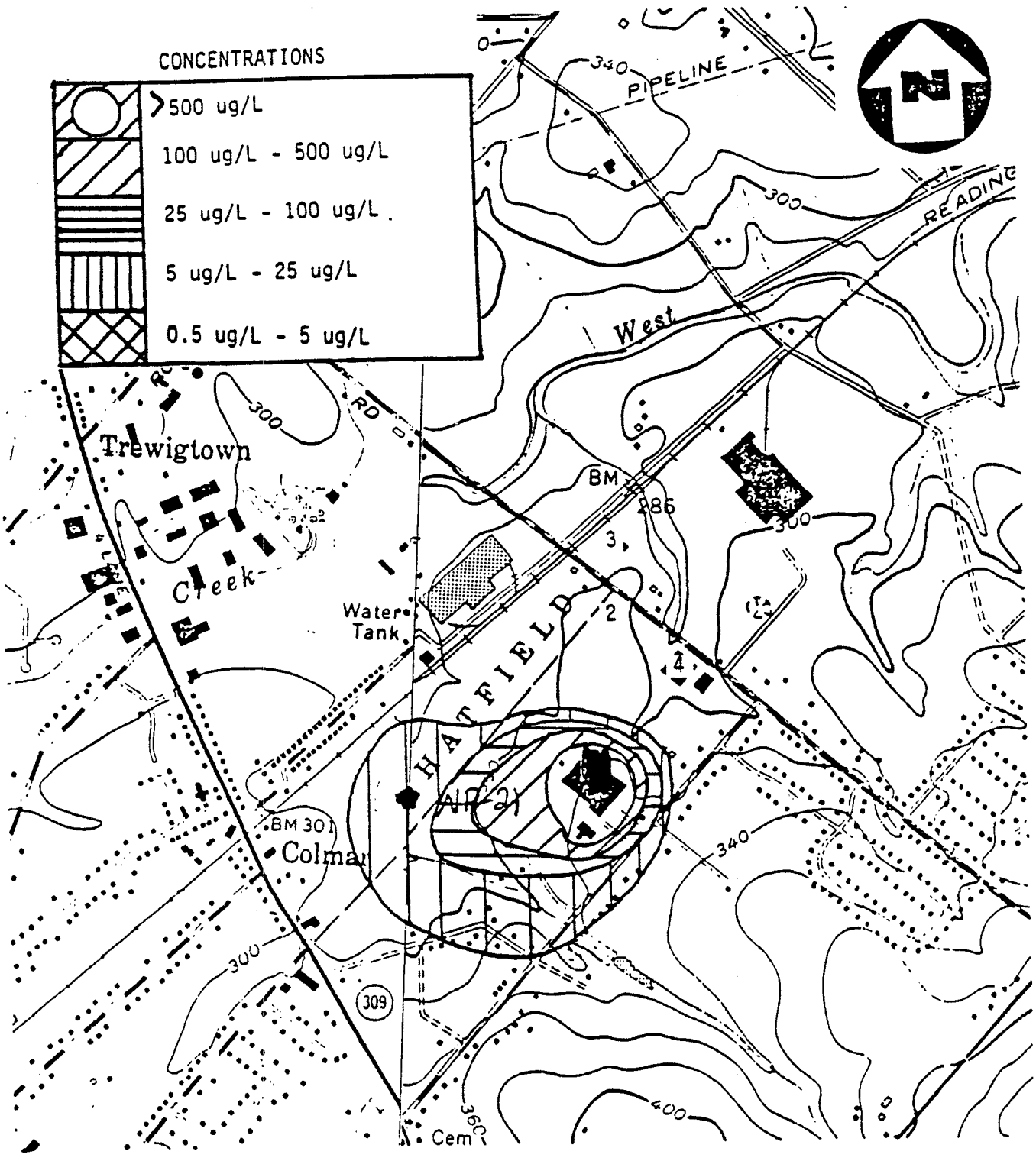
Information generated by NPWA to establish the contamination plume, along with investigations conducted by PA DER and EPA, indicated that AEL is the major potential responsible party in the area. Monitoring wells on AEL property have concentrations of TCE in excess of 500 ug/l. The contaminants have moved from AEL primarily to the south and west, thus contaminating NP-21 and probably some home wells in the area.[1,2,3]

EPA has named Linberg Company and Brown, Boveri Electric as users of TCE and/or PCE. In addition, Gas Springs Company uses TCE, which is delivered by Baron Blakeslee Division of Allied Chemical Company. On 1 occasion, an NPWA employee saw a Baron Blakeslee tank truck leaking TCE onto the ground at the Gas Springs facility.[1,2]

AEL is presently working with PA DER in an effort to correct the contamination problem in and around their facility. If home wells in the area are found to be contaminated, public water supply is available (see map in appendix B).



300161




AREA 5 (no scale)

[redacted]

2 GAS SPRING COMPANY

3 BROWN, BOVERI ELECTRIC

4 LINBERG COMPANY

FROM REFERENCE 5 and 6

NUS CORPORATION
A Halliburton Company



300162

NP-21 RESULTS FOR 1984 ug/L

| DATE | DAY # | SAMPLE # | 1,1-DCE | C-1,2-DCE | 1,1,1-TCA | TCE |
|---|---|---|---|---|---|---|
| -Jan-84 | 3 | 5 | 0.6 | 0.2 | 5.3 | 10.8 |
| -Jan-84 | 9 | 29 | 0.7 | <0.2 | 6.4 | 11.2 |
| 23-Jan-84 | 23 | 94 | 2.3 | 0.2 | 5.6 | 11.0 |
| 30-Jan-84 | 30 | 116 | 0.8 | 0.2 | 5.6 | 10.6 |
| 02-Feb-84 | 33 | 132 | 0.8 | <0.2 | 5.5 | 10.2 |
| 06-Feb-84 | 37 | 144 | 0.8 | 0.3 | 5.3 | 10.2 |
| 10-Feb-84 | 41 | 165 | 0.8 | 0.2 | 5.5 | 10.0 |
| 13-Feb-84 | 44 | 189 | 0.9 | 0.2 | 5.4 | 10.4 |
| 16-Feb-84 | 47 | 194 | 0.8 | 0.5 | 5.2 | 9.9 |
| 21-Feb-84 | 52 | 209 | 0.8 | 0.2 | 4.5 | 8.1 |
| 27-Feb-84 | 58 | 237 | 1.3 | 0.2 | 8.9 | 14.2 |
| 12-Mar-84 | 72 | 265 | 1.2 | 0.3 | 8.9 | 10.2 |
| 19-Mar-84 | 79 | 297 | 1.3 | 1.2 | 9.3 | 8.9 |
| 20-Mar-84 | 80 | 311 | 1.3 | 0.2 | 9.5 | 8.9 |
| 26-Mar-84 | 86 | 324 | 3.0 | 0.5 | 10.1 | 8.8 |
| 09-Apr-84 | 100 | 456 | 1.7 | 0.3 | 13.8 | 9.9 |
| 23-Apr-84 | 114 | 540 | 2.5 | 0.2 | 13.5 | 8.1 |
| 07-May-84 | 128 | 606 | 2.1 | 0.2 | 11.4 | 10.1 |
| 21-May-84 | 142 | 697 | 0.9 | 0.2 | 9.4 | 9.4 |
| 06-Aug-84 | 219 | 988 | 1.2 | 0.2 | 14.6 | 13.5 |
| 27-Aug-84 | 240 | 1104 | 1.0 | <0.5 | 12.1 | 8.6 |
| 31-Aug-84 | 244 | 1124 | 1.1 | <0.5 | 9.5 | 10.5 |
| 22-Oct-84 | 296 | 1317 | 1.5 | <0.5 | 9.0 | 11.2 |
| 12-Nov-84 | 317 | 1450 | 2.0 | <0.5 | 7.4 | 9.4 |
| 26-Nov-84 | 331 | 1549 | 1.7 | <0.5 | 7.1 | 9.1 |
| 0-Dec-84 | 345 | 1666 | 2.0 | <0.5 | 5.5 | 10.5 |

NP-21 RESULTS FOR 1985 ug/L

| DATE | DAY # | SAMPLE # | 1,1-DCE | C-1,2-DCE | 1,1,1-TCA | TCE |
|---|---|---|---|---|---|---|
| 07-Jan-85 | 7 | 60 | 2.1 | <0.5 | 9.4 | 10.5 |
| 21-Jan-85 | 21 | 135 | 1.3 | <0.5 | 7.3 | 13.2 |
| 11-Feb-85 | 42 | 346 | 1.4 | <0.5 | 5.1 | 7.6 |
| 25-Feb-85 | 56 | 439 | 1.5 | <0.5 | 6.3 | 9.9 |
| 13-Mar-85 | 72 | 543 | 1.7 | <0.5 | 7.0 | 12.2 |
| 25-Mar-85 | 84 | 677 | 1.4 | <0.5 | 9.0 | 10.8 |
| 22-Apr-85 | 112 | 828 | 1.2 | <0.5 | 8.3 | 8.3 |
| 06-May-85 | 126 | 966 | 2.5 | <0.5 | 12.0 | 19.6 |
| 20-May-85 | 140 | 1057 | 1.2 | <0.5 | 4.8 | 10.0 |
| 03-Jun-85 | 154 | 1154 | 1.3 | <0.5 | 7.1 | 13.7 |
| 17-Jun-85 | 168 | 1240 | 0.7 | <0.5 | 6.0 | 9.6 |
| 24-Jun-85 | 175 | 1280 | 0.8 | <0.5 | 3.9 | 7.8 |
| 08-Jul-85 | 189 | 1347 | 0.9 | <0.5 | 5.7 | 8.8 |
| 22-Jul-85 | 203 | 1460 | <0.5 | <0.5 | 6.4 | 1.7 |
| 05-Aug-85 | 217 | 1529 | <0.5 | <0.5 | 5.0 | 5.1 |
| 19-Aug-85 | 231 | 1639 | <0.5 | <0.5 | 4.1 | 2.1 |
| 03-Sep-85 | 246 | 1754 | 0.5 | <0.5 | 4.8 | 5.5 |
| 16-Sep-85 | 259 | 1846 | <0.5 | <0.5 | 4.6 | 1.6 |
| 07-Oct-85 | 280 | 1949 | 1.1 | <0.5 | 3.9 | 11.7 |
| 21-Oct-85 | 294 | 2117 | 0.5 | <0.5 | 3.8 | 7.7 |
| 4-Nov-85 | 308 | 2193 | <0.5 | <0.5 | 3.0 | 7.5 |
| /-Dec-85 | 343 | 2531 | <0.5 | <0.5 | 4.0 | 9.6 |
| 30-Dec-85 | 364 | 2665 | <0.5 | <0.5 | 3.2 | 8.5 |

Area # 5 From Reference 1



300163

REFERENCE NO. 13

300164

## 4.7 Area 6

Area 6 is situated predominantly in the borough of Lansdale and extends into Hatfield Township, Towamencin Township, and Upper Gwynedd Township. The area is located in the southern Telford and northern Lansdale quadrangle (see map, page 4-24). This area has the greatest areal extent and contamination concentrations within the North Penn study area. VOC contamination of groundwater was discovered in this area in August 1979. NPWA wells L-8, L-9, L-10, and L-25 are not in use due to high levels of VOCs. NPWA well L-23 exceeds the proposed limit for TCE of 5 ug/l and would require treatment for continued use. In addition, NPWA well L-21 is located near the plume and is contaminated with TCE, although the concentration is below the proposed limit.[1]

NPWA well L-8 is the most contaminated well in the area. Chemical contaminants include vinyl chloride (15 to 45 ug/l), TCE (300 to 2,000 ug/l), PCE (150 to 800 ug/l), cis-1,2-dichloroethylene (200 to 1,200 ug/l), 1,1,1-trichloroethane (15 to 50 ug/l), and 1,1-dichloroethylene (10 to 15 ug/l) (see page 4-25). L-8 is presently treated with a carbon-activated filter and discharges into the sewer. L-9 has TCE contamination ranges of 28 to 190 ug/l and a PCE contamination range of 4.7 to 172 ug/l (see pages 4-26 and 4-27). L-10 has TCE and PCE contamination of 25 ug/l. L-25 has TCE contamination of 34 ug/l and a PCE contamination of 12 ug/l. L-23 has a TCE concentration of 10.4-30.4 ug/l (see page 4-28). The maximum concentration of TCE in L-21 to date is 1.3 ug/l (see page 4-29).[1]

Potentially responsible parties in area 6 include J.W. Rex Company, John Evans' Sons, Incorporated, Keystone Hydraulics, Royal Cleaners, Eaton Laboratories, Lansdale Transportation, Andale Company, Philadelphia Toboggan (now HGH Corporation), and Precision Rebuilders.[1,2]

The Keystone Hydraulics property was previously owned by the Allied Chemical Plant, and J.W. Rex owned the property prior to Allied. All 3 industries probably contributed to the VOC contamination in the area and in particular to well L-8, located across the street from the plant. In addition, Eaton Laboratories, a known user of TCE, is located near L-8. J.W. Rex is also believed to have contaminated the groundwater at its present location, on Eighth Street (see map, page 4-24).[1,2]



300165

John Evans' and Philadelphia Toboggan, now owned by HGH Corporation, are believed to be the major sources of VOC contamination in the northeastern section of the plume. Concentrations of TCE are above 500 ug/l around and between these facilities.[1,2]

Royal Cleaners and Lansdale Transportation, now owned by Lansdale Realty, are believed to be the responsible parties for the PCE contamination plume. This plume is mapped separately and is located northeast of the main plume. The concentration of PCE in groundwater near Royal Cleaners is greater than 100 ug/l.[1,2]

Andale Company, located on Hancock Street outside the plume, may also be a potentially responsible party for VOC contamination. Andale is a known user of TCE, although there is not a remarkable groundwater contamination problem at or near their facility.[1,2]

Precision Rebuilders, who now occupy the building used by K and K Laundry, may be a responsible party. Wells at their facility were reported by EPA to be grossly contaminated. It is difficult to determine if Precision Rebuilders or K and K Laundry, or both parties, are responsible for the contamination.[1,2]

In addition, Crystal Soap and Chemical Company, Decision Data Computer Company, Skee-Ball, and American Olean Tile Company could be potentially responsible parties of VOC contamination, but little is known about their operations at this time. Lehigh Valley Farms-Atlantic Processing, Incorporated may be a responsible party. TCE contamination was recently detected in their wells, but it is difficult to identify them as a party since the plume appears to be moving slowly toward their facility (southwest). William Wilson's Sons is located in the southern section of the plume and may be a potentially responsible party.[1,2]

It appears that the VOC contaminants have moved from their origin in the northern section of the plume southwest where L-9, L-10, and L-25 are located.[1]



300166

Improper handling and disposal of VOCs has caused a major groundwater contamination problem in the industrial borough of Lansdale. NPWA has 6 wells contaminated with VOCs in this area. At this time, L-8, L-9, L-10, and L-25 are out of service due to VOC contamination. Together, these wells have a permitted capacity of 489,600 gpd. Water from L-8 is presently treated at the well head, then piped to the wastewater treatment plant for additional treatment. Water from L-23 exceeds the proposed limit for TCE of 5 ug/l and would require treatment for continued use. L-23 has a permitted capacity of 144,000 gpd. NPWA well L-21 is contaminated below the proposed limit and has a permitted capacity of 86,400 gpd. Potentially responsible parties for the VOC contamination for this area have been named and their approximate locations have been mapped on page 4-24.



300167

NUS CORPORATION
A Halliburton Company

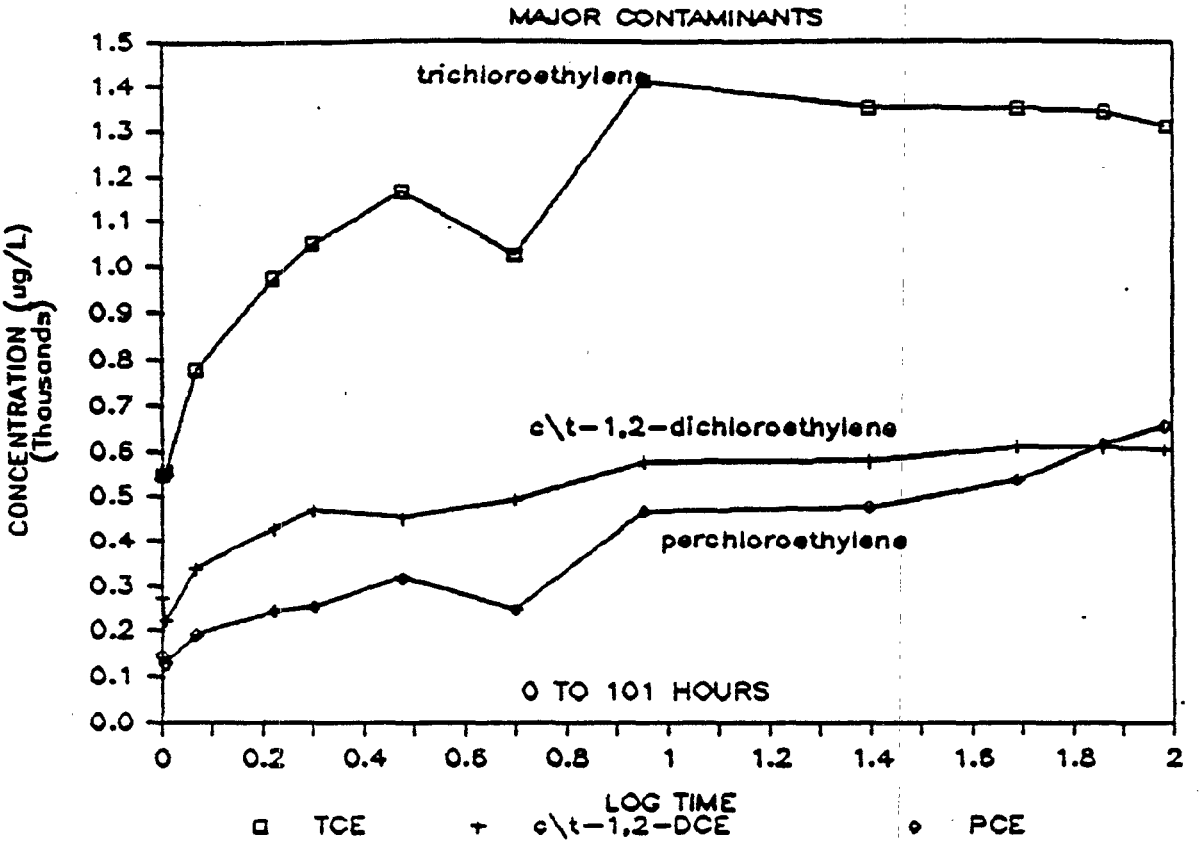
(no scale)

1 J.W. REX COMPANY
2 JOHN EVANS' SONS, INC.
[redacted]
4 EATON LABORATORIES
5 ROYAL CLEANERS
6 LANSDALE TRANSPORTATION
7 ANDALE COMPANY
8 H.G.H. CORPORATION
9 PRECISION REBUILDERS
10 AMERICAN OLEAN TILE COMPANY
11 DECISION DATA COMPUTER COMPANY
12 SKEE-BALL
13 WILLIAM WILSONS' SONS
14 LEHIGH VALLEY FARMS
15 CRYSTAL SOAP AND CHEMICAL CO.

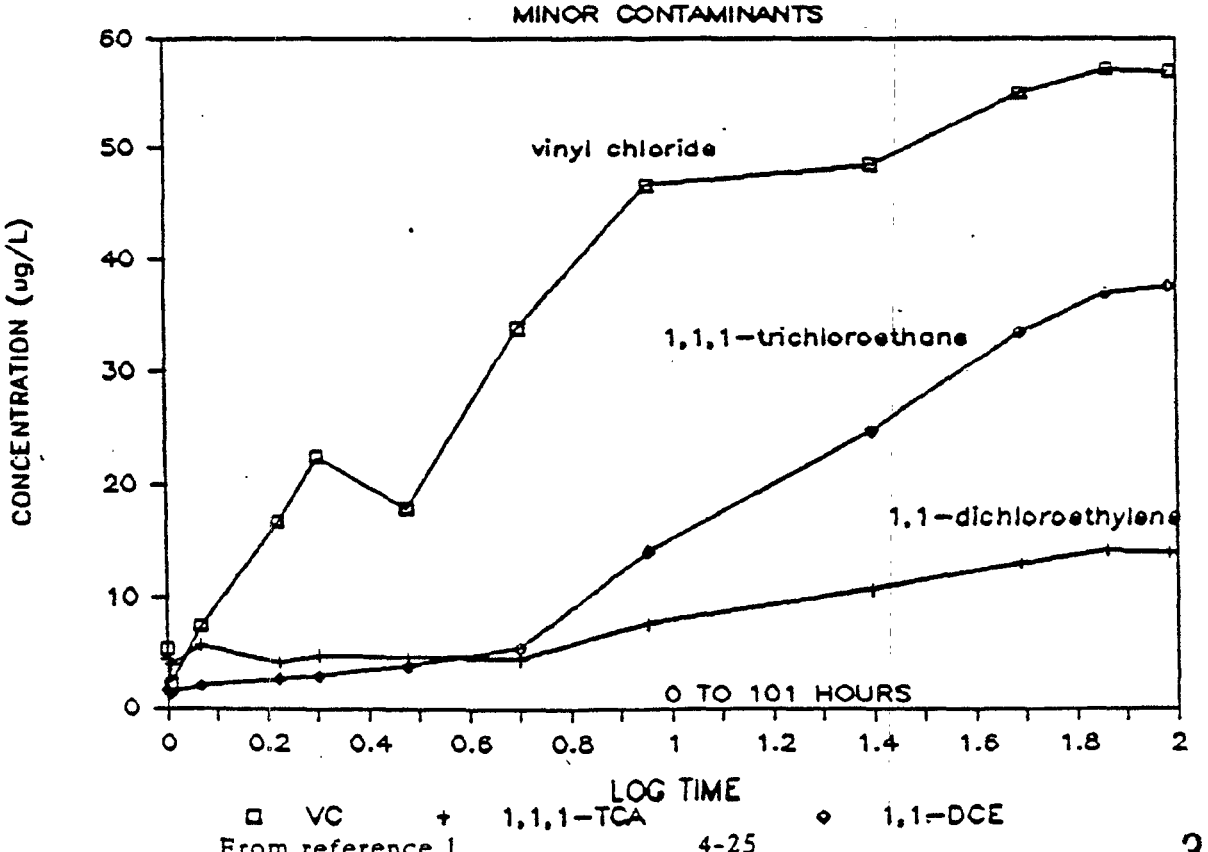
FROM REFERENCE 5 and 8

300168

# L-8 PUMPING TEST - JANUARY 1986




# L-8 PUMPING TEST - JANUARY 1986



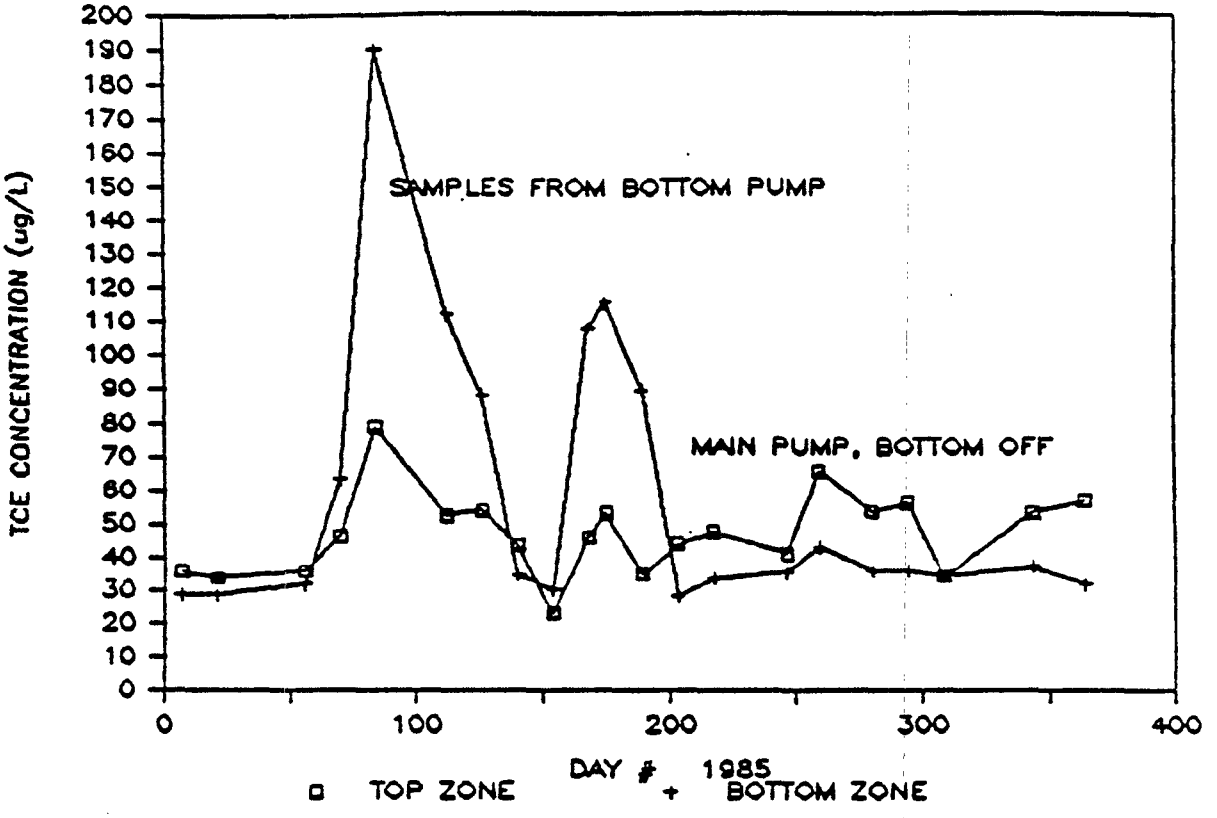

From reference 1



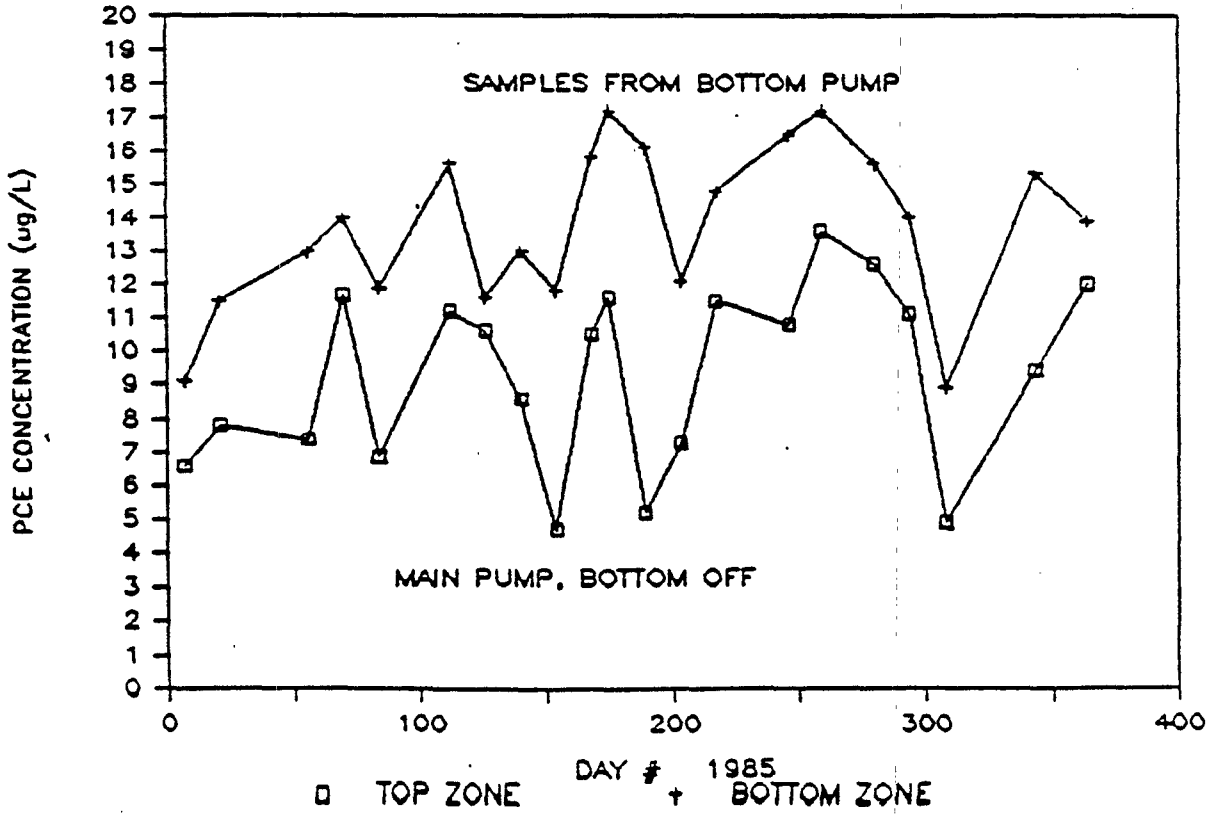
300169

Area # 5

# L-9 TCE RESULTS 1985

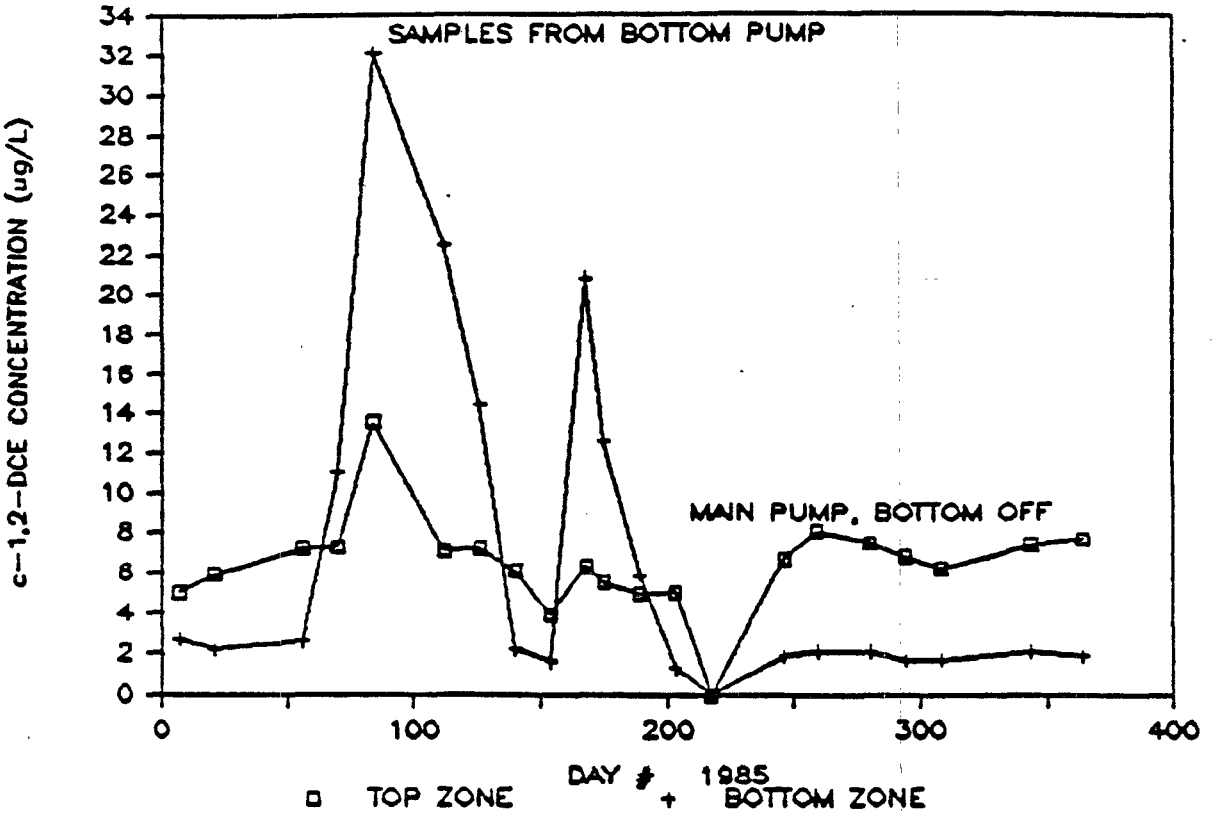



# L-9 PCE RESULTS 1985

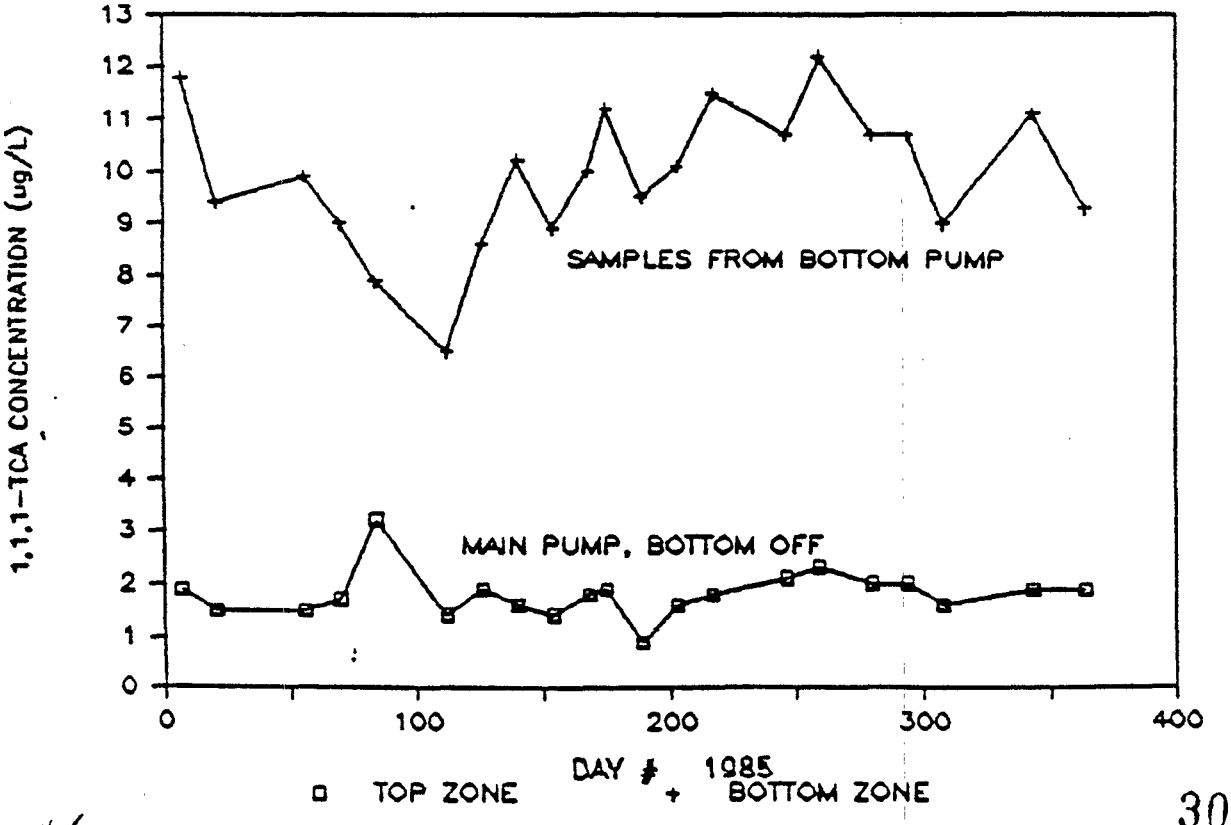



Area #6 From reference 1 4-26 300170

# L-9 c-1,2-DCE RESULTS 1985




# L-9 1,1,1-TCA RESULTS 1985




Area #6

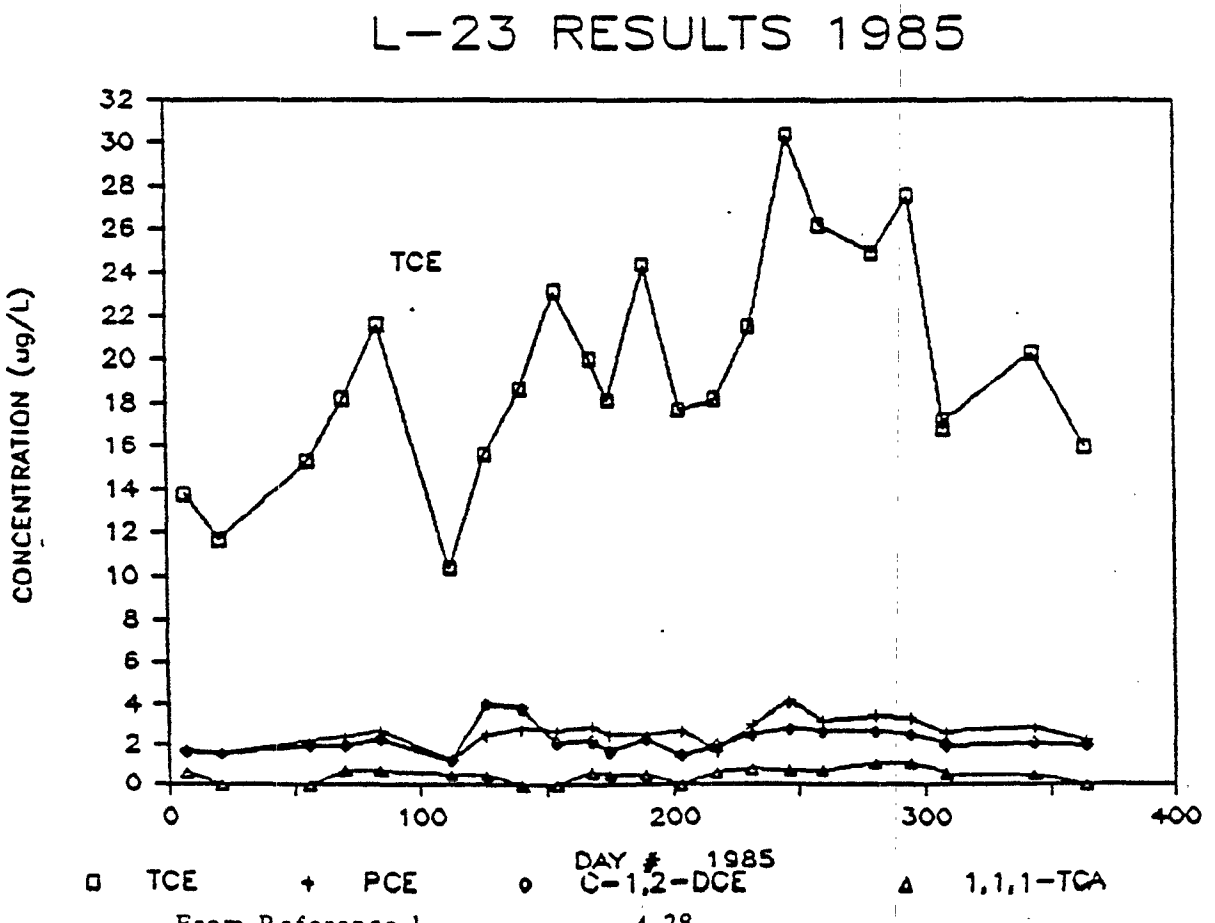
From Reference 1



300171

L-23 RESULTS FOR 1985

| DATE | DAY # | SAMPLE # | C-1,2-DCE | 1,1,1-TCA | TCE | PCE |
|---|---|---|---|---|---|---|
| | | | | ug/L | | |
| -Jan-85 | 7 | 57 | 1.7 | 0.6 | 13.8 | 1.8 |
| .-Jan-85 | 21 | 146 | 1.6 | <0.5 | 11.7 | 1.6 |
| 25-Feb-85 | 56 | 436 | 2.0 | <0.5 | 15.3 | 2.2 |
| 11-Mar-85 | 70 | 527 | 2.0 | 0.7 | 18.2 | 2.4 |
| 25-Mar-85 | 84 | 673 | 2.3 | 0.7 | 21.6 | 2.7 |
| 22-Apr-85 | 112 | 824 | 1.2 | 0.5 | 10.4 | 1.3 |
| 06-May-85 | 126 | 962 | 4.0 | 0.5 | 15.6 | 2.5 |
| 20-May-85 | 140 | 1053 | 3.8 | <0.5 | 18.6 | 2.8 |
| 03-Jun-85 | 154 | 1149 | 2.1 | <0.5 | 23.1 | 2.7 |
| 17-Jun-85 | 168 | 1236 | 2.2 | 0.6 | 20.0 | 2.9 |
| 24-Jun-85 | 175 | 1276 | 1.7 | 0.5 | 18.1 | 2.5 |
| 08-Jul-85 | 189 | 1342 | 2.3 | 0.5 | 24.4 | 2.5 |
| 22-Jul-85 | 203 | 1456 | 1.5 | <0.5 | 17.7 | 2.7 |
| 05-Aug-85 | 217 | 1524 | 2.0 | 0.6 | 18.2 | 1.7 |
| 19-Aug-85 | 231 | 1635 | 2.5 | 0.8 | 21.5 | 3.0 |
| 03-Sep-85 | 246 | 1749 | 2.8 | 0.7 | 30.4 | 4.1 |
| 16-Sep-85 | 259 | 1843 | 2.7 | 0.7 | 26.2 | 3.2 |
| 07-Oct-85 | 280 | 1941 | 2.7 | 1.1 | 24.9 | 3.4 |
| 21-Oct-85 | 294 | 2113 | 2.5 | 1.1 | 27.5 | 3.3 |
| 04-Nov-85 | 308 | 2190 | 2.1 | 0.6 | 16.8 | 2.6 |
| 04-Nov-85 | 308 | 2191 | 2.0 | 0.5 | 17.2 | 2.7 |
| 09-Dec-85 | 343 | 2527 | 2.1 | 0.5 | 20.3 | 2.9 |
| 30-Dec-85 | 364 | 2662 | 2.0 | <0.5 | 16.0 | 2.2 |




From Reference 1

4-28

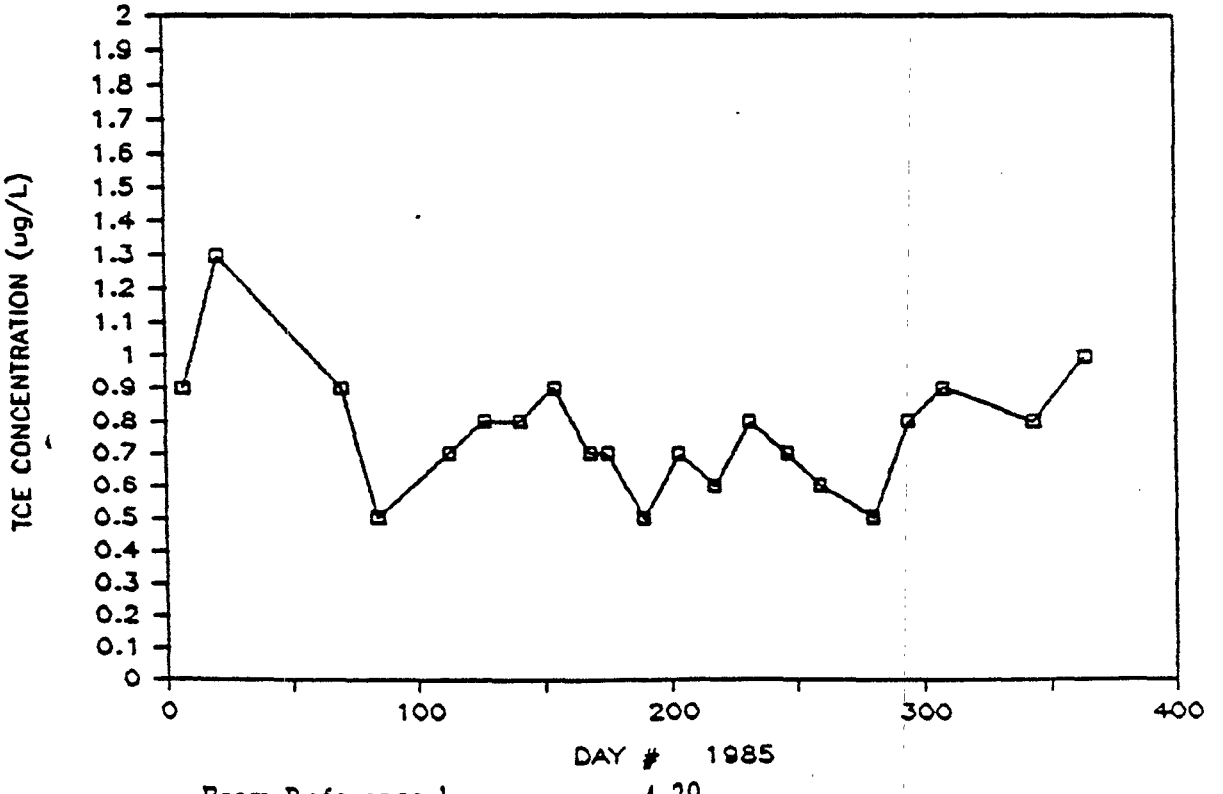
Area #6

300172

L-21 RESULTS FOR 1985

| DATE | DAY # | SAMPLE # | TCE ug/L | PCE ug/L |
|---|---|---|---|---|
| [illegible]Jan-85 | 7 | 53 | 0.9 | <0.5 |
| [illegible] Jan-85 | 21 | 142 | 1.3 | <0.5 |
| 11-Mar-85 | 70 | 522 | 0.9 | <0.5 |
| 25-Mar-85 | 84 | 672 | <0.5 | <0.5 |
| 22-Apr-85 | 112 | 821 | 0.7 | <0.5 |
| 06-May-85 | 126 | 959 | 0.8 | <0.5 |
| 20-May-85 | 140 | 1049 | 0.8 | <0.5 |
| 03-Jun-85 | 154 | 1145 | 0.9 | <0.5 |
| 17-Jun-85 | 168 | 1232 | 0.7 | <0.5 |
| 24-Jun-85 | 175 | 1272 | 0.7 | <0.5 |
| 08-Jul-85 | 189 | 1338 | <0.5 | <0.5 |
| 22-Jul-85 | 203 | 1452 | 0.7 | <0.5 |
| 05-Aug-85 | 217 | 1520 | 0.6 | <0.5 |
| 19-Aug-85 | 231 | 1632 | 0.8 | <0.5 |
| 03-Sep-85 | 246 | 1747 | 0.7 | <0.5 |
| 16-Sep-85 | 259 | 1839 | 0.6 | <0.5 |
| 07-Oct-85 | 280 | 1940 | <0.5 | <0.5 |
| 21-Oct-85 | 294 | 2108 | 0.8 | <0.5 |
| 04-Nov-85 | 308 | 2186 | 0.9 | <0.5 |
| 09-Dec-85 | 343 | 2523 | 0.8 | <0.5 |
| 30-Dec-85 | 364 | 2656 | 1.0 | 0.5 |

# L-21 TCE RESULTS - 1985




From Reference 1



Area #6

300173

## 4.8 Area 7

Area 7 is situated in Upper Gwynedd Township (southeast of Lansdale) within the Lansdale quadrangle (see map, page 4-32). The majority of the area is supplied by North Wales Water Authority or relies on private wells. VOC contamination was discovered in this area in August 1979. NPWA well L-22 lies within the contamination plume. The major contaminant in L-22 is TCE, with concentrations ranging from 50 to 140 ug/l (see page 4-33). Water from L-22 is treated by a granular-activated carbon plant before entering the NPWA distribution system. The well is 645 feet deep and has a permitted capacity of 252,000 gpd.[1]

Several pump tests have been performed in this area, commonly referred to as the Wissahickon well field. A major finding was the observation that, when L-22 is not pumped, VOC contamination levels in L-17 and L-12 (located north of L-22) increase. TCE concentrations in L-17 and L-12 are 1 to 2 ug/l when L-22 is pumping. Continuous pumping of L-22 is needed to keep TCE contamination levels in L-12 and L-17 below the proposed limits of 5 ug/l. Wells L-12 and L-17 have a combined permitted capacity of 244,800 gpd.[1,14]

Many potentially responsible parties have been identified in this area. They include, but are not limited to, Spra-Fin, Incorporated, Ford Electronics and Refrigeration Corporation, Deltron Incorporated, Teleflex, Incorporated, Leeds and Northrup, Porter Instruments, Greene Tweed Company, and Zenith Electronic Corporation.[1,2]

The major source of contamination appears to be Spra-Fin, Incorporated, with TCE concentrations in excess of 13,000 ug/l in groundwater obtained from their on-site wells.

NPWA has determined, from pump tests and additional geologic and hydrogeologic data, that there is a direct hydraulic connection between the Spra-Fin, Incorporated well and NPWA well L-22.[14]

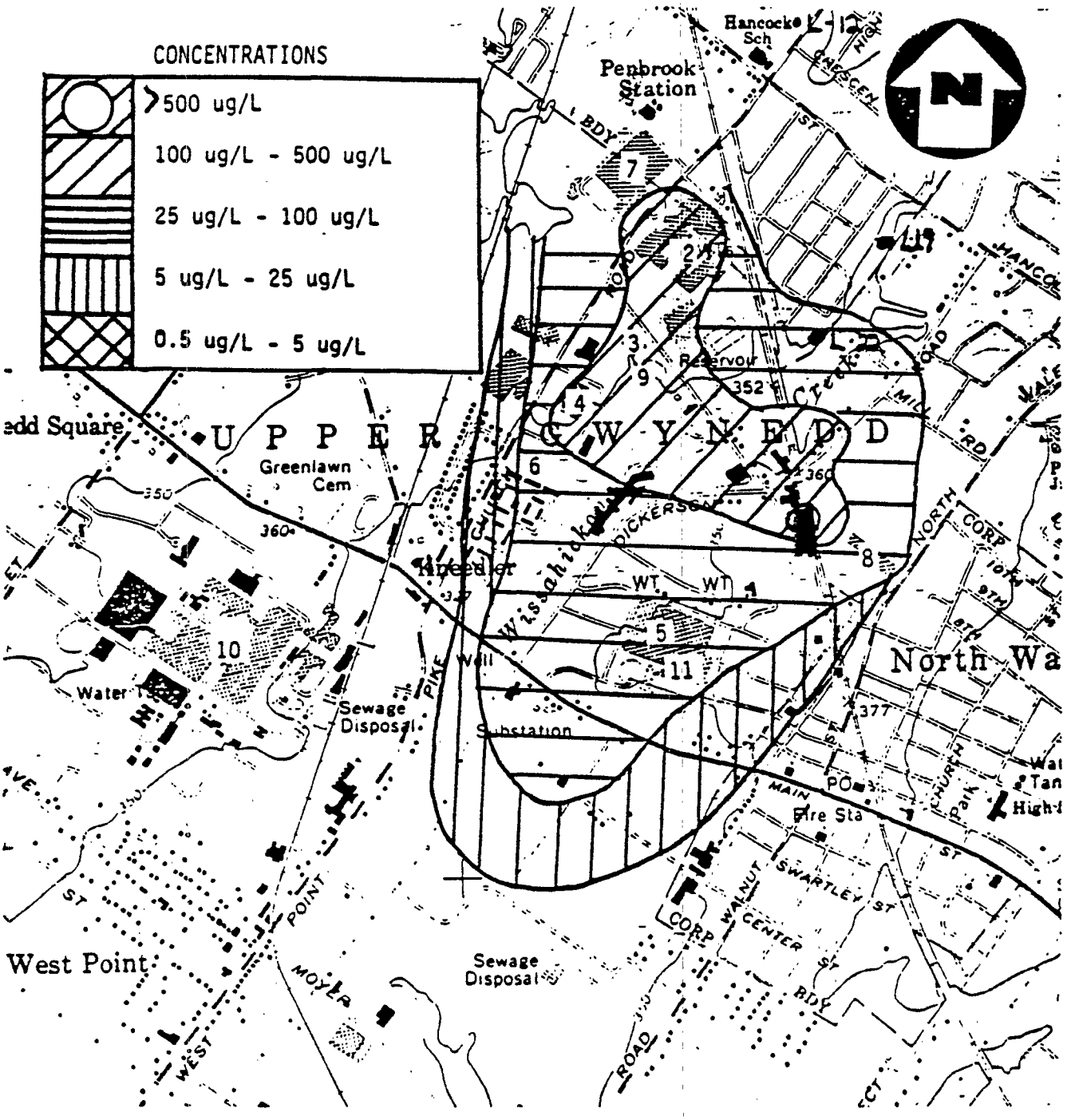


300174

Ford, Detron, Teleflex, Leed and Northrup, Porter Instruments, Greene Tweed, and Zenith are all known users of VOCs and are considered potentially responsible parties in area 7. In addition, Brooks Instruments, Precision Tube Company, Incorporated, and Merck, Sharp, and Dohme could be potentially responsible parties. Brooks Instruments may have owned the Leeds and Northrup property at one time and/or they may have been the owner of Porter Instruments. If either condition is true, Brooks would be considered a potentially responsible party since they are a known user of TCE. It is unknown at this time if Precision Tube or Merck, Sharp, and Dohme are VOC users, but both industries have groundwater contamination below their facilities.[1]



300175




(no scale)

FROM REFERENCE 8

[redacted]

2 FORD ELECTRONICS AND REFRIGERATION CORP.
3 DELTRON INC.
4 TELEFEX, INC.-AEROSCAPE/DEFENSE DIVISION
5 LEEDS AND NORTHRUP
6 PORTER INSTRUMENTS
7 ZENITH ELECTRONICS CORP.
8 GREENE TWEED COMPANY
9 PRECISION TUBE COMPANY, INC.
10 MERCK, SHARP, AND DOHME
11 BROOKS INSTRUMENT DIVISION

NUS CORPORATION
A Halliburton Company

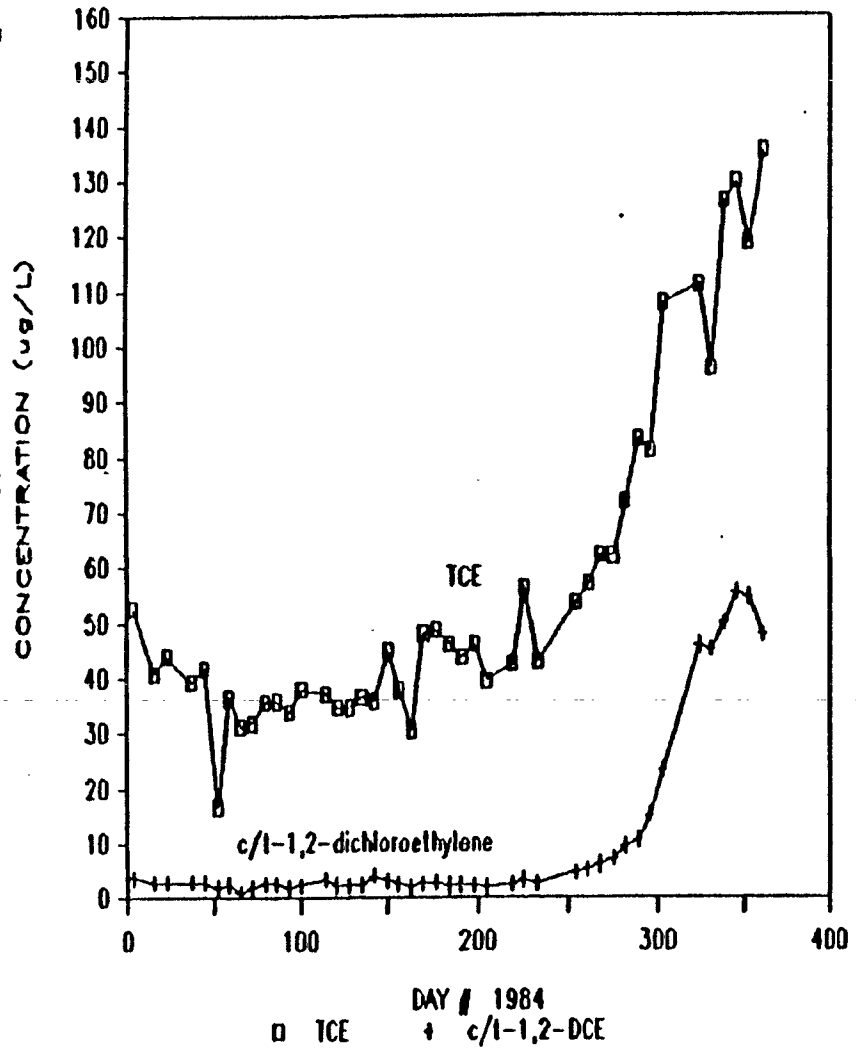


300176

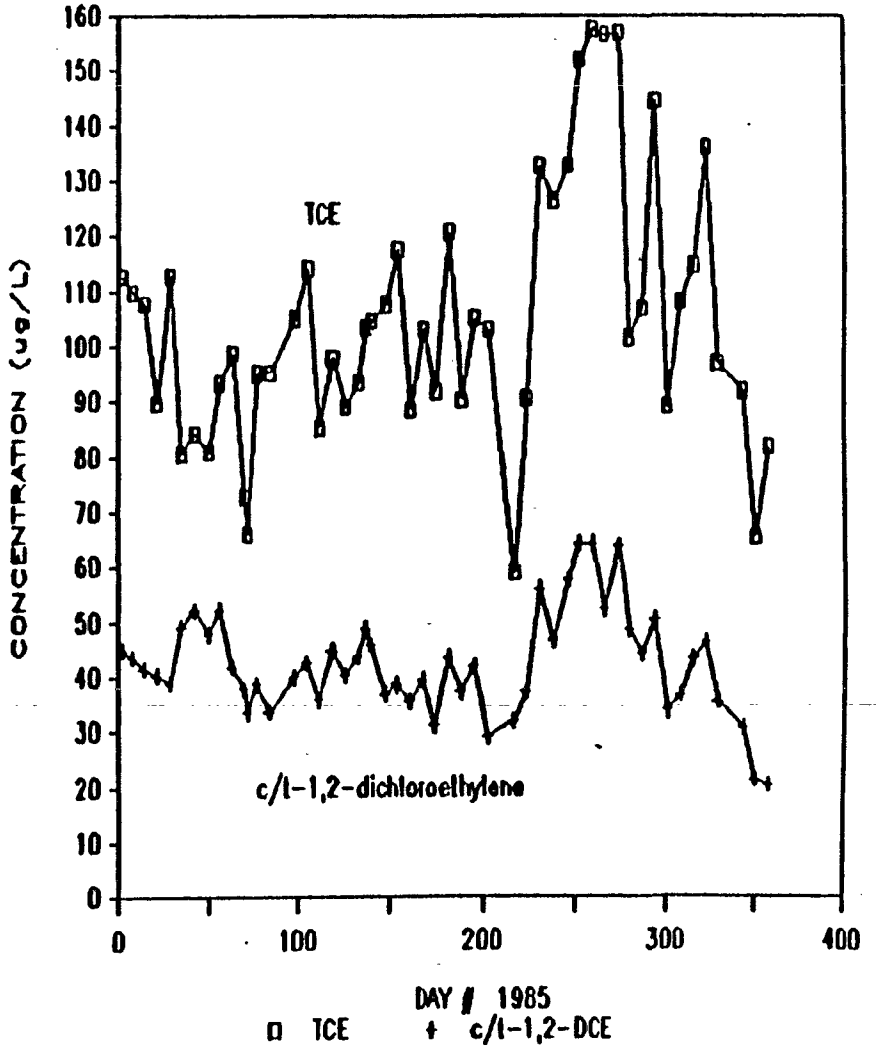
Area # 7

From Reference 1
4-33

## L-22 RAW -- 1984




## L-22 RAW -- 1985



## 4.9 Area 8

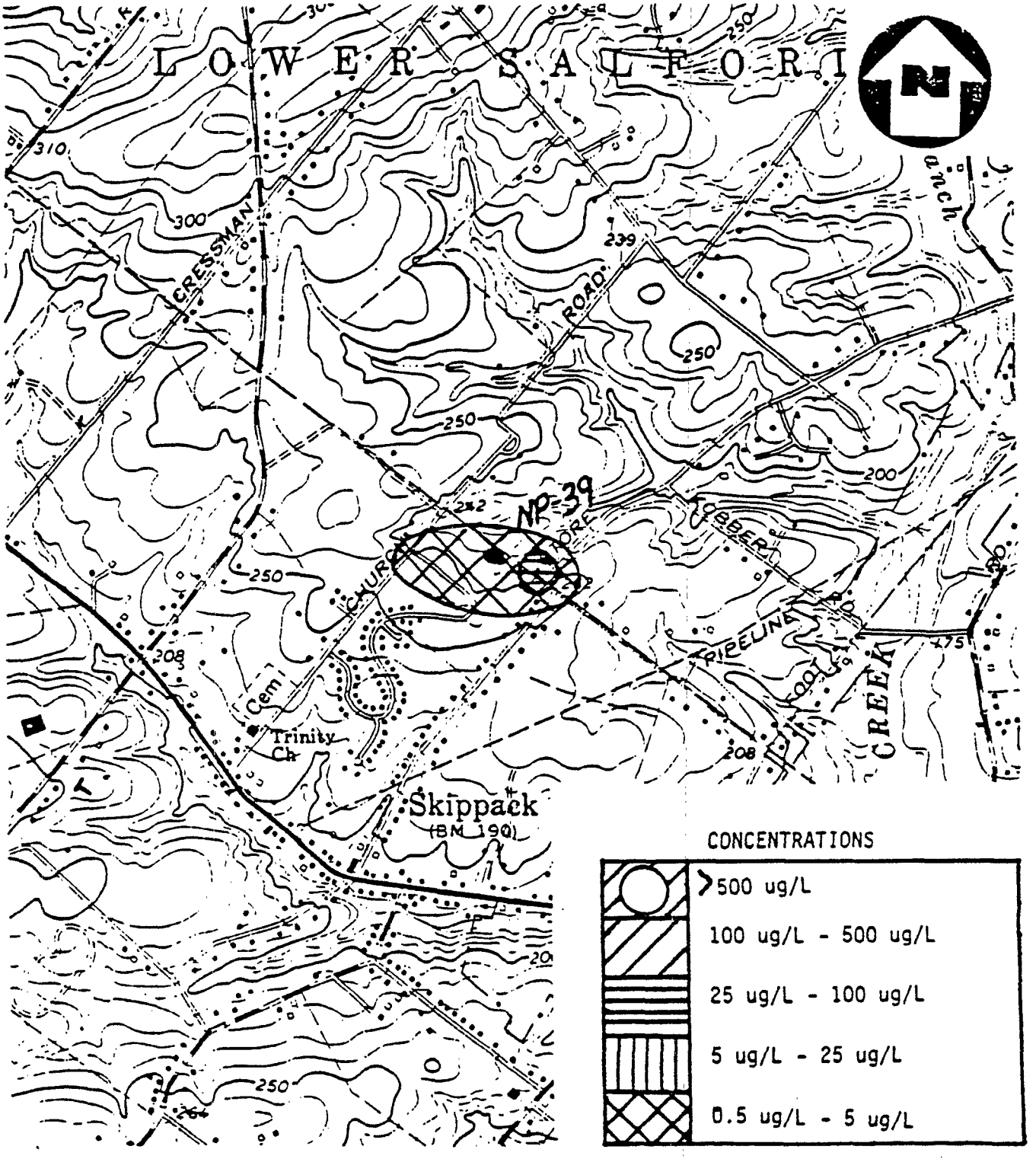
Area 8 is situated on the Lower Salford Township and Skippack Township border just north of Skippack. The area can be located on the Collegeville quadrangle (see map, page 4-35). TCE contamination was first discovered in this area in 1980. NPWA well NP-39, which is located within the contamination plume, has a TCE concentration range of 0.5 to 4.6 ug/l (see page 4-36). NP-39 is 510 feet deep and has a permitted capacity of 360,000 gpd.[1]

Residents in the area are serviced by NPWA or rely on private wells. The Rice home well, located at 991 Store Road, was tested by NPWA. The Rice's well water contained 63.1 ug/l TCE. Potential sources of this contamination are unknown. However, numerous tanks and drums are located behind the house at 2108 Store Road (about 300 feet from the Rice home). The contents of these drums and tanks are unknown at this time.[1]

Area 8 is a small, localized TCE plume. NPWA well NP-39 has not yet exceeded the limit for TCE contamination of 5 ug/l. Efforts to find the source of contamination, prior to continued increase in VOC concentrations, are necessary so that NP-39 can continue production below the proposed limit for TCE.

In addition, individuals on home wells should consider hooking up to the public water supply if their VOC contaminant levels exceed the proposed limit.

300178




AREA 8 (no scale)

NO KNOWN POTENTIAL RESPONSIBLE PARTIES

FROM REFERENCE 7

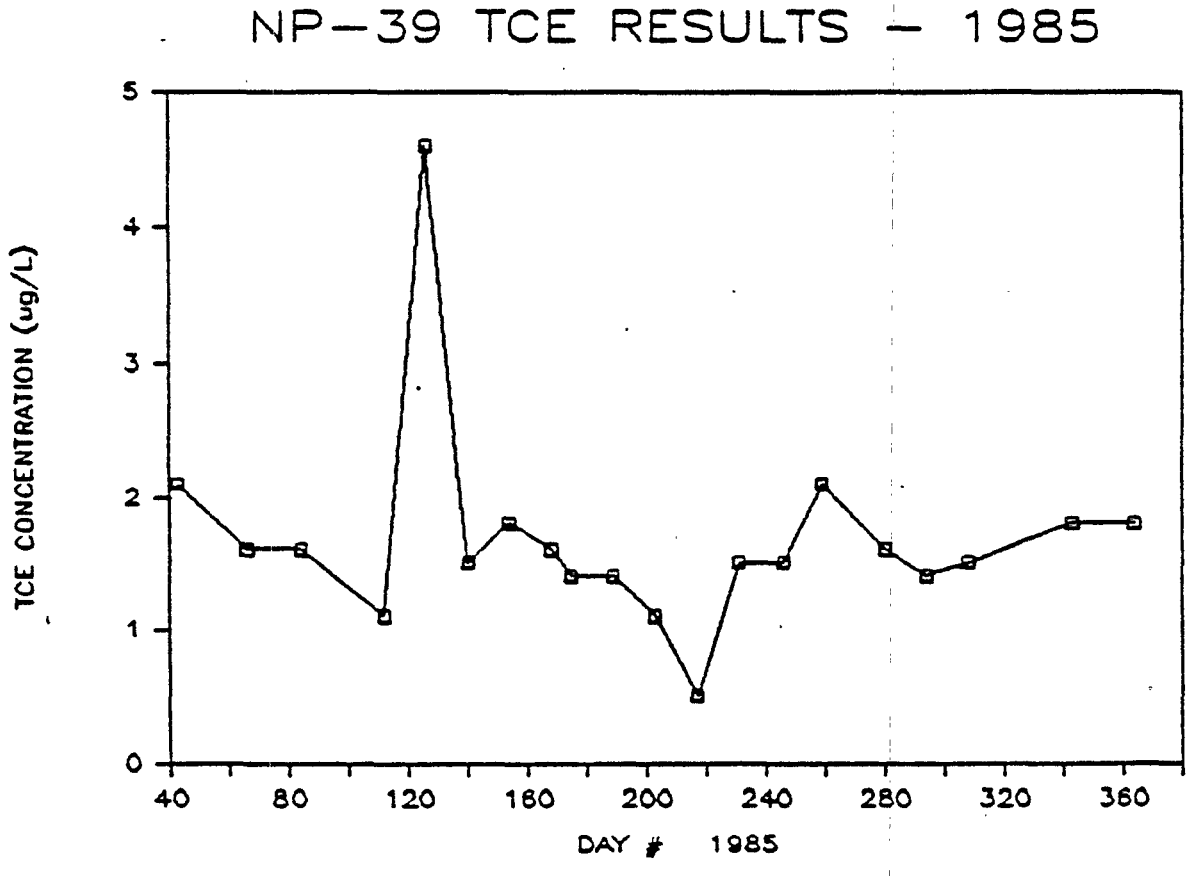
NUS CORPORATION
A Halliburton Company



300179

NP-39 RESULTS FOR 1985 ug/L

| DATE | DAY # | SAMPLE # | TCE | PCE |
|---|---|---|---|---|
| -Feb-85 | 43 | 360 | 2.1 | <0.5 |
| /-Mar-85 | 66 | 497 | 1.6 | <0.5 |
| 25-Mar-85 | 84 | 681 | 1.6 | <0.5 |
| 22-Apr-85 | 112 | 833 | 1.1 | <0.5 |
| 06-May-85 | 126 | 970 | 4.6 | <0.5 |
| 20-May-85 | 140 | 1062 | 1.5 | <0.5 |
| 03-Jun-85 | 154 | 1158 | 1.8 | <0.5 |
| 17-Jun-85 | 168 | 1245 | 1.6 | <0.5 |
| 24-Jun-85 | 175 | 1285 | 1.4 | <0.5 |
| 08-Jul-85 | 189 | 1356 | 1.4 | <0.5 |
| 22-Jul-85 | 203 | 1465 | 1.1 | <0.5 |
| 05-Aug-85 | 217 | 1533 | 0.5 | <0.5 |
| 19-Aug-85 | 231 | 1644 | 1.5 | <0.5 |
| 03-Sep-85 | 246 | 1758 | 1.5 | <0.5 |
| 16-Sep-85 | 259 | 1852 | 2.1 | <0.5 |
| 07-Oct-85 | 280 | 1953 | 1.6 | <0.5 |
| 21-Oct-85 | 294 | 2122 | 1.4 | <0.5 |
| 04-Nov-85 | 308 | 2199 | 1.5 | <0.5 |
| 09-Dec-85 | 343 | 2538 | 1.8 | <0.5 |
| 30-Dec-85 | 364 | 2669 | 1.8 | <0.5 |




Area #8 From Reference 1 4-36 300180

## 4.10 Area 9

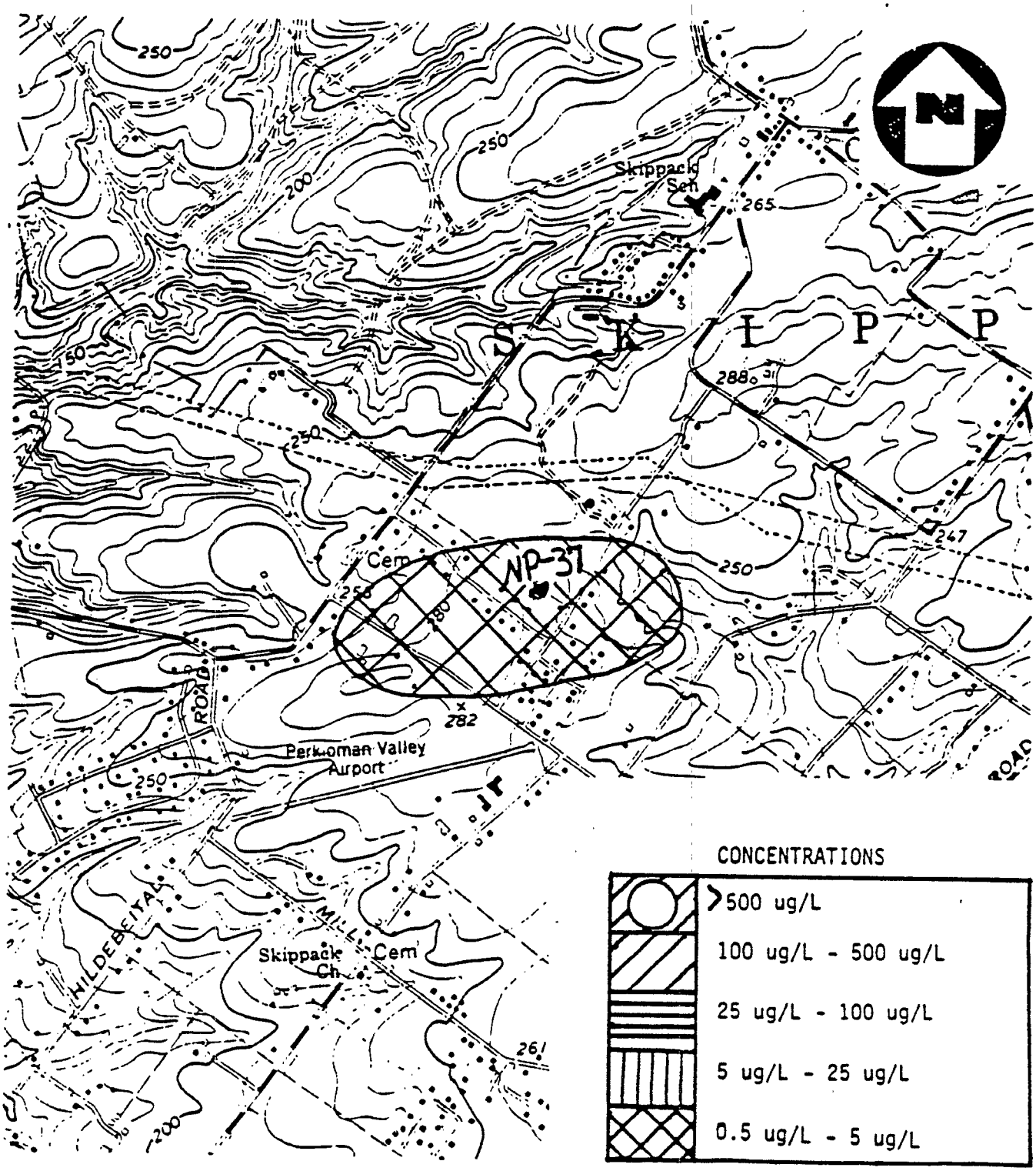
Area 9 is situated in Skippack Township east of Route 113. The area is located on the Collegeville quadrangle (see map, page 4-38). Contamination in this area was discovered in August 1979. NPWA well NP-37, which is located within the contamination plume, has a 1,1,1-trichloroethane concentration range of 1 to 2 ug/l (see page 4-38). NP-37 is 487 feet deep and has a permitted capacity of 144,000 gpd.[1]

Residents in the area are supplied by NPWA or rely on private wells. To this date, no private wells in the area have been tested for VOC contamination.[1]

The proposed limit for 1,1,1-trichloroethane is 200 ug/l. Concentration levels in NP-37 are far below this proposed limit. Residential wells should be checked for contamination. If high levels of VOC contamination are found, residents should consider hooking up to public water supply. At this time, there are no known potentially responsible parties contributing to the VOC contamination in area 9.[1]



300181




AREA 9 (no scale)

NO KNOWN POTENTIAL RESPONSIBLE PARTIES

FROM REFERENCE 7

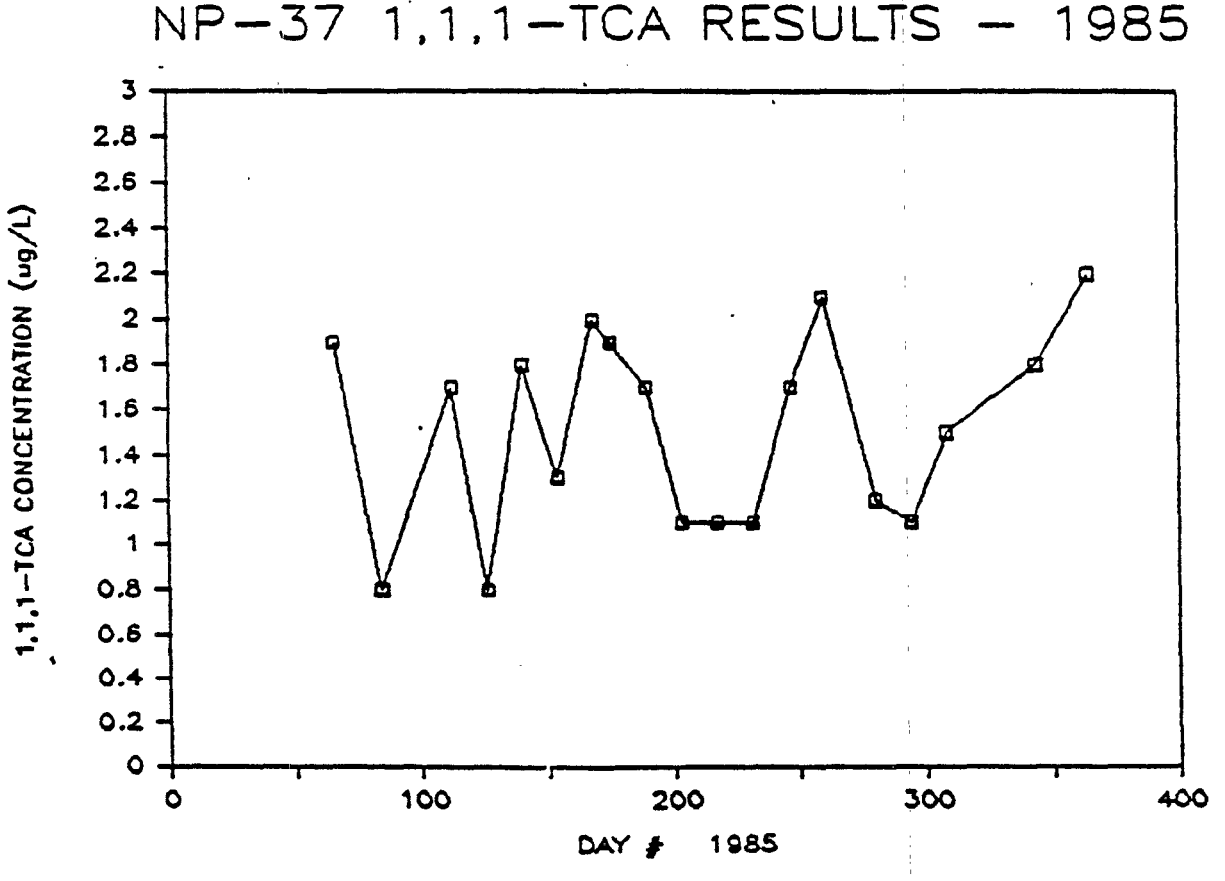
NUS CORPORATION
A Halliburton Company



300182

NP-37 RESULTS FOR 1985 ug/L

| DATE | DAY # | SAMPLE # | 1,1,1-TCA | TCE |
|---|---|---|---|---|
| -Mar-85 | 66 | 495 | 1.9 | <0.5 |
| -Mar-85 | 84 | 680 | 0.8 | <0.5 |
| 22-Apr-85 | 112 | 832 | 1.7 | <0.5 |
| 06-May-85 | 126 | 969 | 0.8 | <0.5 |
| 20-May-85 | 140 | 1061 | 1.8 | <0.5 |
| 03-Jun-85 | 154 | 1157 | 1.3 | <0.5 |
| 17-Jun-85 | 168 | 1244 | 2.0 | <0.5 |
| 24-Jun-85 | 175 | 1284 | 1.9 | <0.5 |
| 08-Jul-85 | 189 | 1350 | 1.7 | <0.5 |
| 22-Jul-85 | 203 | 1464 | 1.1 | <0.5 |
| 05-Aug-85 | 217 | 1532 | 1.1 | <0.5 |
| 19-Aug-85 | 231 | 1643 | 1.1 | <0.5 |
| 03-Sep-85 | 246 | 1757 | 1.7 | <0.5 |
| 16-Sep-85 | 259 | 1851 | 2.1 | <0.5 |
| 07-Oct-85 | 280 | 1952 | 1.2 | <0.5 |
| 21-Oct-85 | 294 | 2121 | 1.1 | <0.5 |
| 04-Nov-85 | 308 | 2198 | 1.5 | <0.5 |
| 09-Dec-85 | 343 | 2537 | 1.8 | <0.5 |
| 30-Dec-85 | 364 | 2668 | 2.2 | <0.5 |




Area #9 From Reference 1 4-39

300183

## 4.11 Area 10

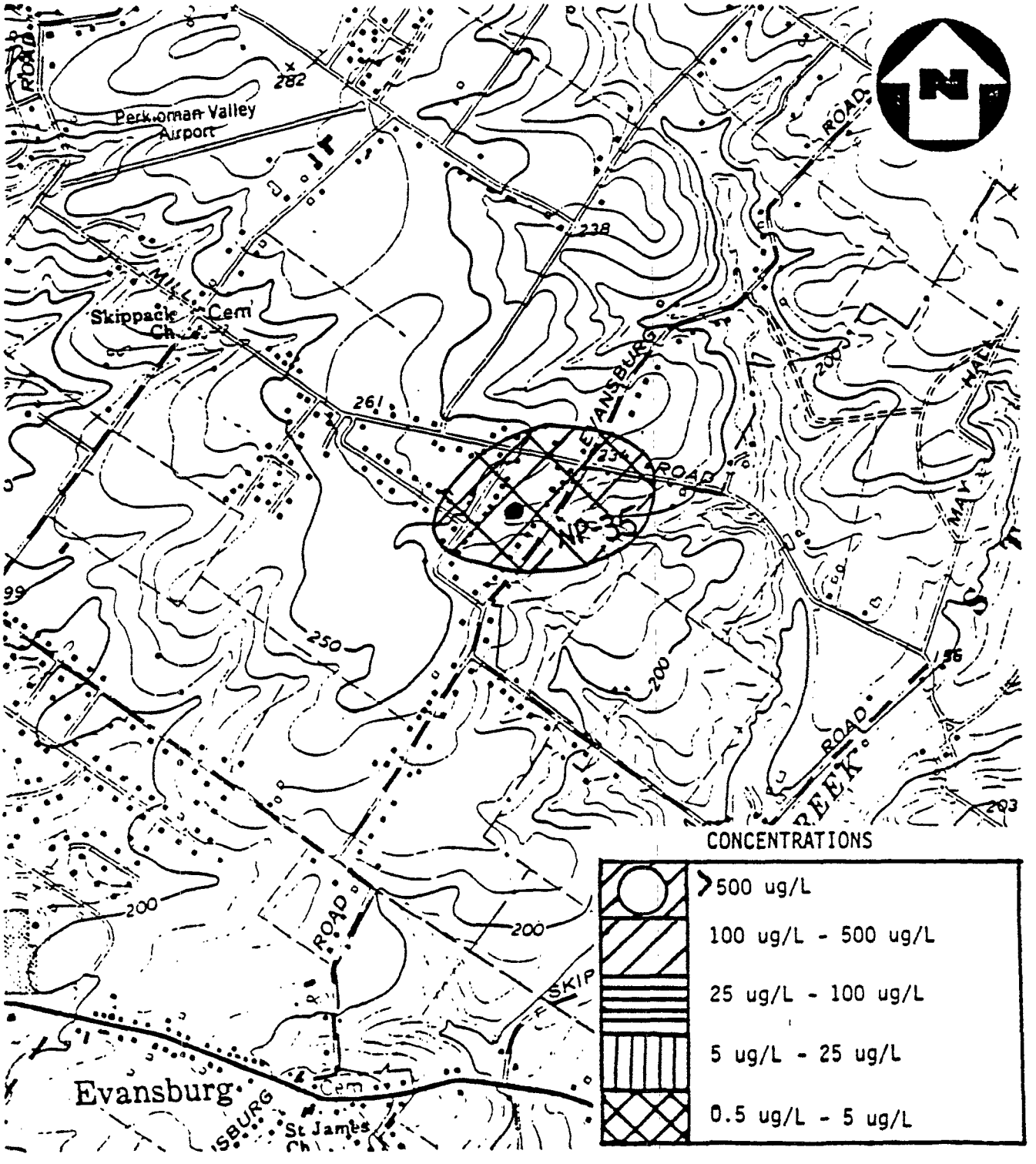
Area 10 is situated in Skippack Township at the intersection of Evansburg Road and Mill Road. The area can be located on the Collegeville quadrangle (see map, page 4-41). Contamination in this area was discovered in August 1979. NPWA well NP-35, which is located within the plume, has 1,1,1-trichloroethane contamination ranging in concentrations of 1 to 3.5 ug/l (see page 4-42). NP-35 is 557 feet deep and has a permitted capacity of 50,400 gpd. NP-35 is the sole source for the NPWA satellite system in area 10 (see appendix B).[1]

Area residents are supplied by NPWA or rely on private wells. No private wells have been sampled in the area; therefore, the plume boundaries are estimated.[1]

The proposed limit for 1,1,1-trichloroethane is 200 ug/l. Contaminations in NP-35 are far below the proposed limit. Residential wells in the area should be checked for VOC contamination. If residential well concentrations are higher, residents should consider hooking up to the public water system. At this time, there are no known potentially responsible parties contributing to the VOC contamination at area 10.[1]



300184




AREA 10 (no scale)

NO KNOWN POTENTIAL RESPONSIBLE PARTIES

FROM REFERENCE 7

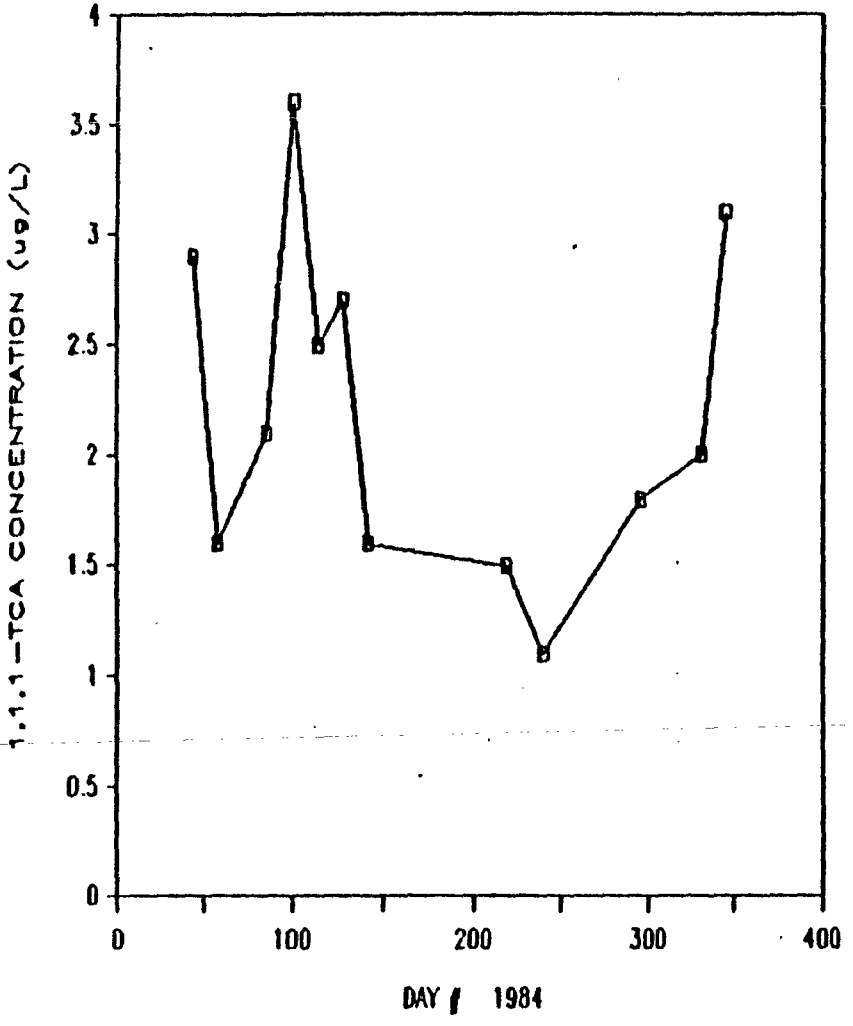
NUS CORPORATION
A Halliburton Company



300185

Attachment #10

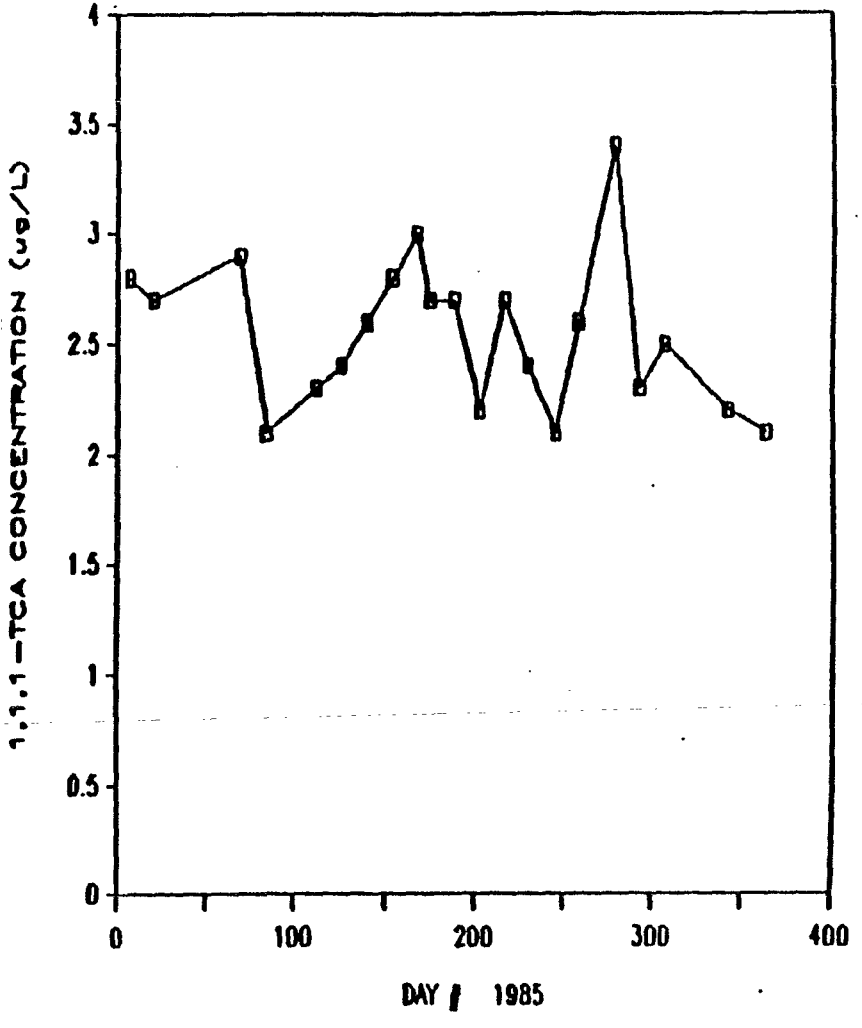
## NP-35 1,1,1-TCA RESULTS - 1984




From Reference 1

4-42

## NP-35 1,1,1-TCA RESULTS - 1985



## 4.12 Area 11

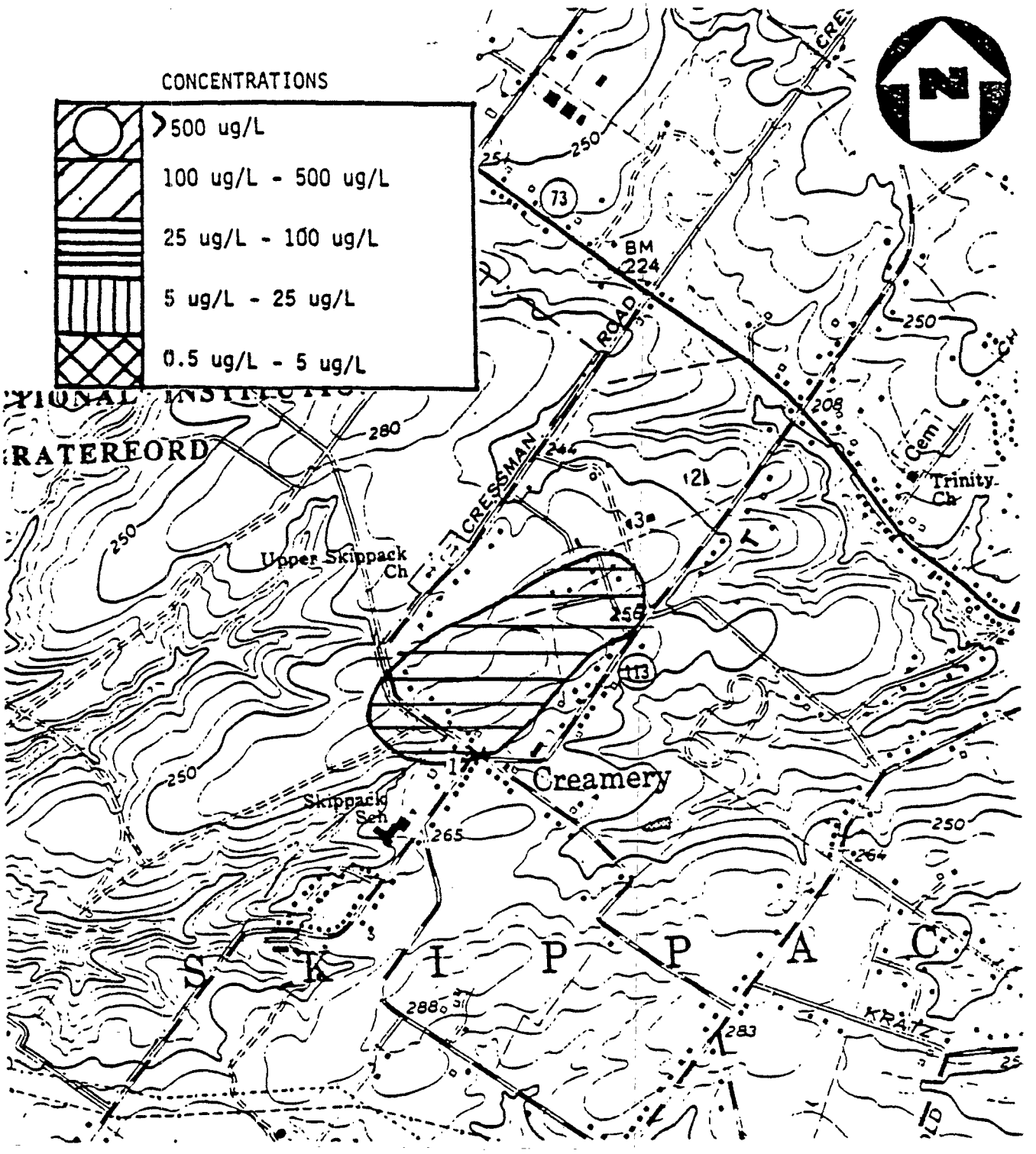
Area 11 is situated in Skippack Township near Creamery. The area can be located on the Collegeville quadrangle (see map, page 4-44). VOC contamination was discovered in this area in 1980 by PA DER. The entire area relies on private wells and no NPWA wells are located in the area.[1]

PA DER performed a well survey in this area in 1981. TCE contamination in residential wells was up to 89 ug/l. PA DER attributed this contamination to septic tank cleaning. NUS FIT III has determined 3 other potentially responsible parties for the VOC contamination in this area, including W.M. Yocum Machine Company, EAM Corporation, and Static, Incorporated. These 3 industries are believed to be users of VOC.[1,3]

Additional study is needed in area 11. All wells should be checked for VOC contamination. Residents with TCE contamination should consider hooking up to public water. In addition, contamination concentrations in home wells may give additional indication of the potentially responsible parties.



300187




AREA 11 (no scale)

1 W.M. YOCUM MACHINE COMPANY

2 EAM CORP.

3 STATIC, INC.

FROM REFERENCE 7

NUS CORPORATION
A Halliburton Company



300188

## 4.13 Area 12

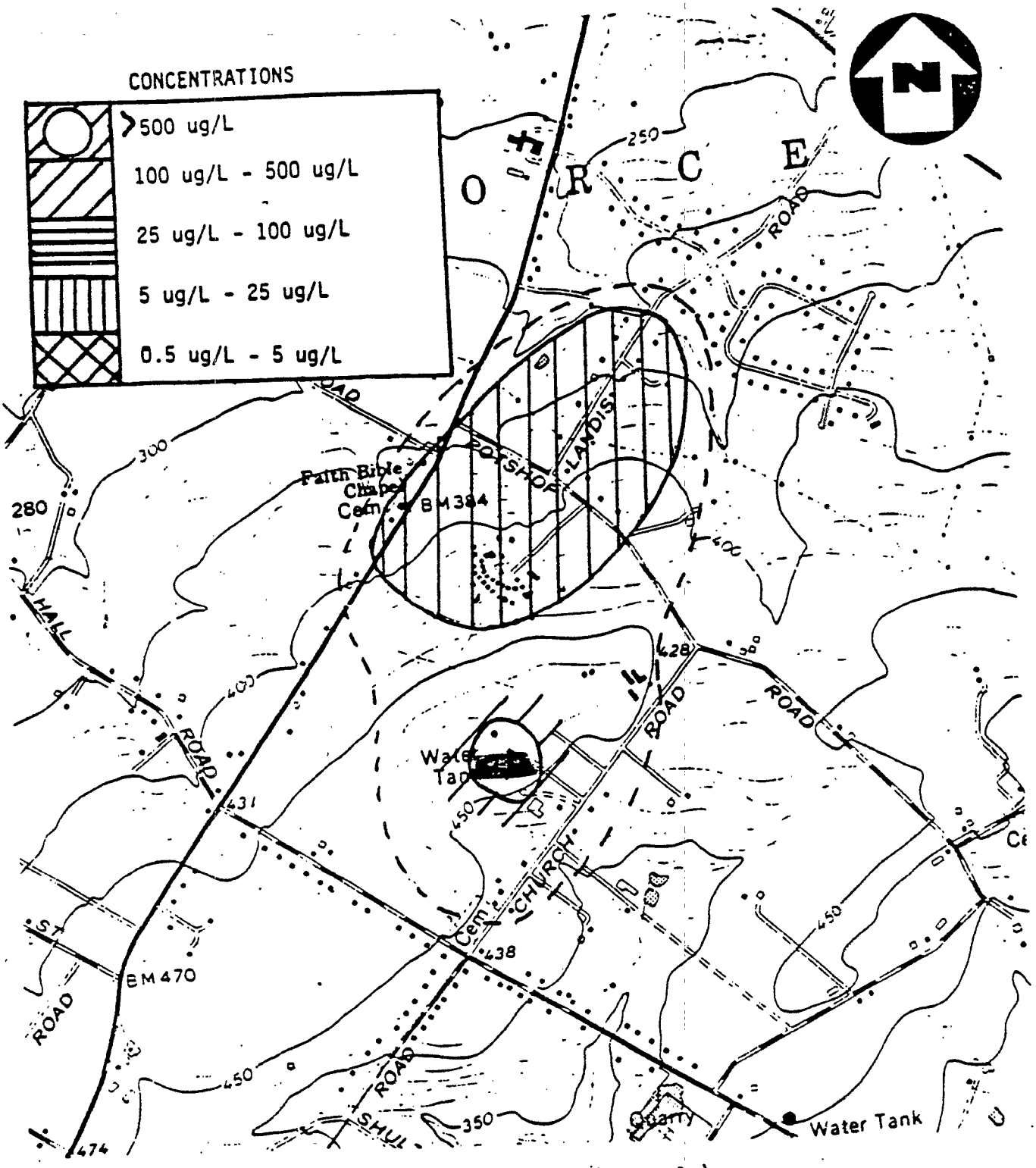
Area 12 is situated in Worchester Township. The area can be located on the Lansdale quadrangle (see map, page 4-46). VOC contamination was discovered in this area in August 1979 by NPWA when testing a residential well. The entire area relies on private wells and there are no NPWA wells in the area.[1]

NPWA detected TCE contamination in Variety Club Camp, Pennsylvania School for the Handicapped, and residential wells, all located in the northern area of the plume. This area is close to NPWA service lines and could hook up to their supply.

PA DER discovered high levels of TCE contamination at the Transicoil, Incorporated facility, located on Trooper Road. Considering PA DER's findings and the high topographic location of the Transicoil facility, they are the likely responsible party for area 12.[3]



AR300189




[redacted] (no scale)

[redacted]

FROM REFERENCE 8

NUS CORPORATION
A Halliburton Company



AR300190

SECTION 5

300191

## 5.0 SUMMARY AND CONCLUSION

Groundwater contamination from the careless handling, use, and disposal of organic chemicals is a widespread problem in the North Penn area. Twelve individual areas of groundwater contamination have been documented. Private and NPWA wells located in these areas have become contaminated.

NPWA has 18 contaminated wells in 9 of the identified areas (see well summary, page 5-2). Five of the 18 wells are inactive due to contamination. With treatment, wells S-9, L-9, L-10, and L-25 could supply an additional 0.5 mgd to NPWA. Water from well L-8 is presently treated, but contaminant levels are still above the maximum contaminant level (MCL). Presently, NPWA must purchase 1.6 mgd to meet customer demands. Active wells (NP-33, NP-21, L-22, and L-23) have VOC contamination levels above the proposed limit. Water from these wells is either treated (L-22) or mixed with cleaner water (NP-33, NP-21, and L-23) to bring contamination levels below the proposed limits. Other wells have VOC contamination below the proposed limits for each particular chemical contaminant.

The 3 areas that do not use NPWA wells (areas 4, 11, and 12) rely on private wells or are served by North Wales Water Authority. Private wells in these areas should be checked for contamination. If contamination levels exceed the proposed limits, residents should hook up to the nearest water authority.

File searches at EPA, PA DER, and NPWA, and a site reconnaissance performed by NUS FIT III have produced 51 potentially responsible parties for the groundwater contamination in the North Penn area (see potentially responsible parties summary, pages 5-3 and 5-4). The first list of industries (primary) are known users or are strongly suspected to be users of chemicals. Some industries have changed ownership (indicated in summary). In such a case, both parties are considered potentially responsible parties. The secondary list includes industries that could have or may be contributing to the groundwater contamination in the North Penn area.



300192

Site Name: North Penn Area
TDD No.: F3-8512-31

## Summary NPWA Wells

| Well | Area | Depth (ft) | Capacity (gpd) | Maximum Concentration of VOCs in ppb TCE | PCE | Other | Stati |
|---|---|---|---|---|---|---|---|
| S-9 | 1 | 300 | 144,000 | | 24.7 | | Inact |
| S-10 | 1 | 300 | 115,200 | | 2.6 | | Acti |
| NP-15 | 2 | 500 | 144,000 | no limit set | | | Acti |
| | | | | 1,1-dichloroethane | | 19.2 | |
| NP-5 | 3 | 630 | 504,000 | | 5.1 | | Acti |
| NP-33 | 3 | 560 | 216,000 | 13.2 | | | Acti |
| NP-21 | 5 | 500 | 864,000 | 19.8 | | | Acti |
| L-8** | 6 | 291 | 100,800 | 2,000 | 800 | 45(V.C.) | Inac |
| L-9 | 6 | 500 | 144,000 | 190 | 17.2 | | Inac |
| L-10 | 6 | 264 | 100,800 | 25 | 25 | | Inac |
| L-21 | 6 | 399 | 144,000 | 1.3 | | | Acti |
| L-23 | 6 | 600 | 86,400 | 30.4 | 4.1 | | Act |
| L-25 | 6 | 492 | 144,000 | 34 | 12 | | Inac |
| L-22* | 7 | 645 | 252,000 | 157.6 | 1.3 | | Act |
| L-17 | 7 | 565 | 144,000 | 1.2 | | | Act |
| L-12 | 7 | 620 | 100,800 | 0.5 | | | Act |
| NP-39 | 8 | 510 | 360,000 | 4.6 | | | Act |
| NP-37 | 9 | 487 | 144,000 | 1,1,1-trichloroethane | | 2.2 | Act |
| NP-35 | 10 | 557 | 50,400 | 1,1,1-trichloroethane | | 3.6 | Act |

* Equipped with granular-activated charcoal treatment and pumped to NPWA distribution syst

** Equipped with granular-activated charcoal treatment and pumped to wastewater treatment



300193

Site Name: North Penn Area
TDD No.: F3-8512-31

## Summary of Potentially Responsible Parties

Primary

| Industry | Area |
|---|---|
| Gentle Cleaners, Incorporated | 1 |
| Granite Knitting Mills, Incorporated | 1 |
| Parkside Apartments | 1 |
| Ametek Corporation - Hunter Spring Division | 2 |
| Waste Conversion, Incorporated | 2 |
| SPS Technology | 2 |
| B & G Manufactures Company (now Jed Manufacturing) | 2 |
| Greene Tweed Company | 3 and 7 |
| Nice Bearing Division of SKF Industries | 3 |
| Reclamation Resources | 4 |
| American Electronic Laboratories | 5 |
| Gas Spring Company | 5 |
| Brown, Boveri Electric | 5 |
| Limberg Company | 5 |
| Baron Blackeslee Division - Allied Chemical Company | 5 |
| J.W. Rex Company | 6 |
| John Evans' Sons, Incorporated | 6 |
| Allied Paint Company | 6 |
| Keystone Hydraulics | 6 |
| Eaton Laboratories | 6 |
| Royal Cleaners | 6 |
| Lansdale Transportation (now owned by Lansdale Realty) | 6 |
| Andale Company | 6 |
| Philadelphia Toboggan (now H.G.H. Corporation) | 6 |
| K & K Laundry (now Precision Rebuilders) | 6 |



300194

| | |
|---|---|
| Spra-Fin, Incorporated | 7 |
| Ford Electronics and Refrigeration Corporation | 7 |
| Deltron Incorporated | 7 |
| Teleflex, Incorporated - Aeroscope/Defense Division | 7 |
| Leeds and Northrup | 7 |
| Porter Instruments | 7 |
| Zenith Electronics Corporation (now Elan Associates) | 7 |
| Green Tweed Company | 7 and 3 |
| Transicoil | 12 |

Secondary

Industry

| | |
|---|---|
| A. Steiert and Sons, Incorporated | 2 |
| Met-Pro Corporation | 3 |
| Percora Chemical Company | 3 |
| Penn Fishing Tackle Company | 3 |
| William Wilson's Sons | 6 |
| Lehigh Valley Farms - Atlantic Processing, Incorporated | 6 |
| Crystal Soap and Chemical Company | 6 |
| American Olean Tile Company | 6 |
| Decision Data Computer Company | 6 |
| Skee-Ball | 6 |
| Precision Tube Company, Incorporated | 7 |
| Merck, Sharp, and Dohme | 7 |
| Brooks Instrument Division | 7 |
| Residents at 2001 Store Road | 3 |



300195

| | |
|---|---|
| W.M. Yocum Machine Company | 11 |
| EAM Corporation | 11 |
| Static, Incorporated | 11 |



300196

APPENDIX A

| 1. COST CENTER: / ACCOUNT NO.: | REM/FIT ZONE CONTRACT TECHNICAL DIRECTIVE DOCUMENT (TDD) | 2. NO.: F3-8512-31 |
|---|---|---|

| 3. PRIORITY: | 4. ESTIMATE OF TECHNICAL HOURS: | 5. EPA SITE ID: | 6. COMPLETION DATE: | 7. REFERENCE INFO.: |
|---|---|---|---|---|
| [X] HIGH<br>[ ] MEDIUM<br>[ ] LOW | GG per HGB ~~150~~ 200<br>4A. ESTIMATE OF SUBCONTRACT COST: | 5A. EPA SITE NAME: North Penn Area Lansdale, PA | GG per HGB TF 9/31/86 | [X] YES [ ] NO<br>[ ] ATTACHED<br>[ ] PICK UP |

8. GENERAL TASK DESCRIPTION: Perform a preliminary assessment/site inspection of the subject site using available information.

9. SPECIFIC ELEMENTS:

~~1.) Review background information~~
~~2.) Contact state and local agencies for relevant information.~~
~~3.) Contact Water authority for water supply information (Harry Borchers 855-3617)~~
~~4.) Determine possible responsible parties in the water supply area from available records.~~
~~5.) Maintain contact with Laura Boornazian and Butch Byer~~
~~6.) Prepare and submit report, include incover letter recommendations for need of HRS.~~
~~7.) All work on this project to be performed according to: WP-PA-1, Rev. 1 & WP-SI-1, Rev.1~~

10. INTERIM DEADLINES:

11. DESIRED REPORT FORM: FORMAL REPORT [X] LETTER REPORT [ ] FORMAL BRIEFING [ ]

OTHER (SPECIFY):

12. COMMENTS: State Code 042 County Code 091

| 13. AUTHORIZING RPO: | 14. DATE: |
|---|---|
| Harold G Byer (SIGNATURE) | 3/5/86 |

| 15. RECEIVED BY: | 16. DATE: |
|---|---|
| [ ] ACCEPTED [ ] ACCEPTED WITH EXCEPTIONS [ ] REJECTED<br>(CONTRACTOR RPM SIGNATURE) | |

Sheet 1 White – FITL Copy
Sheet 2 Canary – DPO Copy
Sheet 3 Pink – Contracting Officer's Copy (Washington, D. C.)
Sheet 4 Goldenrod – Project Officer's Copy (Washington, D. C.)

# APPENDIX B

Available in EPA files

300200

APPENDIX C

## References

1. North Penn Water Authority. File information.

2. United States Environmental Protection Agency. File information for the North Penn area.

3. Pennsylvania Department of Environmental Resources. File information for the North Penn area.

4. United States Department of the Interior Geologic Survey. Perkiomenville, Pennsylvania Quadrangle, 7.5 Minute Series. Topographic Map. 1973.

5. United States Department of the Interior Geologic Survey. Telford, Pennsylvania Quadrangle, 7.5 Minute Series. Topographic Map. 1973.

6. United States Department of the Interior Geologic Survey. Doylestown, Pennsylvania Quadrangle, 7.5 Minute Series. Topographic Map. 1983.

7. United States Department of the Interior Geologic Survey. Collegeville, Pennsylvania Quadrangle, 7.5 Minute Series. Topographic Map. 1983.

8. United States Department of the Interior Geologic Survey. Lansdale, Pennsylvania Quadrangle, 7.5 Minute Series. Topographic Map. 1983.

9. United States Department of the Interior Geologic Survey. Ambler, Pennsylvania Quadrangle, 7.5 Minute Series. Topographic Map. 1983.

10. Pennsylvania Department of Transportation. Traffic and Legislative Route Map. Montgomery County and Bucks County Map. 1982.

11. Commonwealth of Pennsylvania Department of Environmental Resources, Topographic and Geologic Survey. Geologic Map of Pennsylvania. 1979.



300202

12. United States Department of Agriculture, Soil Conservation Service. Soil Survey of Montgomery County, Pennsylvania. 1967.

13. United States Department of Agriculture, Soil Conservation Service. Soil Survey of Bucks and Philadelphia Counties, Pennsylvania. 1975.

14. Martin, L. Source Identification of TCE and other Chlorinated Organic Groundwater Pollutants in the Upper Wissahickon Watershed - Phase II. 1981.

15. Newport, T., Commonwealth of Pennsylvania, Bureau of Topographic and Geologic Survey. Groundwater Resources of Montgomery County, Pennsylvania. Report 29, 1973.

16. Rima, D., H. Meisler, and S. Longwill, Commonwealth of Pennsylvania, Bureau of Topographic and Geologic Survey. Geology and Hydrology of the Stockton Formation in Southeastern Pennsylvania. Bulletin W-14, 1962.

17. Rima, D., Commonwealth of Pennsylvania, Bureau of Topographic and Geologic Survey. Groundwater Resources of the Lansdale Area, Pennsylvania. Report 146, 1955.

18. Longwill, S., and C. Wood, Commonwealth of Pennsylvania, Bureau of Topographic and Geologic Survey. Groundwater Resources of the Brunswick Formation in Montgomery and Berks Counties, Pennsylvania. Report W-22, 1965.

19. United States Department of the Interior, Fish and Wildlife Service, with Garth Glenn, NUS FIT III. Correspondence. January 24, 1986.

20. Montgomery County Planning Commission. Water Service Plan. 1977.



300203

APPENDIX D

300204

# 1983 DEPENDABLE DAILY OUTPUT OF THE WATER SYSTEM - SOURCES (MAIN SYSTEM ONLY)

| GROUNDWATER SOURCES(WELLS) WELL NAME OR NUMBER | Depth (feet) | Diam (in.) | Is Source metered YES | NO | Average Daily Withdrawal GPD | (Days) | Safe Yield or Minimum Prod During Dry Yrs of Record (CPD) | Facilities which limit the Total Daily Output (e.g.,Raw Water Pumpg,Treatment Works,Transmission Mains,Distribution Systems, etc...) TYPE | CAPACITY (CPD) | |
|---|---|---|---|---|---|---|---|---|---|---|
| L-7 | 378 | 8 | x | | 41,205 | (365) | 38,880 | pump | 57,600 | |
| L-8 | 291 | 8 | | | -- | | 37,440 | pump | 100,800 | Inactive |
| L-9 | 500 | 8 | x | | 100,315 | (365) | 96,480 | pump | 144,000 | Inactive |
| L-10 | 264 | 8 | x | | 23,452 | ( 79) | 36,000 | pump | 100,800 | Inactive |
| L-11 | 390 | 8 | x | | -- | | 20,160 | pump | 50,400 | |
| L-12 | 285 | 8 | x | | 57,783 | (365) | 51,840 | pump | 57,600 | |
| L-14 | 325 | 10 | x | | 24,712 | (102) | 63,360 | pump | 144,000 | |
| L-16 | 399 | 10 | x | | 102,153 | (365) | 37,440 | pump | 144,000 | |
| L-17 | 387 | 10 | x | | 111,430 | (365) | 66,240 | pump | 144,000 | |
| L-18 | 406 | 10 | x | | 267,693 | (365) | 120,960 | pump | 288,000 | |
| L-19 | 430 | 10 | x | | 91,353 | (365) | 43,200 | pump | 72,000 | |
| L-21 | 399 | 10 | x | | 98,622 | (365) | 105,120 | pump | 144,000 | |
| L-22 | 645 | 8 | x | | 149,962 | (365) | 51,840 | pump | 165,600 | |
| L-23 | 600 | 10 | x | | 44,603 | (208) | 64,800 | pump | 86,400 | |
| L-25 | 492 | 8 | x | | -- | | 53,280 | pump | 144,000 | |
| L-26 | 400 | 10 | x | | 65,411 | (365) | 51,840 | pump | 72,000 | |
| L/pool | | | x | | 10,893 | ( 62) | 17,280 | pump | -- | |
| S-2 | 216 | 6 | x | | 92,958 | (365) | 84,960 | pump | 108,000 | |
| S-4 | 300 | 8 | x | | 29,273 | (365) | 23,040 | pump | 36,000 | |
| S-8 | 300 | 8 | x | | 41,578 | (320) | 44,640 | pump | 86,400 | |
| S-9 | 300 | 8 | x | | -- | | 64,800 | pump | 144,000 | Inactive |
| S-10 | 300 | 8 | x | | 59,747 | (365) | 46,080 | pump | 72,000 | |
| S/pool | | | x | | 21,547 | (110) | 34,560 | pump | -- | |
| NP-2 | 664 | 8 | x | | 53,345 | (320) | 50,400 | pump | 72,000 | |
| NP-4 | 668 | 10 | x | | 117,422 | (365) | 92,160 | pump | 144,000 | |
| NP-5 | 630 | 10 | x | | 261,175 | (365) | 263,160 | pump | 360,000 | |
| NP-8 | 645 | 8 | x | | -- | | 43,200 | well | 57,600 | |
| NP-11 | 500 | 8 | x | | 71,178 | (365) | 64,800 | pump | 72,000 | |
| NP-12 | 620 | 8 | x | | 16,962 | (253) | 149,760 | pump | 172,800 | |
| NP-14 | 585 | 10 | x | | 152,474 | (365) | 239,040* | well | 432,000 | |
| NP-15 | 500 | 8 | x | | 72,613 | (365) | 74,880 | pump | 144,000 | |
| NP-16 | 500 | 8 | x | | -- | | 144,000¶ | pump | 288,000 | |
| NP-17 | 565 | 11 | x | | 355,605 | (365) | 239,040* | well | 576,000 | |
| NP-20 | 300 | 8 | x | | 134,405 | (365) | 93,600* | well | 288,000 | |
| NP-21 | 500 | 12 | x | | 291,432 | (365) | 244,800* | well | 432,000 | |
| NP-26 | 475 | 8 | x | | 49,312 | (365) | 205,920 | pump | 216,000 | |
| NP-29 | 410 | 8 | x | | 65,073 | (365) | 72,000* | well | 216,000 | |
| NP-30 | 400 | 8 | x | | 98,416 | (365) | 72,000* | well | 216,000 | |
| NP-31 | 500 | 10 | x | | 91,323 | (365) | 89,280* | well | 216,000 | |
| NP-33 | 560 | 12 | x | | 132,403 | (275) | 178,560 | pump | 216,000 | |
| NP-34 | 335 | 10 | x | | 97,159 | (365) | 100,000# | permit & pump | 100,000 | |
| NP-46 | 500 | 8 | x | | 6,211 | ( 69) | 72,000* | well | 144,000 | |
| NP-48 | 492 | 10 | x | | 144,419 | (190) | 220,000# | permit & pump | 220,000 | |
| | | | | | 3,645,617 | | 3,962,840 | | 6,944,000 | |

* if pump operated 24 hours
\# limited by permit
¶ emergency (diesel power only)



300205

1983 DEPENDABLE DAILY OUTPUT OF THE WATER SYSTEM - SOURCES (SATELLITE SYSTEM ONLY)

| GROUNDWATER SOURCES (WELLS) WELL NAME OR NUMBER | Depth (feet) | Diam (in.) | Is Source metered YES | Is Source metered NO | Average Daily Withdrawal GPD | Average Daily Withdrawal (Days) | Safe Yield or Minimum Prod During Dry Yrs of Record (GPD) | Facilities which limit the Total Daily Output (e.g., Raw Water Pumpg, Treatment Works, Transmission Mains, Distribution Systems, etc...) TYPE | CAPACITY (GPD) |
|---|---|---|---|---|---|---|---|---|---|
| NP 28 | 300 | 8 | x | | 3,189 | (365) | 89,280* | pump | 144,000 |
| NP 35 | 557 | 6 | x | | 4,046 | (365) | 28,800* | pump | 80,400 |
| NP 36 | 341 | 6 | x | | 7,180 | (365) | 67,680* | pump | 115,200 |
| NP 37 | 487 | 6 | x | | 27,994 | (365) | 24,480* | pump | 93,600 |
| NP 38 | 350 | 6 | x | | 1,024 | (365) | 21,600* | pump | 36,000 |
| NP 39 | 510 | 8 | x | | 41,904 | (365) | 161,280* | pump | 360,000 |
| Total Satellite Systems | | | | | 85,337 | | 393,120 | | 799,200 |
| plus Total Main System | | | | | 3,645,617 | | 3,962,840 | | 6,944,000 |
| | | | | | 3,730,954 | | 4,355,960 | | 7,743,200 |

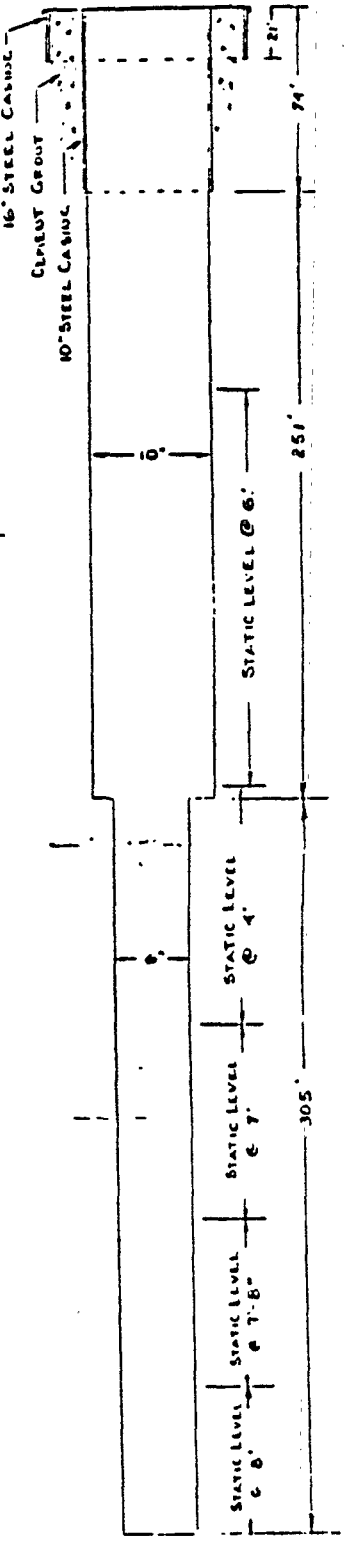
* if pump operated 24 hours



300206

WELL LOG

| DEPTH | SOIL TYPE | DISCHARGE FROM AIR DRILLING RIG: DURING DRILLING | DISCHARGE FROM AIR DRILLING RIG: AFTER DRILLING | DEEP W TURBINE |
|---|---|---|---|---|
| 0 | Red Clay | | | |
| 8 | Coarse-Fine Red Shale | | | |
| 29 | Medium Red Shale with Seams of Blue Shale | 10 GPM | | |
| 40 | | 37 GPM | | |
| | Medium Red Shale, Tr. Calcite | | | |
| 65 | Fine Red Shale, Calcite | Hard - 10 Grains | | |
| 75 | | | | |
| | | | 148 GPM | 249 |
| 110 | | | | 305 |
| | | | | 352 |
| | | | | 407 |
| | | | | 446 |
| | | | 185 GPM | |
| | Fine, Medium Red Shale, Tr. Calcite | 124 GPM | | |
| | | 130 GPM | | |
| | Hit Void @ 200 Ft. | 185 GPM | | |
| | | Hard - 12 Grains | | |
| | | | 204 GPM | |
| 259 | Med., Fine Grey Shale, Tr. Red Shale, Tr. Calcite | | | |
| 290 | Medium Red Shale, Tr. Calcite | | | |
| | Hit Void @ 318 Ft. | 230 GPM | 204 GPM | |
| | | Hard - 13 Grains | | |
| 330 | Fine Red Shale | 204 GPM | | |
| 360 | | | | |
| | Med., Fine Red Shale, Tr. Calcite | | | |
| 580 | Med., Fine Red Shale, Tr. Calcite, Tr. Sandstone (?) | | | |
| 630 | | | 204 GPM | |




NORTH PENN WATER AUTH

WELL NO. U.P.-5

GEOLOGIC LOG & WE
CONSTRUCTION DIAGR

FRETZ RD. TOWAMENC

DRAWN BY: R. Maier | DATE: SEPT
[illegible] MARCH 19, 1966 | SCALE: [illegible]

300207

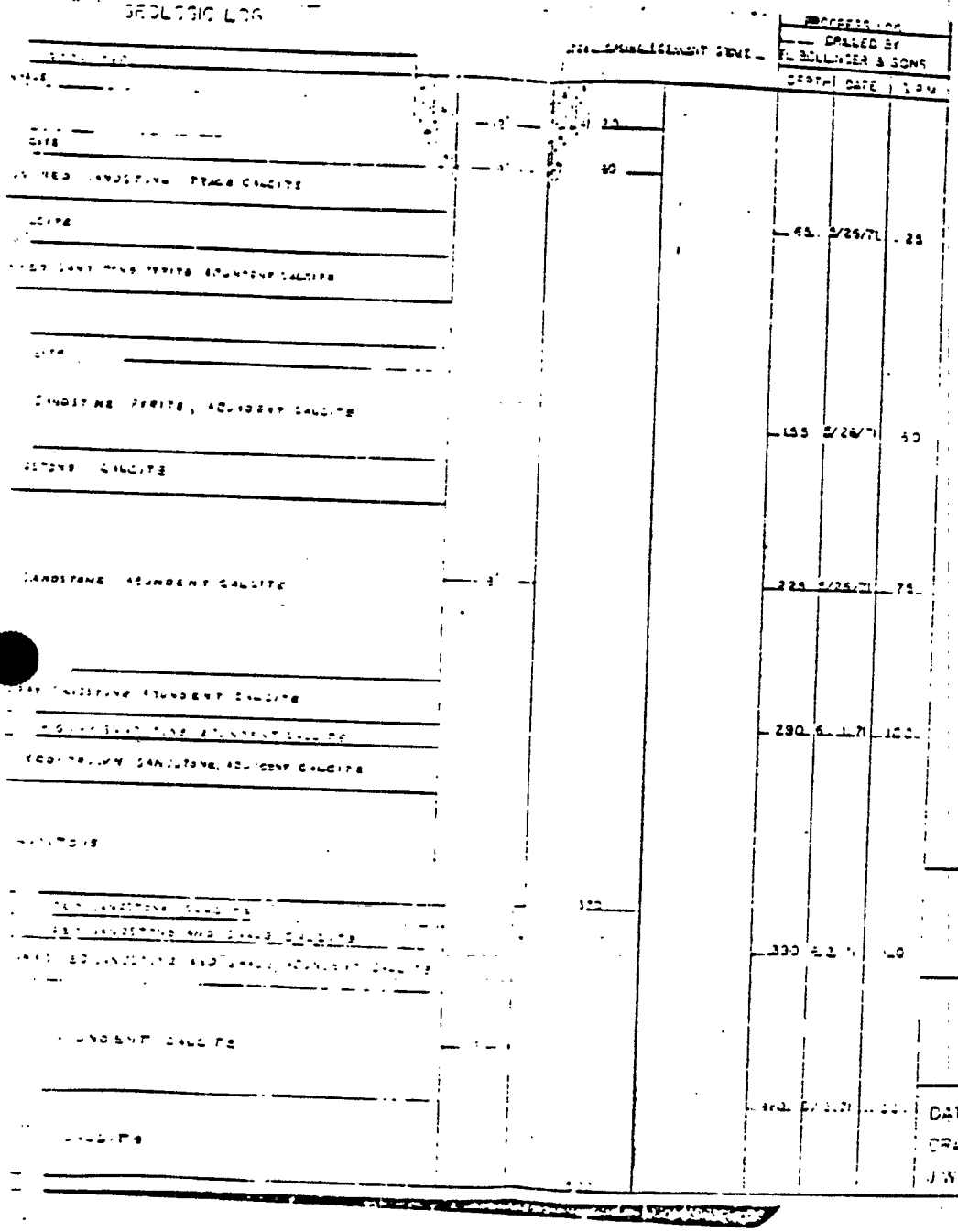



EXHIBIT H

NORTH PENN WATER AUTHORITY

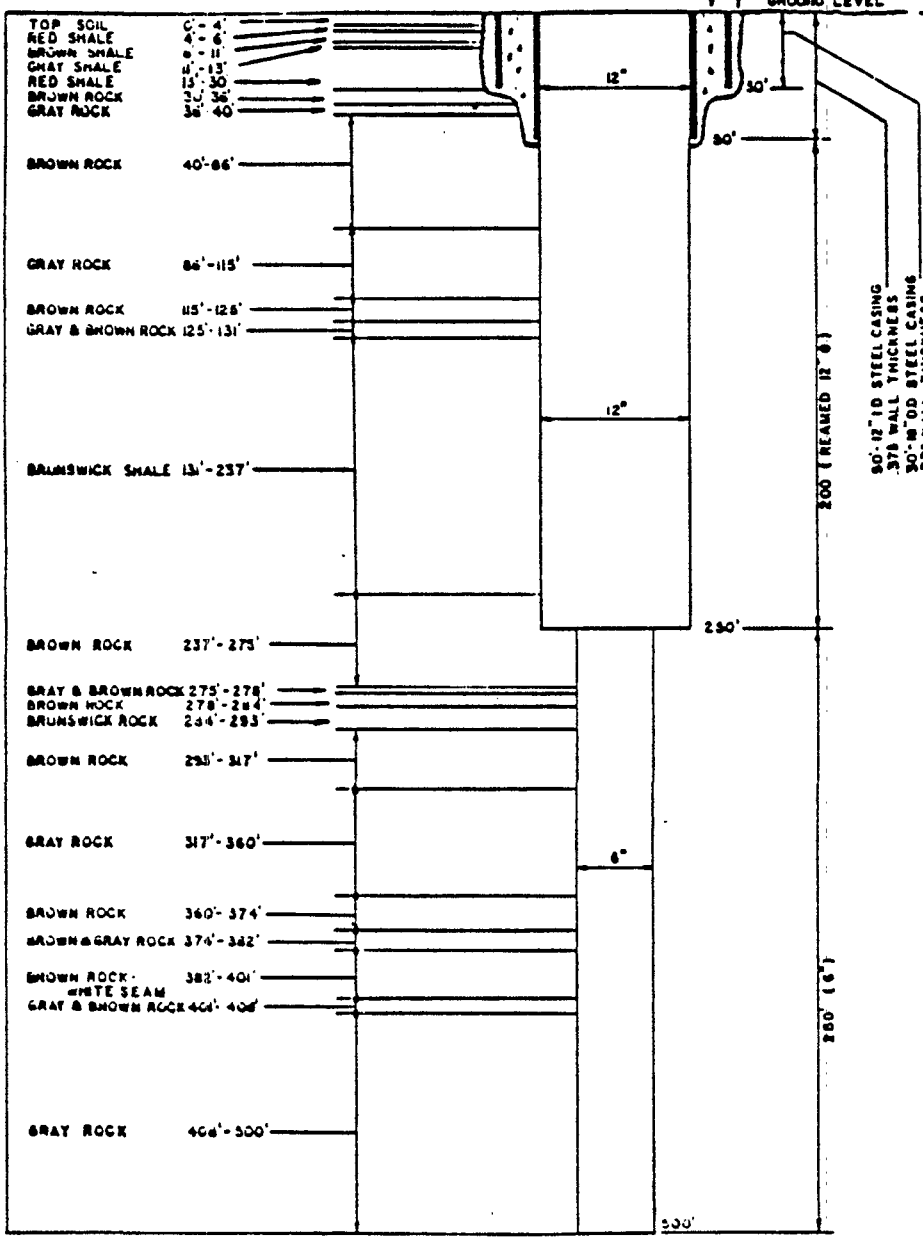
WELL NP 15
UNIONVILLE PIKE
DRILLING LOG

DATE 8-14-72
DRAWING N°
J.W.B.

SCALE:
HOR. 1"=10'
VERT. 1"=10'

300208

# WELL Nº N.P.-21




| PROGRESS LOG — DRILLED BY F.L. BOLLINGERS & SONS | | | |
|---|---|---|---|
| DEPTH | DATE | G.P.M. | STATIC |
| 0' | 4\|22\|69 | 0 | ---- |
| 31' | | 6 | |
| 75' | | 25 | |
| 130' | | 100 | |
| 205' | 4\|23\|69 | 120 | 7' |
| 324' | 4\|25\|69 | 200 | 7' |
| 336' | 4\|28\|69 | 240 | 7' |
| 500' | 5\|7\|69 | 330 | 7' |

EXHIBIT "H"

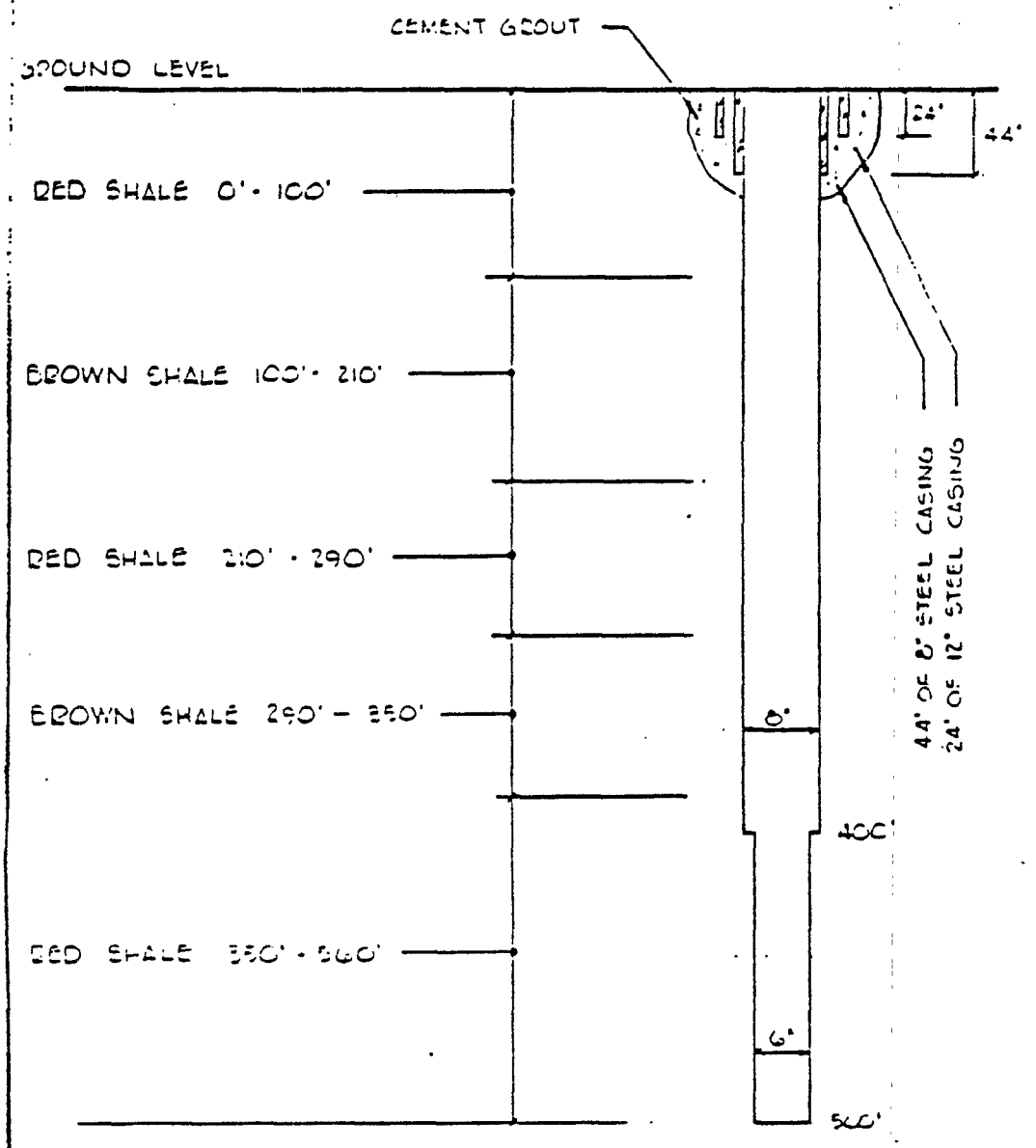
NORTH PENN WATER AUTHORITY

WELL Nº N.P.-21
HATFIELD TOWNSHIP
DRILLING LOG

DATE 1-5-70
DWN. BY T GABLE
SCALE
HOR: 1" = 10'

300209

# WELL N.P. · 33




PROGRESS LOG

DRILLED BY: F.L. SOLLINGER 1/55

| DEPTH | G.P.M. | STAT |
|---|---|---|
| 110' | 8 | — — |
| 270' | 12 | — — |
| 290' | 100 | — — |
| 320' | 150 | — — |
| 350' | 200 | — — |
| 390' | 300 | — — |
| 560' | | |

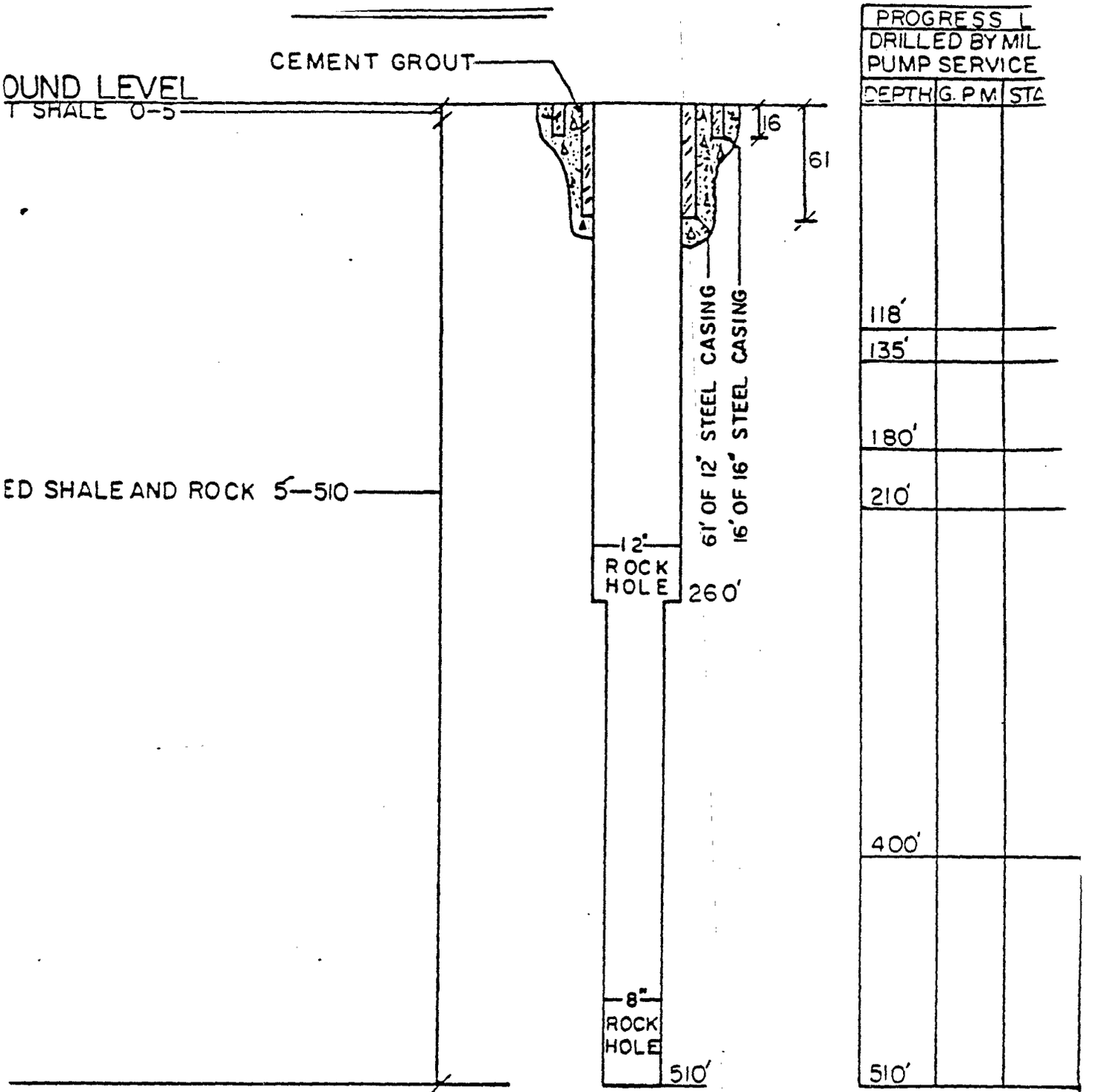
NORTH PENN WATER AUTHORITY

WELL N.P. - 33
TOWAMENCIN TOWNSHIP
DRILLING LOG

DATE : 3-15-77 SCALE : NONE

EXHIBIT H

300210




NORTH PENN WATER AUTHORITY

WELL NP 39

SKIPPACK TOWNSHIP

DRILLING LOG

DATE: 9-1-77 SCALE: NONE

DWG. BY: R.T.W. DWG NO A123-0356

EXHIBIT H

AR300211

REFERENCE 2
A Hazard Ranking System for Ametek, Incorporated
October 10, 1986

300212

R-585-8-6-11

# A HAZARD RANKING SYSTEM FOR AMETEK, INCORPORATED

PREPARED UNDER

TDD NO. F3-8607-06
EPA NO. PA-2031
CONTRACT NO. 68-01-6699

FOR THE

HAZARDOUS SITE CONTROL DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

OCTOBER 10, 1986

NUS CORPORATION
SUPERFUND DIVISION

| SUBMITTED BY | REVIEWED BY | APPROVED BY |
|---|---|---|
| WILLIAM HOSE | BRUCE R. PLUTA | GARTH GLENN |
| ENVIRON. TECHNICIAN | SENIOR STAFF SCIENTIST | MANAGER, FIT III |

300213

**Facility Name:** AMETEK, Incorporated - Hunter Spring Division

**Location:** One Spring Avenue, Hatfield, Montgomery County, Pennsylvania

**EPA Region:** III

**Person(s) in Charge of the Facility:** William Spencer
Vice President and General Manager
AMETEK, Incorporated - Hunter Spring Division
One Spring Avenue
Hatfield, PA 19440

**Name of Reviewer:** William Hose
NUS Corporation

**Date:** October 10, 1986

**General Description of the Facility:**

AMETEK, Incorporated - Hunter Spring Division manufactures precision springs, reels, and measuring and controlling apparatus. As of 1980, AMETEK, Incorporated utilized the following chemicals for the corresponding operations: zinc and cadmium cyanide in plating operations; sodium bichromate to organic plate parts; sodium hydroxide in plating; cadmium, zinc, and cadmium oxide in electroplating; phosphoric, nitric, hydrochloric, sulphuric, and muriatic acids in plating, pickling, and passivate operations; and trichlorethylene (TCE) as a degreaser. The site is situated within an undulating plain, characterized by low hills. AMETEK is located atop one such hill. The overall site slope is gentle and directed toward the southeast.

A March 22, 1984 Pennsylvania Department of Environmental Resources (PA DER) Hazardous Waste Inspection report classified the facility as a small quantity generator of TCE from degreasing operations and electroplating treatment sludge.

North Penn Water Authority sampling results of a composite sample of AMETEK, Incorporated well nos. 1 and 2, dated February 27, 1986, showed high levels of TCE, 1,1,1-trichloroethane (1,1,1-TCEA), 1,1-dichloroethylene, and 1,1-dichloroethane (1,1-dichloroethylene and 1,1-dichloroethane are known break-down products of TCE and 1,1,1-TCEA, respectively). Contamination of the groundwater regime could potentially affect 69,706 people using private wells and municipal water supply sources, all of which draw from the aquifer of concern.

Scores: $S_M = 35.57$ $S_{gw} = 61.54$ $S_{sw} = N/A$ $S_a = 0$

$S_{FE} = 0$

$S_{DC} = N/A$

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**FIGURE 1**

**HRS COVER SHEET**

300214

## Ground Water Route Work Sheet

| Rating Factor | Assigned Value (Circle One) | Multiplier | Score | Max. Score | Ref. (Section) |
|---|---|---|---|---|---|
| 1 Observed Release | 0 (45) | 1 | 45 | 45 | 3.1 |
| If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2. | | | | | |
| 2 Route Characteristics | | | | | 3.2 |
| Depth to Aquifer of Concern | 0 1 2 3 | 2 | | 6 | |
| Net Precipitation | 0 1 2 3 | 1 | | 3 | |
| Permeability of the Unsaturated Zone | 0 1 2 3 | 1 | | 3 | |
| Physical State | 0 1 2 3 | 1 | | 3 | |
| Total Route Characteristics Score | | | | 15 | |
| 3 Containment | 0 1 2 3 | 1 | | 3 | 3.3 |
| 4 Waste Characteristics | | | | | 3.4 |
| Toxicity/Persistence | 0 3 6 9 12 (15) 18 | 1 | 15 | 18 | |
| Hazardous Waste Quantity | 0 (1) 2 3 4 5 6 7 8 | 1 | 1 | 8 | |
| Total Waste Characteristics Score | | | 16 | 26 | |
| 5 Targets | | | | | 3.5 |
| Ground Water Use | 0 1 2 (3) | 3 | 9 | 9 | |
| Distance to Nearest Well/Population Served | 0 4 6 8 10 / 12 16 18 20 / 24 30 32 35 (40) | 1 | 40 | 40 | |
| Total Targets Score | | | 49 | 49 | |
| 6 If line 1 is 45, multiply 1 x 4 x 5. If line 1 is 0, multiply 2 x 3 x 4 x 5 | | | 36280 | 57,330 | |
| 7 Divide line 5 by 57,330 and multiply by 100 | | $S_{gw}$ = | 61.54 | | |

FIGURE 2
GROUND WATER ROUTE WORK SHEET

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300215

not evaluated

| Surface Water Route Work Sheet | | | | | |
|---|---|---|---|---|---|
| Rating Factor | Assigned Value (Circle One) | Multiplier | Score | Max. Score | Ref. (Section) |
| 1 Observed Release | 0 45 | 1 | | 45 | 4.1 |
| If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2. | | | | | |
| 2 Route Characteristics | | | | | 4.2 |
| Facility Slope and Intervening Terrain | 0 1 2 3 | 1 | | 3 | |
| 1-yr. 24-hr. Rainfall | 0 1 2 3 | 1 | | 3 | |
| Distance to Nearest Surface Water | 0 1 2 3 | 2 | | 6 | |
| Physical State | 0 1 2 3 | 1 | | 3 | |
| Total Route Characteristics Score | | | | 15 | |
| 3 Containment | 0 1 2 3 | 1 | | 3 | 4.3 |
| 4 Waste Characteristics | | | | | 4.4 |
| Toxicity/Persistence | 0 3 6 9 12 15 18 | 1 | | 18 | |
| Hazardous Waste Quantity | 0 1 2 3 4 5 6 7 8 | 1 | | 8 | |
| Total Waste Characteristics Score | | | | 26 | |
| 5 Targets | | | | | 4.5 |
| Surface Water Use | 0 1 2 3 | 3 | | 9 | |
| Distance to a Sensitive Environment | 0 1 2 3 | 2 | | 6 | |
| Population Served/Distance to Water Intake Downstream | 0 4 6 8 10<br>12 16 18 20<br>24 30 32 35 40 | 1 | | 40 | |
| Total Targets Score | | | | 55 | |
| 6 If line 1 is 45, multiply 1 x 4 x 5<br>If line 1 is 0, multiply 2 x 3 x 4 x 5 | | | | 64 350 | |
| 7 Divide line 6 by 64.350 and multiply by 100 | | $S_{sw}$ = N/A | | | |

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

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AR300216

| Air Route Work Sheet | | | | | |
|---|---|---|---|---|---|
| Rating Factor | Assigned Value (Circle One) | Multiplier | Score | Max. Score | Ref. (Section) |
| 1 Observed Release | (0) 45 | 1 | 0 | 45 | 5.1 |
| Date and Location: | | | | | |
| Sampling Protocol: | | | | | |
| If line 1 is 0, the $S_a$ = 0. Enter on line 5. If line 1 is 45, then proceed to line 2. | | | | | |
| 2 Waste Characteristics | | | | | 5.2 |
| Reactivity and Incompatibility | 0 1 2 3 | 1 | | 3 | |
| Toxicity | 0 1 2 3 | 3 | | 9 | |
| Hazardous Waste Quantity | 0 1 2 3 4 5 6 7 8 | 1 | | 8 | |
| Total Waste Characteristics Score | | | | 20 | |
| 3 Targets | | | | | 5.3 |
| Population Within 4-Mile Radius | 0 9 12 15 18 21 24 27 30 | 1 | | 30 | |
| Distance to Sensitive Environment | 0 1 2 3 | 2 | | 6 | |
| Land Use | 0 1 2 3 | 1 | | 3 | |
| Total Targets Score | | | | 39 | |
| 4 Multiply 1 x 2 x 3 | | | | 35,100 | |
| 5 Divide line 4 by 35,100 and multiply by 100 | $S_a$ = 0 | | | | |

FIGURE 9
AIR ROUTE WORK SHEET

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300217

| | $S$ | $S^2$ |
|---|---|---|
| Groundwater Route Score ($S_{gw}$) | 61.54 | 3787.17 |
| Surface Water Route Score ($S_{sw}$) | N/A | N/A |
| Air Route Score ($S_a$) | 0 | 0 |
| $S_{gw}^2 + S_{sw}^2 + S_a^2$ | | 3787.17 |
| $\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$ | | 61.54 |
| $\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$ | | 35.57 |

FIGURE 10
WORKSHEET FOR COMPUTING $S_M$

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300218

| Fire and Explosion Work Sheet | | | | | |
|---|---|---|---|---|---|
| Rating Factor | Assigned Value (Circle One) | Multiplier | Score | Max. Score | Ref. (Section) |
| 1 Containment | 1 3 | 1 | N/A | 3 | 7.1 |
| 2 Waste Characteristics | | | | | 7.2 |
| Direct Evidence | 0 3 | 1 | | 3 | |
| Ignitability | 0 1 2 3 | 1 | | 3 | |
| Reactivity | 0 1 2 3 | 1 | | 3 | |
| Incompatibility | 0 1 2 3 | 1 | | 3 | |
| Hazardous Waste Quantity | 0 1 2 3 4 5 6 7 8 | 1 | | 8 | |
| Total Waste Characteristics Score | | | N/A | 20 | |
| 3 Targets | | | | | 7.3 |
| Distance to Nearest Population | 0 1 2 3 4 5 | 1 | | 5 | |
| Distance to Nearest Building | 0 1 2 3 | 1 | | 3 | |
| Distance to Sensitive Environment | 0 1 2 3 | 1 | | 3 | |
| Land Use | 0 1 2 3 | 1 | | 3 | |
| Population Within 2-Mile Radius | 0 1 2 3 4 5 | 1 | | 5 | |
| Buildings Within 2-Mile Radius | 0 1 2 3 4 5 | 1 | | 5 | |
| Total Targets Score | | | N/A | 24 | |
| 4 Multiply 1 x 2 x 3 | | | N/A | 1,440 | |
| 5 Divide line 4 by 1,440 and multiply by 100 | | $S_{FE}$ = 0 | | | |

FIGURE 11
FIRE AND EXPLOSION WORK SHEET

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300219

NOT EVALUATED

| Direct Contact Work Sheet | | | | | |
|---|---|---|---|---|---|
| Rating Factor | Assigned Value (Circle One) | Multiplier | Score | Max. Score | Ref. (Section) |
| 1 Observed Incident | 0 45 | 1 | | 45 | 8.1 |
| If line 1 is 45, proceed to line 4<br>If line 1 is 0, proceed to line 2 | | | | | |
| 2 Accessibility | 0 1 2 3 | 1 | | 3 | 8.2 |
| 3 Containment | 0 15 | 1 | | 15 | 8.3 |
| 4 Waste Characteristics Toxicity | 0 1 2 3 | 5 | | 15 | 8.4 |
| 5 Targets | | | | | 8.5 |
| Population Within a 1-Mile Radius | 0 1 2 3 4 5 | 4 | | 20 | |
| Distance to a Critical Habitat | 0 1 2 3 | 4 | | 12 | |
| Total Targets Score | | | | 32 | |
| 6 If line 1 is 45, multiply 1 x 4 x 5<br>If line 1 is 0, multiply 2 x 3 x 4 x 5 | | | | 21,600 | |
| 7 Divide line 6 by 21,600 and multiply by 100 | | SDC = N/A | | | |

FIGURE 12
DIRECT CONTACT WORK SHEET

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10-10-86

300220

# DOCUMENTATION RECORDS
# FOR
# HAZARD RANKING SYSTEM

**INSTRUCTIONS: The purpose of these records is to provide a convenient way to prepare an auditable record of the data and documentation used to apply the Hazard Ranking System to a given facility. As briefly as possible, summarize the information you used to assign the score for each factor (e.g. "Waste quantity equals 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference that will make the document and for a given point easier to find. Include the location of the document and consider appending a copy of the relevant page(s) for ease in review.**

**FACILITY NAME:** AMETEK, Incorporated

**LOCATION:** One Spring Avenue
Hatfield, Montgomery County, Pennsylvania

**COORDINATES:**

Latitude $40^{\circ}$ 17' 35"

Longitude $75^{\circ}$ 17' 40"

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10-10-86



300221

## GROUND WATER ROUTE

### 1 OBSERVED RELEASE

**Contaminants detected (5 maximum):**

trichloroethylene (TCE)
1,1-dichloroethylene
1,1,1-trichloroethane (1,1,1-TCEA)
1,1-dichloroethane

**Rationale for attributing the contaminants to the facility:**

| | AMETEK Composite of Well nos. 1 & 2 | A. Stiert & Son, Inc. | Richmond Ring (background) | B&G Mfg. Co., Inc. (background) | Eastern Prestressed Concrete (background) |
|---|---|---|---|---|---|
| TCE | 333.1 | 198.9 | ND | ND | 3.8 |
| 1,1-dichloroethylene | 100.9 | 8.3 | ND | ND | ND |
| 1,1,1-TCEA | 407.2 | 168.1 | ND | ND | ND |
| 1,1-dichloroethane | 81.3 | 2.7 | ND | ND | ND |

The above contaminants were detected in both on-site (AMETEK composite) and downgradient wells (A. Stiert & Son, Incorporated) at levels significantly higher than those detected in background well samples (Richmond Ring, B & G Manufacturing, and Eastern Prestressed Concrete) (ref. nos. 2, 3, 4, 25, and 26). In addition, AMETEK, Incorporated utilized TCE as part of its manufacturing process; A. Stiert & Son, Incorporated reportedly has not used 1,1,1-TCEA as part of its operations; 1,1-dichloroethylene and 1,1-dichloroethane are known break-down products of TCE and 1,1,1-TCEA, respectively (ref. nos. 5, 6, 7, and 27).

A value of 45 was assigned.

Reference nos. 2, 3, 4, 5, 6, 7, 25, 26, and 27

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300222

## 2 ROUTE CHARACTERISTICS

### Depth to Aquifer of Concern

**Name/description of aquifer(s) of concern:**

The AMETEK site, located in the Triassic Lowlands Section of the Piedmont Physiographic Province, lies on or near a contact which separates the Brunswick Formation from the Lockatong Formation. The Brunswick occupies a significant portion of the study region, being the only formation found in the southern half of the three-mile radius. To the north, the Lockatong Formation is found interfingered with the Brunswick. A geologic map depicting the areal extent of these formations is included as reference no. 23. That portion of the three-mile radius designated as the aquifer of concern, depicted in reference nos. 12 and 12A, consists of the Brunswick Formation and interfingered portions of the Lockatong Formation.

The Brunswick Formation is composed of reddish-brown shale, mudstone, and siltstone (ref. nos. 18 (pgs. 15 and 16), 19 (pg. 18), 20 (pg. 3), and 22 (pg. 33)). The Lockatong is described as a massively bedded, medium to dark gray argillite, interbedded with thinner sequences of gray to black shale, siltstone, and marlstone (ref. nos. 18 (pg. 25), 19 (pg. 7), 20 (pg. 3), 21 (pg. 7), and 22 (pg. 30)).

The Brunswick and Lockatong Formations are conformable (ref. no. 19 (pgs. 7 and 8)). Considerable interfingering of the two takes place along contacts (ref. nos. 19 (pg. 7) and 22 (pg. 30)). An interpretive geologic cross section has been included as reference no. 24 to indicate the nature of bedding near transitional boundaries between the Brunswick and Lockatong. The above occupy a series of disconnected and downfaulted basins (ref. nos. 21 (pg. 6) and 22 (pg. 24)) in which they dip to the north-northwest, the Brunswick and Lockatong dipping an average of 20 degrees (ref. no. 18 (pgs. 15 and 25)). The trace of a large normal fault, which trends east-west, transects the three-mile radius (ref. no. 19); the fault trace may be located on site (ref. no. 23).

Both formations are generally composed of fine-grained rocks, where primary porosity is small and associated permeability is low. As such, most groundwater in the region is found within, and transmitted through, secondary porosity features such as fractures, joints, faults, and bedding plane partings (ref. nos. 18 (pgs. 10 to 13), 19 (pgs. 11 to 15), and 22 (pgs. 31, 32, and 34)). Wells of the region are completed as open rock holes.

Within the Brunswick Formation, the most important of these openings are the nearly vertical joint planes, which criss-cross each other at various angles; these openings provide for an interconnection of channels for groundwater flow. However, both the number and width of these openings vary from bed to bed. As a result of the depositional environment, the rocks form a series of overlapping lens-shaped beds (ref. no. 19 (pgs. 11 and 12)).

Secondary permeability features displayed within the Lockatong are similar to that of the Brunswick; yet, here the openings tend to be more narrow and more widely spaced (ref. nos. 18 (pg. 25) and 19 (pg. 15)).



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Interconnection of the above formations is carried out in large part via secondary features (joints and fractures) which allow for the majority of groundwater transmission and storage. These formations have also been documented as contemporaneous; interfingering of the Lockatong and Brunswick is well documented. That portion of the three-mile radius that has been excluded from the aquifer of concern largely represents the main body of the Lockatong Formation within the region. The relative permeability of the Lockatong Formation is lower than that of the Brunswick Formation; hence, it has been excluded.

**Depth(s) from the ground surface to the highest seasonal level of the saturated zone (water table(s)) of the aquifer of concern:**

N/A

**Depth from the ground surface to the lowest point of waste disposal/storage:**

N/A

## Net Precipitation

**Mean annual or seasonal precipitation (list months for seasonal):**

N/A

**Mean annual lake or seasonal evaporation (list months for seasonal):**

N/A

**Net precipitation (subtract the above figures):**

N/A

## Permeability of Unsaturated Zone

**Type of geologic material in unsaturated zone:**

N/A

**Permeability associated with geologic material:**

N/A

## Physical State

**Physical state of substances at time of disposal (or at present time for generated gases):**

N/A

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300224

## 3 CONTAINMENT

### Containment

**Method(s) of waste or leachate containment evaluated:**

N/A

**Method with highest score:**

N/A

* * *

## 4 WASTE CHARACTERISTICS

### Toxicity and Persistence

**Compound(s) evaluated:**

TCE, 1,1-dichloroethylene, 1,1,1-TCEA, and 1,1-dichloroethane

The aforementioned contaminants were evaluated since they were detected in on- and off-site samples and have been attributed to the site.

Reference nos. 2, 3, 4, 5, 6, 7, 25, 26, and 27

**Compound with highest score:**

1,1-Dichloroethylene

A value of 15 was assigned.

Reference nos. 1 and 8

### Hazardous Waste Quantity

**Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):**

Unknown; however, organic contamination has been attributed to the site via on- and off-site sampling.

A value of 1 was assigned.

Reference nos. 2, 3, 4, 5, 6, 7, 25, 26, and 27

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10-10-86



300225

**Basis of estimating and/or computing waste quantity:**

N/A

* * *

## 5 TARGETS

### Groundwater Use

**Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:**

Within the study area, the aquifer of concern is utilized as a potable water source by all residents using private wells (ref. no. 12). In addition, three municipal water suppliers (North Penn Water Authority (NPWA), Telford Borough Authority, and the Hatfield Borough Authority) also draw their water supply from the aquifer of concern (ref. nos. 9, 10, 11, 12, and 17). There is no alternative supply available for private wells that draw from the aquifer of concern (ref. nos. 9, 10, 11, 12, and 17).

A value of 3 was assigned.

Reference nos. 9, 10, 11, 12, and 17

### Distance to Nearest Well

**Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:**

The nearest well that is drawing from the aquifer of concern and is used as a potable water supply is the combination of AMETEK well nos. 1 and 2. Water drawn from these wells is believed to be mixed (ref. no. 4). Sampling results collected by the NPWA (ref. no. 2) and Quality Control Laboratory, Incorporated (ref. no. 13) show that both the wells and an employee drinking fountain are contaminated with TCE.

Reference nos. 2, 4, 13, 25, and 26

**Distance to above well or building:**

The distance from the known point of contamination to the nearest well is zero feet, since the AMETEK wells are contaminated.

A value of 4 was assigned.

Reference nos. 2, 4, 13, 25, and 26

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10-10-86



300226

## Population Served by Ground Water Wells Within a 3-Mile Radius

**Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:**

Within the study area, 729 homes have been identified which utilize the aquifer of concern as a potable water supply (ref. no. 12). In addition, water supply wells for the Telford Borough Authority, the Hatfield Borough Water Authority, and the NPWA main system have also been identified as drawing from the aquifer of concern (ref. nos. 9, 10, 11, and 17).

Population Served by Each:

| | |
|---|---|
| Private homes (ref. no. 12) | |
| 729 homes x 3.8 persons per home = 2,770 | 2,770 |
| Telford Borough Authority (ref. no. 11) | 7,000 |
| Hatfield Borough Water Authority (ref. no. 10) | 10,000 |
| NPWA (main system) (ref. nos. 9 and 17) | |
| 13,141 connections x 3.8 persons per connection = 49,936 | 49,936 |
| | 69,706 persons |

Reference nos. 9, 10, 11, 12, and 17

**Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):**

Irrigation techniques are generally not employed within the study area.

Reference nos. 14 and 15

**Total population served by groundwater within a 3-mile radius:**

The total population served by groundwater equals 69,706 persons.

A value of 5 was assigned.

A matrix value of 40 was assigned.

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10-16-86



300227

## SURFACE WATER ROUTE

### 1 OBSERVED RELEASE

**Contaminants detected in surface water at the facility or downhill from it (5 maximum):**

No hazardous substance available to the surface water pathway has been identified, and this pathway was not considered to represent a significant threat. Hence, the surface water route was not evaluated.

**Rationale for attributing the contaminants to the facility:**

N/A

* * *

### 2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

**Average slope of facility in percent:**

N/A

**Name/description of nearest downslope surface water:**

N/A

**Average slope of terrain between facility and above-cited surface water body in percent:**

N/A

**Is the facility located either totally or partially in surface water?**

N/A

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300228

Is the facility completely surrounded by areas of higher elevation?

N/A

1-Year 24-Hour Rainfall in Inches

N/A

Distance to Nearest Downslope Surface Water

N/A

Physical State of Waste

N/A

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

N/A

Method with highest score:

N/A

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300229

## 4 WASTE CHARACTERISTICS

Toxicity and Persistence

**Compound(s) evaluated**

N/A

**Compound with highest score:**

N/A

Hazardous Waste Quantity

**Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):**

N/A

**Basis of estimating and/or computing waste quantity:**

N/A

* * *

## 5 TARGETS

Surface Water Use

**Use(s) of surface water within 3 miles downstream of the hazardous substance:**

N/A

**Is there tidal influence?**

N/A

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300230

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

N/A

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

N/A

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

N/A

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

N/A

Computation of land area irrigated by above-cited intake(s) and conversion to population

N/A

Total population served:

N/A

Name/description of nearest of above water bodies:

N/A

Distance to above-cited intakes, measured in stream miles.

N/A

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300231

## AIR ROUTE

### 1 OBSERVED RELEASE

**Contaminants detected:**

No known air quality monitoring has been conducted on site.

**Date and location of detection of contaminants:**

N/A

**Methods used to detect the contaminants:**

N/A

**Rationale for attributing the contaminants to the site:**

N/A

* * *

### 2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

**Most reactive compound:**

N/A

**Most incompatible pair of compounds:**

N/A

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300232

Toxicity

Most toxic compound:

N/A

Hazardous Waste Quantity

Total quantity of hazardous waste:

N/A

Basis of estimating and/or computing waste quantity:

N/A

* * *

3 TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:
0 to 4 mi  0 to 1 mi  0 to 1/2 mi  0 to 1/4 mi

N/A

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

N/A

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

N/A

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Distance to critical habitat of an endangered species, if 1 mile or less:

N/A

Land Use

Distance to commercial/industrial area, if 1 mile or less:

N/A

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

N/A

Distance to residential area, if 2 miles or less:

N/A

Distance to agricultural land in production within past 5 years, if 1 mile or less:

N/A

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

N/A

Is a historic or landmark site (National Register or Historic Places and National Landmarks) within the view of the site?

N/A

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David E. Egan
10-10-86



300234

## FIRE AND EXPLOSION

### 1 DOCUMENTED THREAT

**If either a state or local fire marshal has certified that the facility presents a significant fire or explosion threat to the public or to sensitive environments, document the certificatio**

**Name/affiliation of fire marshal:**

The site has never been certified as a fire and/or explosion hazard and poses no threat at present.

Reference no. 16

**Date of Certification:**

N/A

**Comments:**

N/A

**If there is a demonstrated fire and explosion threat based on field observations, document the threat:**

**Inspectors reporting the threat:**

N/A

**Date of observations:**

N/A

**Methods used to document the threat:**

N/A

**Comments:**

N/A

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10-10-86



300235

## 2 CONTAINMENT

N/A

Containment

**Measure(s) taken to minimize or prevent hazardous substances from catching fire or explodin**

N/A

* * *

## 3 WASTE CHARACTERISTICS

Direct Evidence

**Type of measures taken:**

N/A

**Date and location of positive measurements:**

N/A

Ignitability

**Compound evaluated:**

N/A

**Compound with highest score:**

N/A

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300236

Reactivity

Compounds evaluated:

N/A

Compound with highest score:

N/A

Incompatibility

Compounds evaluated:

N/A

Most incompatible pair of compounds:

N/A

Hazardous Waste Quantity

Total quantity of hazardous waste:

N/A

Basis of estimating and/or computing waste quantity:

N/A

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10-10-86



300237

4 TARGETS

Distance to Nearest Population

N/A

Distance to Nearest Building

N/A

Distance to Nearest Sensitive Environment

Distance to wetlands, if less than 100 feet:

N/A

Distance to critical habitat of an endangered species, if greater than 1/2 mile:

N/A

Land Use

Distance to commercial industrial area, if 1 mile or less:

N/A

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

N/A

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10-10-86

300238

**Distance to residential area, if 2 miles or less:**

N/A

**Distance to agricultural land in production within past 5 years, if 1 mile or less:**

N/A

**Distance to prime agricultural land in production within past 5 years, if 2 miles or less:**

N/A

**Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?**

N/A

**Population Within 2-Mile Radius**

N/A

**Number of Buildings Within a 2-Mile Radius**

N/A

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10-10-86



300239

## DIRECT CONTACT

No contaminants directly accessible to the public have been identified; therefore, direct contact was not evaluated.

### 1 OBSERVED INCIDENT

**Pertinent details of incident:**

N/A

**Location:**

N/A

**Date:**

N/A

* * *

### 2 ACCESSIBILITY

Accessibility to Hazardous Substance

**Measure(s) taken to limit access by humans or animals to the hazardous substances:**

N/A

* * *

### 3 CONTAINMENT

Containment

**Indicate whether the hazardous substance itself is accessible to direct contact:**

N/A

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10-10-86



300240

## 4 WASTE CHARACTERISTICS

Toxicity

**Compounds evaluated:**

N/A

**Compound with highest score:**

N/A

* * *

## 5 TARGETS

Population Within 1-mile Radius

N/A

Distance to a Critical Habitat of an Endangered Species

N/A

OA
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10-10-86



300241

ATTACHMENT 1

# REFERENCES


| Reference No. | Description of Reference |
|---|---|
| 1. | Uncontrolled Hazardous Waste Site Ranking System; A User's Manual.<br><br>National Oil and Hazardous Substances Contingency Plan appendix A (40 CFR 300) (47 FR 31219) July 16, 1982. |
| 2. | North Penn Water Authority. Report of Volatile Hydrocarbon Analysis. March 13, 1986; Combined with United States Geological Survey, Telford, Pennsylvania Quadrangle, 7.5 Minute Series. Topographic Map. 1960, photorevised 1973 (Sample locations added by NUS Corporation). |
| 3. | Pennsylvania Department of Environmental Resources. File information; site sketch of AMETEK facility. October 23, 1985. |
| 4. | Gabriel, Terry, North Penn Water Authority, with Timothy Silar, NUS FIT III. Telecon. August 4, 1986. |
| 5. | Pennsylvania Department of Environmental Resources. File information; Hazardous Waste Inspection report, parts A and C, and comments. March 22, 1984. |
| 6. | United States Environmental Protection Agency. Identification and Listing of Hazardous Waste. Part 261, subpart D, 261.30 - 261.32. May 19, 1980. |
| 7. | Cline, Patricia, and Daniel Vista. Migration and Degradation Patterns of Volatile Organic Compounds. Presented at the Fifth National Conference on Management of Uncontrolled Hazardous Waste Sites, Washington, D.C. November 7 to 9, 1984. |
| 8. | Sax, N. Irving. Dangerous Properties of Industrial Materials. Sixth Edition. 1984. |
| 9. | Richenbach, Dale, North Penn Water Authority, with Timothy Silar, NUS FIT III. Meeting. July 30, 1986. |
| 10. | Hickson, Robert, Hatfield Borough Water Authority, with Timothy Silar, NUS FIT III. Meeting. July 29, 1986. |
| 11. | Beck, Donald, Telford Borough Water Authority, with Timothy Silar, NUS FIT III. Meeting. July 30, 1986. |


QA David E Egan 10-10-86

300243

| Reference No. | Description of Reference |
|---|---|
| 12. | United States Geological Survey. Telford, Pennsylvania Quadrangle, 7.5 Minute Series. Topographic Map. 1960, photorevised 1969 and 1973; Combined with Doylestown, Pennsylvania Quadrangle, 7.5 Minute Series. Topographic Map. 1960, photorevised 1973. (One- and three-mile radii by NUS Corporation.) |
| 12A. | Longwill, Stanley, M., and Charles R. Wood. Geologic Map of the Brunswick And Lockatong Formations in Berks and Montgomery Counties, Pennsylvania; Kammerer, J.C., Groundwater Resources of Bucks County, Pennsylvania. (Three-mile radius added by NUS Corporation.) (Boundary of the aquifer of concern added by NUS.) |
| 13. | Quality Control Laboratory, Incorporated. Sample results. Collected March 12, 1980. |
| 14. | Reber, Paul, Pennsylvania State University Agricultural Extension Service, with William Hose, NUS FIT III. Telecon. August 8, 1986. |
| 15. | Tindall, David, Bucks County Soil Conservation Survey, with Timothy Silar, NUS FIT III. Telecon. August 4, 1986. |
| 16. | Rehrig, Paul, Hatfield Borough Fire Marshal, with William Hose, NUS FIT III. Telecon. August 5, 1986. |
| 17. | Richenbach, Dale, North Penn Water Authority, with William Hose, NUS FIT III. Telecon. October 7, 1986. |
| 18. | Newport, Thomas G., United States Geological Survey. Groundwater Resources of Montgomery County, Pennsylvania. Bulletin W-29. First printing, 1981; second printing, 1973. |
| 19. | Longwill, Stanley, M., and Charles R. Wood, United States Geological Survey. Groundwater Resources of the Brunswick Formation in Montgomery and Berks Counties, Pennsylvania. Bulletin W22, 1965. |
| 20. | Rima, Donald R., United States Geological Survey. Groundwater Resources of the Lansdale Area, Pennsylvania. Progress Report 146, 1955. |
| 21. | Rima, Donald R., Harold Meisler, and Stanley Longwill, United States Geological Survey. Geology and Hydrology of the Stockton Formation in Southeastern Pennsylvania. Bulletin W 14, 1962. |

QA David E Egan 10-10-86

300244

| Reference No. | Description of Reference |
|---|---|


22. Greenman, David W., Pennsylvania Department of Internal Affairs, Topographic and Geologic Survey. Groundwater Resources of Bucks County, Pennsylvania. Bulletin W 11, 1955.

23. Longwill, Stanley, M., and Charles R. Wood. Geologic Map of the Brunswick And Lockatong Formations in Berks and Montgomery Counties, Pennsylvania; Kammerer, J.C., Groundwater Resources of Bucks County, Pennsylvania. (Three-mile radius added by NUS Corporation.)

24. Gannett, Fleming, Corddry and Carpenter, Incorporated. Geologic section, Wissahickon Well Field, Lansdale Municipal Authority, Lansdale, Pennsylvania. January 4, 1952.

25. Coyle, Judith A., North Penn Water Authority, to Timothy Silar, NUS FIT III. Correspondence. October 7, 1986.

26. Coyle, Judith A., North Penn Water Authority, with William Hose, NUS FIT III. Telecon. October 8, 1986.

27. Pennsylvania Department of Labor and Industry. Environmental Hazard Survey. April 22, 1986.


QA
David E Egan
10-10-86

ATTACHMENT 2

| ...ST CENTER: | REM/FIT ZONE CONTRACT<br>TECHNICAL DIRECTIVE DOCUMENT (TDD) | 2. NO.: |
|---|---|---|
| ACCOUNT NO.: | | F3-8607-06 |

| 3. PRIORITY: | 4. ESTIMATE OF TECHNICAL HOURS: | 5. EPA SITE ID: | 6. COMPLETION DATE: | 7. REFERENCE INFO.: |
|---|---|---|---|---|
| [X] HIGH<br>[ ] MEDIUM<br>[ ] LOW | 60 | | 8/18/86 | [X] YES [ ] NO<br>[ ] ATTACHED<br>[X] PICK UP |
| | 4A. ESTIMATE OF SUBCONTRACT COST: | 5A. EPA SITE NAME: Ametek Corp. Hatfield, PA | | |

8. GENERAL TASK DESCRIPTION: Preparation of HRS report for the subject site.

9. SPECIFIC ELEMENTS:

1.) Review background information.
2.) Review information obtained under TDD No. F3-8512-31.
3.) Contact state & local agencies for relevant inforamtion.
4.) Review PA DER and NPWA files for relevant information and data.
5.) Compute HRS score.
6.) Prepare & submit HRS report including all required documentation.
7.) All work on this project to be performed according to: WP-HRS, Rev. 0.

10. INTERIM DEADLINES:

11. DESIRED REPORT FORM: FORMAL REPORT [X] LETTER REPORT [ ] FORMAL BRIEFING [ ]

OTHER (SPECIFY): Coordinate with Lorie Acker
Determine RCRA staus, if applicable

12. COMMENTS:
State Code 042 County Code 091

13. AUTHORIZING RPO: Harold G Byer (SIGNATURE) — 14. DATE: 7/31/86

15. RECEIVED BY: [X] ACCEPTED [ ] ACCEPTED WITH EXCEPTIONS [ ] REJECTED
(CONTRACTOR RPM SIGNATURE) — 16. DATE: 8/4/86

Sheet 1 White – FITL Copy
Sheet 2 Canary – DPO Copy
Sheet 3 Pink – Contracting Officer's Copy (Washington, D. C.)
Sheet 4 Goldenrod – Project Officer's Copy (Washington D. C.)

AR300247

ATTACHMENT 3

F3-8607-07

EPA

# POTENTIAL HAZARDOUS WASTE SITE
# SITE INSPECTION REPORT
## PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION
01 STATE: PA | 02 SITE NUMBER: 2031

## II. SITE NAME AND LOCATION

| 01 SITE NAME (Legal, common, or descriptive name of site) | 02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER | | | | | |
|---|---|---|---|---|---|---|
| Ametek, Incorporated | One Spring Avenue | | | | | |
| **03 CITY** | **04 STATE** | **05 ZIP CODE** | **06 COUNTY** | **07 COUNTY CODE** | **08 CONG. DIST.** | |
| Hatfield | PA | 19440 | Montgomery | 091 | PA05 | |

**09 COORDINATES:** LATITUDE 40° 17' 35" | LONGITUDE 75° 17' 40"

**10 TYPE OF OWNERSHIP (Check one):** [X] A. PRIVATE [ ] B. FEDERAL _____ [ ] C. STATE [ ] D. COUNTY [ ] E. MUNICIPAL [ ] F. OTHER _____ [ ] G. UNKNOWN

## III. INSPECTION INFORMATION

| 01 DATE OF INSPECTION | 02 SITE STATUS | 03 YEARS OF OPERATION |
|---|---|---|
| N/A (MONTH / DAY / YEAR) | [X] ACTIVE [ ] INACTIVE | _____ (BEGINNING YEAR) _____ (ENDING YEAR) X UNKNOWN |

**04 AGENCY PERFORMING INSPECTION (Check all that apply):** N/A

[ ] A. EPA [ ] B. EPA CONTRACTOR _____ (Name of firm) [ ] C. MUNICIPAL [ ] D. MUNICIPAL CONTRACTOR _____ (Name of firm)
[ ] E. STATE [ ] F. STATE CONTRACTOR _____ (Name of firm) [ ] G. OTHER _____ (Specify)

| 05 CHIEF INSPECTOR | 06 TITLE | 07 ORGANIZATION | 08 TELEPHONE NO |
|---|---|---|---|
| N/A | N/A | N/A | ( ) N/A |
| **09 OTHER INSPECTORS** | **10 TITLE** | **11 ORGANIZATION** | **12 TELEPHONE NO** |
| | N/A | N/A | ( ) N/A |
| evaluated using available data | | | ( ) |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |

| 13 SITE REPRESENTATIVES INTERVIEWED | 14 TITLE | 15 ADDRESS | 16 TELEPHONE NO |
|---|---|---|---|
| N/A | N/A | N/A | ( ) N/A |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |

| 17 ACCESS GAINED BY (Check one) | 18 TIME OF INSPECTION | 19 WEATHER CONDITIONS |
|---|---|---|
| N/A [ ] PERMISSION [ ] WARRANT | N/A | N/A |

## IV. INFORMATION AVAILABLE FROM

| 01 CONTACT | 02 OF (Agency/Organization) | 03 TELEPHONE NO |
|---|---|---|
| Lorie Acker | EPA | (215)597-3165 |

| 04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM | 05 AGENCY | 06 ORGANIZATION | 07 TELEPHONE NO. | 08 DATE |
|---|---|---|---|---|
| William Hose | NUS | FIT III | (215) 687-9510 | 8 / 11 / 86 (MONTH / DAY / YEAR) |

EPA FORM 2070-13 (7-81)

AR300249

ORIGINAL (Red)

EPA

# POTENTIAL HAZARDOUS WASTE SITE
# SITE INSPECTION REPORT
## PART 2 - WASTE INFORMATION

**I. IDENTIFICATION**

| 01 STATE | 02 SITE NUMBER |
|---|---|
| PA | 2031 |

## II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

**01 PHYSICAL STATES** (Check all that apply)

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- ☒ E. SLURRY
- ☒ F. LIQUID
- ☐ G. GAS
- ☐ D. OTHER _____ (Specify)

**02 WASTE QUANTITY AT SITE** (Measures of waste quantities must be independent)

- TONS: unknown
- CUBIC YARDS: unknown
- NO. OF DRUMS: unknown

**03 WASTE CHARACTERISTICS** (Check all that apply)

- ☒ A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☐ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

## III. WASTE TYPE

| CATEGORY | SUBSTANCE NAME | 01 GROSS AMOUNT | 02 UNIT OF MEASURE | 03 COMMENTS |
|---|---|---|---|---|
| SLU | SLUDGE | | | |
| OLW | OILY WASTE | | | |
| SOL | SOLVENTS | unknown | N/A | PA DER file information indicates that AMETEK uses and has used solvents as part of its degreasing operation. |
| PSD | PESTICIDES | | | |
| OCC | OTHER ORGANIC CHEMICALS | | | |
| IOC | INORGANIC CHEMICALS | | | |
| ACD | ACIDS | | | |
| BAS | BASES | | | |
| MES | HEAVY METALS | | | |

## IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

| 01 CATEGORY | 02 SUBSTANCE NAME | 03 CAS NUMBER | 04 STORAGE DISPOSAL METHOD | 05 CONCENTRATION | 06 MEASURE OF CONCENTRATION |
|---|---|---|---|---|---|
| SOL | trichloroethylene | 79-01-6 | unknown | 333.1 | ug/l |
| SOL | 1,1-dichloroethylene | 75-34-4 | unknown | 100.9 | ug/l |
| SOL | 1,1,1-trichloroethane | 71-55-6 | unknown | 407.2 | ug/l |
| SOL | 1,1-dichloroethane | 75-34-3 | unknown | 81.3 | ug/l |
| | | | | | |
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| | | | | | |

## V. FEEDSTOCKS (See Appendix for CAS Numbers) N/A

| CATEGORY | 01 FEEDSTOCK NAME | 02 CAS NUMBER | CATEGORY | 01 FEEDSTOCK NAME | 02 CAS NUMBER |
|---|---|---|---|---|---|
| FDS | | | FDS | | |
| FDS | | | FDS | | |
| FDS | | | FDS | | |
| FDS | | | FDS | | |

## VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

North Penn Water Authority (NPWA) file information
Pennsylvania Department of Environmental Resources (PA DER) file information

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AR300250

EPA

**POTENTIAL HAZARDOUS WASTE SITE**
**SITE INSPECTION REPORT**
**PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS**

| I. IDENTIFICATION | |
|---|---|
| 01 STATE | 02 SITE NUMBER |
| PA | 2031 |

**II. HAZARDOUS CONDITIONS AND INCIDENTS**

01 ☒ A. GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: 69,706
02 ☐ OBSERVED (DATE: 2/27/86) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

North Penn Water Authority sample analysis has revealed contamination in both on site and downgradient wells at levels significantly higher than those detected in background samples.

01 ☐ B. SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known

01 ☐ C. CONTAMINATION OF AIR
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No known air quality monitoring has been conducted on site.

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The site has never been certified as a fire and/or explosion threat.

01 ☒ E. DIRECT CONTACT 1907
03 POPULATION POTENTIALLY AFFECTED 1,907
02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No contaminants directly accessible to the public have been identified.

01 ☐ F. CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED: _____ (Acres)
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known, there are no soil sample analyses available.

01 ☒ G. DRINKING WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: 69,706
02 ☐ OBSERVED (DATE 2/27/86) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

North Penn Water Authority sample analysis has revealed groundwater contamination downgradien from the site within the aquifer of concern. The aquifer of concern supplies 69,706 people within the study area.

01 ☐ H. WORKER EXPOSURE/INJURY
03 WORKERS POTENTIALLY AFFECTED. _____
02 ☐ OBSERVED (DATE. _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known

01 ☒ I. POPULATION EXPOSURE/INJURY
03 POPULATION POTENTIALLY AFFECTED: 69,706
02 ☐ OBSERVED (DATE: 8/11/86) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

A total of 69,706 people which utilize the aquifer of concern as their potable water source are potentially affected by the contaminated groundwater.

EPA FORM 2070-13 (7-81)

ORIGINAL (Red)

EPA

**POTENTIAL HAZARDOUS WASTE SITE**
**SITE INSPECTION REPORT**
**PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS**

**I. IDENTIFICATION**
01 STATE: PA | 02 SITE NUMBER: 2031

**II. HAZARDOUS CONDITIONS AND INCIDENTS** (Continued)

01 ☐ J. DAMAGE TO FLORA
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known

01 ☐ K. DAMAGE TO FAUNA
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

None known

01 ☐ L. CONTAMINATION OF FOOD CHAIN
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills/Runoff/Standing liquids/Leaking drums)
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 69,706
04 NARRATIVE DESCRIPTION

The containmant of the wastes is unknown; however, contamination of the groundwater has been attributed to the site.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

None known

**III. TOTAL POPULATION POTENTIALLY AFFECTED:** 69,706

**IV. COMMENTS**

The total population potentially affected reflects all groundwater users including free flowing municipal systems which draw from the aquifer of concern.

**V. SOURCES OF INFORMATION** (Cite specific references, e.g. state files, sample analysis, reports)

PA DER file information
NUS Corporation FIT III Hazard Ranking System, August 11, 1986

EPA FORM 2070-13 (7-81)

AR300252

EPA

# POTENTIAL HAZARDOUS WASTE SITE
# SITE INSPECTION
## PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

| 01 STATE | 02 SITE NUMBER |
|---|---|
| PA | 2031 |

## II. PERMIT INFORMATION

| 01 TYPE OF PERMIT ISSUED (Check all that apply) | 02 PERMIT NUMBER | 03 DATE ISSUED | 04 EXPIRATION DATE | 05 COMMENTS |
|---|---|---|---|---|
| ☐ A. NPDES | | | | |
| ☐ B. UIC | | | | |
| ☐ C. AIR | | | | |
| ☐ D. RCRA | | | | |
| ☐ E. RCRA INTERIM STATUS | PAD002342475 | | | |
| ☐ F. SPCC PLAN | | | | |
| ☐ G. STATE (Specify) | | | | |
| ☐ H. LOCAL (Specify) | | | | |
| ☐ I. OTHER (Specify) | | | | |
| ☒ J. NONE | N/A | N/A | N/A | |

## III. SITE DESCRIPTION

| 01 STORAGE/DISPOSAL (Check all that apply) | 02 AMOUNT | 03 UNIT OF MEASURE |
|---|---|---|
| ☐ A. SURFACE IMPOUNDMENT | | |
| ☐ B. PILES | | |
| ☐ C. DRUMS, ABOVE GROUND | | |
| ☐ D. TANK, ABOVE GROUND | | |
| ☐ E. TANK, BELOW GROUND | | |
| ☐ F. LANDFILL | | |
| ☐ G. LANDFARM | | |
| ☐ H. OPEN DUMP | | |
| ☒ I. OTHER (Specify) unknown | | |

04 TREATMENT (Check all that apply)
- ☐ A. INCINERATION
- ☐ B. UNDERGROUND INJECTION
- ☒ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER (Specify)

05 OTHER
- ☒ A. BUILDINGS ON SITE

06 AREA OF SITE
unknown (Acres)

07 COMMENTS
N/A

## IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)
☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☒ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.
AMETEK's containment procedures are unknown; however, groundwater contamination has been attributed to the site and an inadequate value was assigned.

## V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE ☐ YES ☐ NO unknown
02 COMMENTS
No contaminants directly accessible to the public have been identified.

## VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

PA DER file information
NUS Corporation FIT III winshield site inspection, August 6, 1986
NUS Corporation FIT III Hazard Ranking System, August 11, 1986



AR300253

ORIGINAL (Red)

EPA

# POTENTIAL HAZARDOUS WASTE SITE
# SITE INSPECTION REPORT
## PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

**I. IDENTIFICATION**
01 STATE: PA | 02 SITE NUMBER: 2031

## II. DRINKING WATER SUPPLY

| 01 TYPE OF DRINKING SUPPLY (Check as applicable) | SURFACE | WELL | 02 STATUS: ENDANGERED | AFFECTED | MONITORED | 03 DISTANCE TO SITE |
|---|---|---|---|---|---|---|
| COMMUNITY | A. ☐ | B. ☒ | A. ☒ | B. ☐ | C. ☐ | A. .5 (mi) |
| NON-COMMUNITY | C. ☐ | D. ☒ | D. ☒ | E. ☐ | F. ☐ | B. 0 feet (mi) |

## III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☒ A. ONLY SOURCE FOR DRINKING ☐ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available) ☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available) ☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER: 69,706 via main system — 03 DISTANCE TO NEAREST DRINKING WATER WELL: 0 feet (mi)

| 04 DEPTH TO GROUNDWATER | 05 DIRECTION OF GROUNDWATER FLOW | 06 DEPTH TO AQUIFER OF CONCERN | 07 POTENTIAL YIELD OF AQUIFER | 08 SOLE SOURCE AQUIFER |
|---|---|---|---|---|
| < 8 (ft) | unknown | 8 (ft) | unknown (gpd) | ☒ YES ☐ NO |

09 DESCRIPTION OF WELLS (Including useage, depth, and location relative to population and buildings)

Wells are cased several feet into bedrock then constructed as open-holes (uncased) to the total depth.

| 10 RECHARGE AREA | | 11 DISCHARGE AREA | |
|---|---|---|---|
| ☐ YES ☐ NO | COMMENTS: Unknown | ☐ YES ☐ NO | COMMENTS: Unknown |

## IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☒ A. RESERVOIR, RECREATION DRINKING WATER SOURCE ☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☐ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

| NAME: | potentially AFFECTED | DISTANCE TO SITE |
|---|---|---|
| West Branch Neshaminy Creek | ☒ | 2,500 feet (mi) |
| Neshaminy Creek | ☒ | 2.1 (mi) |
| | ☐ | (mi) |

## V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

| ONE (1) MILE OF SITE | TWO (2) MILES OF SITE | THREE (3) MILES OF SITE |
|---|---|---|
| A. 1,097 NO. OF PERSONS | B. 13,143 NO. OF PERSONS | C. 28,240 NO. OF PERSONS |

02 DISTANCE TO NEAREST POPULATION: .5 (mi) to corporate boundry of Hatfield

| 03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE | 04 DISTANCE TO NEAREST OFF-SITE BUILDING |
|---|---|
| 2,315 | 400 feet (mi) |

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

The site lies in a relatively rural area between the communities of Souderton, 1.2 miles west, and Hatfield ,5 miles south.

EPA FORM 2070-13 (7-81)

AR300254

EPA

# POTENTIAL HAZARDOUS WASTE SITE
# SITE INSPECTION REPORT
## PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE: PA | 02 SITE NUMBER: 2031

## VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Choose one)

☐ A. $10^{-6}$ – $10^{-8}$ cm/sec ☒ B. $10^{-4}$ – $10^{-6}$ cm/sec ☐ C. $10^{-4}$ – $10^{-3}$ cm/sec ☐ D. GREATER THAN $10^{-3}$ cm/sec

02 PERMEABILITY OF BEDROCK (Choose one)

☐ A. IMPERMEABLE (Less than $10^{-6}$ cm/sec) ☒ B. RELATIVELY IMPERMEABLE ($10^{-4}$ – $10^{-6}$ cm/sec) ☐ C. RELATIVELY PERMEABLE ($10^{-2}$ – $10^{-4}$ cm/sec) ☐ D. VERY PERMEABLE (Greater than $10^{-2}$ cm/sec)

| 03 DEPTH TO BEDROCK | 04 DEPTH OF CONTAMINATED SOIL ZONE | 05 SOIL pH | |
|---|---|---|---|
| < 12 (ft) | unknown (ft) | unknown | |

| 06 NET PRECIPITATION | 07 ONE YEAR 24 HOUR RAINFALL | 08 SLOPE: SITE SLOPE | DIRECTION OF SITE SLOPE | TERRAIN AVERAGE SLOPE |
|---|---|---|---|---|
| 8 (in) | 2.6 (in) | 1-12 % | southeast | 0-3 % |

09 FLOOD POTENTIAL
N/A
SITE IS IN _____ YEAR FLOODPLAIN

10
N/A ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)
ESTUARINE N/A OTHER
A. _____ (mi) B. _____ (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)
N/A _____ (mi)
ENDANGERED SPECIES: _____

13 LAND USE IN VICINITY

DISTANCE TO:

| COMMERCIAL/INDUSTRIAL | RESIDENTIAL AREAS, NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES | AGRICULTURAL LANDS: PRIME AG LAND | AGRICULTURAL LANDS: AG LAND |
|---|---|---|---|
| A. 800 feet (mi) | B. .5 (mi) | C. N/A (mi) | D. 200 feet (mi) |

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

Overall, the AMETEK facility is situated within an undulating plain with scattered low hills and ridges. AMETEK itself is located atop of a hill. The site slope is very mild and points to the southeast.

## VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)


United States Department of Agriculture Soil Conservations Service, Soil Survey of Montgomery County, Pennsylvania. April 1967.
National Climatic Center, Climatic Atlas of the United States
PA DER file informaiton
NUS Corporation FIT III Hazard Ranking System, August 11, 1986




AR300255

ORIGINAL (Red)

EPA

# POTENTIAL HAZARDOUS WASTE SITE
# SITE INSPECTION REPORT
## PART 6 - SAMPLE AND FIELD INFORMATION

| I. IDENTIFICATION | |
|---|---|
| 01 STATE | 02 SITE NUMBER |
| PA | 2031 |

## II. SAMPLES TAKEN

| SAMPLE TYPE | 01 NUMBER OF SAMPLES TAKEN | 02 SAMPLES SENT TO | 03 ESTIMATED DATE RESULTS AVAILABLE |
|---|---|---|---|
| GROUNDWATER | | evaluated using available data | |
| SURFACE WATER | | | |
| WASTE | | | |
| AIR | | | |
| RUNOFF | | | |
| SPILL | | | |
| SOIL | | | |
| VEGETATION | | | |
| OTHER | | | |

## III. FIELD MEASUREMENTS TAKEN

| 01 TYPE | 02 COMMENTS |
|---|---|
| N/A | |
| | |
| | |
| | |
| | |

## IV. PHOTOGRAPHS AND MAPS

01 TYPE ☐ GROUND ☐ AERIAL N/A

02 IN CUSTODY OF N/A
(Name of organization or individual)

03 MAPS ☒ YES ☐ NO

04 LOCATION OF MAPS: NUS Corporation FIT III

## V. OTHER FIELD DATA COLLECTED (Provide narrative description)

N/A

## VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

NUS Corporation FIT III Hazard Ranking System, August 11, 1986.

EPA FORM 2070-13 (7-81)

AR300256

EPA

# POTENTIAL HAZARDOUS WASTE SITE
# SITE INSPECTION REPORT
## PART 7 - OWNER INFORMATION

I. IDENTIFICATION
01 STATE: PA | 02 SITE NUMBER: 2031

## II. CURRENT OWNER(S)

| 01 NAME | 02 D+B NUMBER | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|---|---|---|---|
| AMETEK, Incorporated | | One Spring Avenue | | Hatfield | PA | 19440 |
| N/A | | | | | | |
| N/A | | | | | | |
| N/A | | | | | | |

## PARENT COMPANY (if applicable)

| 08 NAME | 09 D+B NUMBER | 10 STREET ADDRESS (P.O. Box, RFD #, etc.) | 11 SIC CODE | 12 CITY | 13 STATE | 14 ZIP CODE |
|---|---|---|---|---|---|---|
| Unknown | | | | | | |
| N/A | | | | | | |
| N/A | | | | | | |
| N/A | | | | | | |

## III. PREVIOUS OWNER(S) (List most recent first)

| 01 NAME | 02 D+B NUMBER | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|---|---|---|---|
| Unknown | | | | | | |
| N/A | | | | | | |
| N/A | | | | | | |
| N/A | | | | | | |

## IV. REALTY OWNER(S) (If applicable, list most recent first)

| 01 NAME | 02 D+B NUMBER | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|---|---|---|---|
| Unknown | | | | | | |
| N/A | | | | | | |
| N/A | | | | | | |
| N/A | | | | | | |

## V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sampling results)

PA DER file information

EPA FORM 2070-13 (7-81)

AR300257

ORIGINAL (Red)

EPA

# POTENTIAL HAZARDOUS WASTE SITE
# SITE INSPECTION REPORT
## PART 8 - OPERATOR INFORMATION

**I. IDENTIFICATION**

| 01 STATE | 02 SITE NUMBER |
|---|---|
| PA | 2031 |

## II. CURRENT OPERATOR (Provide if different from owner)

| 01 NAME | 02 D+B NUMBER |
|---|---|
| N/A | |

| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
|---|---|
| | |

| 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|
| | | |

| 08 YEARS OF OPERATION | 09 NAME OF OWNER |
|---|---|
| | |

## OPERATOR'S PARENT COMPANY (If applicable)

| 10 NAME | 11 D+B NUMBER |
|---|---|
| N/A | |

| 12 STREET ADDRESS (P.O. Box, RFD #, etc.) | 13 SIC CODE |
|---|---|
| | |

| 14 CITY | 15 STATE | 16 ZIP CODE |
|---|---|---|
| | | |

## III. PREVIOUS OPERATOR(S) (List most recent first, provide only if different from owner)

| 01 NAME | 02 D+B NUMBER |
|---|---|
| Unknown | |

| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
|---|---|
| | |

| 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|
| | | |

| 08 YEARS OF OPERATION | 09 NAME OF OWNER DURING THIS PERIOD |
|---|---|
| | |

## PREVIOUS OPERATORS' PARENT COMPANIES (If applicable)

| 10 NAME | 11 D+B NUMBER |
|---|---|
| Unknown | |

| 12 STREET ADDRESS (P.O. Box, RFD #, etc.) | 13 SIC CODE |
|---|---|
| | |

| 14 CITY | 15 STATE | 16 ZIP CODE |
|---|---|---|
| | | |

| 01 NAME | 02 D+B NUMBER |
|---|---|
| N/A | |

| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
|---|---|
| | |

| 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|
| | | |

| 08 YEARS OF OPERATION | 09 NAME OF OWNER DURING THIS PERIOD |
|---|---|
| | |

| 10 NAME | 11 D+B NUMBER |
|---|---|
| N/A | |

| 12 STREET ADDRESS (P.O. Box, RFD #, etc.) | 13 SIC CODE |
|---|---|
| | |

| 14 CITY | 15 STATE | 16 ZIP CODE |
|---|---|---|
| | | |

| 01 NAME | 02 D+B NUMBER |
|---|---|
| N/A | |

| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
|---|---|
| | |

| 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|
| | | |

| 08 YEARS OF OPERATION | 09 NAME OF OWNER DURING THIS PERIOD |
|---|---|
| | |

| 10 NAME | 11 D+B NUMBER |
|---|---|
| N/A | |

| 12 STREET ADDRESS (P.O. Box, RFD #, etc.) | 13 SIC CODE |
|---|---|
| | |

| 14 CITY | 15 STATE | 16 ZIP CODE |
|---|---|---|
| | | |

## IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

PA DER file information

EPA FORM 2070-13 (7-81)

AR300258

EPA

# POTENTIAL HAZARDOUS WASTE SITE
# SITE INSPECTION REPORT
## PART 9 - GENERATOR/TRANSPORTER INFORMATION

| I. IDENTIFICATION | |
|---|---|
| 01 STATE | 02 SITE NUMBER |
| PA | 2031 |

## II. ON-SITE GENERATOR

| 01 NAME | 02 D+B NUMBER |
|---|---|
| AMETEK, Incorporated | |

| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
|---|---|
| One Spring Avenue | |

| 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|
| Hatfield | PA | 19440 |

small quantity generator

## III. OFF-SITE GENERATOR(S)

| 01 NAME | 02 D+B NUMBER | 01 NAME | 02 D+B NUMBER |
|---|---|---|---|
| N/A | | N/A | |
| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
| 05 CITY | 06 STATE / 07 ZIP CODE | 05 CITY | 06 STATE / 07 ZIP CODE |
| 01 NAME | 02 D+B NUMBER | 01 NAME | 02 D+B NUMBER |
| N/A | | N/A | |
| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
| 05 CITY | 06 STATE / 07 ZIP CODE | 05 CITY | 06 STATE / 07 ZIP CODE |

## IV. TRANSPORTER(S)

| 01 NAME | 02 D+B NUMBER | 01 NAME | 02 D+B NUMBER |
|---|---|---|---|
| Unknown | | Unknown | |
| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
| 05 CITY | 06 STATE / 07 ZIP CODE | 05 CITY | 06 STATE / 07 ZIP CODE |
| 01 NAME | 02 D+B NUMBER | 01 NAME | 02 D+B NUMBER |
| N/A | | N/A | |
| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
| 05 CITY | 06 STATE / 07 ZIP CODE | 05 CITY | 06 STATE / 07 ZIP CODE |

## V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis reports)

PA DER file information

EPA FORM 2070-13 (7-81)

AR300259

ORIGINAL (Red)

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
## PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION
01 STATE: PA | 02 SITE NUMBER: 2031

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ D. SPILLED MATERIAL REMOVED | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ E. CONTAMINATED SOIL REMOVED | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ F. WASTE REPACKAGED | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ G. WASTE DISPOSED ELSEWHERE | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ H. ON SITE BURIAL | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ I. IN SITU CHEMICAL TREATMENT | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ J. IN SITU BIOLOGICAL TREATMENT | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ K. IN SITU PHYSICAL TREATMENT | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ L. ENCAPSULATION | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ M. EMERGENCY WASTE TREATMENT | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ N. CUTOFF WALLS | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ P. CUTOFF TRENCHES/SUMP | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ Q. SUBSURFACE CUTOFF WALL | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

EPA FORM 2070-13 (7-81)

EPA

# POTENTIAL HAZARDOUS WASTE SITE
# SITE INSPECTION REPORT
# PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION

| 01 STATE | 02 SITE NUMBER |
|---|---|
| PA | 2031 |

## II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ S. CAPPING/COVERING — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

## III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

PA DER file information

EPA FORM 2070-13 (7-81)

AR300261

ORIGINAL (Red)

EPA

**POTENTIAL HAZARDOUS WASTE SITE**
**SITE INSPECTION REPORT**
**PART 11 - ENFORCEMENT INFORMATION**

| I. IDENTIFICATION | |
|---|---|
| 01 STATE | 02 SITE NUMBER |
| PA | 2031 |

**II. ENFORCEMENT INFORMATION**

01 PAST REGULATORY/ENFORCEMENT ACTION ☒ YES ☐ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

In 1984, AMETEK, Incorporated was cited for the following two violations:

1. Waste sludge was manifested with the incorrect hazardous waste number.

2. Waste TCE was being transported by an unlicensed hauler to a facility which does not have a permit to accept waste. The hauler and facility were United States Gauge Division in Sellersville, Pennsylvania.

The current hauler is unknown.

**III. SOURCES OF INFORMATION** *(Cite specific references, e.g., state files, sample analysis, reports)*

PA DER file information

EPA FORM 2070-13 (7-81)

AMETEK

REFERENCE NO. 2

AR300263

REPORT OF VOLATILE HALOCARBON ANALYSIS
North Penn Water Authority

SAMPLE # 2086-85

Source of Sample: NPWRA 328-85 Ametek Well #2, 3 min running

Date Collected: 10-16-85 Date Run: 10-23-85 Exam. By: YT
Collected By: GTC Time: 1437 THM Preserved: no

Results Expressed as ug/L

| | | |
|---|---|---|
| Trihalomethanes: | | LLD |
| Chloroform | | 0.5 |
| Dichlorobromomethane | | 0.5 |
| Dibromochloromethane | | 0.5 |
| Bromoform | | 1.0 |
| Total Trihalomethanes | | |
| Vinyl Chloride | | 0.5 |
| Methylene Chloride | | 5.0 |
| Trichlorofluoromethane | 332.2 | 1.0 |
| 1,1-Dichloroethylene | 168.3 | 0.5 |
| 1,1-Dichloroethane | 4.8 | 0.5 |
| cis-1,2-Dichloroethylene | | 0.5 |
| 1,2-Dichloroethane | | 0.5 |
| 1,1,1-Trichloroethane | 858.3 | 0.5 |
| Carbon Tetrachloride | | 0.5 |
| Trichloroethylene | 438.3 | 0.5 |
| Tetrachloroethylene | 30.0 | 0.5 |

Remarks:

1/2 DILUTION, MULTIPLY LLD'S BY 2

COPY

Approved By: Jac

Reviewed By: DE

AR300264

REPORT OF VOLATILE HALOCARBON ANALYSIS
North Penn Water Authority

SAMPLE # 930-85

Source of Sample: NPWRA 173-85 Ametek Well #2 (84-02)

Date Collected: 4-30-85 Date Run: 5-9-85 Exam. By: YJ
Collected By: GTC Time: 0950 THM Preserved: no

Results Expressed as ug/L

| | | LLD |
|---|---|---|
| Trihalomethanes: | | |
| Chloroform | | 0.5 |
| Dichlorobromomethane | | 0.5 |
| Dibromochloromethane | | 0.5 |
| Bromoform | | 1.0 |
| Total Trihalomethanes | | |
| Vinyl Chloride | | 0.5 |
| Methylene Chloride | | 5.0 |
| Trichlorofluoromethane | 1.4 | 1.0 |
| 1,1-Dichloroethylene | 125.0 | 0.5 |
| 1,1-Dichloroethane | 3.4 | 0.5 |
| cis-1,2-Dichloroethylene | 11.1 | 0.5 |
| 1,2-Dichloroethane | | 0.5 |
| 1,1,1-Trichloroethane | 723.2 | 0.5 |
| Carbon Tetrachloride | | 0.5 |
| Trichloroethylene | 354.9 | 0.5 |
| Tetrachloroethylene | 22.1 | 0.5 |

Remarks:

COPY

Approved By: _____

Reviewed By: _____

300265

REPORT OF VOLATILE HALOCARBON ANALYSIS
North Penn Water Authority

SAMPLE # 2085-85

Source of Sample: NPWRA 327-85 Ametek Well #1, 2 min running

Date Collected: 10-16-85 Date Run: 10-23-85 Exam. By: YT
Collected By: GTC Time: 1423 THM Preserved: no

Results Expressed as ug/L

| | | |
|---|---|---|
| Trihalomethanes: | | LLD |
| Chloroform | | 0.5 |
| Dichlorobromomethane | | 0.5 |
| Dibromochloromethane | | 0.5 |
| Bromoform | | 1.0 |
| Total Trihalomethanes | | |
| Vinyl Chloride | | 0.5 |
| Methylene Chloride | | 5.0 |
| Trichlorofluoromethane | | 1.0 |
| 1,1-Dichloroethylene | 42.4 | 0.5 |
| 1,1-Dichloroethane | 46.5 | 0.5 |
| cis-1,2-Dichloroethylene | | 0.5 |
| 1,2-Dichloroethane | | 0.5 |
| 1,1,1-Trichloroethane | 187.8 | 0.5 |
| Carbon Tetrachloride | | 0.5 |
| Trichloroethylene | 158.6 | 0.5 |
| Tetrachloroethylene | 5.7 | 0.5 |

Remarks:

1/2 DILUTION, MULTIPLY LLD'S BY 2

COPY

Approved By: _____

Reviewed By: _____

300266

REPORT OF VOLATILE HALOCARBON ANALYSIS
North Penn Water Authority

SAMPLE # 929-85

Source of Sample: NPWRA 172-85 Ametek Well #1 (84-01)

Date Collected: 4-30-85 Date Run: 5-9-85 Exam. By: YJ
Collected By: GTC Time: 0922 THM Preserved: no

Results Expressed as ug/L

| | | LLD |
|---|---|---|
| Trihalomethanes: | | |
| Chloroform | | 0.5 |
| Dichlorobromomethane | | 0.5 |
| Dibromochloromethane | | 0.5 |
| Bromoform | | 1.0 |
| Total Trihalomethanes | | |
| Vinyl Chloride | | 0.5 |
| Methylene Chloride | | 5.0 |
| Trichlorofluoromethane | | 1.0 |
| 1,1-Dichloroethylene | 80.8 | 0.5 |
| 1,1-Dichloroethane | 69.4 | 0.5 |
| cis-1,2-Dichloroethylene | 0.8 | 0.5 |
| 1,2-Dichloroethane | | 0.5 |
| 1,1,1-Trichloroethane | 316.2 | 0.5 |
| Carbon Tetrachloride | | 0.5 |
| Trichloroethylene | 251.2 | 0.5 |
| Tetrachloroethylene | 8.7 | 0.5 |

Remarks:

COPY

Approved By: Jac

Reviewed By:

300267

AMETEK

REPORT OF VOLATILE HALOCARBON ANALYSIS
North Penn Water Authority

SAMPLE # 2461-86

Source of Sample: Ameteck Well #1, Sample #1

Date Collected: 11-18-86 Date Run: 11-19-86 Exam. By: YI
Collected By: TG Time: 0930 THM Preserved: No

Results Expressed as ug/L

| | RESULTS | LOWER DETECTION LIMIT |
|---|---|---|
| Trihalomethanes: | | |
| Chloroform | | 0.5 |
| Dichlorobromomethane | | 0.5 |
| Dibromochloromethane | | 0.5 |
| Bromoform | | 1.0 |
| Total Trihalomethanes | | |
| Vinyl Chloride | | 0.5 |
| Methylene Chloride | | 5.0 |
| Trichlorofluoromethane | 340.2 | 1.0 |
| 1,1-Dichloroethylene | 222.8 | 0.5 |
| 1,1-Dichloroethane | 28.0 | 0.5 |
| cis-1,2-Dichloroethylene | 3.0 | 0.5 |
| 1,2-Dichloroethane | 1,337 1,1,1-TCA | 0.5 |
| 1,1,1-Trichloroethane | | 0.5 |
| Carbon Tetrachloride | | 0.5 |
| Trichloroethylene | 654.5 | 0.5 |
| Tetrachloroethylene | 38.7 | 0.5 |

Remarks: 1/2 Dilution

Approved By: [signature]

Reviewed By:

300268

REPORT OF VOLATILE HALOCARBON ANALYSIS
North Penn Water Authority

SAMPLE # 2462-86

Source of Sample: Ameteck Well #1, Sample #2

Date Collected: 11-18-86 Date Run: 11-19-86 Exam. By: YT
Collected By: TG Time: 0940 THM Preserved: No

Results Expressed as ug/L

| | RESULTS | LOWER DETECTION LIMIT |
|---|---|---|
| Trihalomethanes: | | |
| Chloroform | | 0.5 |
| Dichlorobromomethane | | 0.5 |
| Dibromochloromethane | | 0.5 |
| Bromoform | | 1.0 |
| Total Trihalomethanes | | |
| Vinyl Chloride | | 0.5 |
| Methylene Chloride | | 5.0 |
| Trichlorofluoromethane | 321.6 | 1.0 |
| 1,1-Dichloroethylene | 248.8 | 0.5 |
| 1,1-Dichloroethane | 16.8 | 0.5 |
| cis-1,2-Dichloroethylene | 2.8 | 0.5 |
| 1,2-Dichloroethane | | 0.5 |
| 1,1,1-Trichloroethane | 1,429 | 0.5 |
| Carbon Tetrachloride | | 0.5 |
| Trichloroethylene | 681.9 | 0.5 |
| Tetrachloroethylene | 46.6 | 0.5 |

Remarks: 1/2 Dilution

Approved By: [signature]

Reviewed By: _____

300269

REPORT OF VOLATILE HALOCARBON ANALYSIS
North Penn Water Authority

SAMPLE # 504-86

Source of Sample: Ametek

Date Collected: 2-27-86 Date Run: 3-13-86 Exam. By: YT
Collected By: TG Time: 1050 THM Preserved: no

Results Expressed as ug/L

| | | |
|---|---|---|
| **Trihalomethanes:** | | **LLD** |
| Chloroform | | 0.5 |
| Dichlorobromomethane | | 0.5 |
| Dibromochloromethane | | 0.5 |
| Bromoform | | 1.0 |
| Total Trihalomethanes | | |
| Vinyl Chloride | | 0.5 |
| Methylene Chloride | | 5.0 |
| Trichlorofluoromethane | | 1.0 |
| 1,1-Dichloroethylene | 100.9 | 0.5 |
| 1,1-Dichloroethane | 81.3 | 0.5 |
| cis-1,2-Dichloroethylene | | 0.5 |
| 1,2-Dichloroethane | | 0.5 |
| 1,1,1-Trichloroethane | 407.2 | 0.5 |
| Carbon Tetrachloride | | 0.5 |
| Trichloroethylene | 333.1 | 0.5 |
| Tetrachloroethylene | 13.6 | 0.5 |

Remarks:
Not notified as of 3/26/86.

#19

Approved By: JAW

Reviewed By:

300270

REPORT OF VOLATILE HALOCARBON ANALYSIS
North Penn Water Authority

MPLE # 503-86

Source of Sample: A. Stiert & Son Inc.

Date Collected: 2-27-86 Date Run: 3-13-86 Exam. By: YT
Collected By: TG Time: 1040 THM Preserved: no

Results Expressed as ug/L

| | | |
|---|---|---|
| Trihalomethanes: | | LLD |
| Chloroform | 0.5 | 0.5 |
| Dichlorobromomethane | | 0.5 |
| Dibromochloromethane | | 0.5 |
| Bromoform | | 1.0 |
| Total Trihalomethanes | | |
| Vinyl Chloride | | 0.5 |
| Methylene Chloride | | 5.0 |
| Trichlorofluoromethane | | 1.0 |
| 1,1-Dichloroethylene | 8.3 | 0.5 |
| 1,1-Dichloroethane | 2.7 | 0.5 |
| cis-1,2-Dichloroethylene | 5.7 | 0.5 |
| 1,2-Dichloroethane | | 0.5 |
| 1,1,1-Trichloroethane | 168.1 | 0.5 |
| arbon Tetrachloride | | 0.5 |
| ichloroethylene | 198.9 | 0.5 |
| Tetrachloroethylene | | 0.5 |

Remarks: Not notified as of 3/26/86.

#18

Approved By: [signature]

Reviewed By: _____

300271

REPORT OF VOLATILE HALOCARBON ANALYSIS
North Penn Water Authority

SAMPLE # 502-86

Source of Sample: Richmond Ring Co.

Date Collected: 2-27-86 Date Run: 3-11-86 Exam. By: YT
Collected By: TG Time: 1030 THM Preserved: no

Results Expressed as ug/L

| | |
|---|---|
| Trihalomethanes: | LLD |
| Chloroform | 0.5 |
| Dichlorobromomethane | 0.5 |
| Dibromochloromethane | 0.5 |
| Bromoform | 1.0 |
| Total Trihalomethanes | |
| Vinyl Chloride | 0.5 |
| Methylene Chloride | 5.0 |
| Trichlorofluoromethane | 1.0 |
| 1,1-Dichloroethylene | 0.5 |
| 1,1-Dichloroethane | 0.5 |
| cis-1,2-Dichloroethylene | 0.5 |
| 1,2-Dichloroethane | 0.5 |
| 1,1,1-Trichloroethane | 0.5 |
| Carbon Tetrachloride | 0.5 |
| Trichloroethylene | 0.5 |
| Tetrachloroethylene | 0.5 |

Remarks: Notified Mr. Burk 3/26/86.

#17

NO CONTAMINATION

Approved By: JW

Reviewed By:

300272

REPORT OF VOLATILE HALOCARBON ANALYSIS
North Penn Water Authority

IPLE # 501-86

Source of Sample: B & G Mfg. Co. Inc.

Date Collected: 2-27-86 Date Run: 3-11-86 Exam. By: YT
Collected By: TG Time: 0950 THM Preserved: no

Results Expressed as ug/L

| | LLD |
|---|---|
| Trihalomethanes: | |
| Chloroform | 0.5 |
| Dichlorobromomethane | 0.5 |
| Dibromochloromethane | 0.5 |
| Bromoform | 1.0 |
| Total Trihalomethanes | |
| Vinyl Chloride | 0.5 |
| Methylene Chloride | 5.0 |
| Trichlorofluoromethane | 1.0 |
| 1,1-Dichloroethylene | 0.5 |
| 1,1-Dichloroethane | 0.5 |
| cis-1,2-Dichloroethylene | 0.5 |
| 1,2-Dichloroethane | 0.5 |
| 1,1,1-Trichloroethane | 0.5 |
| arbon Tetrachloride | 0.5 |
| ichloroethylene | 0.5 |
| Tetrachloroethylene | 0.5 |

Remarks: 3/26/86 - left message for Mr. Burns to call me for results

#16

NO CONTAMINATION

Approved By: [signature]

Reviewed By: _____

300273

REPORT OF VOLATILE HALOCARBON ANALYSIS
North Penn Water Authority

SAMPLE # 488-86

Source of Sample: Eastern Prestressed Concrete

Date Collected: 2-26-86 Date Run: 3-11-86 Exam. By: YT
Collected By: TG Time: 1500 THM Preserved: no

Results Expressed as ug/L

| | | |
|---|---|---|
| Trihalomethanes: | | LLD |
| Chloroform | | 0.5 |
| Dichlorobromomethane | | 0.5 |
| Dibromochloromethane | | 0.5 |
| Bromoform | | 1.0 |
| Total Trihalomethanes | | |
| Vinyl Chloride | | 0.5 |
| Methylene Chloride | | 5.0 |
| Trichlorofluoromethane | | 1.0 |
| 1,1-Dichloroethylene | | 0.5 |
| 1,1-Dichloroethane | | 0.5 |
| cis-1,2-Dichloroethylene | 0.5 | 0.5 |
| 1,2-Dichloroethane | | 0.5 |
| 1,1,1-Trichloroethane | | 0.5 |
| Carbon Tetrachloride | | 0.5 |
| Trichloroethylene | 3.8 | 0.5 |
| Tetrachloroethylene | | 0.5 |

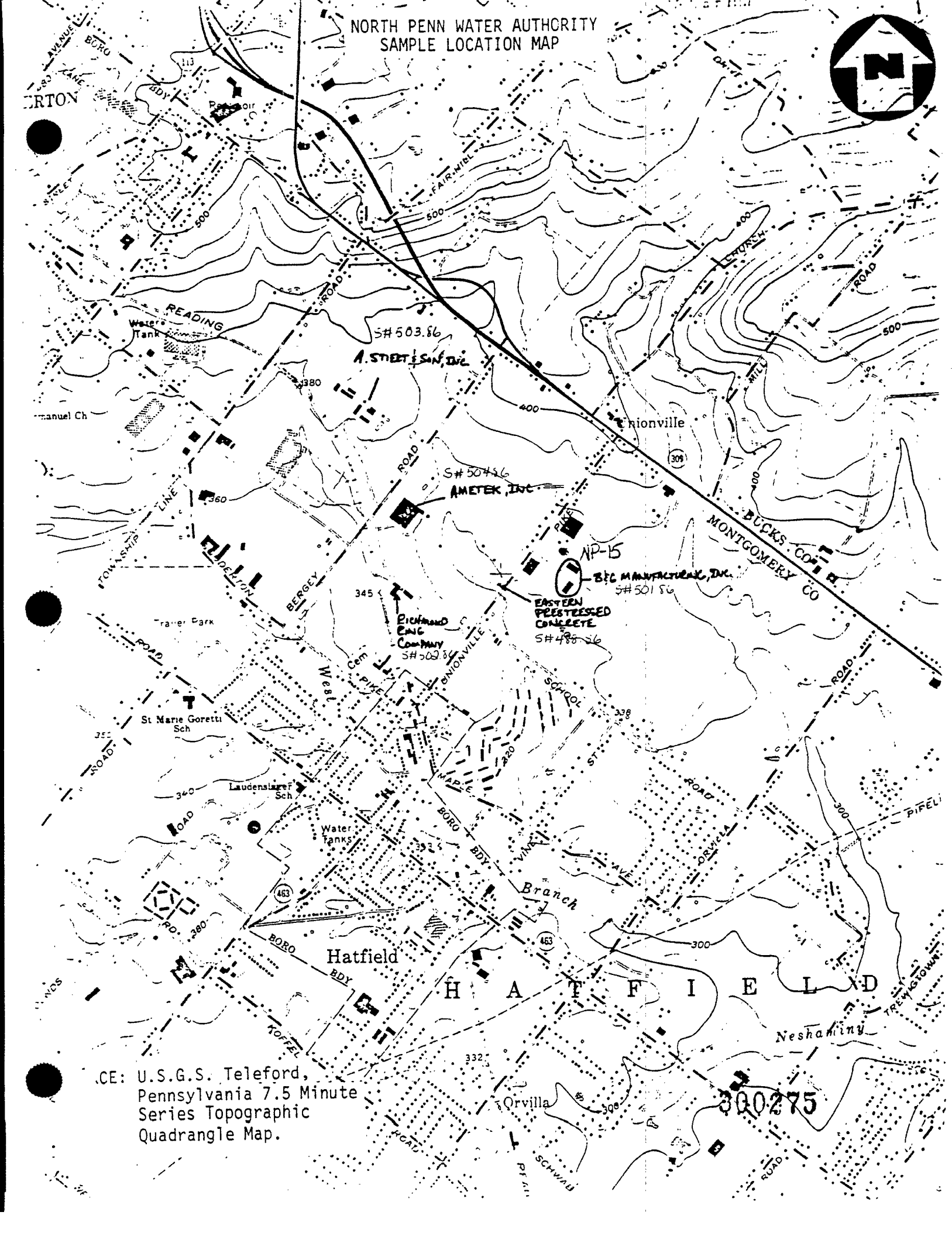
Remarks:
Not notified as of 3/26/86.

#14

Approved By: JWC

Reviewed By:

300274




SCALE: U.S.G.S. Teleford, Pennsylvania 7.5 Minute Series Topographic Quadrangle Map.

Disregard Previous Editions

# QUALITY ASSURANCE PROGRAM

# FOR

# ANALYSIS OF

# TRIHALOMETHANES

# AND OTHER VOLATILE ORGANIC CHEMICALS

NORTH PENN WATER AUTHORITY
200 N. CHESTNUT STREET
LANSDALE, PA. 19446
215-855-3617

PREPARED BY: Judith A. Coyle
Water Quality Manager

300276

# TABLE OF CONTENTS

1.0 Title Page
2.0 Table of Contents
3.0 Description of Analysis
4.0 Personnel
5.0 Sampling Procedures
6.0 Records and Data Reporting
7.0 Internal Quality Control Checks

Appendix A - U.S. EPA Method 502.1

300277

## 3.0 DESCRIPTION OF ANALYSIS

3.1 All trihalomethane (THM) and volatile organic chemical (VOC) analyses will be performed by ~~Keller and Lichtenberg in~~ "The Determination of Halogenated Chemicals in Water by the Purge and Trap Method - Method 502.1", EPA #600/4-81-059. A copy of this method can be found attached as Appendix A.

3.2 Five mL portions of water samples, or aqueous dilutions of samples are concentrated by means of a Tekmar LSC-2 purge and trap device equipped with a Tekmar ALS 10-sample automatic sampler. The sample is desorbed for analysis by a Varian 4600 gas chromatograph with a Tracor Hall Electrolytic Conductivity Detector. Data analysis is performed by a Varian Vista 402 chromatography data system.

300278

## 4.0 PERSONNEL

4.1 Position: Water Quality Manager
Name: Judith A. Coyle
Academics: M.S./B.A./M.S.
Present Specialty: Env. Science/Water Quality (Bacteriology/Org. Chem./inorg. chem)
Experience (years/area): 3 years/technician
5 years/present specialty

4.2 Position: Bacteriological Laboratory Supervisor/Water Quality Specialist
Name: Yifen Tsai
Academics: M.S./B.S./M.S.
Present Specialty: Env. Science/Microbiology
Experience (years/area): 2 years/present specialty

4.3 Position: Laboratory Technician/chemistry (part-time)
Name: James K. Weil
Academics: M.S./B.S./M.S.
Present Specialty: Water chemistry - analytical
Experience: (years/area): 30+ years/organic chemistry (retired)
4 years/present specialty

300279

## 5.0 SAMPLING PROCEDURES

### 5.1 Sample Bottle Preparation

5.1.1 Sample containers are 40 mL screw cap vials with a teflon-lined spetum seal.

5.1.2 Wash sample bottles, cap and seals in detergent solution. Rinse with tap water then organic free water.

5.1.3 All bottles, caps and seals to dry at room temperature then place in 105°C oven for one hour. Allow bottles to cool.

5.1.4 For THM sample bottles, add crystalline sodium thiosulfate (2.5 to 3 mg/40mL) then seal with septum caps. VOA sample bottles are sealed without preservatives.

### 5.2 SAMPLE COLLECTION

5.2.1 Collect samples as indicated by bottle labels and accompanying sample list. Collect 2 samples at each location.

5.2.2 Turn on the water and allow to run until temperature has stabilized. Fill the sample bottles and seal them so that no air is trapped in the bottle. Make sure the teflon side of the septum is down.

5.2.3 If the sample is for THM's, make sure to keep the sodium thiosulfate crystal in the bottle. Shake several times after sealing.

5.2.4 To seal the bottles without air bubbles, fill until a miniscus forms at the top of the bottle, then carefully screw the cap straight down. Turn the bottle over and tap to check for air bubbles. If a bubble is present, carefully open the bottle and add a few more drops of sample to form the miniscus, then reseal.

5.2.5 Fill in the sample label with your initials and the time and date sampled.

5.2.6 Keep the samples cool and return them to the laboratory within 8 hours.

5.2.7 Carry the laboratory provided field blank in close proximity to the samples.

### 5.3 DISTRIBUTION

All samplers will receive a copy of this section of the QA program.

300280

## 6.0 RECORDS AND DATA REPORTING

6.1 Keep all records of organic chemical analyses for 10 years.

6.2 Keep records of action taken to correct violations of primary drinking water standards for 3 years after the last action taken with respect to the particular violation involved.

6.3 The data must contain date, place and time of sampling, name of person who collected sample, type of sample, i.e. distribution, check, raw, treated, maximum, special. Date of receipt and analysis, person who performed analysis, method used and results including units.

6.4 THM quarterly sample results are reported to DER and EPA by the 10th day of the month following the sample period.

300281

## 7.0 ANALYTICAL PROCEDURES

### 7.1 Preparation of Standards in Methanol

7.1.1 Place about 9.8 mL of methanol into 10.0 mL volumetric flask. Allow flask to stand unstoppered until alcohol-wetted surfaces have dried. (approximately 10 minutes).

7.1.2 Add neat reagents (purchase from Chem Services) to the flask according to the chart below to produce 2 ug/uL standard mix. Neat standards are stored in the freezer. Be sure to allow them to come to room temperature before using. Discard the neat standards when they reach their expiration date. Inject the neat standards into the bulb of the flask.

7.1.3 Table of neat standards:

| Compound | Density (g/mL) | uL in 10mL MeOH |
|---|---|---|
| 1,2-dichloroethane | 1.2351 | 16.2 |
| bromoform | 2.8899 | 6.9 |
| dibromochloromethane | 2.451 | 8.2 |
| dichlorobromomethane | 1.980 | 10.1 |
| chloroform | 1.4832 | 13.5 |
| c-1,2-dichloroethylene | 1.2837 | 15.6 |
| trichloroethylene | 1.4642 | 13.7 |
| carbon tetrachloride | 1.5940 | 12.5 |
| perchloroethylene | 1.6227 | 12.3 |
| 1,1,1-trichloroethane | 1.3390 | 14.9 |
| 1,1-dichloroethane | 1.1757 | 17.0 |
| 1,1-dichloroethylene | 1.218 | 16.4 |
| methylene chloride | 1.3266 | 15.1 |
| trichlorofluoromethane | 1.494 | 13.4 |

calculation: 1/density (mg/uL) = XuL/20 mg
20 mg into 10 mL MeOH = 2ug/uL stock standard

7.1.4 Bring the standard to volume with methanol, stopper and slowly invert three times to mix. Do not shake.

7.1.5 Discard portion in the neck of the flask and pour the remainder into a 15mL bottle with a teflon-lined septum cap. Label with concentration, date and initials.

7.1.6 Store in the freezer for up to 3 months. Daily QC samples have shown that deterioration of the standard under these conditions does not occur until sometime after 4 months.

### 7.2 Preparation of Aqueous Standard

7.2.1 Aqueous standards are prepared on the day of use at 100 ug/L.

7.2.2 Fill a 100mL flask to volume with organic-free water, then inject 5uL of the methanol standard (see 7.1) into the bulb of the flask. Be sure that the water and MeOH Standard are both at room temperature.

7.2.3 Stopper the flask and slowly invert three times to mix. Do not shake. Discard the portion in the neck of the flask.

7.2.4 Proceed to load the autosampler as if the standard were an aqueous sample.

7.3 Vinyl Chloride Calibration

7.3.1 See Sec. 5.13 of Method 502.1 (Appendix A) for procedure.

7.3.2 The amount of vinyl chloride to be injected is determined on a daily basis from the equation found in Method 502.1/Appendix A, Sec. 10.3.

7.4 Quality Control Samples

7.4.1 EPA Quality Control Samples in MeOH are obtained from Cincinnati quarterly and stored in the freezer. (ESML Volatile Organics 1 & 2).

7.4.2 Aqueous QC samples (high and low range) are prepared according to the EPA directions in 200mL amounts. The aqueous QC samples are stored in 40mL septum cap sample vials in the refrigerator, for no more than 2 weeks.

7.5 Loading the Tekmar ALS Autosampler

7.5.1 Make up a list of samples to be run and their autosampler position.

7.5.2 When samples have reached room temperature, the autosampler may be loaded. Five mL portions are injected by syringe into each port of the autosampler. (Autosampler glassware is cleaned in the same manner as sample collection bottles. See Sec. 5.1 of the QA Plan).

7.5.3 Enter the sample list into the automation section of the GC data system, then tape the list to the GC while the samples are running.

7.6 Run the GC according to Varian manual. See Appendix A, Method 502.1, Sec. 4.2 for GC operating conditions.

7.7. Record results in the brown GC lab book on a daily basis. Also record any maintenance or problems which occurred.

## 8.0 INTERNAL QUALITY CONTROL CHECKS

8.1 A Performance Evaluation sample, supplied by U.S. EPA, must be analyzed annually for TTHM and VOC's.

8.2 This QA Plan with the attached GC method must remain in the drawer under the GC, available at all times to the analysts.

8.3 Date all reagents with the date they arrive as well as the date they are opened. Discard any containers which have passed their expiration date.

8.4 A service contract is maintained for the gas chromatographic system. The service phone number and system ID numbers are on the side of the instrument.

8.5 Run a laboratory method blank of organic-free water daily.

8.6 A three point calibration curve is run annually. If the curve is linear through the origin (which it has been over the operating lifetime of this laboratory) one standard is run in duplicate each day. This standard must be no more than ±15% from the curve or corrective action must be taken. (See Sec. 8.4)

8.7. Before samples are run:
An acceptable EPA QC sample (see Sec. 7.4 of this QA Plan) must be run every day, alternately between high and low range samples. Record any corrective action taken to keep these samples within ±20% of true value. Record results in black QC notebook.

8.8 A field blank of organic-free water must accompany each sample set. If the blank is contaminated the samples must be discarded and collected again. Add sodium thiosulfate to blanks accompanying THM samples.

8.9 Ten percent of all VOA/THM samples must be analyzed in duplicate. Record results in black QC notebook.

8.10 Any time the GC undergoes a major modification or a prolonged period of "down" time, run two high range and two low range QC samples. These samples must be within ±20% of true value before any samples may be run.

8.11 When analyzing THM samples, run the low range QC sample each day to address the requirement for a 2ug/L check sample.

8.12 On the first day of quarterly THM sample analysis, run a spiked sample. Collect system water in 40mL vial with sodium thiosulfate. At the same time, collect source water in a 200mL vial preserved with sodium thiosulfate. Inject 40uL of low-range QC mix into 200mL vial. Analyze both samples and calculate recovery of QC mix.

8.13 The maximum holding time for a THM or VOC sample is 28 days in the refrigerator. Samples held longer than this should be discarded. If they must be run, flag the results with the holding time deviation.

300284

8.14 The Water Quality Manager is in charge of corrective action for the GC. Normal problem areas to be addressed include outdated QC mix or standards, operator error in preparing QC sample or standard, bad nickel tube, restricted solvent flow, dirty detector, etc. When the QC problem cannot be corrected in-house, the service representative will be called (see 8.4). Any action taken in-house or by the service representative will be entered into the brown GC notebook.

8.15 Record retention times of standards daily in the black QC notebook. If the RT varies more than 10% form the monthly average, then the problem must be corrected before samples may be run.

300285

AR300286

NORTH PENN WATER AUTHORITY

# VOA QUALITY CONTROL DATA FOR THE MONTH OF March 1986

| QA PARAMETER | COMPOUND | 3/4 | 3/5 | 3/6 | 3/7 | 3/10 | 3/11 | 3/12 | 3/13 | 3/14 | 3/17 | 3/18 | 3/19 | 3/20 | 3/21 | 3/24 | 3/25 | 3/26 | | | | | True Val. c ug/L | SUMMARY N | SUMMARY x̄ | SUMMARY SD | SUMMARY %SD | SUMMARY R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1st Mix 1/24/86 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | CHCL3 | | | 11.7 | | 12.3 | | | 11.8 | | 11.8 | | 12.1 | | 12.4 | | 11.9 | | | | | | 12.0 | | | | | |
| LOW-RANGE | 1,2-DCA | | | 25 | | 27 | | | 28 | | 28 | | 26 | | 26 | | 22 | | | | | | 20 | | | | | |
| QC SAMPLE | 1,1,1-TCA | | | 15 | | 16 | | | 13 | | 14 | | 14 | | 17 | | 14 | | | | | | 14 | | | | | |
| | CCL4 | | | 25 | | 26 | | | 24 | | 24 | | 25 | | 25 | | 23 | | | | | | 26 | | | | | |
| (UG/LITER) | TCE | | | 31 | | 32 | | | 29 | | 32 | | 32 | | 32 | | 30 | | | | | | 29 | | | | | |
| 1st Mix 1/24/86 | PCE | | | 19 | | 19 | | | 18 | | 17 | | 17 | | 18 | | 17 | | | | | | 16 | | | | | |
| | CL2BRCH | | | 20 | | 21 | | | 20 | | 20 | | 19 | | 20 | | 21 | | | | | | 20 | | | | | |
| | BR2CLCH | | | 27 | | 27 | | | 27 | | 27 | | 22 | | 29 | | 28 | | | | | | 26 | | | | | |
| | BR3CH | | | 26 | | 26 | | | 27 | | 24 | | 25 | | 25 | | 25 | | | | | | 29 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | N | x̄ | SD | %SD | R |
| | CHCL3 | | 427 | | 434 | | 43.6 | 40.2 | | 41.0 | | 427 | | 42.3 | | 42.6 | | 46.4 | | | | | 43.0 | | | | | |
| HIGH-RANGE | 1,2-DCA | | 23.2 | | 178 | | 21.7 | 19.6 | | 21.9 | | 220 | | 18.5 | | 243 | | 22.6 | | | | | 22.2 | | | | | |
| QC SAMPLE | 1,1,1-TCA | | 14.9 | | 145 | | 14.8 | 13.3 | | 13.9 | | 14.2 | | 14.7 | | 15.1 | | 15.7 | | | | | 14.3 | | | | | |
| | CCL4 | | 9.7 | | 10.1 | | 10.4 | 7.4 | | 9.3 | | 10.0 | | 10.0 | | 9.9 | | 10.2 | | | | | 10.0 | | | | | |
| (UG/LITER) | TCE | | 10.8 | | 11.2 | | 12.7 | 11.9 | | 10.1 | | 12.2 | | 11.6 | | 13.0 | | 11.2 | | | | | 12.0 | -- | | | | |
| 1st Mix 1/24/86 | PCE | | 5.5 | | 6.9 | | 6.3 | 5.7 | | 5.9 | | 6.8 | | 6.1 | | 6.6 | | 6.5 | | | | | 6.2 | | | | | |
| | CL2BRCH | | 8.1 | | 8.4 | | 8.8 | 7.8 | | 8.0 | | 8.1 | | 8.5 | | 8.5 | | 8.5 | | | | | 7.9 | | | | | |
| | BR2CLCH | | 12.3 | | 12.2 | | 12.1 | 10.6 | | 11.7 | | 12.6 | | 12.2 | | 11.8 | | 12.3 | | | | | 10.7 | | | | | |
| | BR3CH | | 8.9 | | 9.9 | | 9.2 | 7.3 | | 9.3 | | 9.6 | | 9.2 | | 8.3 | | 9.3 | | | | | 9.9 | | | | | |
| | PAIR | | | A | C | B (3/4) | A (3/4) | | | C | B (3/7) | E (3/7) | D (3/7) | G (3/11) | F (3/11) | E (3/11) | G (3/11) | F (3/11) | A (3/11) | B (3/11) | A (3/20) | E (3/20) | I (3/20) | C (3/20) | N | x̄ | SD | %SD | R |
| | SAMP # | | | 349 | 354 | 351 | 350 | | | 355 | 352 | 437 | 371 | 443 | 441 | 438 | 444 | 442 | 514 | 517 | 515 | 525 | 522 | 519 | | | | | |
| DUPLICATE | VC/1,1-DCE | | | 1.5 | 3.6 | | | | | 3.9 | | | | | 3.6 | | | 4.3 | | | | | 3.6 | | | | | |
| ANALYSES | C-1,2-DCE | | | 147 | 165 | 17 | 12.6 | | | 16.6 | 19 | 12.3 | 13.1 | | 17.0 | 11.8 | | 17.1 | 11.3 | 11.5 | 12.6 | | 16.3 | 17 | | | | |
| | CHCL3 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (UG/LITER) | 1,2-DCA | | | | | | | | | | | 0.5 | | | | | | | | | | | | | | | | |
| | 1,1,1-TCA | | | 15 | 35 | | 14 | | | 40 | 0.5 | | 14 | 3.3 | 3.6 | 0.5 | 3.5 | 40 | 14 | 13 | 14 | | 17 | | | | | |
| | CCL4 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | | | 76.3 | | 14.1 | 66.5 | | | | 17.8 | 22.6 | 70.3 | 5.7 | | 13.1 | 7.5 | | 71.8 | 71.1 | 74.5 | 16.1 | | 170 | | | | | |
| | PCE | | | | | 2.0 | | | | | 2.4 | 3.0 | | | | 2.0 | | | | | | | | 5.4 | | | | | |
| | VC/CH2Cl2 | 3755 7551 | | 3757 7544 | 3768 7643 | 3774 7668 | | 3755 7653 | 3760 7642 | 3765 7656 | 3704 7687 | 3707 7700 | 3721 7660 | 3747 7668 | 3776 7678 | 3758 7658 | 3770 7670 | | | | | | | | N | x̄ | SD | %SD | R |
| Standards | C-1,1-DCE | 9880 9841 | | 9170 9283 | 9181 9890 | 9195 9867 | | 9180 9664 | 9160 9859 | 9180 9866 | 9200 9907 | 9165 9865 | 9174 9845 | 9174 9847 | 9178 9868 | 9158 9847 | 9170 9868 | | | | | | | | | | | | |
| | C-1,2-DCE | 11522 11570 | | 11167 11282 | 11158 11656 | 11183 11664 | | 11135 11893 | 11131 11867 | 11178 11812 | 11145 11833 | 11138 11834 | 11169 11859 | 11135 11879 | 11168 11867 | 11145 11847 | 11180 11868 | | | | | | | | | | | | |
| RETENTION TIME STABILITY | CHCL3 | 12484 | | 12464 | 12473 | 12485 | | 12487 | 12479 | 12489 | 12504 | 12497 | 12504 | 12480 | 12493 | 12490 | 12537 | | | | | | | | | | | | |
| | 1,2-DCA | 13568 | | 13200 | 13196 | 13217 | | 13210 | 13204 | 13211 | 13224 | 13205 | 13205 | 13205 | 13197 | 13204 | 13194 | | | | | | | | | | | | |
| | 1,1,1-TCA | 14504 | | 14529 | 14537 | 14558 | | 14548 | 14547 | 14549 | 14564 | 14550 | 14565 | 14546 | 14559 | 14549 | 14534 | | | | | | | | | | | | |
| (MINUTES) | CCL4 | 14939 | | 14929 | 14930 | 14947 | | 14939 | 14938 | 14941 | 14953 | 14940 | 14956 | 14938 | 14958 | 14948 | 14934 | | | | | | | | | | | | |
| | TCE | 17616 | | 17607 | 17609 | 17619 | | 17613 | 17610 | 17613 | 17624 | 17611 | 17632 | 17613 | 17598 | 17601 | 17597 | | | | | | | | | | | | |
| | PCE | 23342 | | 23339 | 23349 | 23346 | | 23333 | 23342 | 23346 | 23356 | 23339 | 23357 | 23341 | 23334 | 23337 | 23337 | | | | | | | | | | | | |
| DWG.#804-0524 | RESOL | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Samples - 13th

NORTH PENN WATER AUTHORITY

# VOA QUALITY CONTROL DATA FOR THE MONTH OF April 1986

| QA PARAMETER | COMPOUND | 4/1 | 4/3 | 4/4 | 4/8 | 4/9 | 4/10 | 4/14 | 4/18 | 4/21 | 4/22 | 4/23 | 4/24 | 4/25 | 4/28 | 4/30 | | | | | | | True Value 4/86 | SUMMARY N | $\bar{x}$ | SD | %SD | %E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOA Mix 1/86 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VOA Mix 4/3/86 | CHCL3 | 13.2 | 11.6 | | 12.0 | | 12.5 | | 12.2 | | 10.9 | | 14.4 | 14.9 | 12.7 | | | | | | | | 12.0 | | | | | |
| LOW-RANGE | 1,2-DCA | 2.9 | 2.5 | | 3.2 | | 3.4 | | 1.4 | | 1.2 | | 1.3 | 1.3 | 1.1 | | | | | | | | 2.0 | | | | | |
| QC SAMPLE | 1,1,1-TCA | 1.5 | 1.4 | | 1.5 | | 1.4 | | 1.0 | | 1.5 | | 1.7 | 1.7 | 1.4 | | | | | | | | 1.4 | | | | | |
| New Vial 1/14/86 | CCL4 | 2.5 | 2.3 | | 2.4 | | 2.7 | | 2.3 | | 2.7 | | 2.9 | 3.1 | 2.5 | | | | | | | | 2.6 | | | | | |
| New Vial 4/14/86 | TCE | 3.3 | 3.2 | | 3.3 | | 3.3 | | 2.4 | | 2.9 | | 2.9 | 2.5 | 2.5 | | | | | | | | 2.9 | | | | | |
| (UG/LITER) | PCE | 1.9 | 1.7 | | 1.9 | | 1.8 | | 1.3 | | 1.5 | | 1.5 | 1.4 | 1.5 | | | | | | | | 1.6 | | | | | |
| 4/10 | CL2BRCH | 2.0 | 2.0 | | 2.1 | | 2.0 | | 1.6 | | 2.1 | | 2.1 | 2.0 | 1.8 | | | | | | | | 2.0 | | | | | |
| 4/14 | BR2CLCH | 3.0 | 2.4 | | 2.6 | | 2.6 | | 1.8 | | 2.4 | | 2.4 | 2.6 | 2.4 | | | | | | | | 2.6 | | | | | |
| 4/24 | BR3CH | 2.7 | 2.4 | | 2.4 | | 2.7 | | 1.5 | | 2.6 | | 2.4 | 2.2 | 2.4 | | | | | | | | 2.9 | | | | | |
| | | | | | | | | | | | | | | D | | | | | | | | | | N | $\bar{x}$ | SD | %SD | %E |
| | CHCL3 | | | 44.3 | | 45.4 | | 43.5 | 51.1 | 44.4 | 49.2 | 41.6 | 47.6 | | | 42.8 | 44.8 | | | | | | 43.0 | | | | | |
| HIGH-RANGE | 1,2-DCA | | | 25.0 | | 26.5 | | 23.5 | 26.9 | 20.5 | 24.3 | 22.4 | 26.0 | | | 21.3 | 23.2 | | | | | | 22.2 | | | | | |
| QC SAMPLE | 1,1,1-TCA | | | 14.7 | | 15.3 | | 15.4 | 17.4 | 14.6 | 15.2 | 13.7 | 17.6 | | | 16.4 | 16.6 | | | | | | 14.3 | | | | | |
| New Vial 1/10/86 | CCL4 | | | 9.8 | | 10.2 | | 10.7 | 11.7 | 9.8 | 10.1 | 8.1 | 11.8 | | | 11.0 | 11.0 | | | | | | 10.0 | | | | | |
| New Vial 4/14/86 | TCE | | | 12.6 | | 12.8 | | 12.3 | 12.9 | 10.7 | 11.4 | 10.1 | 12.4 | | | 10.9 | 11.8 | | | | | | 12.8 | | | | | |
| (UG/LITER) | PCE | | | 6.2 | | 6.8 | | 6.8 | 6.0 | 5.2 | 4.9 | 4.7 | 6.1 | | | 5.5 | 5.6 | | | | | | 6.2 | | | | | |
| 4/9 | CL2BRCH | | | 8.4 | | 8.5 | | 8.0 | 9.8 | 8.2 | 8.7 | 8.0 | 8.9 | | | 8.1 | 8.1 | | | | | | 7.9 | | | | | |
| 4/14 | BR2CLCH | | | 12.0 | | 11.5 | | 11.5 | 11.9 | 11.0 | 10.6 | 10.5 | 11.4 | | | 10.7 | 10.6 | | | | | | 10.7 | | | | | |
| 4/24 | BR3CH | | | 10.3 | | 9.2 | | 9.0 | 8.7 | 8.9 | 8.9 | 8.1 | 8.8 | | | 8.6 | 8.0 | | | | | | 9.9 | | | | | |
| | PAIR | | | | C | B(1/2) | A(1/2) | C(1/2) | D(1/2) | A(1/2) | D(1/2) | | | | D | F | E(1/2) | E(1/2) | G(1/2) | H(1/2) | I(1/2) | | | N | $\bar{x}_D$ | SD | %SD | |
| | SAMP # | | | | 810 | 808 | 806 | 811 | 809 | 807 | 829 | | | | 840 | 983 | 930 | 929 | 990 | 992 | 984 | | | | | | | |
| DUPLICATE | VC 1,1-DCE | | | | | | 2.7 | | | 4.0 | | | | | | | | | 1.8 | | | | | | | | | |
| ANALYSES | 1,2-DCE | | | | | | 16.3 | | | 18.4 | 12.4 | | | | 9.6 | 9.8 | 8.8 | 8.9 | 13.7 | | 10.4 | | | | | | | |
| | CHCL3 | | | | | | | | | | | | | | 0.5 | | | 0.5 | | | | | | | | | | |
| (UG/LITER) | 1,2-DCA | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1,1,1-TCA | | | | 1.4 | 4.2 | 3.3 | 1.6 | 4.6 | 4.0 | 1.4 | | | | 1.5 | 1.3 | 1.3 | 1.2 | 2.2 | 1.4 | 1.3 | | | | | | | |
| | CCL4 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | | | | | 6.9 | 1.6 | | 6.7 | | 7.5 | | | | 61.7 | 65.6 | 54.8 | 60.2 | | 7.4 | 69.9 | | | | | | | |
| | PCE | | | | | | 0.5 | | | | | | | | | | | | | | | | | | | | | |
| | VC / $CH_2Cl_2$ | 3.724 | 3.701 | 3.769 | 3.762 | 3.736 | 3.726 | 3.769 | 3.746 | 7.091 | 7.076 | 7.083 | 7.107 | | 7.115 | 7.125 | | | | | | | | N | $\bar{x}$ | SD | %SD | RRT |
| | | 7.170 | 7.166 | 7.051 | 7.045 | 7.032 | 7.023 | 7.072 | 7.061 | | | | | | | | | | | | | | | | | | | |
| | 1,1-DCE | 9.152 | 9.153 | 9.116 | 9.167 | 9.174 | 9.175 | 9.178 | 9.221 | 9.217 | 9.217 | 9.205 | 9.224 | | 9.225 | 9.225 | | | | | | | | | | | | |
| | | 9.862 | 9.863 | 9.852 | 9.850 | 9.847 | 9.850 | 9.857 | 9.861 | 9.869 | 9.869 | 9.867 | 9.899 | | 9.845 | 9.847 | | | | | | | | | | | | |
| RETENTION | 1,2-DCE | 11.179 | 11.180 | 11.170 | 11.165 | 11.172 | 11.183 | 11.171 | 11.222 | 11.222 | 11.220 | 11.240 | 11.217 | | 11.221 | 11.225 | | | | | | | | | | | | |
| | | 11.837 | 11.836 | 11.866 | 11.864 | 11.871 | 11.862 | 11.867 | 11.902 | 11.902 | 11.900 | 11.900 | 11.918 | | 11.902 | 11.902 | | | | | | | | | | | | |
| TIME | CHCL3 | 12.489 | 12.491 | 12.462 | 12.479 | 12.486 | 12.476 | 12.483 | 12.526 | 12.528 | 12.525 | 12.559 | 12.530 | | 12.531 | 12.535 | | | | | | | | | | | | |
| STABILITY | 1,2-DCA | 13.211 | 13.214 | 13.205 | 13.204 | 13.209 | 13.208 | 13.206 | 13.252 | 13.256 | 13.251 | 13.300 | 13.253 | | 13.255 | 13.257 | | | | | | | | | | | | |
| | 1,1,1-TCA | 14.555 | 14.553 | 14.547 | 14.548 | 14.549 | 14.544 | 14.554 | 14.595 | 14.597 | 14.596 | 14.653 | 14.596 | | 14.661 | 14.679 | | | | | | | | | | | | |
| (MINUTES) | CCL4 | 14.938 | 14.938 | 14.934 | 14.930 | 14.943 | 14.935 | 14.934 | 14.985 | 14.987 | 14.981 | 14.966 | 14.990 | | 14.989 | 15.071 | | | | | | | | | | | | |
| | TCE | 17.608 | 17.617 | 17.603 | 17.607 | 17.630 | 17.643 | 17.603 | 17.656 | 17.607 | 17.655 | 17.632 | 17.658 | | 17.660 | 17.672 | | | | | | | | | | | | |
| | PCE | 23.343 | 23.339 | 23.335 | 23.340 | 23.352 | 23.343 | 23.331 | 23.395 | 23.404 | 23.384 | 23.367 | 23.391 | | 23.386 | 23.385 | | | | | | | | | | | | |
| DWG.#804-0624 | REBOL | | | | | | | | | | | | | | | | | | | | | | | | | | | |

AR300288

NORTH PENN WATER AUTHORITY

# VOA QUALITY CONTROL DATA FOR THE MONTH OF September 1986

| QA PARAMETER | COMPOUND | 9/2 | 9/3 | 9/4 | 9/10 | 9/9 | 9/12 | 9/13 | 9/14 | 9/15 | | | | | | | | | | | | | True Value ug/L | SUMMARY N | SUMMARY $\bar{x}$ | SUMMARY SD | SUMMARY %SD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VCA 14m 9/15/86 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LOW-RANGE QC SAMPLE Nos Vol 4/-186 (UG/LITER) 8/9 1-7 | CHCL3 | 11.5 | | 12.7 | | 12.5 | | 12.0 | 12.- | | | | | | | | | | | | | | 12.0 | | | | |
| | 1,2-DCA | 2.7 | | 2.8 | | 2.6 | | 2.4 | 2.- | | | | | | | | | | | | | | 2.0 | | | | |
| | 1,1,1-TCA | 1.8 | | 1.6 | | 1.7 | | 1.4 | 1.5 | | | | | | | | | | | | | | 1.4 | | | | |
| | CCL4 | 2.5 | | 2.6 | | 2.4 | | 2.2 | 2.- | | | | | | | | | | | | | | 2.6 | | | | |
| | TCE | 2.8 | | 3.0 | | 2.9 | | 2.7 | 2.1 | | | | | | | | | | | | | | 2.9 | | | | |
| | PCE | 1.6 | | 1.6 | | 1.8 | | 1.4 | 1.9 | | | | | | | | | | | | | | 1.6 | | | | |
| | CL2BRCH | 2.1 | | 2.1 | | 1.8 | | 1.2 | 1.9 | | | | | | | | | | | | | | 2.0 | | | | |
| | BR2CLCH | 2.9 | | 2.6 | | 2.7 | | 2.7 | 2.7 | | | | | | | | | | | | | | 2.6 | | | | |
| | BR3CH | 3.0 | | 2.1 | | 2.7 | | 2.- | 2.- | | | | | | | | | | | | | | 2.9 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | N | $\bar{x}$ | SD | %SD |
| HIGH-RANGE QC SAMPLE Nos Vol -14486 (UG/LITER) 8/8 9/12 | CHCL3 | | 44.2 | | 44.2 | | 44.- | | 44.- | 42.2 | | | | | | | | | | | | | 43.0 | | | | |
| | 1,2-DCA | | 25.5 | | 25.6 | | 24.6 | | 24.- | 24.8 | | | | | | | | | | | | | 22.- | | | | |
| | 1,1,1-TCA | | 15.6 | | 15.8 | | 14.1 | | 16.- | 14.3 | | | | | | | | | | | | | 14.2 | | | | |
| | CCL4 | | 10.0 | | 10.6 | | 9.4 | | 10.- | 8.7 | | | | | | | | | | | | | 10.0 | | | | |
| | TCE | | 10.1 | | 12.5 | | 11.6 | | 12.- | 11.7 | | | | | | | | | | | | | 12.0 | | | | |
| | PCE | | 6.2 | | 6.4 | | 6.5 | | 7.- | 6.4 | | | | | | | | | | | | | 6.0 | | | | |
| | CL2BRCH | | 9.0 | | 8.5 | | 8.1 | | 8.4 | 8.2 | | | | | | | | | | | | | 7.9 | | | | |
| | BR2CLCH | | 11.9 | | 11.9 | Reran | 11.2 | | 11.3 | 11.6 | | | | | | | | | | | | | 10.7 | | | | |
| | BR3CH | | 9.9 | | 9.6 | 1.- | 9.5 | | 9.- | 9.6 | | | | | | | | | | | | | 9.9 | | | | |
| DUPLICATE ANALYSES (UG/LITER) | PAIR | | A | | B | D | C | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | | N | $\bar{x}$ | SD | %SD |
| | SAMP # | | 1289-86 | | 1291-86 | 1289-86 | 1287-86 | 1288-86 | 1290-86 | 1292-86 | 1286-86 | 1293-86 | 1294-86 | 1295-86 | 1296-86 | 1297-86 | 1298-86 | 1299-86 | 1300-86 | 1301-86 | 1302-86 | 1303-86 | | | | | |
| | VC 1,1-DCE | | | | | | 1.6 | | 1.2 | | | | | | | | | | 5.2 | 6.5 | | | | | | | |
| | 1,2-DCE | | 34.7 | | 35.5 | | 31 | | 33.3 | 19.9 | 26.7 | 34.0 | 1.4 | 1.1 | 1.- | 1.- | 1.- | 2.8 | 1.- | 35.6 | | | | | | | |
| | CHCL3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1,2-DCA | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1,1,1-TCA | | 1.7 | | 1.8 | 5.3 | 1.- | 1.2 | 2.6 | 11.7 | 1.- | 1.2 | 1.- | 1.- | 1.- | 1.- | 2.0 | | | | | | | | | | |
| | CCL4 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | | 112.6 | | 117.9 | 4.0 | | 15.5 | | 3.8 | 110.7 | 92.- | 90.1 | | 1.- | 1.- | | 118.7 | | | | | | | | | |
| | PCE | | 0.5 | | 2.2 | | | | | | 1.- | | 1.- | | 1.- | | | 0.- | | | | | | | | | |
| RETENTION TIME STABILITY (MINUTES) | VC CH2Cl2 | 3.241 7.279 | 3.224 7.324 | 3.119 7.324 | 3.906 7.338 | 3.94- 7.- | 3.10 7.- | 3.871 7.- | 3.23- 7.- | 3.87- 7.- | | | | | | | | | | | | | | | | | |
| | 1,1-DCE | 9.545 10.240 | 9.536 10.243 | 9.335 10.242 | 9.369 10.243 | 9.44- 10.- | 9.41 10.- | 9.41 10.- | 9.41 10.- | 9.41 10.- | | | | | | | | | | | | | | | | | |
| | 1,2-DCE | 11.599 12.217 | 11.662 12.326 | 11.655 12.327 | 11.619 12.341 | 11.67 12.- | 11.67 12.- | 11.67 12.- | 11.67 12.- | 11.67 12.- | | | | | | | | | | | | | | | | | |
| | CHCL3 | 12.963 | 12.969 | 12.969 | 12.983 | 12.9- | 12.9- | 12.9- | 12.9- | 12.9- | | | | | | | | | | | | | | | | | |
| | 1,2-DCA | 13.684 | 13.681 | 13.687 | 13.699 | 13.6- | 13.6- | 13.6- | 13.6- | 13.6- | | | | | | | | | | | | | | | | | |
| | 1,1,1-TCA | 15.054 | 15.050 | 15.049 | 15.064 | 14.9- | 15.0- | 15.0- | 15.0- | 15.0- | | | | | | | | | | | | | | | | | |
| | CCL4 | 15.449 | 15.443 | 15.442 | 15.457 | 15.3- | 15.4- | 15.4- | 15.4- | 15.4- | | | | | | | | | | | | | | | | | |
| | TCE | 18.126 | 18.117 | 18.120 | 18.135 | 18.0- | 18.0- | 18.1- | 18.1- | 18.1- | | | | | | | | | | | | | | | | | |
| | PCE | 23.926 | 23.917 | 23.923 | 23.931 | 23.7- | 23.7- | 23.7- | 23.7- | 23.7- | | | | | | | | | | | | | | | | | |
| DWG.#804-0824 | RESOL | | | | | | | | | | | | | | | | | | | | | | | | | | |

NORTH PENN WATER AUTHORITY

# VOA QUALITY CONTROL DATA FOR THE MONTH OF SEPTEMBER 1985

| QA PARAMETER | COMPOUND | 9/4 | 9/11 | 9/12 | 9/13 | 9/16 | 9/17 | 9/18 | 9/19 | 9/20 | 9/24 | 9/25 | 9/26 | | | | | | | | | True Value µg/L | SUMMARY N | SUMMARY $\bar{x}$ | SUMMARY SD | SUMMARY %SD | SUMMARY % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOA Mix 7.23.85 9-24-85 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LOW-RANGE QC SAMPLE New Vial 7.24.85 (UG/LITER) 8/30 9/19 | CHCL3 | | 14.7 | | 13.1 | | 13.6 | | 11.8 | | | 13.6 | | | | | | | | | | 12.0 | | | | | |
| | 1,2-DCA | | 2.9 | | 2.5 | | 3.1 | | 2.3 | | | 2.5 | | | | | | | | | | 2.0 | | | | | |
| | 1,1,1-TCA | | 1.6 | | 1.6 | | 2.1 | | 1.6 | | | 1.6 | | | | | | | | | | 1.4 | | | | | |
| | CCL4 | | 3.0 | | 2.6 | | 2.9 | | 2.4 | | | 2.8 | | | | | | | | | | 2.6 | | | | | |
| | TCE | | 3.2 | | 3.2 | | 2.8 | | 3.1 | | | 3.2 | | | | | | | | | | 2.9 | | | | | |
| | PCE | | 1.9 | | 1.7 | | 1.6 | | 2.0 | | | 1.8 | | | | | | | | | | 1.6 | | | | | |
| | CL2BRCH | | 2.1 | | 2.0 | | 2.0 | | 1.7 | | | 2.1 | | | | | | | | | | 2.0 | | | | | |
| | BR2CLCH | | 2.8 | | 3.0 | | 2.9 | | 2.5 | | | 3.0 | | | | | | | | | | 2.6 | | | | | |
| | BR3CH | | 2.6 | | 2.8 | | 2.7 | | 2.6 | | | 2.7 | | | | | | | | | | 2.9 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | N | $\bar{x}$ | SD | %SD | % |
| HIGH-RANGE QC SAMPLE New Vial 7.25.85 (UG/LITER) 8/30 9/19 | CHCL3 | 42.2 | | 45.1 | | 48.6 | | 44.3 | | 43.9 | 41.1 | | 42.7 | | | | | | | | | 43.0 | | | | | |
| | 1,2-DCA | 17.0 | | 22.9 | | 22.7 | | 25.8 | | 20.9 | 20.6 | | 20.8 | | | | | | | | | 22.2 | | | | | |
| | 1,1,1-TCA | 14.4 | | 15.5 | | 16.7 | | 15.8 | | 15.4 | 13.9 | | 14.8 | | | | | | | | | 14.3 | | | | | |
| | CCL4 | 10.0 | | 10.5 | | 11.2 | | 10.7 | | 10.9 | 9.4 | | 10.5 | | | | | | | | | 10.0 | | | | | |
| | TCE | 10.6 | | 12.8 | | 11.9 | | 13.1 | | 12.6 | 12.1 | | 10.9 | | | | | | | | | 12.0 | | | | | |
| | PCE | 6.2 | | 6.1 | | 6.5 | | 6.0 | | 6.1 | 6.3 | | 5.7 | | | | | | | | | 6.2 | | | | | |
| | CL2BRCH | 8.1 | | 8.6 | | 9.1 | | 8.7 | | 8.7 | 7.2 | | 8.5 | | | | | | | | | 7.9 | | | | | |
| | BR2CLCH | 11.3 | | 11.7 | | 11.7 | | 11.8 | | 12.0 | 10.2 | | 11.6 | | | | | | | | | 10.7 | | | | | |
| | BR3CH | 8.5 | | 9.0 | | 9.8 | | 9.9 | | 9.8 | 8.7 | | 9.8 | | | | | | | | | 9.9 | | | | | |
| | PAIR | A | E | E(9/6) | B | A(9/6) | B(9/6) | D | C | D(9/9) | C(9/20) | | | F(9/11) | | | | | | | | | N | $\bar{x}$ | SD | %SD | |
| DUPLICATE ANALYSES (UG/LITER) | SAMP # | 1749-85 | 1813-85 | 1814-85 | 1752-85 | 1750-85 | 1753-85 | 1846-85 | 1846-85 | 1849-85 | 1847-85 | | | | | | | | | | | | | | | | |
| | VC/1,1-DCE | | | 0.7 | 3.6 | | 3.9 | | | | | | | 0.7 | | | | | | | | | | | | | |
| | 1,1-DCA/C-1,2-DCE | 2.8 | 5.8 | 6.2 | 15.8 | 2.5 | 17.1 | | | | | | | 6.25 | | | | | | | | | | | | | |
| | CHCL3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1,2-DCA | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1,1,1-TCA | 0.7 | 1.8 | 1.9 | 4.2 | 0.6 | 4.8 | | 4.6 | | 4.8 | | | 2.9 | | | | | | | | | | | | | |
| | CCL4 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 30.4 | 28.0 | 27.9 | | 23.7 | | 12.1 | 1.6 | 10.9 | 2.0 | | | 142.6 | | | | | | | | | | | | | |
| | PCE | 4.1 | 5.9 | 6.1 | | 2.8 | | | | | | | | 1.0 | | | | | | | | | | | | | |
| RETENTION TIME STABILITY (MINUTES) | VC/$CH_2Cl_2$ | 3.812 7.012 | 3.815 7.051 | 3.747 7.001 | 3.727 6.999 | 3.801 7.059 | 3.803 7.059 | 3.785 7.043 | 3.791 7.051 | 3.803 7.063 | 3.804 7.054 | 3.755 7.046 | 3.754 7.038 | | | | | | | | | | N | $\bar{x}$ | SD | %SD | R |
| | 1,1-DCE/1,1-DCA | 9.141 9.817 | 9.186 9.859 | 9.159 9.833 | 9.157 9.833 | 9.175 9.846 | 9.187 9.856 | 9.169 9.838 | 9.173 9.844 | 9.184 9.867 | 9.182 9.865 | 9.172 9.826 | 9.170 9.834 | | | | | | | | | | | | | | |
| | C-1,2-DCE/1,1,1-TCA | 11.138 11.844 | 11.189 11.889 | 11.155 11.860 | 11.155 11.860 | 11.165 11.867 | 11.175 11.876 | 11.168 11.865 | 11.168 11.862 | 11.175 11.872 | 11.177 11.874 | 11.145 11.849 | 11.170 11.874 | | | | | | | | | | | | | | |
| | CHCL3 | 12.463 | 12.499 | 12.479 | 12.478 | 12.485 | 12.495 | 12.484 | 12.484 | 12.496 | 12.501 | 12.489 | 12.497 | | | | | | | | | | | | | | |
| | 1,2-DCA | 13.181 | 13.219 | 13.200 | 13.199 | 13.204 | 13.214 | 13.200 | 13.202 | 13.211 | 13.215 | 13.211 | 13.211 | | | | | | | | | | | | | | |
| | 1,1,1-TCA | 14.531 | 14.559 | 14.546 | 14.545 | 14.547 | 14.555 | 14.544 | 14.548 | 14.556 | 14.558 | 14.552 | 14.553 | | | | | | | | | | | | | | |
| | CCL4 | 14.910 | 14.949 | 14.939 | 14.935 | 14.934 | 14.945 | 14.934 | 14.936 | 14.944 | 14.949 | 14.941 | 14.943 | | | | | | | | | | | | | | |
| | TCE | 17.577 | 17.613 | 17.604 | 17.602 | 17.598 | 17.608 | 17.599 | 17.602 | 17.605 | 17.613 | 17.609 | 17.611 | | | | | | | | | | | | | | |
| | PCE | 23.303 | 23.337 | 23.332 | 23.330 | 23.327 | 23.331 | 23.322 | 23.327 | 23.332 | 23.337 | 23.330 | 23.328 | | | | | | | | | | | | | | |
| DWG.#804-0524 | RESOL | | | | | | | | | | | | | | | | | | | | | | | | | | |

NORTH PENN WATER AUTHORITY

# VOA QUALITY CONTROL DATA FOR THE MONTH OF OCTOBER 1985

00290

| QA PARAMETER | COMPOUND | 10/1 | 10/10 | 10/11 | 10/14 | 10/16 | 10/21 | 10/22 | 10/23 | 10/24 | 10/25 | 10/31 | | | | | | | | | | | | True Value ug/l | SUMMARY N | $\bar{x}$ | SD | %SD | %E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VCA 11.x 9-24-85 10-30 85 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | CHCL3 | 12.6 | | 12.0 | | 12.6 | 12.5 | 12.8 | 12.0 | | | 9.4 | | | | | | | | | | | | 12.0 | | | | | |
| LOW-RANGE | 1,2-DCA | 2.2 | | 2.5 | | 2.1 | 2.9 | 2.9 | 2.3 | | | 2.2 | | | | | | | | | | | | 2.0 | | | | | |
| QC SAMPLE | 1,1,1-TCA | 1.8 | | 1.6 | | 1.6 | 1.4 | 1.5 | 1.8 | | | 1.5 | | | | | | | | | | | | 1.4 | | | | | |
| New Vial 7-24-85 10-30-85 | CCL4 | 2.5 | | 2.4 | | 2.5 | 2.5 | 2.6 | 2.6 | | | 2.3 | | | | | | | | | | | | 2.6 | | | | | |
| (UG/LITER) | TCE | 3.0 | | 3.0 | | 3.0 | 2.7 | 3.0 | 2.5 | | | 2.8 | | | | | | | | | | | | 2.9 | | | | | |
| 9/19 | PCE | 1.6 | | 1.7 | | 1.9 | 1.5 | 1.8 | 1.7 | | | 1.5 | | | | | | | | | | | | 1.6 | | | | | |
| | CL2BRCH | 1.8 | | 1.8 | | 2.0 | 2.0 | 1.9 | 1.8 | | | 1.8 | | | | | | | | | | | | 2.0 | | | | | |
| | BR2CLCH | 2.8 | | 2.6 | | 2.7 | 2.4 | 2.6 | 2.7 | | | 2.4 | | | | | | | | | | | | 2.6 | | | | | |
| | BR3CH | 2.8 | | 2.5 | | 2.5 | 2.4 | 2.4 | 2.6 | | | 2.5 | | | | | | | | | | | | 2.9 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | N | $\bar{x}$ | SD | %SD | %E |
| | CHCL3 | | 47.2 | | 47.1 | 47.9 | | | | 45.5 | 44.4 | | | | | | | | | | | | | 43.0 | | | | | |
| HIGH-RANGE | 1,2-DCA | | 23.9 | | 20.7 | 20.7 | | | | 23.1 | 20.9 | | | | | | | | | | | | | 22.2 | | | | | |
| QC SAMPLE | 1,1,1-TCA | | 15.8 | | 15.9 | 15.7 | | | | 16.1 | 14.7 | | | | | | | | | | | | | 14.3 | | | | | |
| New Vial 7-25-85 10-30-85 | CCL4 | | 11.6 | | 11.6 | 11.5 | | | | 10.9 | 11.4 | | | | | | | | | | | | | 10.0 | | | | | |
| (UG/LITER) | TCE | | 12.2 | | 12.4 | 11.9 | | | | 13.2 | 13.2 | | | | | | | | | | | | | 12.0 | | | | | |
| 9/19 | PCE | | 6.5 | | 6.6 | 6.3 | | | | 6.9 | 7.2 | | | | | | | | | | | | | 6.2 | | | | | |
| | CL2BRCH | | 8.7 | | 8.9 | 9.0 | | | | 8.8 | 9.0 | | | | | | | | | | | | | 7.9 | | | | | |
| | BR2CLCH | | 11.4 | | 12.2 | 12.1 | | | | 11.7 | 12.7 | | | | | | | | | | | | | 10.7 | | | | | |
| | BR3CH | | 9.6 | | 9.9 | 10.0 | | | | 10.3 | 10.8 | | | | | | | | | | | | | 9.9 | | | | | |
| | PAIR | | A | A | B(1/10) | B(1/10) | | | | | C | D 1/25 | E(1/10) | F(1/10) | E(1/10) | D(1/10) | C(1/10) | F(1/10) | | | | | | | N | $\bar{x}$ | SD | %SD | |
| | SAMP # | | 1941-85 | 1942-85 | 1947-85 | | | | | | 2109-85 | 2115-85 | 2117-85 | 2146-85 | 2118-85 | 2116-85 | 2110-85 | 2149-85 | | | | | | | | | | | |
| DUPLICATE | VC/1,1-DCE | | | | 3.3 | 3.1 | | | | | 1.8 | 4.3 | 0.5 | 1.5 | | 1.9 | | 0.5 | | | | | | | | | | | |
| ANALYSES | C-1,2-DCE | | 2.7 | 2.5 | 16.5 | 16.3 | | | | | 5.6 | 17.2 | | 3.2 | | 12.4 | 3.7 | 4.9 | | | | | | | | | | | |
| | CHCL3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (UG/LITER) | 1,2-DCA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1,1,1-TCA | | 1.1 | 0.7 | 4.5 | 4.4 | | | | | 2.6 | 4.9 | 3.8 | 2.0 | 2.4 | 3.2 | 2.3 | 3.9 | | | | | | | | | | | |
| | CCL4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | | 24.9 | 22.9 | | | | | | | 14.5 | | 7.7 | 89.1 | 4.2 | | 93.1 | 130.4 | | | | | | | | | | | |
| | PCE | | 3.4 | 3.1 | | | | | | | 1.0 | | | 0.5 | | | 0.5 | 1.2 | | | | | | | | | | | |
| 3/29-changed columns | VC/$CH_2Cl_2$ | 3.792 7.049 | 3.753 7.016 | 3.778 7.027 | 3.777 7.031 | 3.771 7.034 | 3.782 7.036 | 3.787 7.038 | 3.802 7.062 | 3.787 7.041 | 3.787 7.034 | 3.961 7.266 | | | | | | | | | | | | | N | $\bar{x}$ | SD | %SD | RRT |
| | 1,1-DCE | 9.177 9.856 | 9.167 9.847 | 9.176 9.844 | 9.163 9.837 | 9.165 9.838 | 9.170 9.846 | 9.159 9.836 | 9.176 9.856 | 9.170 9.845 | 9.155 9.835 | 9.495 10.207 | | | | | | | | | | | | | | | | | |
| RETENTION | C-1,2-DCE | 11.170 11.874 | 11.170 11.873 | 11.163 11.866 | 11.157 11.860 | 11.155 11.857 | 11.169 11.870 | 11.154 11.854 | 11.171 11.874 | 11.165 11.867 | 11.150 11.855 | 11.564 12.264 | | | | | | | | | | | | | | | | | |
| TIME | CHCL3 | 12.490 | 12.493 | 12.483 | 12.479 | 12.476 | 12.480 | 12.492 | 12.489 | 12.480 | 12.471 | 12.600 | | | | | | | | | | | | | | | | | |
| STABILITY | 1,2-DCA | 13.216 | 13.218 | 13.204 | 13.197 | 13.197 | 13.208 | 13.191 | 13.218 | 13.202 | 13.192 | 13.384 | | | | | | | | | | | | | | | | | |
| | 1,1,1-TCA | 14.554 | 14.558 | 14.552 | 14.544 | 14.533 | 14.546 | 14.531 | 14.549 | 14.540 | 14.531 | 14.711 | | | | | | | | | | | | | | | | | |
| (MINUTES) | CCL4 | 14.946 | 14.946 | 14.943 | 14.934 | 14.933 | 14.937 | 14.919 | 14.936 | 14.932 | 14.926 | 15.104 | | | | | | | | | | | | | | | | | |
| | TCE | 17.609 | 17.610 | 17.613 | 17.598 | 17.588 | 17.610 | 17.587 | 17.602 | 17.600 | 17.590 | 17.850 | | | | | | | | | | | | | | | | | |
| | PCE | 23.337 | 23.339 | 23.342 | 23.326 | 23.306 | 23.334 | 23.312 | 23.330 | 23.320 | 23.318 | 23.624 | | | | | | | | | | | | | | | | | |
| DWG.#804-0524 | RESOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

NORTH PENN WATER AUTHORITY

# VOA QUALITY CONTROL DATA FOR THE MONTH OF APRIL 1984

0291

| QA PARAMETER | COMPOUND | 4/1 | 4/2 | 4/3 | 4/4 | 4/5 | 4/6 | 4/9 | 4/11 | 4/12 | 4/13 | 4/16 | 4/17 | 4/18 | 4/19 | 4/23 | 4/24 | 4/25 | 4/26 | 4/27 | | | | True Value | SUMMARY N | $\bar{x}$ | SD | %SD | %E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOW-RANGE QC SAMPLE 3/27/84 4/19/84 (UG/LITER) | CHCL3 | | 18.1 | | | 18.1 | | 16.5 | | 19.4 | | 18.6 | | 18.2 | | 19.9 | | 20.5 | | 17.6 | | | | 18.2 | | | | | |
| | 1,2-DCA | | 3.0 | | | 3.0 | | 1.1 | | 3.1 | | 2.7 | | 2.7 | | 0.6 | | 2.8 | | 1.6 | | | | 2.5 | | | | | |
| | 1,1,1-TCA | | 1.6 | | | 2.0 | | 1.5 | | 2.1 | | 1.8 | | 1.8 | | 1.8 | | 1.6 | | 1.5 | | | | 1.7 | | | | | |
| | CCL4 | | 3.8 | | | 3.3 | | 3.5 | | 4.3 | | 4.4 | | 4.0 | | 4.1 | | 4.2 | | 3.7 | | | | 3.7 | | | | | |
| | TCE | | 1.4 | | | 1.4 | | 1.6 | | 1.4 | | 1.2 | | 1.2 | | 1.1 | | 1.4 | | 1.3 | | | | 1.3 | | | | | |
| | PCE | | 2.5 | | | 2.2 | | 1.9 | | 2.1 | | 2.1 | | 1.9 | | 1.9 | | 2.6 | | 2.1 | | | | 2.2 | | | | | |
| | CL2BRCH | | 1.4 | | | 0.9 | | 0.7 | | 1.0 | | 0.9 | | 1.3 | | 1.1 | | 1.0 | | 0.9 | | | | 1.2 | | | | | |
| | BR2CLCH | | 2.7 | | | 2.9 | | 2.0 | | 2.8 | | 2.6 | | 2.5 | | 2.2 | | 2.6 | | 2.6 | | | | 3.0 | | | | | |
| | BR3CH | | 4.1 | | | 3.4 | | 2.9 | | 4.2 | | 2.8 | | 3.5 | | 3.0 | | 3.0 | | 3.2 | | | | 4.2 | | | | | |
| HIGH-RANGE QC SAMPLE 3/27/84 4/19/84 4/16/84 (UG/LITER) | CHCL3 | | | 76.7 | 68.8 | | 80.0 | | 66.5 | | | | 76.7 | | 72.8 | | 81.3 | | 78.8 | | | | | 73.0 | | | | | |
| | 1,2-DCA | | | 19.4 | 16.1 | | 16.7 | | 16.9 | | | | 17.0 | | 16.9 | | 18.2 | | 16.6 | | | | | 13.5 | | | | | |
| | 1,1,1-TCA | | | 9.0 | 7.3 | | 9.3 | | 7.2 | | | | 8.8 | | 8.3 | | 9.3 | | 9.0 | | | | | 8.4 | | | | | |
| | CCL4 | | | 16.0 | 11.4 | | 16.0 | | 14.1 | | | | 16.0 | | 15.8 | | 18.3 | | 16.3 | | | | | 14.0 | | | | | |
| | TCE | | | 9.9 | 8.3 | | 11.4 | | 9.1 | | | | 9.1 | | 9.0 | | 9.2 | | 10.4 | | | | | 9.7 | | | | | |
| | PCE | | | 8.0 | 6.8 | | 9.5 | | 7.4 | | | | 7.5 | | 7.1 | | 9.9 | | 8.9 | | | | | 8.4 | | | | | |
| | CL2BRCH | | | 13.9 | 10.1 | | 16.1 | | 9.2 | | | | 10.5 | | 12.1 | | 12.3 | | 11.9 | | | | | 11.5 | | | | | |
| | BR2CLCH | | | 9.6 | 7.9 | | 8.4 | | 7.9 | | | | 8.6 | | 8.3 | | 8.5 | | 8.2 | | | | | 9.0 | | | | | |
| | BR3CH | | | 13.8 | 11.1 | | 13.9 | | 9.3 | | | | 12.8 | | 12.1 | | 11.4 | | 10.5 | | | | | 13.9 | | | | | |
| DUPLICATE ANALYSES (UG/LITER) | PAIR | | | | | | | | | A | A | | | | | | B | B(5%) | | | C(5%) | | | N | $\bar{x}_P$ | SD | %SD | |
| | SAMP # | | | | | | | | | 4/12/84E | 4/25/84E | | | | | | 3/30/84 | 4/11/84 | | | 5/1/84 | | | | | | | |
| | K/1,1-DCE | | | | | | | | | 5.3 | 4.6 | | | | | | 2.5 | 1.6 | | | 0.9 | | | | | | | |
| | C-1,2-DCE | | | | | | | | | 3.25 | 3.2? | | | | | | 0.2 | | | | 1.7 | | | | | | | |
| | CHCL3 | | | | | | | | | | | | | | | | | | | | 0.5 | | | | | | | |
| | 1,2-DCA | | | | | | | | | 0.5 | 0.4 | | | | | | | | | | 0.4 | | | | | | | |
| | 1,1,1-TCA | | | | | | | | | 3.2 | 2.5 | | | | | | 13.5 | 11.8 | | | 1.4 | | | | | | | |
| | CCL4 | | | | | | | | | 0.8 | 0.6 | | | | | | | | | | | | | | | | | |
| | TCE | | | | | | | | | 9.10 | 8.25 | | | | | | 8.1 | 8.7 | | | 15.0 | | | | | | | |
| | PCE | | | | | | | | | 4.1 | 4.0 | | | | | | | | | | 2.0 | | | | | | | |
| RETENTION TIME STABILITY (MINUTES) | VC | 3.712 | 3.757 | — | 3.779 | 3.720 | 3.705 | 3.758 | 3.728 | 3.723 | 3.718 | 3.734 | 4.021 | 7.022 | 6.960 | 6.996 | 1.009 | 2.705 | 3.767 | 7.036 | | | | | N | $\bar{x}$ | SD | %SD | RRT |
| | CH2Cl2 | 6.973 | 7.006 | 7.049 | 7.068 | 6.986 | 7.015 | 6.973 | 6.987 | 6.993 | 6.980 | 6.981 | | | | | | 6.798 | 7.015 | | | | | | | | | | |
| | 1,1-DCE | 9853 | 9867 | 9892 | 9887 | 9867 | 9856 | 9859 | 9877 | 9878 | 9859 | 9870 | 9875 | 9889 | 9852 | 9871 | 9905 | 9855 | 9892 | 9901 | | | | | | | | | |
| | C-1,2-DCE | 11913 | 11920 | 11936 | 11950 | 11934 | 11949 | 11926 | 11939 | 11931 | 11916 | 11926 | 11939 | 11937 | 11913 | 11927 | 11937 | 11983 | 11946 | 11958 | | | | | | | | | |
| | CHCL3 | 12539 | 12543 | 12555 | 12573 | 12558 | 12569 | 12551 | 12564 | 12555 | 12543 | 12551 | 12560 | 12559 | 12539 | 12552 | 12553 | 12549 | 12556 | 12559 | | | | | | | | | |
| | 1,2-DCA | 13257 | 13262 | 13271 | 13290 | 13275 | 13285 | 13270 | 13284 | 13274 | 13260 | 13276 | 13281 | 13271 | 13261 | 13270 | 13272 | 13290 | 13284 | 13277 | | | | | | | | | |
| | 1,1,1-TCA | 14601 | 14605 | 14604 | 14631 | 14681 | 14631 | 14615 | 14626 | 14618 | 14607 | 14624 | 14626 | 14634 | 14607 | 14615 | 14619 | 14612 | 14627 | 14621 | | | | | | | | | |
| | CCL4 | 14911 | 14993 | 14989 | 15019 | 15013 | 15058 | 15005 | 15016 | 15009 | 14996 | 15013 | 15012 | 15013 | 14993 | 15004 | 15007 | 15022 | 15018 | 15027 | | | | | | | | | |
| | TCE | 17667 | 17672 | 17659 | 17698 | 17694 | 17720 | 17685 | 17707 | 17693 | 17678 | 17692 | 17700 | 17697 | 17654 | 17689 | 17692 | 17784 | 17721 | 17765 | | | | | | | | | |
| | PCE | 23410 | 23409 | 23407 | 23425 | 23437 | 23444 | 23426 | 23439 | 23436 | 23422 | 23446 | 23446 | 23435 | 23417 | 23430 | 23431 | | 23430 | 23442 | | | | | | | | | |
| DWG. #804-0824 | RESOL | 3.98 | 3.97 | 3.61 | 3.95 | 4.02 | 3.97 | 4.01 | | 3.82 | 3.96 | 3.95 | 3.91 | 3.95 | 3.82 | 3.91 | 3.95 | | 3.94 | 3.97 | | | | | | | | | |

00262

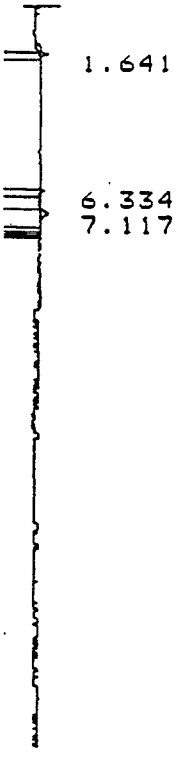
NORTH PENN WATER AUTHORITY

# VOA QUALITY CONTROL DATA FOR THE MONTH OF MARCH 1984

| QA PARAMETER | COMPOUND | 3/2 | 3/5 | 3/6 | 3/8 | 3/12 | 3/13 | 3/14 | 3/19 | 3/21 | 3/23 | 3/26 | 3/27 | 3/28 | 3/29 | 3/30 | 3/31 | True Value ug/L | SUMMARY N | $\bar{x}$ | SD | %SD | %E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CHCL3 | | 18.6 | | 19.9 | | 17.0 | | 17.4 | | 16.0 | | 19.7 | | 17.3 | | | 18.2 | | | | | |
| LOW-RANGE | 1,2-DCA | | 4.1 | | 3.2 | | 3.4 | | 3.2 | | 3.8 | | 3.6 | | 3.5 | | | 2.5 | | | | | |
| QC SAMPLE | 1,1,1-TCA | | 1.2 | | 1.7 | | 1.4 | | 1.3 | | 1.2 | | 1.8 | | 1.5 | | | 1.7 | | | | | |
| 5/5 | CCL4 | | 4.5 | | 3.7 | | 3.3 | | 3.3 | | 3.2 | | 4.2 | | 3.5 | | | 3.7 | | | | | |
| 3/27 | TCE | | 1.7 | | 1.4 | | 1.2 | | 1.1 | | 1.2 | | 1.5 | | 1.3 | | | 1.3 | | | | | |
| (UG/LITER) | PCE | | 2.9 | | 2.2 | | 2.1 | | 2.0 | | 1.8 | | 2.9 | | 2.0 | | | 2.2 | | | | | |
| | CL2BRCH | | 1.6 | | 1.5 | | 1.4 | | 1.4 | | 1.5 | | 1.8 | | 1.5 | | | 1.2 | | | | | |
| | BR2CLCH | | 3.4 | | 3.2 | | 3.3 | | 2.9 | | 3.1 | | 3.4 | | 2.8 | | | 3.0 | | | | | |
| | BR3CH | | 3.9 | | 3.9 | | 3.7 | | 3.7 | | 4.1 | | 4.9 | | 4.7 | | | 4.2 | | | | | |
| | | | | | | | | | | | | | | | | | | | N | $\bar{x}$ | SD | %SD | %E |
| | CHCL3 | 70.0 | | | | 78.0 | | | | 72.3 | | 66.2 | | 69.8 | | 75.9 | | 73.0 | | | | | |
| HIGH-RANGE | 1,2-DCA | 15.2 | | | | 18.5 | | | | 17.2 | | 18.9 | | 15.0 | | 18.7 | | 12.5 | | | | | |
| QC SAMPLE | 1,1,1-TCA | 6.2 | | | | 9.2 | | | | 8.2 | | 9.2 | | 7.7 | | 8.7 | | 8.4 | | | | | |
| | CCL4 | 13.6 | | | | 15.5 | | | | 14.8 | | 16.0 | | 13.3 | | 15.5 | | 14.0 | | | | | |
| (UG/LITER) | TCE | 9.2 | | | | 11.3 | | | | 9.8 | | 11.2 | | 8.5 | | 10.1 | | 9.7 | | | | | |
| 5/2 | PCE | 8.5 | | | | 9.3 | | | | 7.1 | | 9.8 | | 7.4 | | 8.9 | | 8.4 | | | | | |
| 3/26 | CL2BRCH | 11.6 | | | | 12.9 | | | | 12.6 | | 14.3 | | 12.0 | | 12.6 | | 11.5 | | | | | |
| | BR2CLCH | 8.5 | | | | 9.7 | | | | 9.3 | | 11.6 | | 9.2 | | 10.4 | | 9.0 | | | | | |
| | BR3CH | 11.1 | | | | 15.0 | | | | 13.6 | | 17.6 | | 14.2 | | 16.2 | | 13.9 | | | | | |
| | PAIR | A | | | A | | | | | | B | | B | C | C(3/28) | | | | N | $\bar{x}_P$ | SD | %SD | |
| | BAMP # | 283-84 | | | 283-84 | | | | | | 297-84 | | 298-84 | 298-84 | 298-84 | | | | | | | | |
| DUPLICATE | 1,1-DCE | | | | | | | | | | 1.3 | | 1.8 | 1.3 | 1.2 | | | | | | | | |
| ANALYSES | C-1,2-DCE | 1.4 | | | 1.8 | | | | | | 1.2 | | 0.3 | 0.5 | 0.7 | | | | | | | | |
| | CHCL3 | 0.4 | | | 0.5 | | | | | | | | | 19.9 | 23.1 | | | | | | | | |
| (UG/LITER) | 1,2-DCA | | | | | | | | | | | | | | | | | | | | | | |
| | 1,1,1-TCA | | | | 5.6 | | | | | | 4.3 | | 12.9 | 1.2 | 1.3 | | | | | | | | |
| | CCL4 | | | | | | | | | | | | | | | | | | | | | | |
| | TCE | 11.8 | | | 19.2 | | | | | | 8.9 | | 12.2 | 3.1 | 3.45 | | | | | | | | |
| | PCE | 1.4 | | | 2.0 | | | | | | | | | 2.1 | 3.15 | | | | | | | | |
| | VC CH2Cl2 | 6.966 | 6.977 | 6.953 | 6.975 | 6.939 | 6.994 | 6.984 | 7.005 | 6.967 | 6.954 | 6.973 | 6.996 | 6.982 | 6.986 | 6.992 | 6.954 | | N | $\bar{x}$ | SD | %SD | RRT |
| | 1,1-DCE | 9.840 | 9.851 | 9.823 | 9.841 | 9.825 | 9.859 | 9.857 | 9.852 | 9.841 | 9.841 | 9.856 | 9.862 | 9.850 | 9.849 | 9.859 | 9.842 | | | | | | |
| RETENTION | C-1,2-DCE | 11.912 | 11.915 | 11.895 | 11.910 | 11.867 | 11.934 | 11.924 | 11.916 | 11.985 | 11.911 | 11.919 | 11.926 | 11.916 | 11.924 | 1.922 | 1.904 | | | | | | |
| TIME | CHCL3 | 12.537 | 12.539 | 12.519 | 12.531 | 12.514 | 12.555 | 12.548 | 12.542 | 2.521 | 12.524 | 12.544 | 12.548 | 12.539 | 12.541 | 12.519 | 12.508 | | | | | | |
| STABILITY | 1,2-DCA | 13.254 | 13.256 | 13.239 | 13.249 | 13.221 | 13.271 | 13.268 | 13.257 | 3.247 | 13.252 | 3.262 | 3.264 | 13.259 | 13.261 | 13.263 | 3.246 | | | | | | |
| | 1,1,1-TCA | 14.598 | 14.603 | 14.584 | 14.586 | 14.578 | 14.623 | 14.612 | 14.598 | 4.592 | 14.598 | 4.607 | 14.601 | 14.600 | 14.603 | 14.606 | 14.592 | | | | | | |
| (MINUTES) | CCL4 | 14.967 | 14.991 | 14.969 | 14.974 | 14.970 | 15.002 | 15.002 | 14.985 | 4.979 | 14.986 | 4.991 | 4.997 | 4.989 | 14.996 | 14.994 | 14.980 | | | | | | |
| | TCE | 17.670 | 17.673 | 17.648 | 17.654 | 17.653 | 17.679 | 17.684 | 17.666 | 7.668 | 17.673 | 7.672 | 17.679 | 7.669 | 17.677 | 17.678 | 17.663 | | | | | | |
| | PCE | 23.414 | 23.413 | 23.391 | 23.397 | 23.394 | 23.415 | 23.425 | 23.407 | 3.411 | 23.412 | 3.419 | 23.422 | 23.413 | 23.425 | 23.423 | 23.405 | | | | | | |
| DWG.#804-0824 | RESOL | 3.97 | 3.97 | 3.86 | 3.89 | 4.01 | 4.01 | 4.17 | 4.05 | 3.95 | 4.05 | 4.07 | 4.05 | 3.91 | 3.91 | 3.94 | 3.97 | | | | | | |

Blanks

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK




182

TITLE: VOLATILE ORGANIC ANALYSIS (location) 10:36 21 MAR 86 (Date Run)

CHANNEL NO: 2 SAMPLE: BOILED TAP METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.641 | | 1019 | BB | 5.60 |
| 2 | | 0.0 | 7.117 | | 1411 | BB | 11.20 |
| TOTALS: | | 0.0 | | | 2430 | | |

DETECTED PKS: 3 REJECTED PKS: 1

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 20.6 OFFSET: 65

SAVED FILE: 2240

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.48 SIDE 1

LLD = 0.5 µg/L

< 0.5 - not detected

300293

Varian / Sunnyvale, Calif. p/n 03-906362-00

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK

30

... PKS: 11 REJECTED PKS: 0

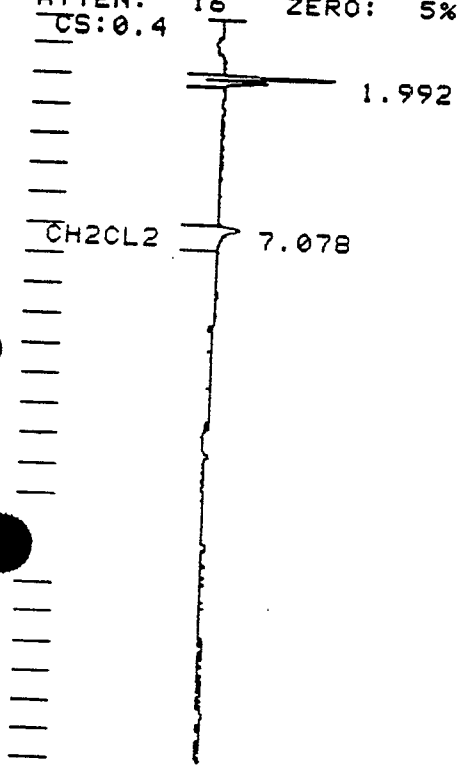
DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 2.4 OFFSET: 78

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.49 SIDE 1

2201

CHART SPEED 0.0 CM/MIN
ATTEN: 16 ZERO: 5% 1 MIN/TICK




varian /sunny... calif.p/n 03-906362 00

TITLE: VOLATILE ORGANIC ANALYSIS 10:57 19 MAR 86

CHANNEL NO: 2 SAMPLE: BOILED TAP METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.992 | | 7319 | BV | 4.60 |
| 2 | | 0.0 | 2.161 | | 3522 | VB | ? 6.35 |
| 3 | CH2CL2 | 0.4 | 7.078 | 0.018 | 4424 | BB | 12.60 |
| T... LS: | | 0.4 | | 0.018 | 15265 | | |

DETECTED PKS: 3 REJECTED PKS: 0

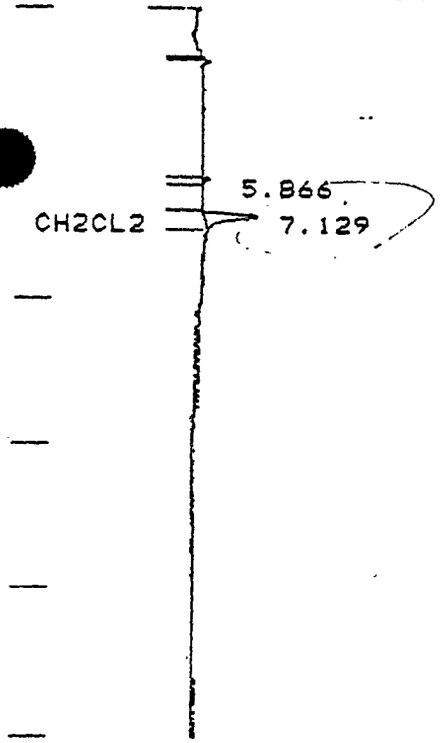
DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 2.4 OFFSET: 71

SAVED FILE: ...

300294

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK




TITLE: VOLATILE ORGANIC ANALYSIS 11:20 18 APR 86

CHANNEL NO: 2 SAMPLE: BOILED TAP METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 7.129 | | 10067 | BB | 12.90 |
| TOTALS: | | 0.0 | | | 10067 | | |

DETECTED PKS: 2 REJECTED PKS: 1

DIVISOR: 1.00000 MULTIPLIER: 1.00000

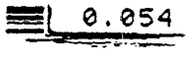
NOISE: 15.8 OFFSET: -53

SAVED FILE: 2438

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.42 SIDE 1

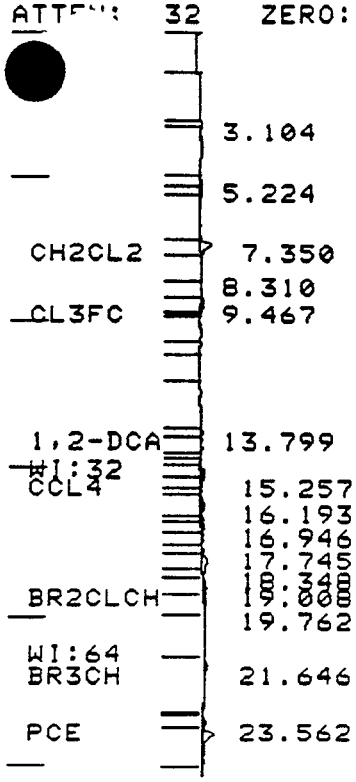
300295

HART SPEED 0.4 CM/MIN
TTEN: 512 ZERO: 5% 5 MIN/TICK




FLUORIDE

CHART SPEED 0.4 CM/MIN
ATTEN: 32 ZERO: 5% 5 MIN/TICK




TITLE: VOLATILE ORGANIC ANALYSIS 9:29 2 SEP 86

CHANNEL NO: 2 SAMPLE: BOILED TAP METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | WI/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | CH2CL2 | 0.2 | 7.350 | 0.020 | 5285 | BV | | 15.10 |
| 2 | CL3FC | 0.1 | 9.467 | -0.093 | 1838 | BB | ? | 17.45 |
| 3 | | 0.0 | 13.952 | | 1159 | VB | ? | 55.10 |
| 4 | 1,1,1-TCA | 0.1 | 15.142 | 0.092 | 2124 | BV | ? | 12.00 |
| 5 | | 0.0 | 15.257 | | 1778 | VV | ? | 28.30 |
| 6 | | 0.0 | 16.193 | | 2841 | VV | ? | 21.80 |
| 7 | | 0.0 | 16.946 | | 1723 | VV | ? | 14.40 |
| 8 | TCE | 0.2 | 18.127 | 0.007 | 3370 | VV | ? | 29.30 |
| 9 | BR2CLCH | 0.1 | 19.008 | 0.168 | 1725 | VV | ? | 37.80 |
| 10 | | 0.0 | 19.762 | | 1078 | VB | ? | 54.70 |
| 11 | BR3CH | 0.4 | 21.646 | 0.046 | 3261 | BV | | 17.90 |
| 12 | PCE | 0.2 | 23.971 | 0.061 | 5092 | VB | | 15.90 |
| TOTALS: | | 1.3 | | 0.301 | 31274 | | | |

| C | RESULT |
|---|---|
| | 0.6 |

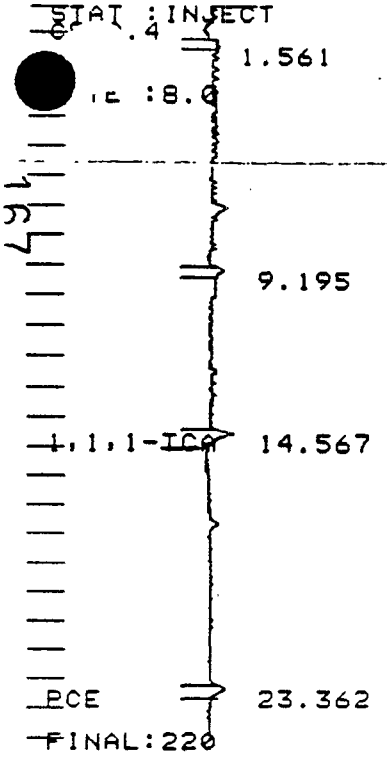
DETECTED PKS: 23 REJECTED PKS: 11

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 10.9 OFFSET: 6

300296

CHART SPEED 0.0 CM/MIN
ATTEN: 16 ZERO: 5% 1 MIN/TICK




TITLE: VOLATILE ORGANIC ANALYSIS 14:01 11 OCT 85

CHANNEL NO: 2 SAMPLE: BOILED TAP METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.561 | | 1301 | BB | | 16.15 |
| 2 | CL3FC | 0.1 | 9.195 | 0.015 | 1768 | BB | ? | 15.40 |
| 3 | 1,1,1-TCA | 0.2 | 14.567 | 0.007 | 4490 | BB | | 12.50 |
| 4 | PCE | 0.1 | 23.362 | 0.022 | 2466 | BB | ? | 14.80 |
| TOTALS: | | 0.4 | | 0.044 | 10025 | | | |

DETECTED PKS: 4 REJECTED PKS: 0

DIVISOR: 1.00000 MULTIPLIER: 1.00000

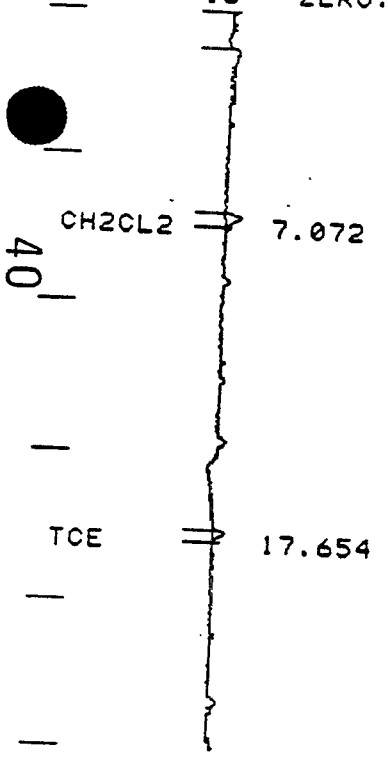
NOISE: 3.6 OFFSET: 166

SAVED FILE: 2085

NOTES:
R:100/TEMP:800°C/5 ML BY ALS
SAVED ON DISC NO.44 SIDE 2

300297

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK




TITLE: VOLATILE ORGANIC ANALYSIS

CHANNEL NO: 2 SAMPLE: BOILED TAP 11:35 25 SEP 85

METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | CH2CL2 | 0.2 | 7.072 | 0.032 | 3015 | BB | 15.10 |
| 2 | TCE | 0.1 | 17.654 | 0.044 | 1860 | BB | 11.90 |
| TOTALS: | | 0.3 | | 0.076 | 4875 | | |

UNIDENT AREA: 0

DETECTED PKS: 2 REJECTED PKS: 0

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 42.5 OFFSET: 19

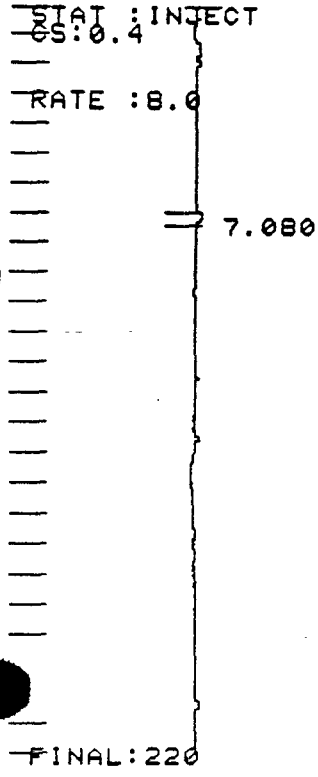
SAVED FILE: 2027

NOTES:
HECD R:100/TEMP:800°C/5 ML BY ALS
FILE SAVED ON DISC NO.47 SIDE 1

300298

HECD R:100/TEMP:800 C/S ML BY ALS
FILE SAVED ON DISC NO.46 SIDE 1

CHART SPEED 0.0 CM/MIN
ATTEN: 32 ZERO: 5% 1 MIN/TICK




varian sunnyvale, calif p n 03 90 00

TITLE: VOLATILE ORGANIC ANALYSIS 17:18 24 SEP 85

CHANNEL NO: 2 SAMPLE: BOILED TAP METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | CH2CL2 | 0.1 | 7.080 | 0.040 | 2106 | BB | ? 16.20 |
| TOTALS: | | 0.1 | | 0.040 | 2106 | | |

UNIDENT AREA: 0

DETECTED PKS: 1 REJECTED PKS: 0

ISOR: 1.00000 MULTIPLIER: 1.00000

300299

00

TITLE: VOLATILE ORGANIC ANALYSIS 21:13 2 SEP 86

NNEL NO: 2 SAMPLE: BOILED TAP METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | CH2CL2 | 0.2 | 7.365 | 0.035 | 4647 | BB | 17.45 |
| TOTALS: | | 0.2 | | 0.035 | 4647 | | |

DETECTED PKS: 1 REJECTED PKS: 0

DIVISOR: 1.00000 MULTIP

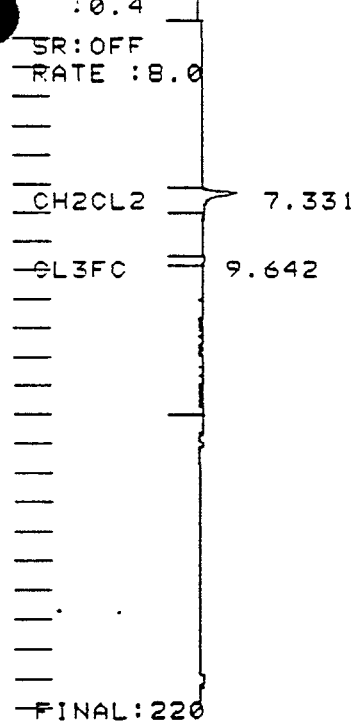
NOISE: 1.2 OFFSET:

SAVED FILE: 3271

NOTES:
HECD R:100/TEMP:830°C/5 M
FILE SAVED ONDISK NO.43 S

Field Blank
Sanderton Sample

CHART SPEED 0.0 CM/MIN
ATTEN: 32 ZERO: 5% 1
AT :INJECT
:0.4
SR:OFF
RATE :8.0




TITLE: VOLATILE ORGANIC ANALYSIS 21:49 2 SEP 86

CHANNEL NO: 2 SAMPLE: 1855 BLANK METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | CH2CL2 | 0.6 | 7.331 | 0.001 | 12530 | BB | 12.55 |
| TOTALS: | | 0.6 | | 0.001 | 12530 | | |

DETECTED PKS: 2 REJECTED PKS: 1

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 1.2 OFFSET: 58

SAVED FILE: 3272

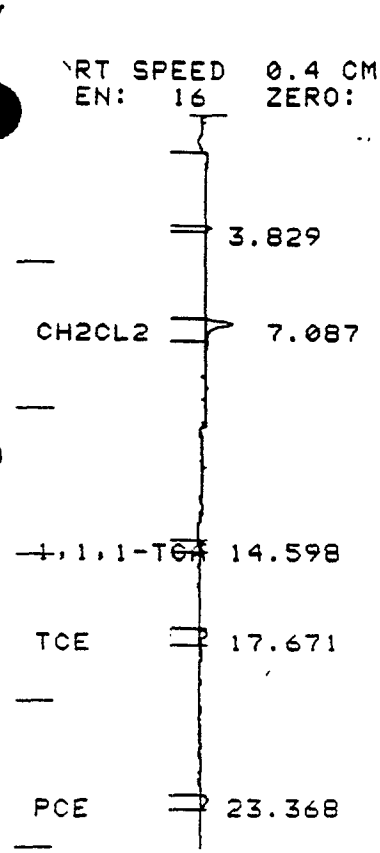
NOTES:
HECD R:100/TEMP:830°C/5 ML SAMPLE BY ALS
FILE SAVED ONDISK NO.43 SIDE 2

varian /sunnyvale calif p n 03 906362 00

01

300300

varian




varian / sunnyvale, calif. p/n 03-906362

TITLE: VOLATILE ORGANIC ANALYSIS 15:28 | 13 MAR 86

CHANNEL NO: 2 SAMPLE: BOILED TAP METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | CH2CL2 | 0.4 | 7.087 | 0.017 | 5634 | BB | 13.15 |
| 2 | TCE | 0.1 | 17.671 | 0.071 | 1338 | BB | 14.65 |
| 3 | PCE | 0.1 | 23.368 | 0.028 | 1264 | BB | 14.45 |
| TOTALS: | | 0.6 | | 0.116 | 8236 | | |

DETECTED PKS: 5 REJECTED PKS: 2

DIVISOR: 1.00000 MULTIPLIER: 1.00000

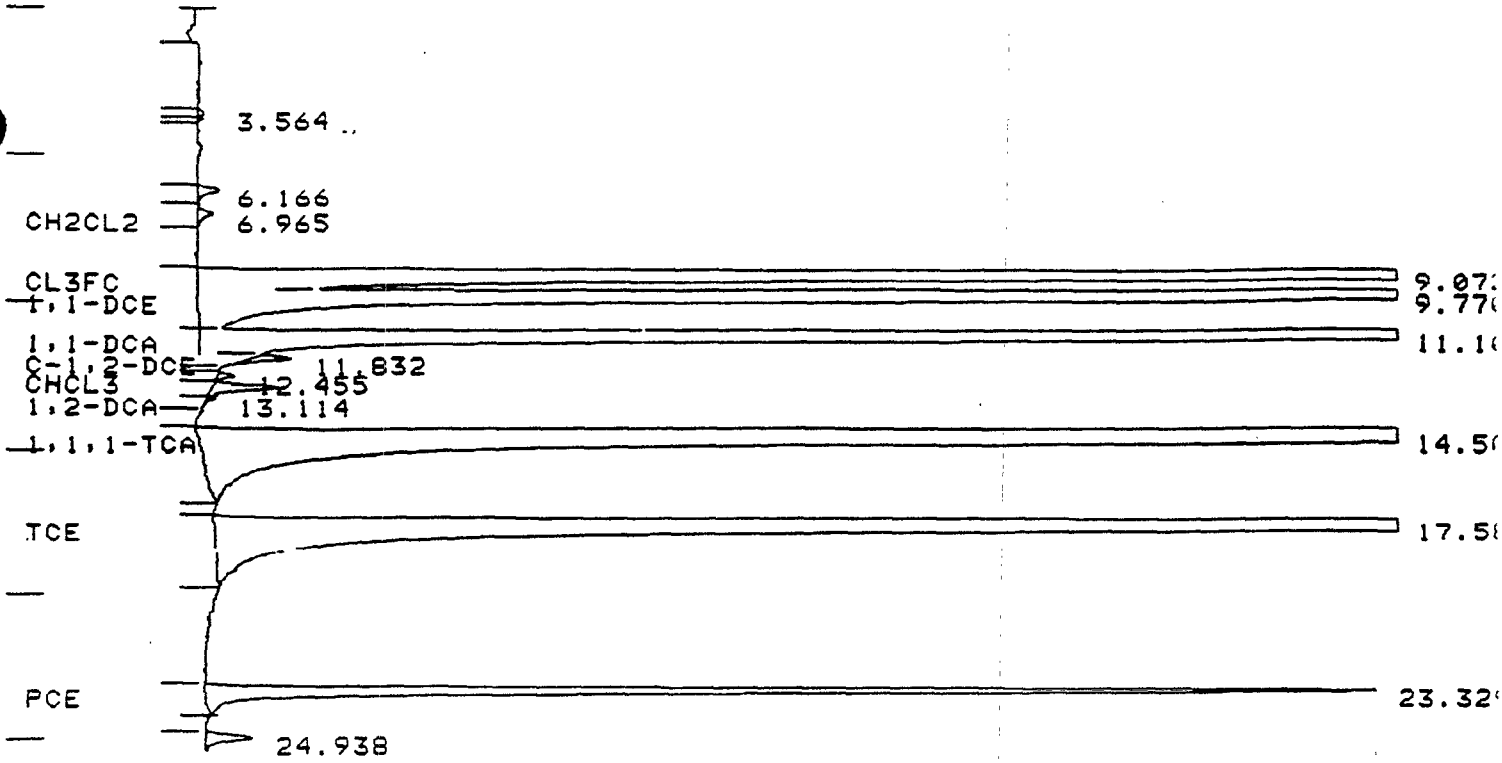
NOISE: 15.8 OFFSET: 76

SAVED FILE: 2138

S:
ECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.42 SIDE 2

300301

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK




20

TITLE: VOLATILE ORGANIC ANALYSIS 11:53 13 MAR 86

CHANNEL NO: 2 SAMPLE: 504 AMETEK METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 3.564 | | 1142 | BV | 13.15 |
| 2 | | 0.0 | 6.166 | | 4668 | BV | 14.15 |
| 3 | | 0.0 | 6.965 | | 3076 | VB | 15.45 |
| 4 | | 0.0 | 9.072 | | 1043140 | BV | 12.80 |
| 5 | 1,1-DCE | 100.9 | 9.770 | -0.090 | 1279860 | VV | 11.60 |
| 6 | 1,1-DCA | 81.3 | 11.109 | -0.071 | 1268740 | VV | 11.65 |
| 7 | C-1,2-DCE | 0.4 | 11.832 | -0.038 | 5703 | T | ? 21.00 |
| 8 | CHCL3 | 0.1 | 12.455 | -0.035 | 2541 | T | ? 16.30 |
| 9 | | 0.0 | 12.829 | | 11354 | T | ? 11.05 |
| 10 | 1,2-DCA | 0.1 | 13.114 | -0.106 | 1158 | T | ? 33.10 |
| 11 | 1,1,1-TCA | 407.2 | 14.508 | -0.032 | 6541260 | BB | 12.90 |
| 12 | TCE | 333.1 | 17.584 | -0.016 | 4620450 | BB | 12.00 |
| 13 | PCE | 13.6 | 23.329 | -0.011 | 199490 | BB | 12.25 |
| 14 | | 0.0 | 24.938 | | 8000 | BB | 13.35 |
| TOTALS: | | 936.7 | | -0.399 | 14990600 | | |

| UP# | RESULT |
|---|---|
| 1 | 0.1 |

DETECTED PKS: 15 REJECTED PKS: 1

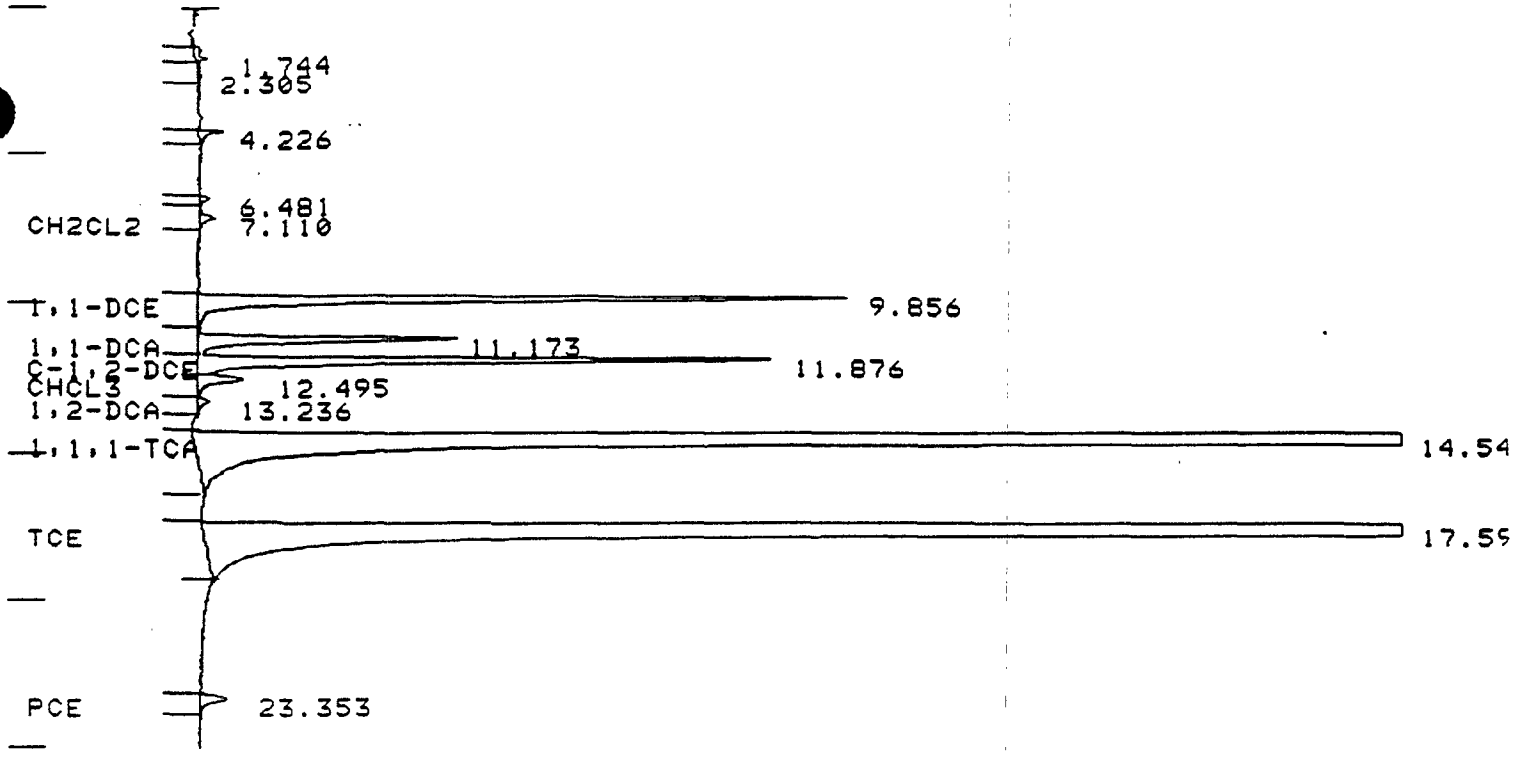
300302

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 24.3 OFFSET: 86

varian /sunnyvale, calif. p 906362 00

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK




TITLE: VOLATILE ORGANIC ANALYSIS 11:21 13 MAR 86

CHANNEL NO: 2 SAMPLE: 503 STIERT METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.744 | | 2419 | BV | | 6.35 |
| 2 | | 0.0 | 2.305 | | 1080 | VB | ? | 3.00 |
| 3 | | 0.0 | 4.226 | | 2723 | BB | ? | 3.55 |
| 4 | | 0.0 | 6.481 | | 1482 | BV | | 9.70 |
| 5 | CH2CL2 | 0.2 | 7.110 | 0.040 | 2880 | VB | | 13.60 |
| 6 | 1,1-DCE | 8.3 | 9.856 | -0.004 | 105412 | BV | | 11.25 |
| 7 | 1,1-DCA | 2.7 | 11.173 | -0.007 | 42392 | VV | | 11.25 |
| 8 | C-1,2-DCE | 5.7 | 11.876 | 0.006 | 92517 | VV | | 11.15 |
| 9 | CHCL3 | 0.5 | 12.495 | 0.005 | 9878 | VV | | 13.60 |
| 10 | 1,2-DCA | 0.2 | 13.236 | 0.016 | 2445 | VB | | 12.70 |
| 11 | 1,1,1-TCA | 168.1 | 14.540 | 0.000 | 2699730 | BB | | 12.45 |
| 12 | TCE | 198.9 | 17.598 | -0.002 | 2758440 | BB | | 11.75 |
| 13 | PCE | 0.4 | 23.353 | 0.013 | 5233 | BB | | 13.20 |
| TOTALS: | | 385.0 | | 0.067 | 5726630 | | | |

| GROUP# | RESULT |
|---|---|
| 1 | 0.5 |

:ECTED PKS: 13 REJECTED PKS: 0

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 24.3 OFFSET: 84

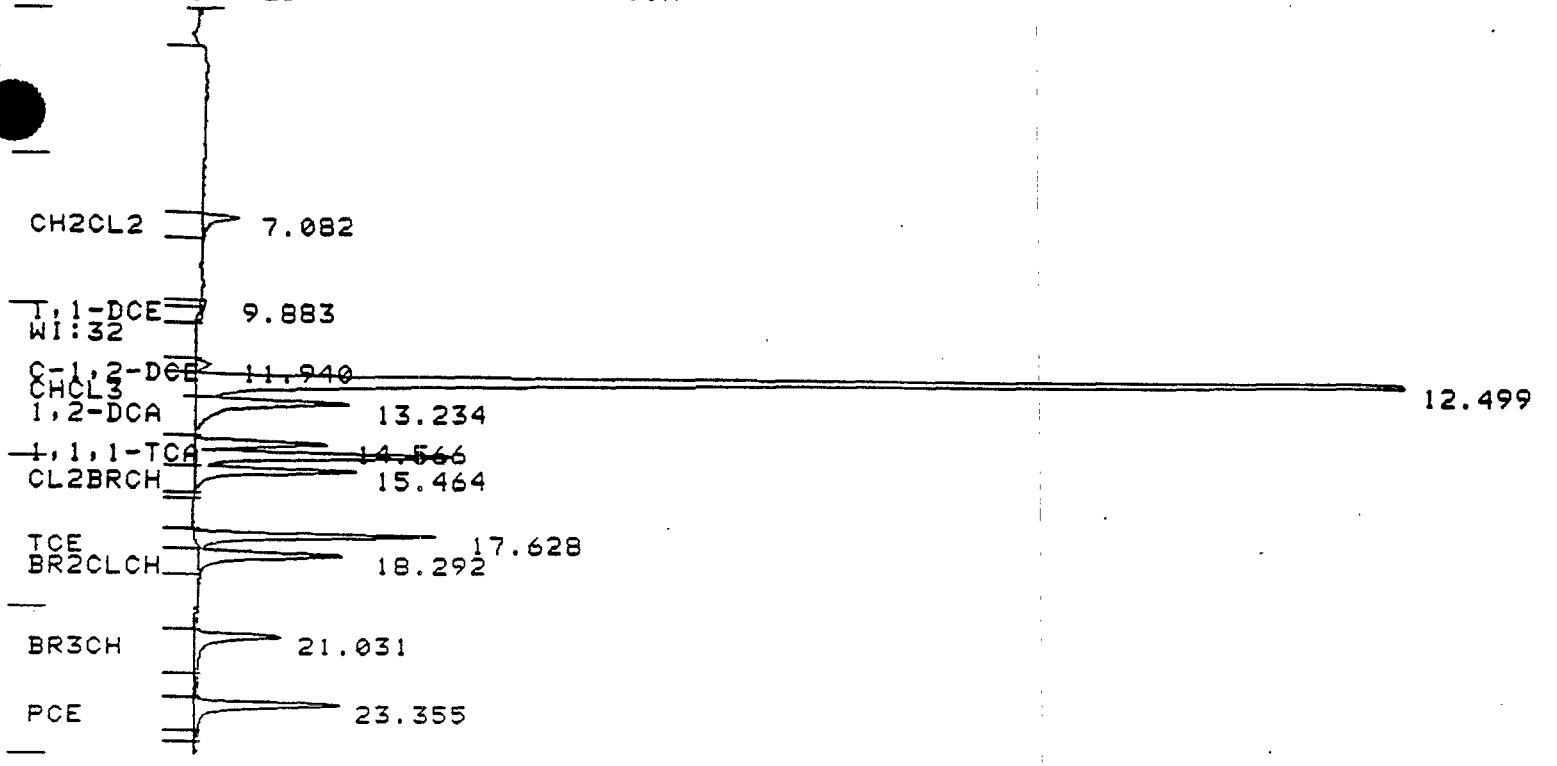
SAVED FILE: 2131

300303

/sunnyvale,calif.p/n 03.906362.00

varian / sunnyvale, c/n 03-906362-0

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK




TITLE: VOLATILE ORGANIC ANALYSIS 10:11 13 MAR 86

CHANNEL NO: 2 SAMPLE: LOW QC METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | CH2CL2 | 0.5 | 7.082 | 0.012 | 7209 | BB | | 12.45 |
| 2 | 1,1-DCE | 0.1 | 9.883 | 0.023 | 1315 | BV | ? | 6.80 |
| 3 | | 0.0 | 10.053 | | 1431 | VB | ? | 24.80 |
| 4 | C-1,2-DCE | 0.2 | 11.940 | 0.070 | 2691 | BV | | 13.65 |
| 5 | CHCL3 | 11.8 | 12.499 | 0.009 | 248902 | VV | | 11.55 |
| 6 | 1,2-DCA | 2.8 | 13.234 | 0.014 | 33449 | VV | | 12.85 |
| 7 | 1,1,1-TCA | 1.3 | 14.566 | 0.026 | 21368 | VV | | 12.15 |
| 8 | CCL4 | 2.4 | 14.951 | 0.011 | 44861 | VV | | 12.65 |
| 9 | CL2BRCH | 2.0 | 15.464 | 0.024 | 28686 | VB | | 12.45 |
| 10 | TCE | 2.9 | 17.628 | 0.028 | 40532 | BV | | 11.95 |
| 11 | BR2CLCH | 2.7 | 18.292 | 0.022 | 26843 | VB | | 13.25 |
| 12 | BR3CH | 2.7 | 21.031 | 0.041 | 18560 | BB | | 13.45 |
| 13 | PCE | 1.8 | 23.355 | 0.015 | 26753 | BB | | 12.60 |
| TOTALS: | | 31.2 | | 0.295 | 502600 | | | |

GROUP# RESULT
19.2

ACCEPTED PKS: 13 REJECTED PKS: 0

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 24.3 OFFSET: 95

SAVED FILE: 2129

300304

TITLE: VOLATILE ORGANIC ANALYSIS 8:51 13 MAR 86

CHANNEL NO: 2 SAMPLE: VOA MIX & VC METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT FACTOR | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | | 0.409 | | 9398 | BV | | 11.00 |
| 2 | | | 1.623 | | 14882 | BB | | 8.65 |
| 3 | VC | 0.717488 | 3.760 | -0.010 | 348438 | BV | | 11.60 |
| 4 | | | 4.507 | | 1522 | T | ? | 3.00 |
| 5 | | | 4.746 | | 1038 | T | ? | 9.85 |
| 6 | CH2CL2 | 0.762388U | 7.042 | -0.028 | 1377250 | BV | | 12.15 |
| 7 | | | 8.064 | | 2508 | T | ? | 6.80 |
| 8 | CL3FC | 0.870726 | 9.180 | 0.000 | 1010650 | VV | | 12.85 |
| 9 | 1,1-DCE | 0.782960U | 9.859 | -0.001 | 1232500 | VV | | 11.85 |
| 10 | | | 10.540 | | 2259 | T | ? | 5.60 |
| 11 | 1,1-DCA | 0.661038U | 11.171 | -0.009 | 1474950 | VV | ? | 8.50 |
| 12 | C-1,2-DCE | 0.646274U | 11.867 | -0.003 | 1516380 | VV | | 11.35 |
| 13 | CHCL3 | 0.482090U | 12.479 | -0.011 | 2074300 | VV | | 11.80 |
| 14 | 1,2-DCA | 0.801182U | 13.204 | -0.016 | 1254400 | VV | | 11.60 |
| 15 | 1,1,1-TCA | 0.643588U | 14.547 | 0.007 | 1522710 | VV | | 12.15 |
| 16 | CCL4 | 0.529269U | 14.938 | -0.002 | 1879950 | VV | | 12.05 |
| 17 | CL2BRCH | 0.660488U | 15.440 | 0.000 | 1673010 | VV | | 11.65 |
| 18 | TCE | 0.720901U | 17.613 | 0.013 | 1435700 | VV | | 11.75 |
| 19 | BR2CLCH | 0.987362U | 18.263 | -0.007 | 1291320 | VB | | 12.20 |
| 20 | | | 20.439 | | 3573 | BV | | 12.85 |
| 21 | BR3CH | 1.421060U | 20.992 | 0.002 | 819810 | VB | | 12.40 |
| 22 | PCE | 0.674551 | 23.342 | 0.002 | 1445410 | BB | | 12.60 |
| | LS: | | | -0.063 | 20392000 | | | |

DETECTED PKS: 30 REJECTED PKS: 8

AMT STD: 1.00000

NOISE: 18.2 OFFSET: 74

SAVED FILE: 2136

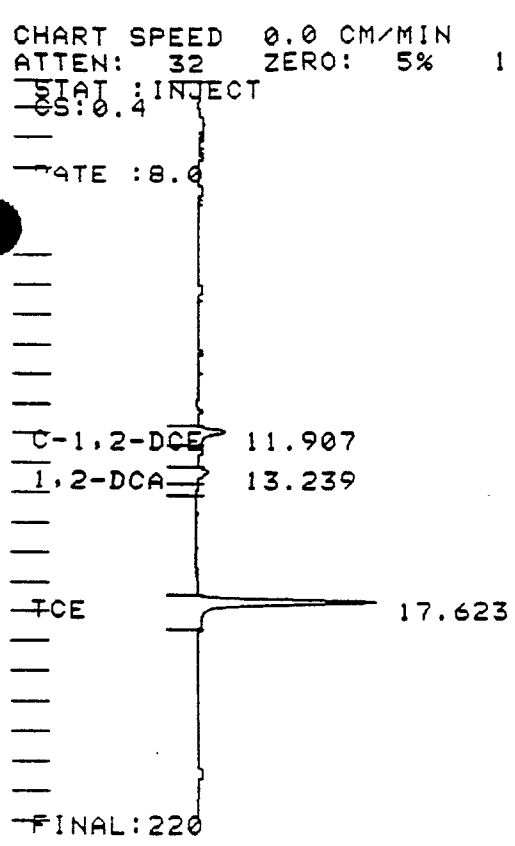
ERRORS:
FACTOR NOT UPDATED

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.42 SIDE 1

(R) varian /sunny.tle call d/n 03 9/5362 00

300305

03-906362-00




TITLE: VOLATILE ORGANIC ANALYSIS 23:40 11 MAR 86

CHANNEL NO: 2 SAMPLE: 488 EASTERN METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | C-1,2-DCE | 0.5 | 11.907 | 0.047 | 8689 | BB | 12.00 |
| 2 | 1,2-DCA | 0.3 | 13.239 | 0.019 | 4118 | BB | 11.50 |
| 3 | TCE | 3.8 | 17.623 | 0.023 | 58853 | BB | 11.75 |
| TOTALS: | | 4.6 | | 0.089 | 71660 | | |

DETECTED PKS: 3 REJECTED PKS: 0

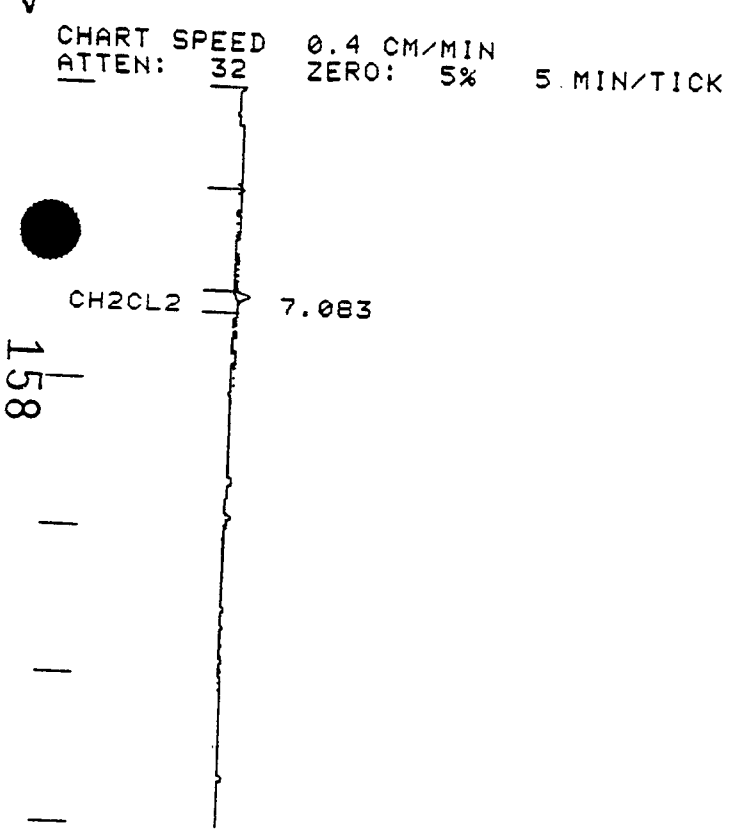
DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 2.4 OFFSET: 93

SAVED FILE: 2123

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.49 SIDE 2

300306




TITLE: VOLATILE ORGANIC ANALYSIS 11:04 11 MAR 86

CHANNEL NO: 2 SAMPLE: BOILED TAP METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | CH2CL2 | 0.4 | 7.083 | 0.013 | 5592 | BB | 12.45 |
| TOTALS: | | 0.4 | | 0.013 | 5592 | | |

DETECTED PKS: 1 REJECTED PKS: 0

DIVISOR: 1.00000 MULTIPLIER: 1.00000

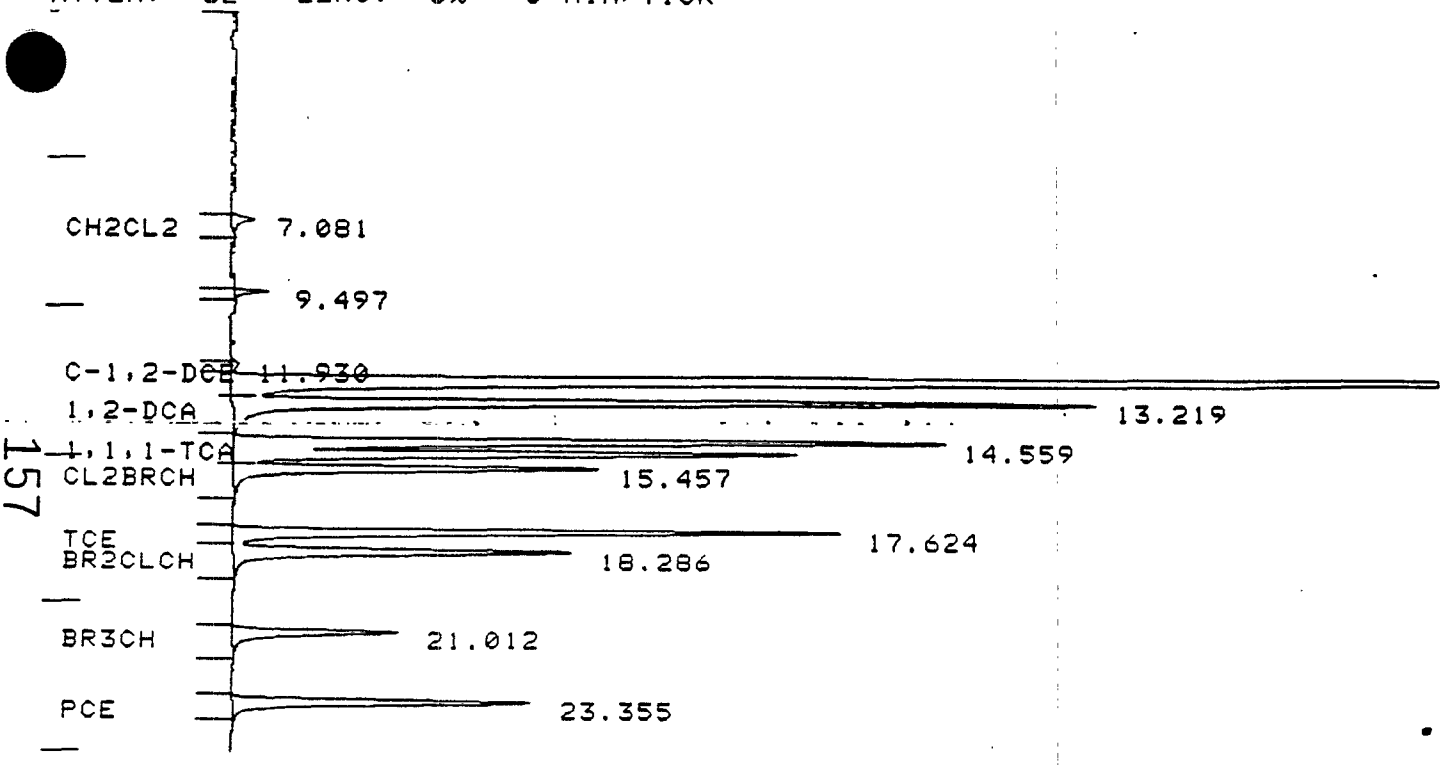
NOISE: 35.2 OFFSET: -29

SAVED FILE: 2110

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.49 SIDE 1

300307

CHART SPEED 0.4 CM/MIN
ATTEN: 32 ZERO: 5% 5 MIN/TICK




157

TITLE: VOLATILE ORGANIC ANALYSIS 10:21 11 MAR 86

CHANNEL NO: 2 SAMPLE: HIGH QC METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | CH2CL2 | 0.5 | 7.081 | 0.011 | 7714 | BB | 12.15 |
| 2 | | 0.0 | 9.497 | | 6906 | BB | 7.15 |
| 3 | C-1,2-DCE | 0.1 | 11.930 | 0.070 | 2172 | BV | ? 14.55 |
| 4 | CHCL3 | 43.6 | 12.490 | -0.010 | 899365 | VV | 11.35 |
| 5 | 1,2-DCA | 21.7 | 13.219 | -0.001 | 291347 | VV | 11.50 |
| 6 | 1,1,1-TCA | 14.8 | 14.559 | -0.001 | 234893 | VV | 12.30 |
| 7 | CCL4 | 10.4 | 14.946 | 0.016 | 192167 | VV | 12.55 |
| 8 | CL2BRCH | 8.8 | 15.457 | 0.007 | 126003 | VB | 12.15 |
| 9 | TCE | 12.7 | 17.624 | 0.024 | 198040 | BV | 11.75 |
| 10 | BR2CLCH | 12.1 | 18.286 | 0.006 | 120367 | VB | 12.30 |
| 11 | BR3CH | 9.2 | 21.012 | 0.012 | 60836 | BB | 12.30 |
| 12 | PCE | 6.3 | 23.355 | 0.005 | 101536 | BB | 12.35 |
| TOTALS: | | 140.2 | | 0.139 | 2241350 | | |

C[illegible]IP# RESULT
73.7

DETECTED PKS: 12 REJECTED PKS: 0

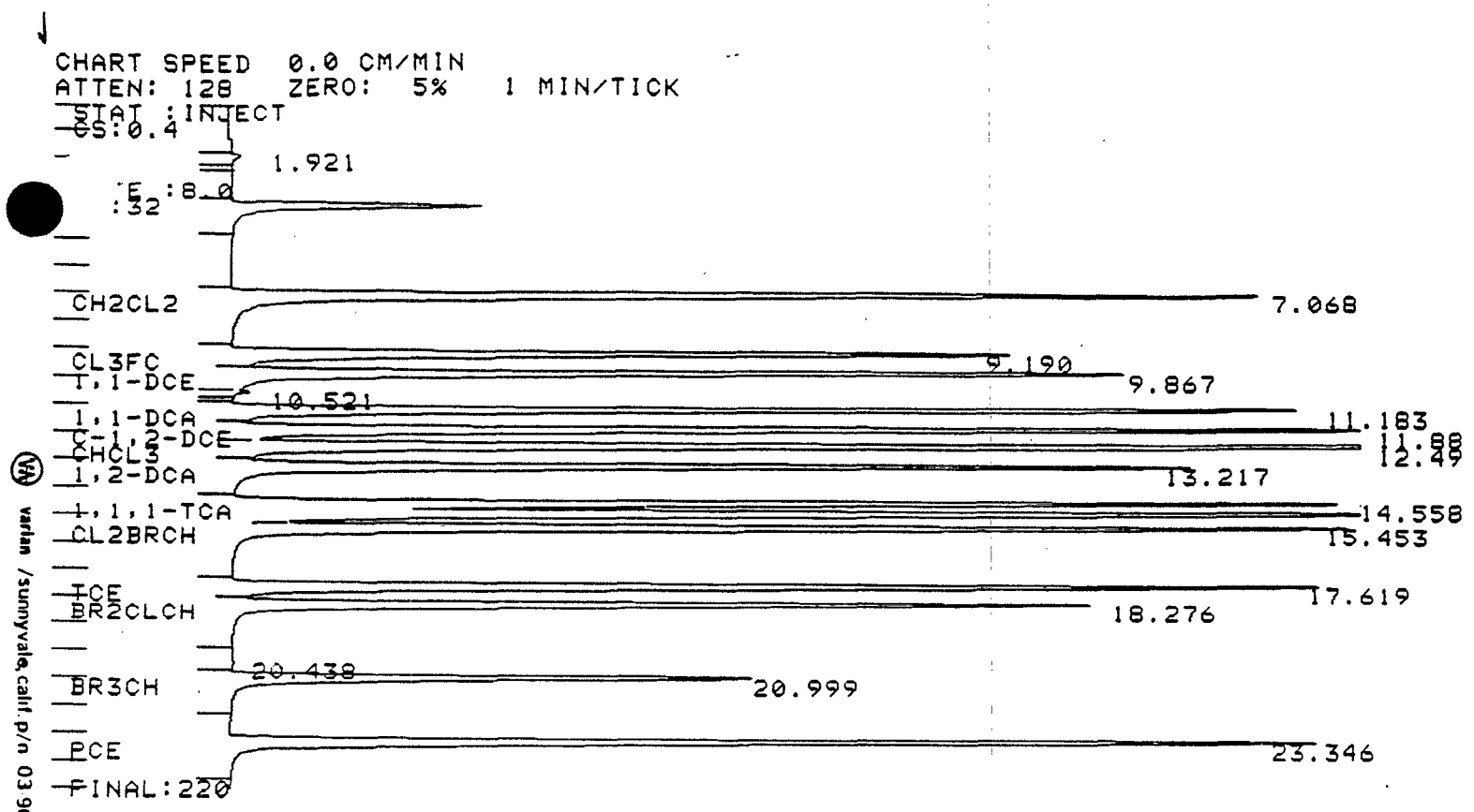
DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 35.2 OFFSET: -31

SAVED FILE: 2109

300308

varian / sunnyvale, calif. p/n 03-908362 00




varian /sunnyvale,calif. p/n 03-906362-00

TITLE: VOLATILE ORGANIC ANALYSIS 9:19 10 MAR 86

CHANNEL NO: 2 SAMPLE: VOA MIX & VC METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT FACTOR | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | | 1.921 | | 13118 | BV | | 9.70 |
| 2 | | | 2.215 | | 1345 | VB | ? | 24.30 |
| 3 | VC | 0.676879U | 3.774 | 0.024 | 369342 | BB | | 11.70 |
| 4 | CH2CL2 | 0.683387U | 7.068 | 0.048 | 1536470 | BV | | 11.95 |
| 5 | CL3FC | 0.798584 | 9.190 | 0.010 | 1101950 | VV | | 11.75 |
| 6 | 1,1-DCE | 0.740417U | 9.867 | 0.027 | 1303320 | VV | | 11.80 |
| 7 | | | 10.521 | | 4060 | T | ? | 6.35 |
| 8 | 1,1-DCA | 0.656101 | 11.183 | 0.013 | 1486050 | VV | | 11.80 |
| 9 | C-1,2-DCE | 0.623560 | 11.884 | 0.024 | 1571620 | VV | | 11.20 |
| 10 | CHCL3 | 0.484677U | 12.495 | 0.015 | 2063230 | VV | | 11.65 |
| 11 | 1,2-DCA | 0.732039U | 13.217 | 0.017 | 1372880 | VV | | 11.65 |
| 12 | 1,1,1-TCA | 0.629912U | 14.558 | 0.008 | 1555770 | VV | | 12.10 |
| 13 | CCL4 | 0.528169 | 14.947 | 0.017 | 1883870 | VV | | 12.40 |
| 14 | CL2BRCH | 0.682015 | 15.453 | 0.003 | 1620200 | VV | | 11.90 |
| 15 | TCE | 0.681564 | 17.619 | 0.019 | 1518570 | VV | | 11.95 |
| 16 | BR2CLCH | 1.005296U | 18.276 | 0.006 | 1200200 | VV | | 12.10 |
| 17 | | | 20.438 | | 3212 | T | ? | 23.20 |
| 18 | BR3CH | 1.493060U | 20.999 | 0.009 | 780275 | VV | | 12.40 |
| 19 | PCE | 0.625135U | 23.346 | -0.004 | 1559660 | VB | | 12.20 |
| TOTALS: | | | | 0.236 | 21013200 | | | |

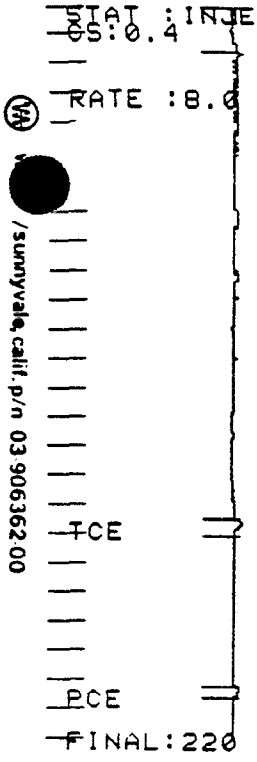
DETECTED PKS: 19 REJECTED PKS: 0

AMT STD: 1.00000

AR300309

CHART SPEED 0.0 CM/MIN
ATTEN: 32 ZERO: 5% 1 MIN/TICK
STAT :INJECT
CS:0.4

RATE :8.0



TCE 17.656

PCE 23.364

FINAL:220

/sunnyvale, calif. p/n 03-906362-00

TITLE: VOLATILE ORGANIC ANALYSIS 1:39 ~~12~~ 11 MAR 86 ← problem w/ power set date incorrectly actually run 3/11/86.

CHANNEL NO: 2 SAMPLE: 501 B & G METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | TCE | 0.2 | 17.656 | 0.056 | 2614 | BB | 13.60 |
| 2 | PCE | 0.1 | 23.364 | 0.014 | 1581 | BB | ? 15.15 |
| TOTALS: | | 0.3 | | 0.070 | 4195 | | |

173

DETECTED PKS: 2 REJECTED PKS: 0

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 2.4 OFFSET: 87

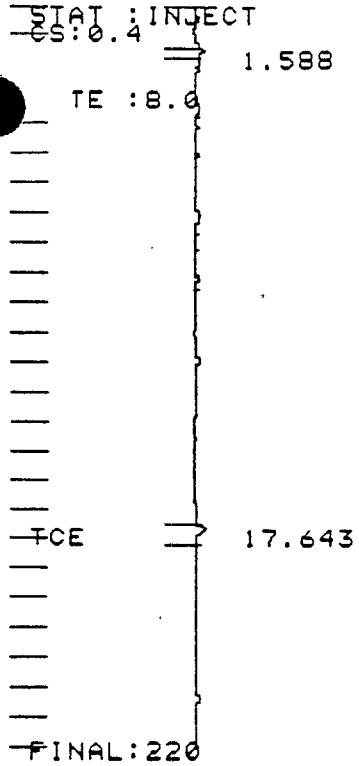
SAVED FILE: 2125

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.49 SIDE 2

CHART SPEED 0.0 CM/MIN
ATTEN: 32 ZERO: 5% 1 MIN/TICK
STAT :INJECT
CS:0.4

300310

CHART SPEED 0.0 CM/MIN
ATTEN: 32 ZERO: 5% 1 MIN/TICK
STAT :INJECT
CS:0.4




varian /sunnyvale, calif. p/n 03-906362 00

TITLE: VOLATILE ORGANIC ANALYSIS 2:39 12 MAR 86

problem with power set date + time incorrect [illegible] 3' 86.

CHANNEL NO: 2 SAMPLE: 502 RING CO METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.588 | | 1865 | BB | 6.50 |
| 2 | TCE | 0.2 | 17.643 | 0.043 | 3512 | BB | 12.70 |
| TOTALS: | | 0.2 | | 0.043 | 5377 | | |

DETECTED PKS: 2 REJECTED PKS: 0

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 2.4 OFFSET: 84

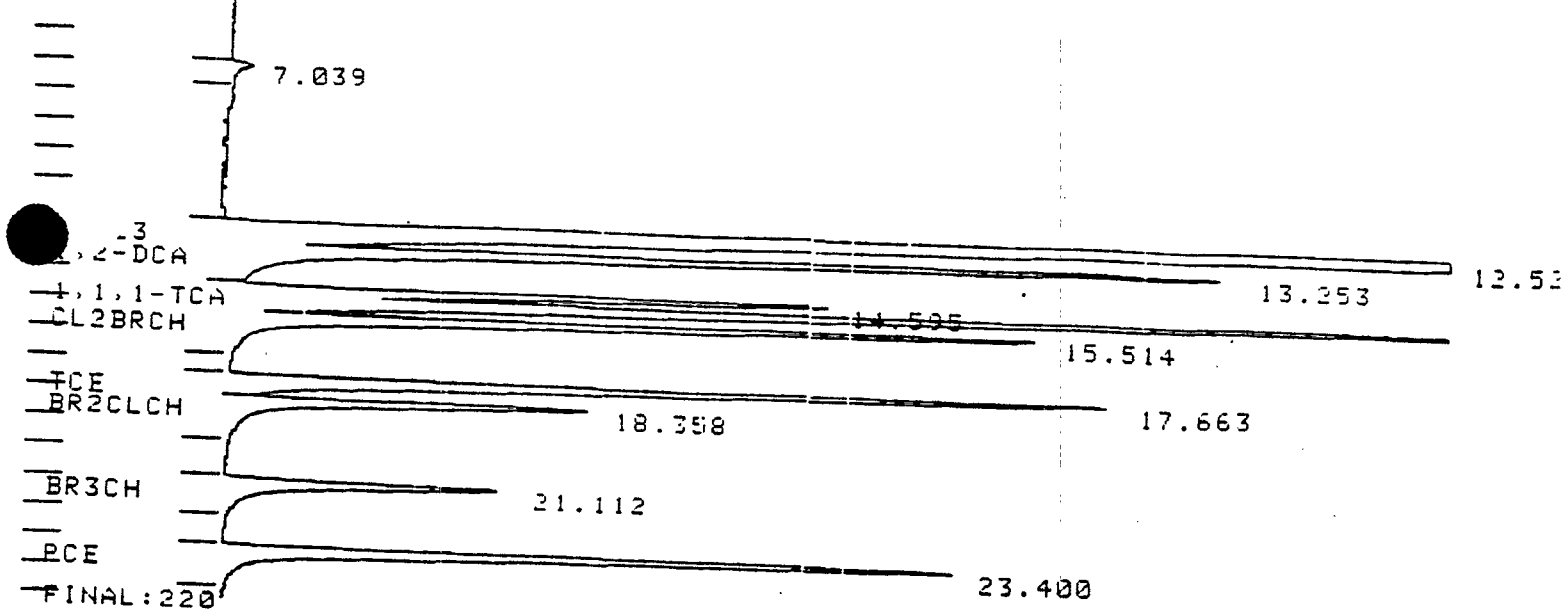
174

SAVED FILE: 2126

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.49 SIDE 2

300311

CHART SPEED 0.0 CM/MIN




96

TITLE: VOLATILE ORGANIC ANALYSIS 12:26 12 MAR 84

CHANNEL NO: 2 SAMPLE: HIGH QC METHOD: 502.1

| RT | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.393 | | 1271 | BB | ? 14.80 |
| 2 | | 0.0 | 7.039 | | 4545 | BB | 15.40 |
| 3 | CHCL3 | 78.0 | 12.529 | 0.009 | 1244830 | BV | 11.40 |
| 4 | 1,2-DCA | 18.5 | 13.253 | 0.023 | 195779 | VV | 12.30 |
| 5 | 1,1,1-TCA | 9.2 | 14.595 | 0.015 | 96957 | VV | 12.70 |
| 6 | CCL4 | 15.5 | 14.978 | -0.032 | 224094 | VV | 12.70 |
| 7 | CL2BRCH | 12.9 | 15.514 | 0.014 | 151089 | VB | 12.55 |
| 8 | TCE | 11.3 | 17.663 | 0.013 | 151189 | BV | 12.15 |
| 9 | BR2CLCH | 9.7 | 18.358 | -0.012 | 76168 | VB | 13.80 |
| 10 | BR3CH | 15.0 | 21.112 | 0.012 | 58182 | BB | 13.45 |
| 11 | PCE | 9.3 | 23.400 | 0.000 | 133470 | BB | 12.50 |
| OTALS: | | 179.4 | | 0.042 | 2337570 | | |

| ROUP# | RESULT |
|---|---|
| 1 | 115.6 |

ETECTED PKS: 11 REJECTED PKS: 0

IVISOR: 1.00000 MULTIPLIER: 1.00000

ESOLUTION: 3.79

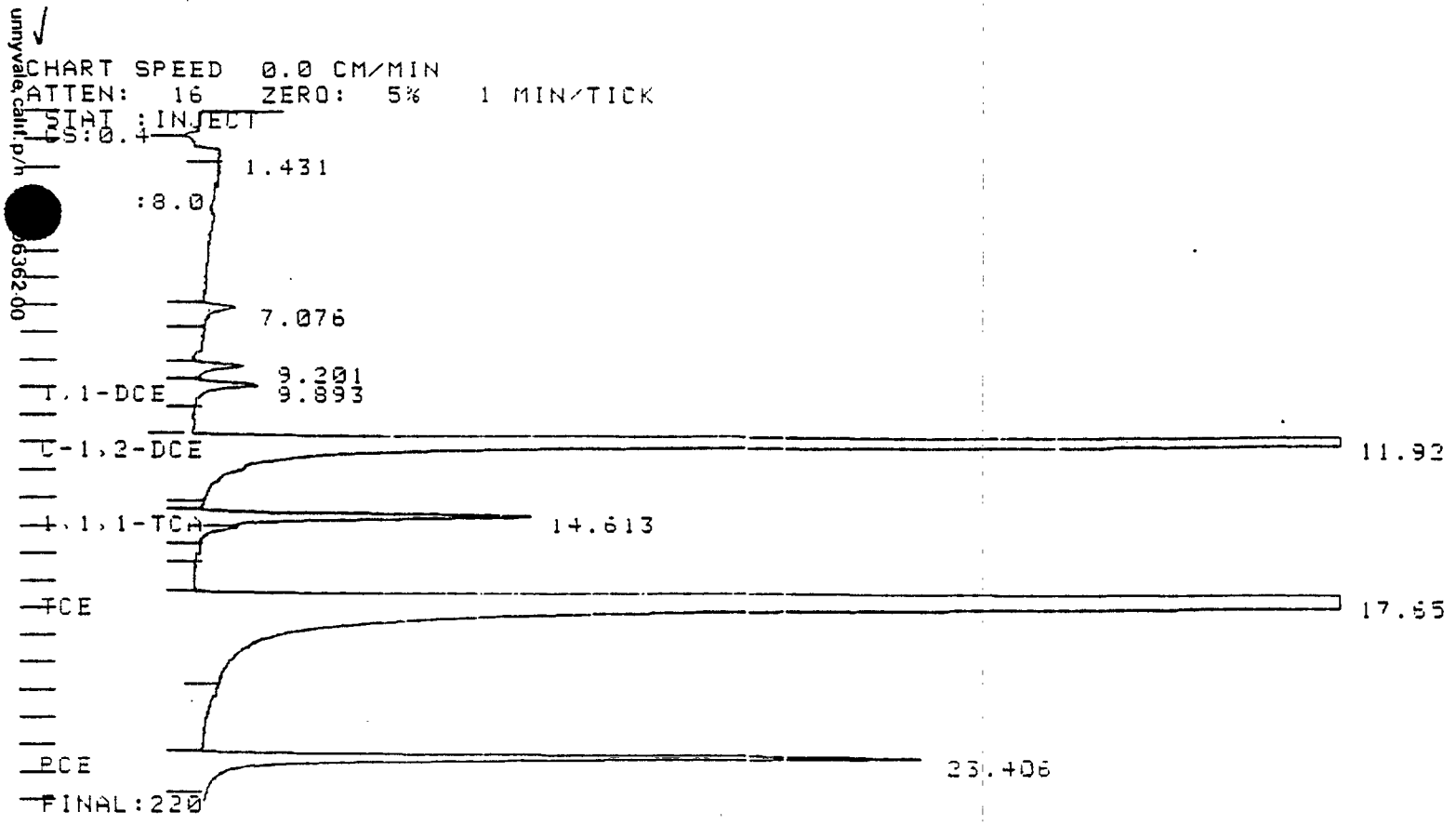
OISE: 2.4 OFFSET: 319

AVED FILE: 5047

ROR
TION OUT OF TOL

ES:
HECD R:100/TEMP:815°C 5 ML SAMPLE BY ALS
FILE TEMPORARILY SAVED ON DISC NO. 45

300312




TLE: VOLATILE ORGANIC ANALYSIS 1/10 Dilution 11:44 12 MAR 84

CHANNEL NO: 2 SAMPLE: 243-84 SF#2 METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L X10 | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 3.0 | 1.431 | | 3950 | BB | ? | 6.90 |
| 2 | | 0.0 | 7.076 | | 7202 | BB | ? | 13.45 |
| 3 | | 0.0 | 9.201 | | 10443 | BV | | 13.60 |
| 4 | 1,1-DCE | 1.9 19.0 | 9.893 | 0.063 | 13307 | VB | | 12.85 |
| 5 | C-1,2-DCE | 93.0 930.0 | 11.921 | 0.011 | 1116000 | BB | | 11.25 |
| 6 | 1,1,1-TCA | 6.0 60.0 | 14.613 | 0.033 | 63277 | BV | | 12.55 |
| 7 | CCL4 | 0.5 5.0 | 14.969 | -0.041 | 7773 | VB | ? | 23.40 |
| 8 | TCE | 539.6 5396.0 | 17.658 | 0.008 | 7244800 | BB | | 12.00 |
| 9 | PCE | 10.0 100.0 | 23.406 | 0.006 | 142865 | BB | | 12.45 |
| TOTALS: | | 651.0 | | 0.080 | 8609620 | | | |

ETECTED PKS: 9 REJECTED PKS: 0

IVISOR: 1.00000 MULTIPLIER: 1.00000

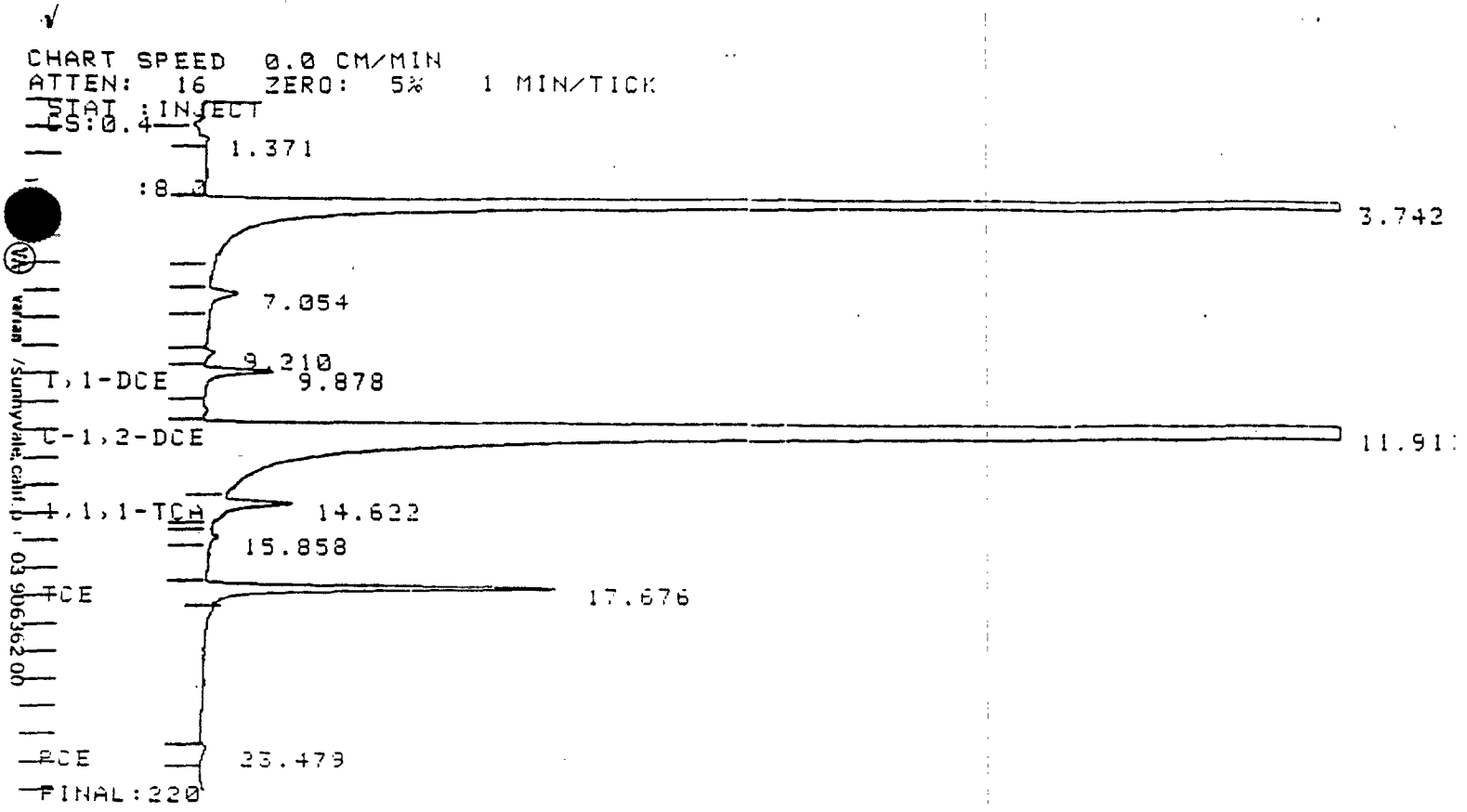
ISE: 2.4 OFFSET: 378

FILE: 5046

ORS:
ESOLUTION PEAK MISSING

S:
CD R:100/TEMP:815°C/5 ML SAMPLE BY ALS
LE TEMPORARILY SAVED ON DISC NO. 45

300313




1/10 Dilution

TITLE: VOLATILE ORGANIC ANALYSIS 10:31 12 MAR 84

CHANNEL NO: 2 SAMPLE: 242-84 SF#1 METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L X 10 | | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | WID/2 (SEC) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | | 1.371 | | 1538 | BB | ? | 14.30 |
| 2 | VC | 55.0 | 550.0 | 3.742 | 0.032 | 740218 | BB | | 11.65 |
| 3 | | 0.0 | | 7.054 | | 6826 | BB | | 15.50 |
| 4 | | 0.0 | | 9.210 | | 2215 | BV | | 13.50 |
| 5 | 1,1-DCE | 2.0 | 20.0 | 9.878 | 0.048 | 13972 | VB | | 12.55 |
| 6 | C-1,2-DCE | 421.5 | 4215.0 | 11.911 | 0.001 | 5360560 | BV | | 11.80 |
| 7 | 1,1,1-TCA | 1.4 | 14.0 | 14.622 | 0.042 | 14470 | T | | 16.55 |
| [illegible] | | [illegible] | | [illegible] | | [illegible] | [illegible] | [illegible] | [illegible] |
| 9 | TCE | 4.7 | 47.0 | 17.676 | 0.026 | 62826 | BB | ? | 9.20 |
| 10 | PCE | 0.1 | 1.0 | 23.479 | 0.079 | 1742 | BB | ? | 16.50 |
| TOTALS: | | 484.7 | | | 0.228 | 5905450 | | | |

93

DETECTED PKS: 10 REJECTED PKS: 0

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NO 2.4 OFFSET: 269

[redacted] FILE: 5044

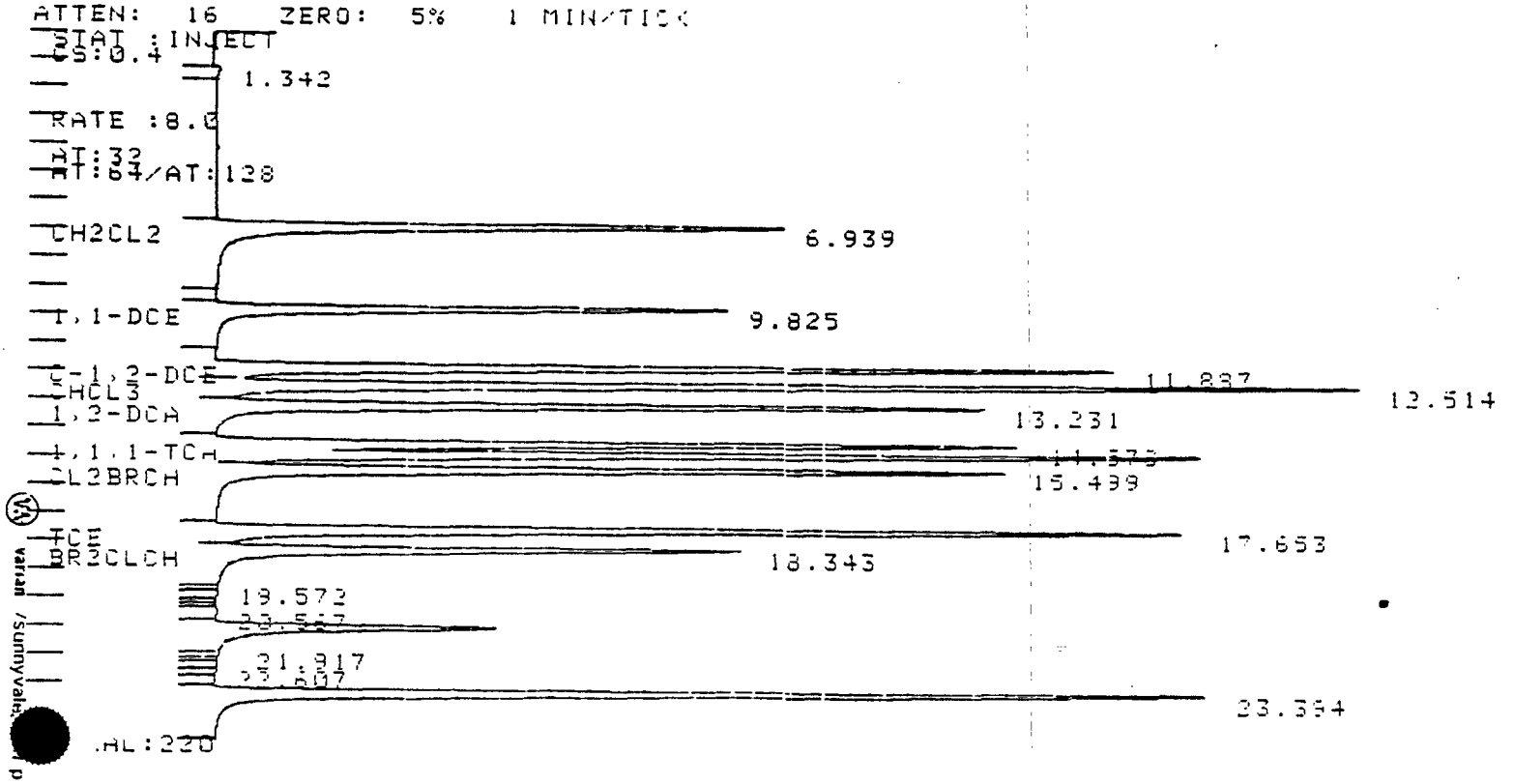
ERRORS:
RESOLUTION PEAK MISSING

NOTES:
HECD R:100/TEMP:815°C/5 ML SAMPLE BY ALS

AR300314

8

CHART SPEED 0.0 CM/MIN
ATTEN: 16 ZERO: 5% 1 MIN/TICK




varian /sunnyvale p n 03 906362.00

TITLE: VOLATILE ORGANIC ANALYSIS 7:33 12 MAR 84

CHANNEL NO: 2 SAMPLE: VOA MIX METHOD: 502.1

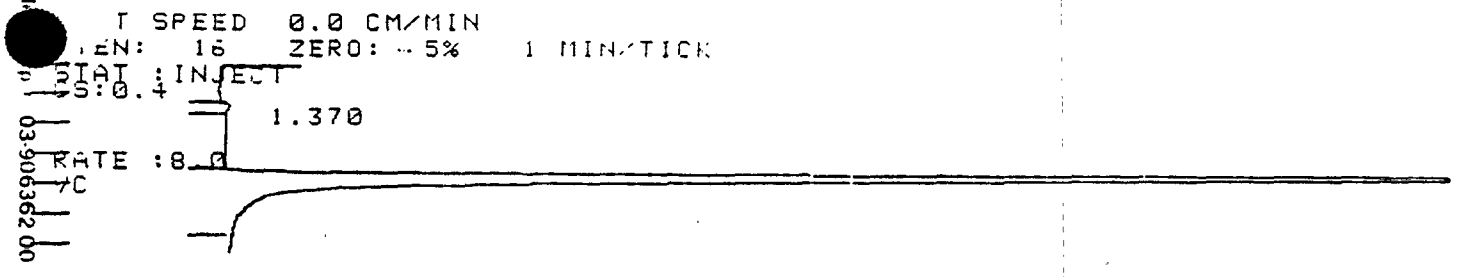
| PEAK NO | PEAK NAME | RESULT FACTOR | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | | 1.342 | | 1029 | BB | ? 8.50 |
| 2 | CH2CL2 | 1.107520U | 6.939 | -0.011 | 902915 | BB | 12.55 |
| 3 | 1,1-DCE | 1.401980U | 9.825 | -0.055 | 713276 | BV | 11.85 |
| 4 | C-1,2-DCE | 0.851211 | 11.887 | -0.023 | 1174800 | VV | 11.45 |
| 5 | CHCL3 | 0.650525 | 12.514 | -0.006 | 1537220 | VV | 11.70 |
| 6 | 1,2-DCA | 0.946651U | 13.231 | -0.019 | 1056350 | VV | 11.70 |
| 7 | 1,1,1-TCA | 0.951535U | 14.578 | -0.002 | 1050930 | VV | 12.00 |
| 8 | CCL4 | 0.729555 | 14.970 | -0.040 | 1370700 | VV | 12.50 |
| 9 | CL2BRCH | 0.878913 | 15.499 | -0.001 | 1137770 | VV | 12.15 |
| 10 | TCE | 0.780568 | 17.653 | 0.003 | 1281120 | VV | 11.75 |
| [illegible] | BR2CLCH | 1.217000 | 18.343 | -0.027 | 821692 | VV | 12.55 |
| | | | 20.567 | | 2066 | T | ? 24.90 |
| [illegible] | BR3CH | 2.151220 | 21.094 | -0.016 | 464853 | VV | ? 10.45 |
| 14 | PCE | 0.713978U | 23.394 | -0.016 | 1400600 | VB | 12.30 |

TOTALS: -0.213 12915300

DETECTED PKS: 21 REJECTED PKS: 7

300315

Kaiser / Sunnyvale




TITLE: VOLATILE ORGANIC ANALYSIS 15:57 12 MAR 84

CHANNEL NO: 2 SAMPLE: VC METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT FACTOR | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | VC | 0.7840650 | 3.734 | 0.024 | 318851 | BB | 11.70 |
| TOTALS: | | | | 0.024 | 318851 | | |

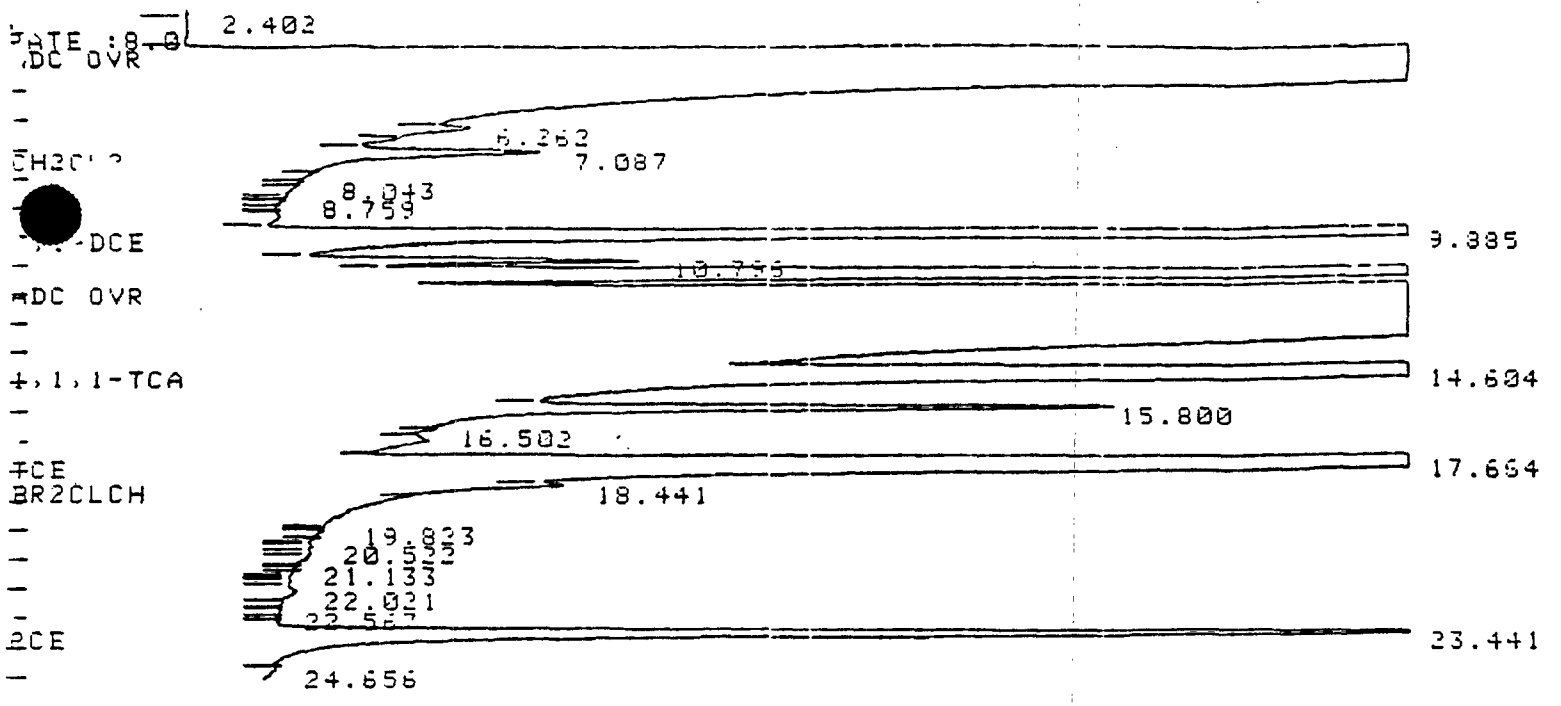
ACCEPTED PKS: 2 REJECTED PKS: 1

AMT STD: 1.00000

NOISE: 1.2 OFFSET: 235

SAVED FILE: 5049

300316




IT.  VOLATILE ORGANIC ANALYSIS  14:47  13 MAR 84

PANEL NO: 2  SAMPLE: 246SUMP30  METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | WID (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.653 | | 8006 | BV | ? | 27.20 |
| 2 | | 0.0 | 1.904 | | 2059 | VV | ? | 4.00 |
| 3 | | 0.0 | 2.402 | | 2114 | VB | ? | 3.20 |
| 4 | VC | 2227.1 | 3.747 | -0.003 | 28511600 | BV | ? | 22.45 |
| 5 | | 0.0 | 6.262 | | 8232 | T | ? | 13.90 |
| 6 | | 0.0 | 7.087 | | 36523 | T | ? | 28.35 |
| 7 | | 0.0 | 9.295 | | 1685 | T | ? | 16.70 |
| 8 | 1,1-DCE | 92.1 | 9.885 | 0.055 | 784191 | VV | | 11.90 |
| 9 | | 0.0 | 10.796 | | 77864 | VV | | 15.55 |
| 10 | | 0.0 | 11.237 | | 1102370 | VV | | 11.95 |
| 11 | C-1,2-DCE | 2751.9 | 11.866 | -0.044 | 37493600 | VV | ? | 22.65 |
| 12 | 1,1,1-TCA | 204.5 | 14.604 | 0.024 | 2557620 | VV | | 12.50 |
| 13 | | 0.0 | 15.800 | | 267111 | VV | | 16.70 |
| 14 | | 0.0 | 16.502 | | 25307 | VV | ? | |
| 15 | | 0.0 | 16.924 | | 83482 | VV | ? | 26.20 |
| 16 | TCE | 253.0 | 17.664 | 0.014 | 4043320 | VV | ? | 8.85 |
| 17 | BR2CLCH | 0.9 | 18.441 | 0.071 | 7519 | T | ? | 9.80 |
| 18 | | 0.0 | 20.767 | | 1391 | T | ? | |
| 19 | | 0.0 | 22.021 | | 2434 | T | ? | 17.03 |
| 20 | PCE | 17.0 | 23.441 | 0.041 | 279889 | VV | ? | 10.25 |
| 21 | | 0.0 | 24.656 | | 2215 | VB | ? | 10.10 |
| TOTALS: | | 5546.5 | | 0.158 | 75298500 | | | |

RESULT
0.9

DETECTED PKS: 37  REJECTED PKS: 16

DIVISOR: 1.00000  MULTIPLIER: 1.00000

NOISE: 1.2  OFFSET: 368

300317

RESOLUTION PEAK MISSING

NOTES:
HECD R:100/TEMP:815°C/5 ML SAMPLE BY ALS
FILE TEMPORARILY SAVED ON DISC NO. 41

1/100 Dilution

RECALC
TITLE: VOLATILE ORGANIC ANALYSIS 14:12 13 MAR 84

CHANNEL NO: 2 SAMPLE: 246 SUMP30 METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | X100 | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | WI/2 (SEC) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | | 2.159 | | 7959 | BB | ? | 27.10 |
| 2 | VC | 112.7 | 11270. | 3.742 | -0.008 | 1442510 | BV | | 11.60 |
| 3 | CH2CL2 | 1.4 | 140.0 | 7.066 | 0.056 | 18219 | T | | 15.75 |
| 4 | | 0.0 | | 9.381 | | 5786 | T | | 5.20 |
| 5 | 1,1-DCE | 5.7 | 570.0 | 9.889 | 0.059 | 48740 | T | | 12.20 |
| 6 | | 0.0 | | 11.260 | | 8285 | T | | 13.80 |
| 7 | C-1,2-DCE | 252.4 | 25240. | 11.933 | 0.023 | 3438450 | VV | | 11.30 |
| 8 | 1,1,1-TCA | 1.6 | 160.0 | 14.664 | 0.084 | 19800 | T | | 14.70 |
| 9 | TCE | 2.4 | 240.0 | 17.722 | 0.072 | 38372 | T | | 12.55 |
| 10 | BR2CLCH | 0.1 | 10 | 18.456 | 0.086 | 1155 | T | ? | 38.00 |
| 11 | | 0.0 | | 22.368 | | 7325 | BV | ? | 55.90 |
| 12 | PCE | 0.2 | 20 | 23.509 | 0.109 | 4029 | VB | | 15.00 |
| TOTALS: | | 376.5 | | | 0.481 | 5040630 | | | |

| | RESULT |
|---|---|
| 1 | 0.1 |

DETECTED PKS: 14 REJECTED PKS: 2

DIVISOR: 1.00000 MULTIPLIER: 1.00000

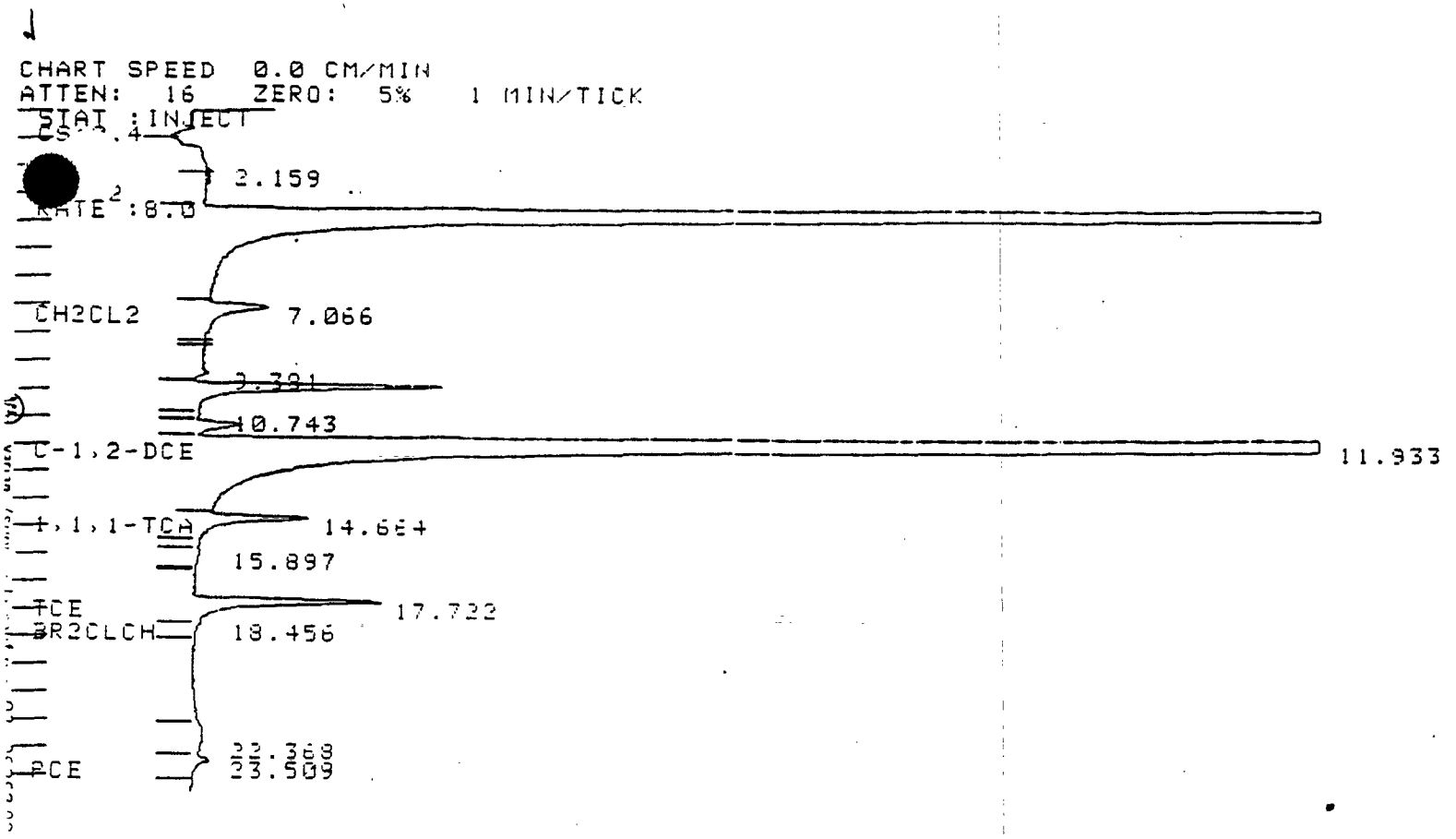
NOISE: 1.2 OFFSET: 366

ERRORS:
RESOLUTION PEAK MISSING

NOTES:
HECD R:100/TEMP:815°C/5 ML SAMPLE BY ALS
FILE TEMPORARILY SAVED ON DISC NO. 41

CHART SPEED 0.0 CM/MIN
FULL SCALE: 16 ZERO: 5% 1 MIN/TICK
STATUS: INJECT

300318




TITLE: VOLATILE ORGANIC ANALYSIS 14:12 13 MAR 84

CHANNEL NO: 2 SAMPLE: 246 SUMP30 METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | N1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 2.159 | | 7959 | BB | ? | 27.10 |
| 2 | | 0.0 | 3.742 | | 1442510 | BV | | 11.60 |
| 3 | CH2CL2 | 1.4 | 7.066 | 0.056 | 18219 | T | | 16.75 |
| 4 | | 0.0 | 9.381 | | 5786 | T | | 5.20 |
| 5 | 1,1-DCE | 5.7 | 9.885 | 0.059 | 48740 | T | | 12.20 |
| 6 | | 0.0 | 11.260 | | 8285 | T | | 13.80 |
| 7 | C-1,2-DCE | 252.4 | 11.933 | 0.023 | 3438450 | VV | | 11.30 |
| 8 | 1,1,1-TCA | 1.6 | 14.664 | 0.084 | 19300 | T | | 14.70 |
| 9 | TCE | 2.4 | 17.722 | 0.072 | 38372 | T | | 12.55 |
| 10 | BR2CLCH | 0.1 | 18.456 | 0.086 | 1155 | T | ? | 38.00 |
| 11 | | 0.0 | 22.368 | | 7325 | BV | ? | 55.90 |
| 12 | PCE | 0.2 | 23.509 | 0.109 | 4029 | VB | | 15.00 |
| TOTALS: | | 263.8 | | 0.489 | 5040630 | | | |

| GROUP# | RESULT |
|---|---|
| 1 | 0.1 |

ED PKS: 14 REJECTED PKS: 2

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 1.2 OFFSET: 366

SAVED FILE: 5057

AR300319

RECALC
STITLE: VOLATILE ORGANIC ANALYSIS 13:12 13 MAR 84

CHANNEL NO: 2 SAMPLE: 245 SF SUMP METHOD: 502.1

| | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 2.282 | | 4587 | BB | ? | 16.00 |
| 2 | VC | 1567.8 | 3.787 | 0.007 | 20071800 | BV | | 17.30 |
| 3 | | 0.0 | 6.264 | | 9523 | T | ? | 22.10 |
| 4 | CH2CL2 | 3.4 | 7.057 | 0.047 | 44168 | T | ? | 16.75 |
| 5 | | 0.0 | 7.920 | | 856 | T | ? | |
| 6 | | 0.0 | 8.199 | | 1134 | T | ? | 1.50 |
| 7 | | 0.0 | 8.505 | | 2090 | T | ? | 6.55 |
| 8 | | 0.0 | 9.252 | | 1694 | T | ? | 14.30 |
| 9 | 1,1-DCE | 54.9 | 9.879 | 0.049 | 466926 | T | ? | 9.10 |
| 10 | | 0.0 | 10.799 | | 24860 | T | | 14.05 |
| 11 | | 0.0 | 11.232 | | 772069 | VV | | 12.00 |
| 12 | C-1,2-DCE | 2383.2 | 11.879 | -0.031 | 32470700 | VV | ? | 22.60 |
| 13 | 1,1,1-TCA | 44.6 | 14.618 | 0.038 | 557744 | T | | 13.00 |
| 14 | | 0.0 | 15.804 | | 120786 | T | | 14.00 |
| 15 | | 0.0 | 16.927 | | 2809 | T | ? | 4.10 |
| 16 | TCE | 205.1 | 17.677 | 0.027 | 3277220 | VV | ? | 8.70 |
| 17 | BR2CLCH | 1.0 | 18.462 | 0.092 | 8438 | T | ? | 12.30 |
| 18 | | 0.0 | 20.782 | | 1736 | T | ? | 20.40 |
| 19 | | 0.0 | 22.005 | | 1376 | T | ? | 16.70 |
| 20 | PCE | 16.0 | 23.423 | 0.023 | 263810 | VV | | 13.00 |
| TOTALS: | | 4276.0 | | 0.252 | 58104300 | | | |

| GROUP# | RESULT |
|---|---|
| 1 | 1.0 |

DETECTED PKS: 32 REJECTED PKS: 12

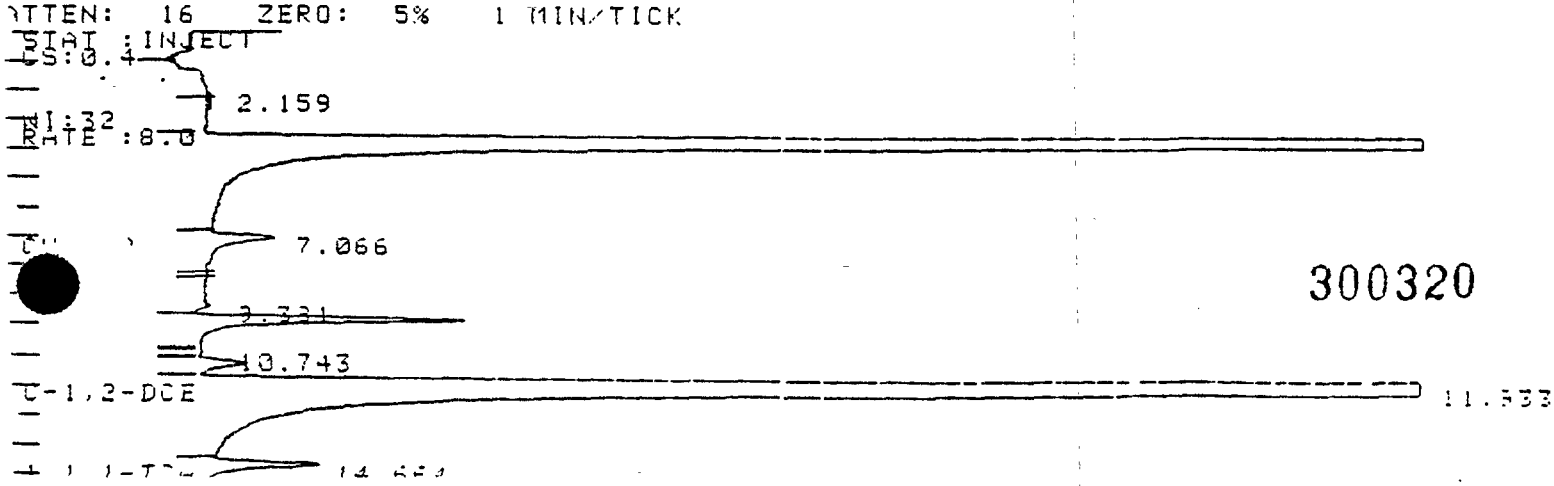
R: 1.00000 MULTIPLIER: 1.00000

NOISE: 1.2 OFFSET: 292

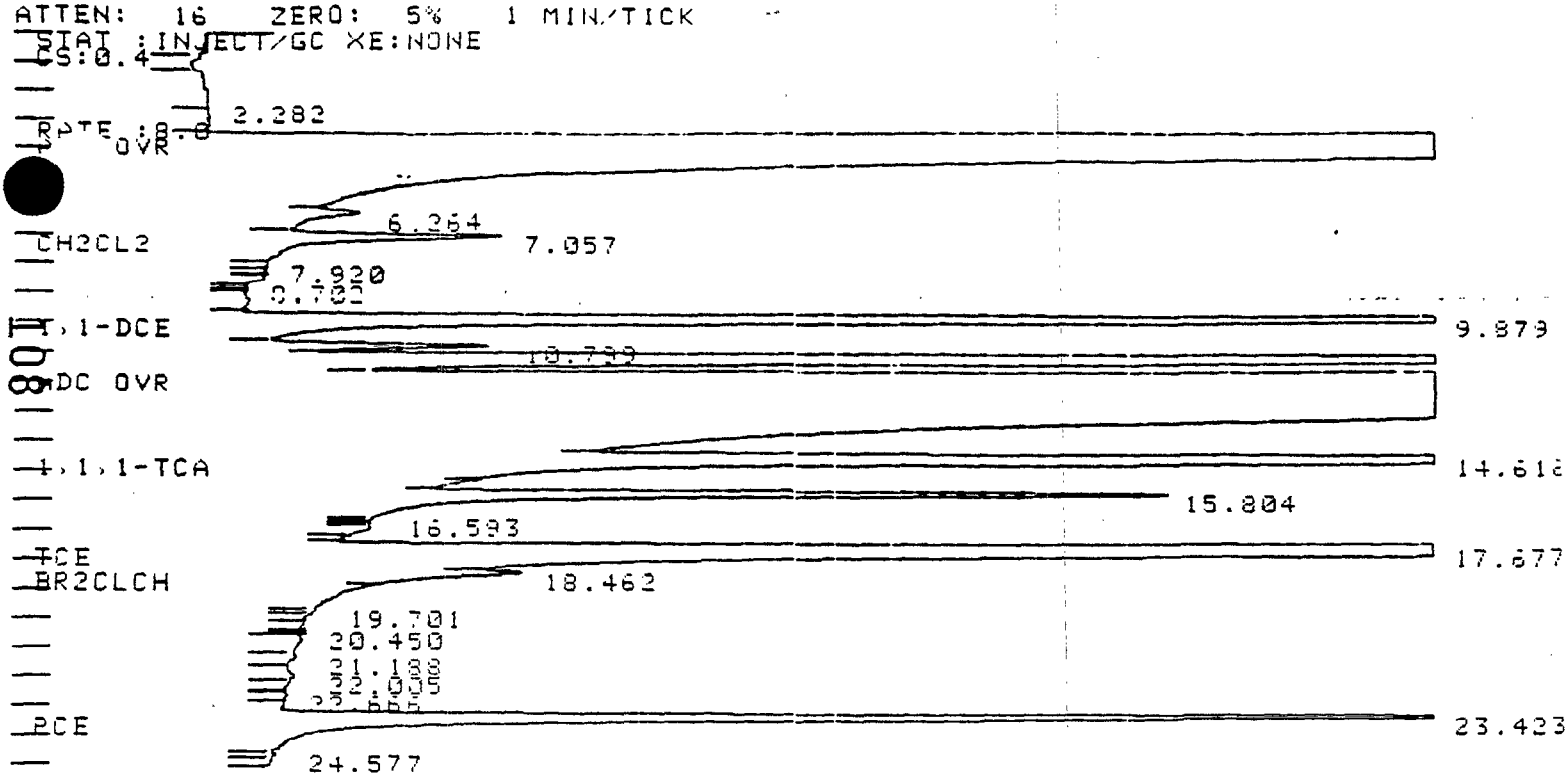
ERRORS:
ADC OVERANGE
RESOLUTION PEAK MISSING

NOTES:
HECD R:100/TEMP:815°C/5 ML SAMPLE BY ALS
FILE TEMPORARILY SAVED ON DISC NO. 41

CHART SPEED 0.0 CM/MIN
ATTEN: 16 ZERO: 5% 1 MIN/TICK




300320




RECALC
TITLE: VOLATILE ORGANIC ANALYSIS 13:13 13 MAR 84

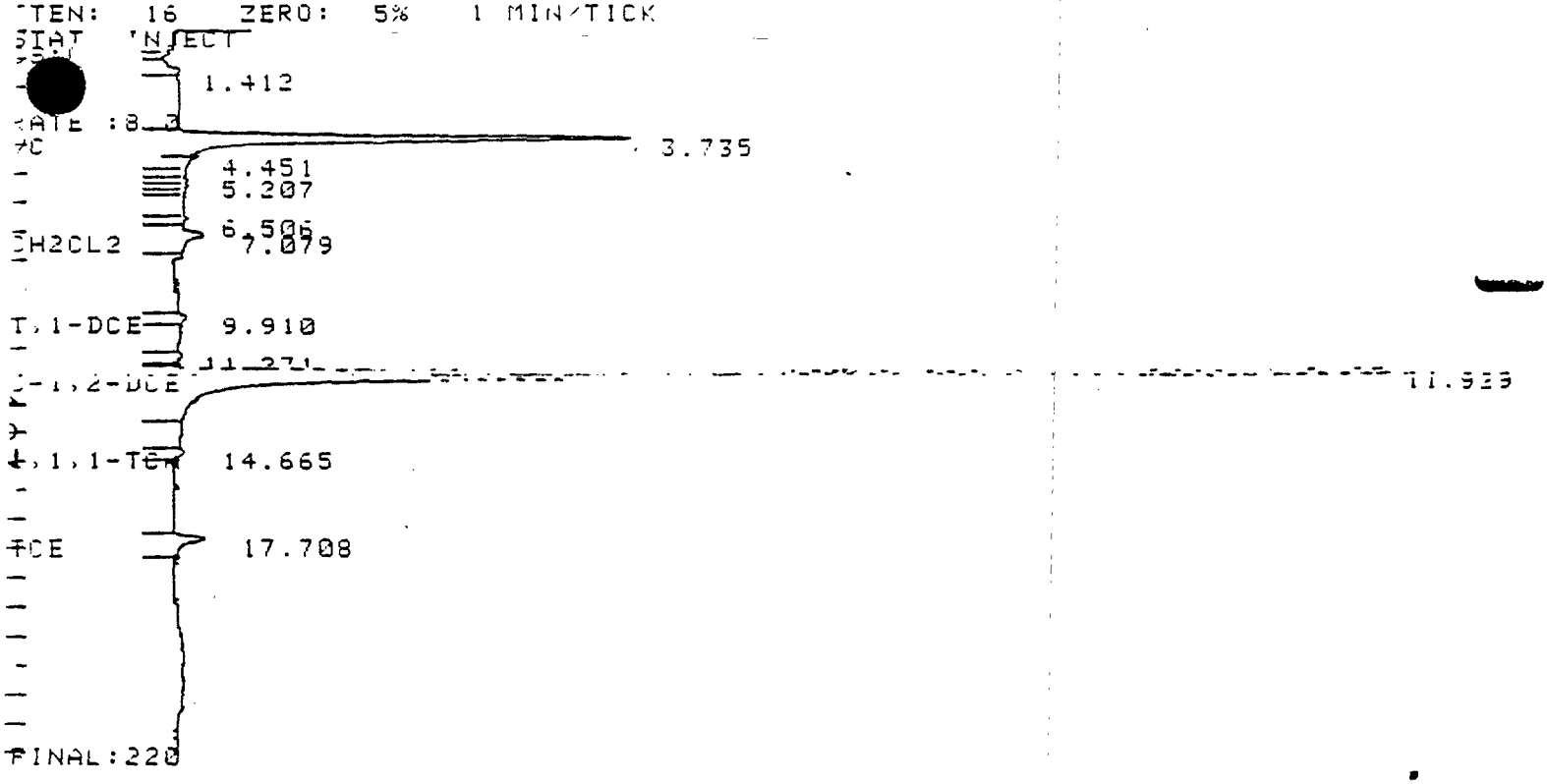
CHANNEL NO: 2 SAMPLE: 245 SF SUMP METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | WIDTH (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 2.282 | | | | | |
| 2 | | 0.0 | 3.787 | | 4587 | BB | ? | 16.00 |
| 3 | | 0.0 | 6.264 | | 20071300 | BV | | 17.30 |
| 4 | CH2CL2 | 3.4 | 7.057 | 0.047 | 9523 | T | ? | 22.10 |
| 5 | | 0.0 | 7.920 | | 44168 | T | ? | 16.75 |
| 6 | | 0.0 | 8.199 | | 856 | T | ? | |
| 7 | | 0.0 | 8.505 | | 1134 | T | ? | 1.50 |
| 8 | | 0.0 | 9.252 | | 2090 | T | ? | 6.55 |
| 9 | 1,1-DCE | 54.9 | 9.879 | 0.049 | 1694 | T | ? | 14.30 |
| 10 | | 0.0 | 10.799 | | 466926 | T | ? | 8.10 |
| 11 | | 0.0 | 11.232 | | 24860 | T | | 14.05 |
| 12 | C-1,2-DCE | 2383.2 | 11.879 | -0.031 | 772069 | VV | | 12.00 |
| 13 | 1,1,1-TCA | 44.6 | 14.618 | 0.038 | 32473703 | VV | ? | 22.60 |
| 14 | | 0.0 | 15.804 | | 557744 | T | | 13.00 |
| 15 | | 0.0 | 16.927 | | 120786 | T | | 14.00 |
| 16 | TCE | 205.1 | 17.677 | 0.027 | 2809 | T | ? | 4.10 |
| 17 | BR2CLCH | 1.0 | 18.462 | 0.092 | 3277220 | VV | ? | 8.70 |
| 18 | | 0.0 | 20.782 | | 8438 | T | ? | 12.30 |
| 19 | | 0.0 | 22.005 | | 1736 | T | ? | 20.40 |
| | E | 16.0 | 23.423 | 0.023 | 1376 | T | ? | 16.70 |
| TOTALS: | | 2708.2 | | 0.245 | 263810 | VV | | 13.00 |
| | | | | | 58104300 | | | |

GROUP# RESULT
1 1.0

DETECTED PKS: 32 REJECTED PKS:

AR300321




1/100 DILUTION

TITLE: VOLATILE ORGANIC ANALYSIS 12:32 13 MAR 84

CHANNEL NO: 2 SAMPLE: 245 SFSUMP METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L x 100 | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.412 | | 994 | BB | ? 16.20 |
| 2 | VC | 6.7 670.0 | 3.735 | -0.005 | 86347 | BV | 11.95 |
| 3 | CH2CL2 | 0.4 40.0 | 7.079 | 0.069 | 5032 | VB | 14.45 |
| 4 | 1,1-DCE | 0.2 20.0 | 9.910 | 0.080 | 1313 | BB | 14.70 |
| 5 | | 0.0 | 11.271 | | 1065 | BV | 13.20 |
| 6 | C-1,2-DCE | 27.3 2730. | 11.929 | 0.019 | 371958 | VB | 11.55 |
| 7 | 1,1,1-TCA | 0.1 10.0 | 14.665 | 0.085 | 1200 | BB | 12.60 |
| 8 | TCE | 0.4 40.0 | 17.708 | 0.058 | 6157 | BB | 13.45 |
| TOTALS: | | 35.1 | | 0.306 | 474066 | | |

DETECTED PKS: 13 REJECTED PKS: 5

DIVISOR: 1.00000 MULTIPLIER: 1.00000

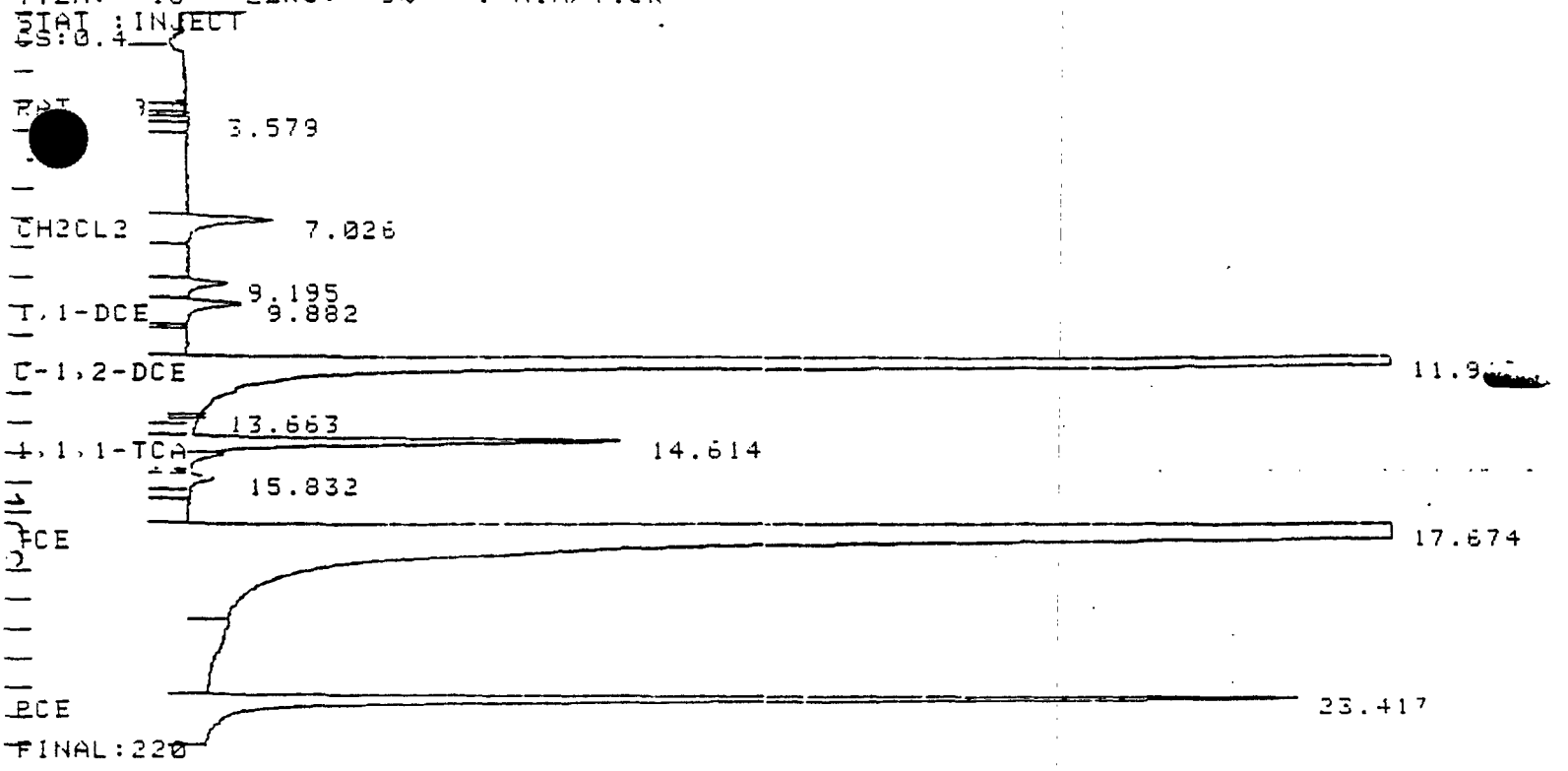
NOI 2.4 OFFSET: 304

D FILE: 5055

ERRORS:
RESOLUTION PEAK MISSING

NOTES:
HECD R:100/TEMP:815°C/5 ML SAMPLE BY ALS
TEMPORARILY SAVED ON DISC NO. 41

300322




TITLE: VOLATILE ORGANIC ANALYSIS 11:44 13 MAR 84

CHANNEL NO: 2 SAMPLE: 244 SFOVER METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | CH2CL2 | 1.4 | 7.026 | 0.016 | 18698 | BB | ? | 12.30 |
| 2 | | 0.0 | 9.195 | | 7570 | BV | | 12.20 |
| 3 | 1,1-DCE | 1.2 | 9.882 | 0.052 | 10581 | VB | | 12.65 |
| 4 | C-1,2-DCE | 90.5 | 11.919 | 0.009 | 1233300 | BV | | 11.25 |
| 5 | 1,1,1-TCA | 5.8 | 14.614 | 0.034 | 72431 | BV | | 12.10 |
| 6 | CCL4 | 0.3 | 14.944 | -0.056 | 5068 | VV | ? | 24.90 |
| 7 | | 0.0 | 15.832 | | 4048 | VB | | 11.60 |
| 8 | TCE | 626.9 | 17.674 | 0.024 | 10017200 | BB | | 12.60 |
| 9 | PCE | 12.1 | 23.417 | 0.017 | 199870 | BB | | 12.35 |
| TOTALS: | | 738.2 | | 0.096 | 11568800 | | | |

DETECTED PKS: 12 REJECTED PKS: 3

DIVISOR: 1.00000 MULTIPLIER: 1.00000

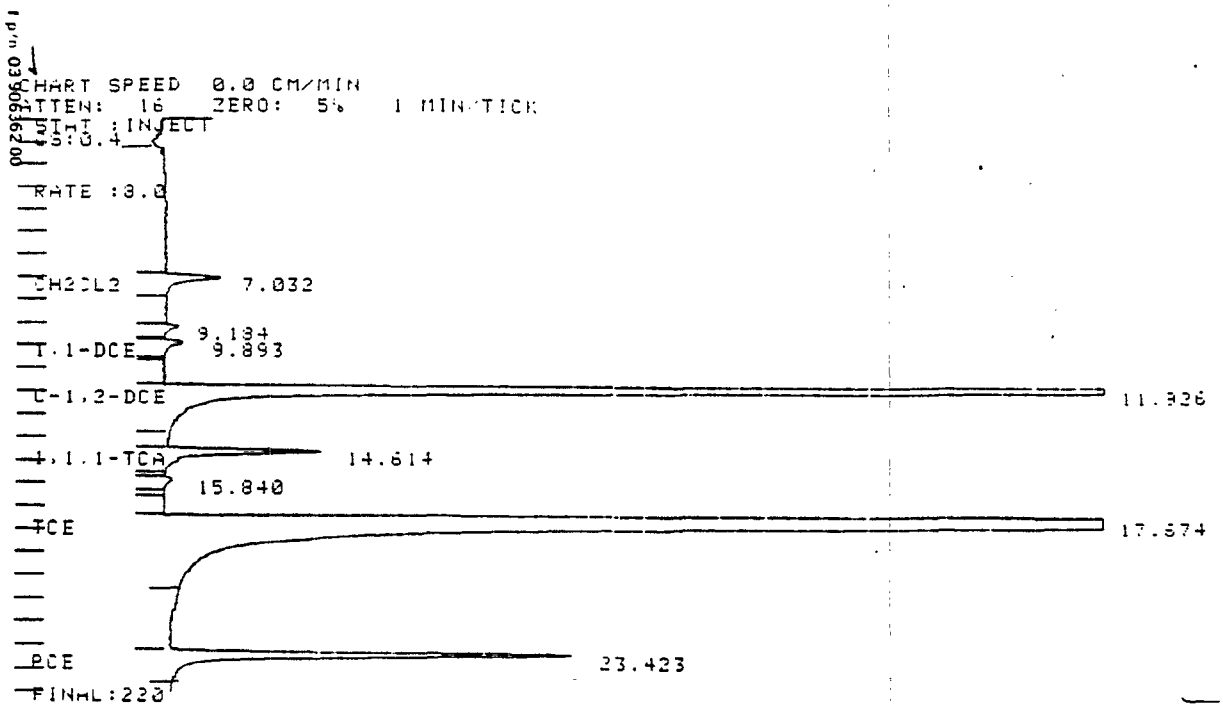
NOISE: 2.4 OFFSET: 284

SAM FILE: 5054

ERRORS:
RESOLUTION PEAK MISSING

300323

NOTES:
HECD R:100/TEMP:815°C/5 ML SAMPLE BY ALS
FILE TEMPORARILY SAVED ON DISC NO. 41




105

1/2 DILUTION

TITLE: VOLATILE ORGANIC ANALYSIS 10:16 13 MAR 84

CHANNEL NO: 2 SAMPLE: 244 SFOVER METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L X2 | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | CH2CL2 | 1.1 2.2 | 7.032 | 0.022 | 14702 | BB | 14.05 |
| 2 | | 0.0 | 9.184 | | 3062 | BB | 12.20 |
| 3 | 1,1-DCE | 0.6 1.2 | 9.893 | 0.063 | 4724 | BB | 12.70 |
| 4 | C-1,2-DCE | 44.6 89.2 | 11.926 | 0.016 | 607903 | BB | 11.45 |
| 5 | 1,1,1-TCA | 2.9 5.8 | 14.614 | 0.034 | 36702 | BB | 12.20 |
| 6 | | 0.0 | 15.840 | | 1952 | BB | 12.90 |
| 7 | TCE | 343.9 687.8 | 17.674 | 0.024 | 5495100 | BB | 12.10 |
| 8 | PCE | 5.8 11.6 | 23.423 | 0.023 | 95628 | BB | 12.55 |
| TOTALS: | | 398.9 | | 0.182 | 6259770 | | |

DETECTED PKS: 8 REJECTED PKS: 0

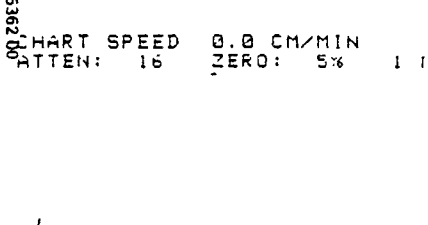
DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 2.4 OFFSET: 285

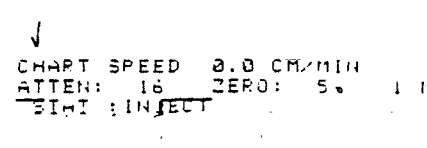
SAVED FILE: 5053

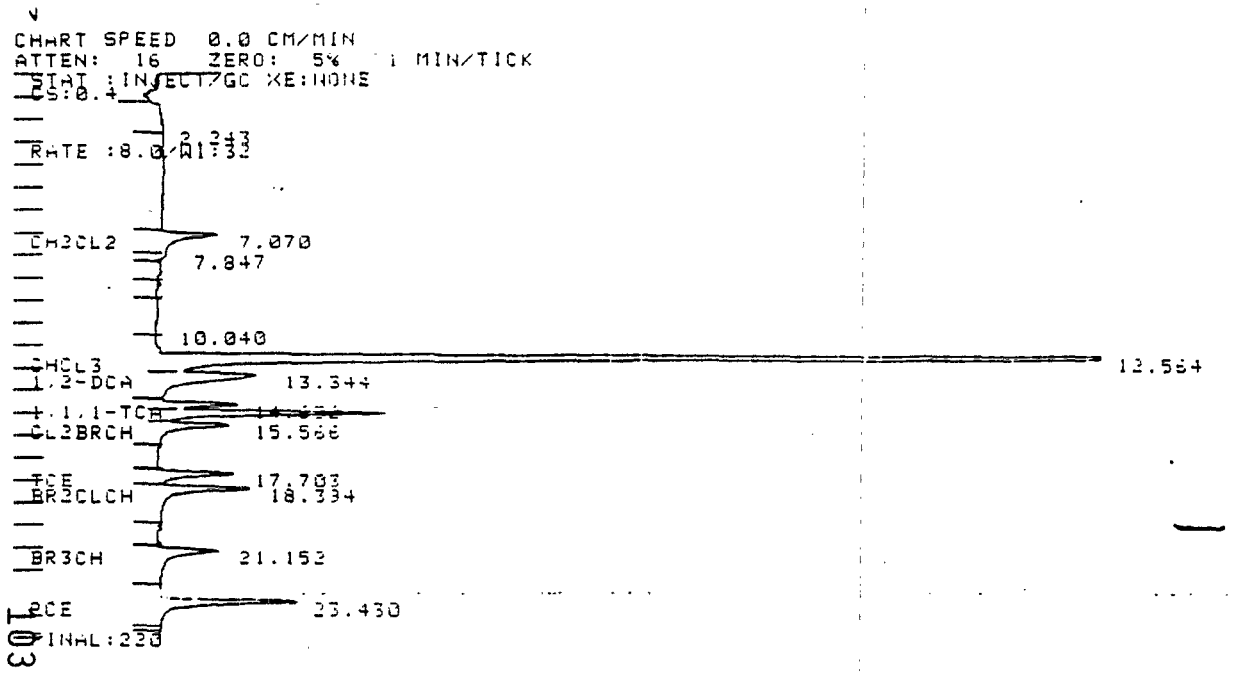
ERRORS:
RESOLUTION PEAK MISSING

NOTES:
HECD R:100/TEMP:815°C/5 ML SAMPLE BY ALS
FILE TEMPORARILY SAVED ON DISC NO. 41




300324






TITLE: VOLATILE ORGANIC ANALYSIS 9:09 13 MAR 84

CHANNEL NO: 2 SAMPLE: LOW OC METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT FACTOR | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | WID (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | | 2.243 | | 7936 | BB | 40.20 |
| 2 | CH2CL2 | 51.80540 | 7.070 | 0.060 | 19303 | BV | 14.50 |
| 3 | | | 7.847 | | 2610 | VB | 28.50 |
| 4 | | | 10.040 | | 2433 | BV | 164.80 |
| 5 | CHCL3 | 3.270380 | 12.564 | 0.044 | 305775 | VV | 11.55 |
| 6 | 1,2-DCA | 21.40060 | 13.344 | 0.114 | 46532 | VV | 26.00 |
| 7 | 1,1,1-TCA | 56.50040 | 14.632 | 0.052 | 17699 | VV | 13.20 |
| 8 | CCL4 | 19.26150 | 15.013 | 0.013 | 51917 | VV | 12.50 |
| 9 | CL2BRCH | 53.99260 | 15.566 | 0.066 | 18521 | VB | 14.35 |
| 10 | TCE | 54.25050 | 17.703 | 0.053 | 18433 | BV | 13.00 |
| 11 | BR2CLCH | 34.73410 | 18.394 | 0.024 | 28315 | VB | 15.15 |
| 12 | BR3CH | 48.21990 | 21.152 | 0.052 | 20317 | BB | 15.40 |
| 13 | PCE | 29.50110 | 23.430 | 0.030 | 33397 | BB | 12.75 |
| TOTALS: | | | | 0.506 | 574188 | | |

DETECTED PKS: 13 REJECTED PKS: 0

AMT STD: 1.00000

RESOLUTION: 2.32

NOISE: 2.4 OFFSET: 319

see below

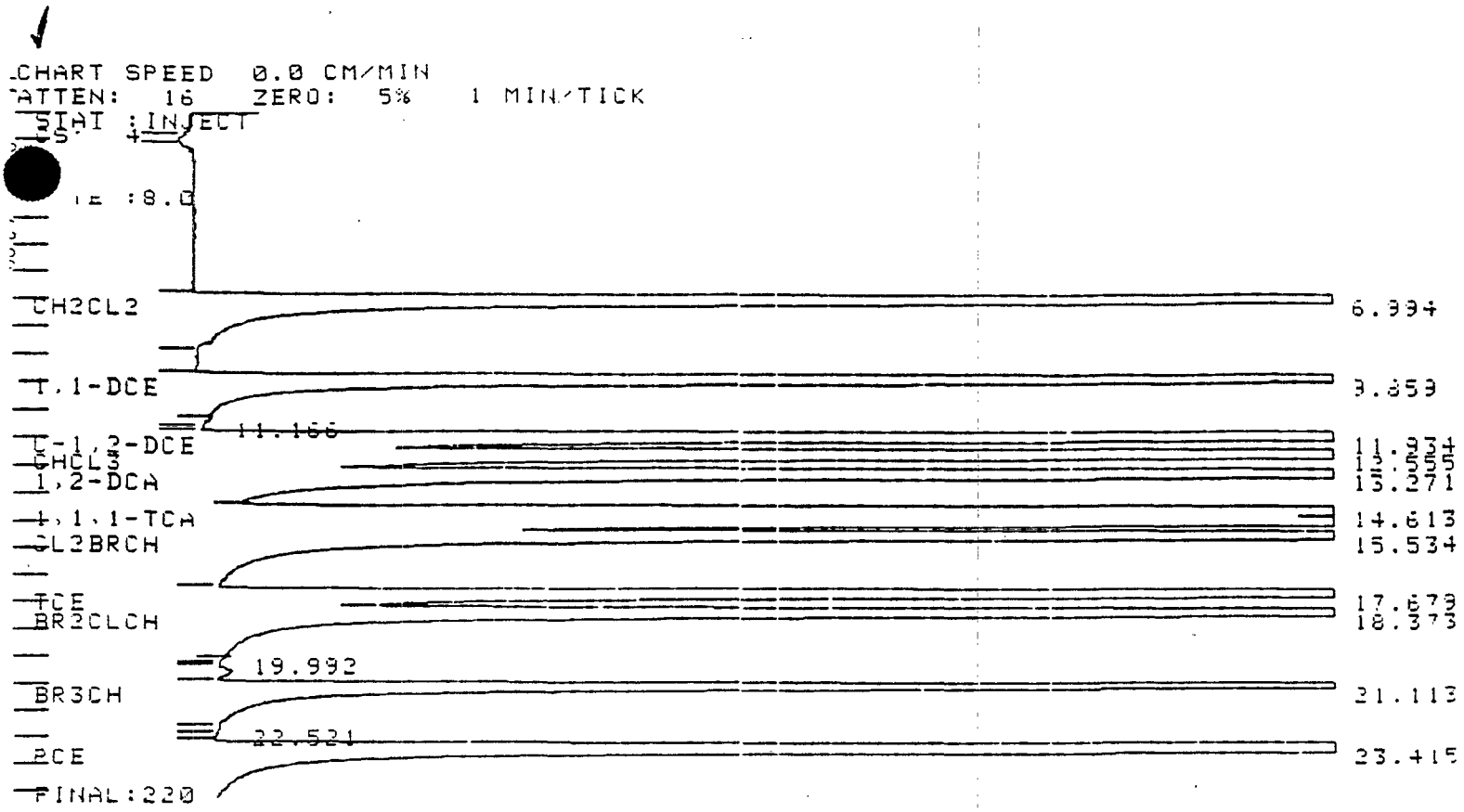
RECALC
TITLE: VOLATILE ORGANIC ANALYSIS 9:09 13 MAR 84

CHANNEL NO: 2 SAMPLE: LOW OC METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | WID (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 2.243 | | 7936 | BB | 40.20 |
| 2 | CH2CL2 | 1.5 | 7.070 | 0.060 | 19303 | BV | 14.50 |
| 3 | | 0.0 | 7.847 | | 2610 | VB | 28.50 |
| 4 | | 0.0 | 10.040 | | 2433 | BV | 164.80 |
| 5 | CHCL3 | 17.0 | 12.564 | 0.044 | 305775 | VV | 11.55 |
| 6 | 1,2-DCA | 3.4 | 13.344 | 0.114 | 46532 | VV | 26.00 |
| 7 | 1,1,1-TCA | 1.4 | 14.632 | 0.052 | 17699 | VV | 13.20 |
| 8 | CCL4 | 2.3 | 15.013 | 0.013 | 51917 | VV | 12.50 |
| 9 | CL2BRCH | .4 | 15.566 | 0.066 | 18521 | VB | 14.35 |
| 10 | TCE | 1.2 | 17.703 | 0.053 | 18433 | BV | 13.00 |
| 11 | BR2CLCH | 3.3 | 18.394 | 0.024 | 28315 | VB | 15.15 |
| 12 | BR3CH | 3.7 | 21.152 | 0.052 | 20317 | BB | 15.40 |
| 13 | PCE | 2.1 | 23.430 | 0.030 | 33397 | BB | 12.75 |
| TOTALS: | | 38.3 | | 0.508 | 574188 | | |

GROUP* RESULT
25.3

300325




102

TITLE: VOLATILE ORGANIC ANALYSIS 8:32 13 MAR 84

CHANNEL NO: 2 SAMPLE: VOA MIX METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT FACTOR | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | WID (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | CH2CL2 | 0.792709 | 6.994 | -0.016 | 1261500 | BB | | 11.95 |
| 2 | 1,1-DCE | 1.211110 | 9.859 | 0.029 | 825690 | BV | | 11.40 |
| 3 | C-1,2-DCE | 0.754882 | 11.934 | 0.024 | 1324710 | VV | | 11.45 |
| 4 | CHCL3 | 0.568069 | 12.555 | 0.035 | 1760350 | VV | | 11.60 |
| 5 | 1,2-DCA | 0.773535 | 13.271 | 0.041 | 1292770 | VV | | 11.55 |
| 6 | 1,1,1-TCA | 0.824102 | 14.613 | 0.033 | 1213440 | VV | | 12.10 |
| 7 | CCL4 | 0.658150U | 15.003 | -0.007 | 1519410 | VV | | 12.40 |
| 8 | CL2BRCH | 0.766101 | 15.534 | 0.034 | 1305310 | VV | | 11.80 |
| 9 | TCE | 0.647304 | 17.679 | 0.029 | 1544870 | VV | | 11.70 |
| 10 | BR2CLCH | 1.133480 | 18.373 | 0.003 | 882236 | VV | | 12.30 |
| 11 | | | 20.550 | | 2596 | T | ? | 19.70 |
| 12 | BR3CH | 2.084680 | 21.113 | 0.013 | 479691 | VV | ? | 9.75 |
| 13 | PCE | 0.630376 | 23.415 | 0.015 | 1586350 | VB | | 12.30 |
| TOTALS: | | | | 0.233 | 14998800 | | | |

[illegible]ED PKS: 17 REJECTED PKS: 4

[illegible] STD: 1.00000

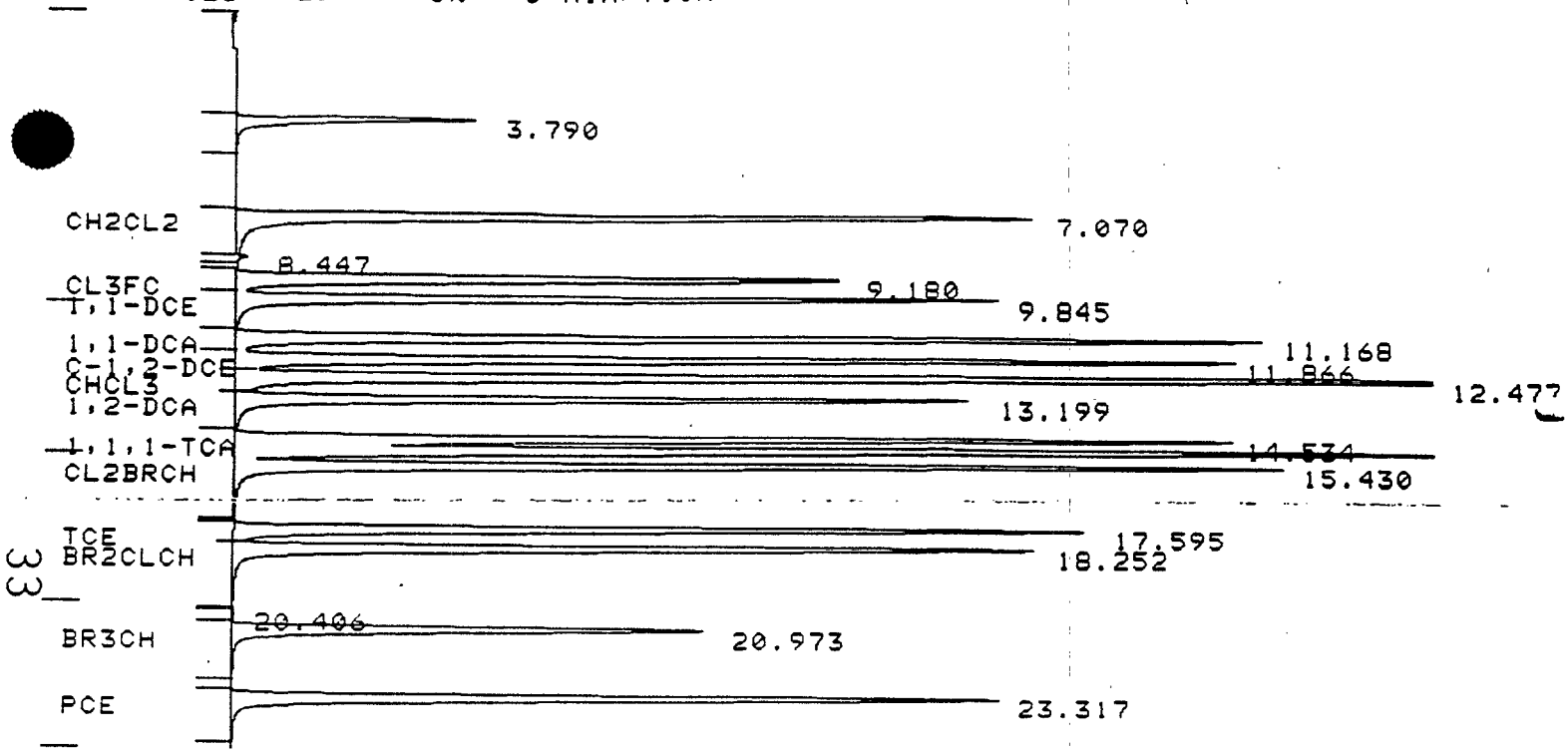
RESOLUTION: 4.01

NOISE: 2.4 OFFSET: 303

SAVED FILE: 5051

300326

CHART SPEED 0.4 CM/MIN
ATTEN: 128 ZERO: 5% 5 MIN/TICK




TITLE: VOLATILE ORGANIC ANALYSIS 10:00 25 MAR 86

CHANNEL NO: 2 SAMPLE: VOA MIX & VC METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT FACTOR | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | VC | 0.799711 | 3.790 | 0.030 | 312613 | BB | 11.25 |
| 2 | CH2CL2 | 0.906655 | 7.070 | 0.040 | 1158100 | BV | 12.20 |
| 3 | | | 8.447 | | 5110 | T | 6.10 |
| 4 | CL3FC | 0.957409U | 9.180 | 0.020 | 919147 | VV | 14.25 |
| 5 | 1,1-DCE | 0.945641 | 9.845 | -0.005 | 1020470 | VV | 11.65 |
| 6 | 1,1-DCA | 0.750167U | 11.168 | 0.008 | 1299710 | VV | 11.40 |
| 7 | C-1,2-DCE | 0.778053 | 11.866 | 0.016 | 1259550 | VV | 11.15 |
| 8 | CHCL3 | 0.557083U | 12.477 | 0.007 | 1795060 | VV | 11.55 |
| 9 | 1,2-DCA | 1.028400U | 13.199 | -0.011 | 977243 | VV | 11.50 |
| 10 | 1,1,1-TCA | 0.754843U | 14.534 | 0.004 | 1298280 | VV | 12.00 |
| 11 | CCL4 | 0.611096 | 14.924 | 0.004 | 1628220 | VV | 12.05 |
| 12 | CL2BRCH | 0.778438U | 15.430 | 0.000 | 1419510 | VB | 11.85 |
| 13 | TCE | 0.942464 | 17.595 | 0.005 | 1098180 | BV | 11.65 |
| 14 | BR2CLCH | 1.168350U | 18.252 | 0.002 | 1091280 | VB | 12.05 |
| 15 | | | 20.406 | | 2773 | BV | 12.40 |
| 16 | BR3CH | 1.735370U | 20.973 | 0.003 | 671326 | VB | 12.65 |
| 17 | PCE | 0.921273 | 23.317 | -0.003 | 1058320 | BB | 12.40 |

TOTALS: 0.120 17014900

.CTED PKS: 17 REJECTED PKS: 0

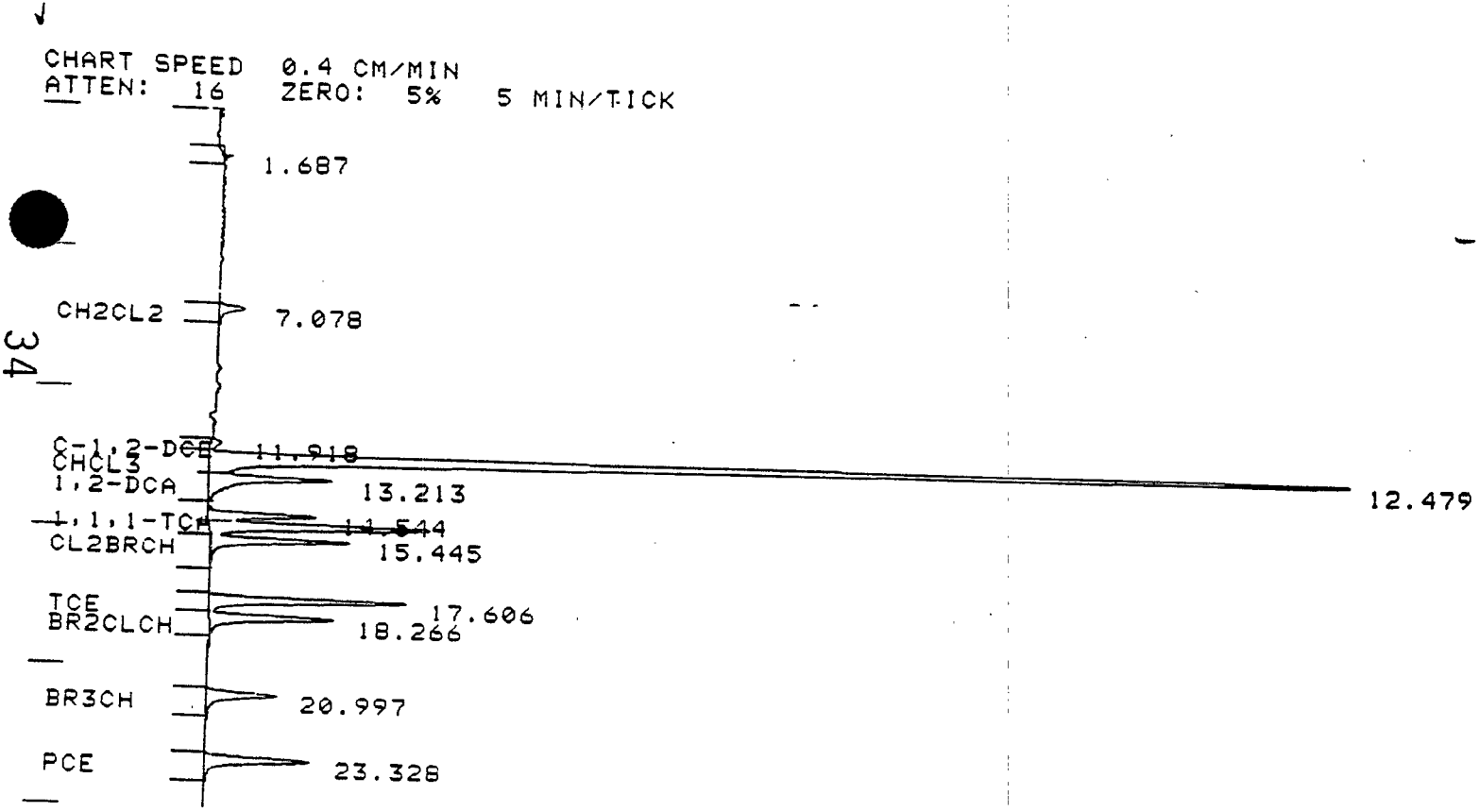
AMT STD: 1.00000

NOISE: 24.3 OFFSET: -39

SAVED FILE: 2271

300327

varian /sunnyvale,calif p/n 03-9[illegible]6200




TITLE: VOLATILE ORGANIC ANALYSIS 10:59 25 MAR 86

CHANNEL NO: 2 SAMPLE: LOW QC METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.687 | | 1489 | BB | 5.65 |
| 2 | CH2CL2 | 0.5 | 7.078 | 0.048 | 5416 | BB | 12.70 |
| 3 | C-1,2-DCE | 0.2 | 11.918 | 0.068 | 2242 | BV | 14.40 |
| 4 | CHCL3 | 11.9 | 12.479 | -0.001 | 214470 | VV | 11.65 |
| 5 | 1,2-DCA | 2.8 | 13.213 | 0.013 | 27342 | VV | 12.75 |
| 6 | 1,1,1-TCA | 1.4 | 14.544 | 0.014 | 18460 | VV | 12.25 |
| 7 | CCL4 | 2.3 | 14.931 | 0.011 | 40082 | VV | 12.35 |
| 8 | CL2BRCH | 2.1 | 15.445 | 0.015 | 26800 | VB | 12.10 |
| 9 | TCE | 3.0 | 17.606 | 0.016 | 34511 | BV | 11.55 |
| 10 | BR2CLCH | 2.8 | 18.266 | 0.016 | 24070 | VB | 12.60 |
| 11 | BR3CH | 2.5 | 20.997 | 0.027 | 14621 | BB | 12.80 |
| 12 | PCE | 1.7 | 23.328 | 0.008 | 20186 | BB | 12.50 |
| TOTALS: | | 31.2 | | 0.235 | 429689 | | |

GROUP# RESULT
1 19.3

DETECTED PKS: 12 REJECTED PKS: 0

JR: 1.00000 MULTIPLIER: 1.00000

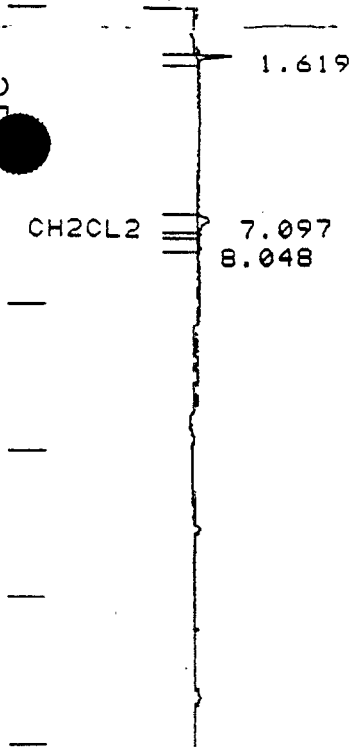
NOISE: 19.4 OFFSET: -43

SAVED FILE: 2272

NOTES:
HECD R:100/TEMP:210.0 F

300328

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK




TITLE: VOLATILE ORGANIC ANALYSIS 11:53 25 MAR 86

CHANNEL NO: 2 SAMPLE: BOILED TAP METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.619 | | 3122 | BB | 5.25 |
| 2 | CH2CL2 | 0.2 | 7.097 | 0.067 | 2832 | BV | 13.85 |
| TOTALS: | | 0.2 | | 0.067 | 5954 | | |

DETECTED PKS: 4 REJECTED PKS: 2

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 19.4 OFFSET: -44

SAVED FILE: 2273

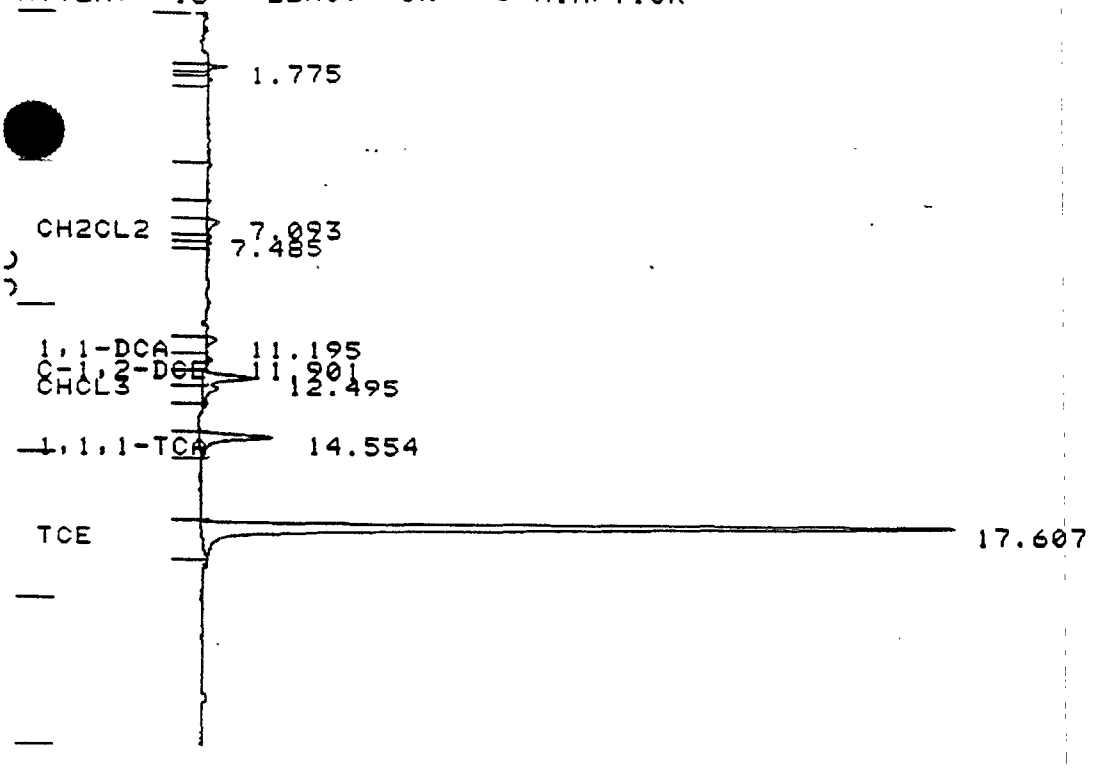
NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.42 SIDE 1

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK

300329

varian /sunnyvale calif p/n 03 9063F2 00

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK




TITLE: VOLATILE ORGANIC ANALYSIS 12:42 25 MAR 86

CHANNEL NO: 2 SAMPLE: 716 BENNER METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.775 | | 1333 | BV | | 4.35 |
| 2 | CH2CL2 | 0.2 | 7.093 | 0.063 | 2620 | BV | | 12.50 |
| 3 | 1,1-DCA | 0.2 | 11.195 | 0.025 | 2067 | BV | | 12.30 |
| 4 | C-1,2-DCE | 0.1 | 11.901 | 0.051 | 1311 | VV | | 11.75 |
| 5 | CHCL3 | 0.4 | 12.495 | 0.015 | 7973 | VV | | 11.60 |
| 6 | | 0.0 | 12.874 | | 2823 | VB | ? | 14.00 |
| 7 | 1,1,1-TCA | 1.0 | 14.554 | 0.024 | 13319 | BB | | 12.40 |
| 8 | TCE | 10.9 | 17.607 | 0.017 | 126443 | BB | | 11.80 |
| TOTALS: | | 12.8 | | 0.195 | 157889 | | | |

| GROUP# | RESULT |
|---|---|
| 1 | 0.4 |

DETECTED PKS: 11 REJECTED PKS: 3

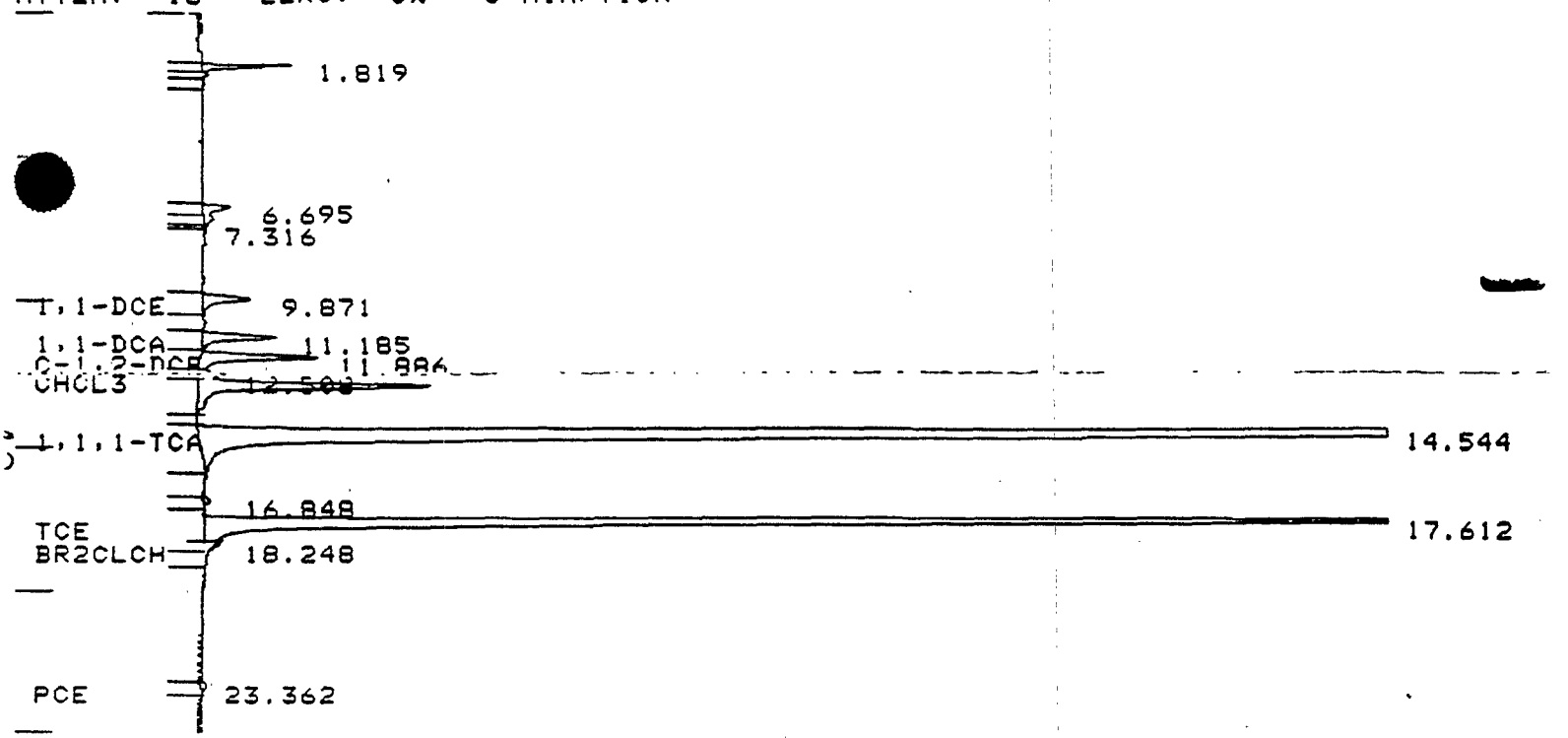
DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOI 19.4 OFFSET: -46

FILE: 2274

300330

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.42 SIDE 1




TITLE: VOLATILE ORGANIC ANALYSIS 3:09 26 MAR 86

CHANNEL NO: 2 SAMPLE: 717 VOC CEN METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.819 | | 8639 | BV | | 5.50 |
| 2 | | 0.0 | 6.695 | | 4768 | BV | | 12.70 |
| 3 | CH2CL2 | 0.2 | 6.962 | -0.068 | 2144 | VV | ? | |
| 4 | 1,1-DCE | 0.7 | 9.871 | 0.021 | 8556 | BB | | 11.90 |
| 5 | 1,1-DCA | 0.9 | 11.185 | 0.015 | 12400 | BV | | 11.75 |
| 6 | C-1,2-DCE | 1.5 | 11.886 | 0.036 | 20590 | VV | | 11.70 |
| 7 | CHCL3 | 0.2 | 12.508 | 0.028 | 4283 | VV | ? | 12.20 |
| 8 | | 0.0 | 12.870 | | 44213 | VB | | 12.40 |
| 9 | 1,1,1-TCA | 56.2 | 14.544 | 0.014 | 762617 | BB | | 12.35 |
| 10 | | 0.0 | 16.848 | | 1416 | BV | | 13.15 |
| 11 | TCE | 23.9 | 17.612 | 0.022 | 276583 | VV | | 11.70 |
| 12 | PCE | 0.1 | 23.362 | 0.042 | 1327 | BB | | 14.20 |
| TOTALS: | | 83.7 | | 0.110 | 1147540 | | | |

GROUP# RESULT
1 0.2

DETECTED PKS: 15 REJECTED PKS: 3

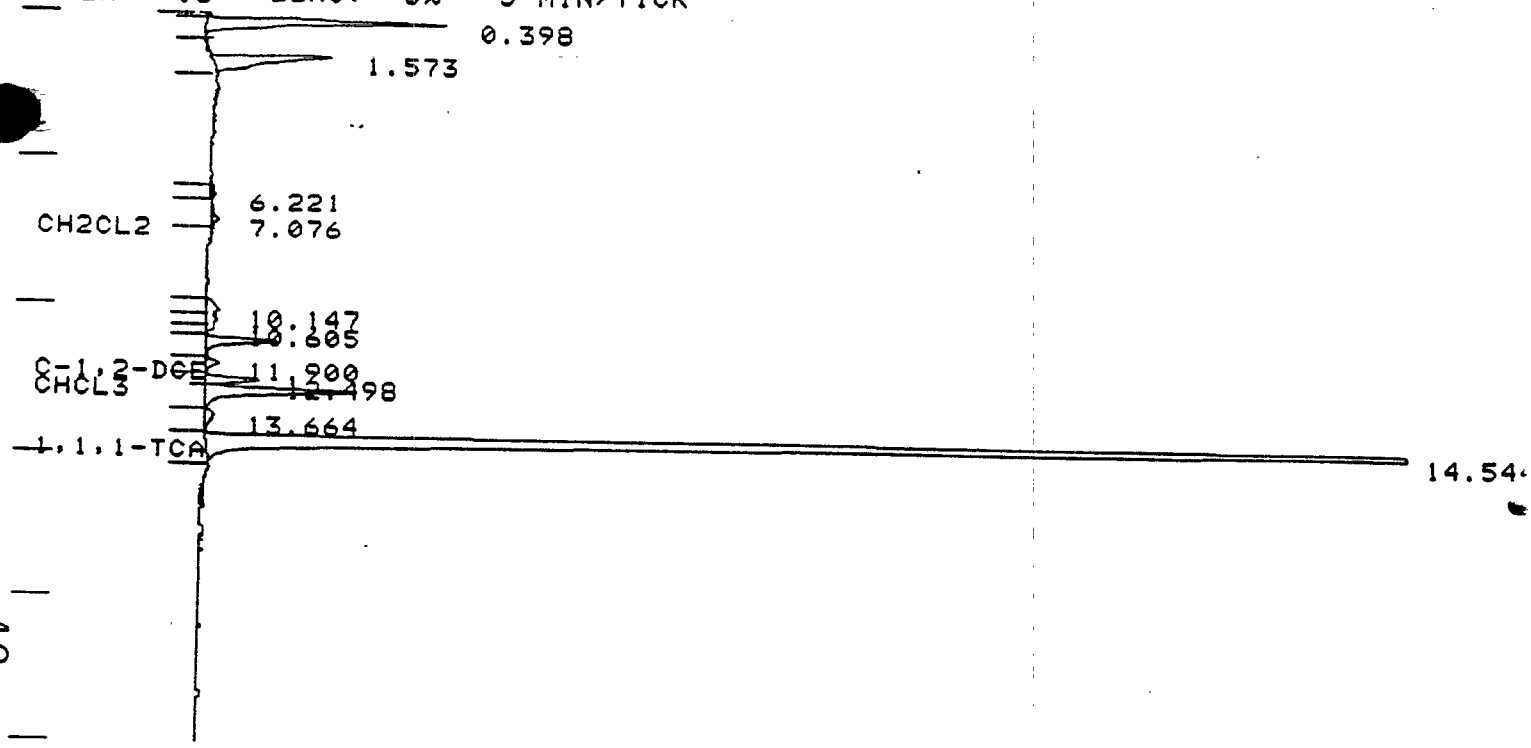
DI R: 1.00000 MULTIPLIER: 1.00000

E: 19.4 OFFSET: -44

300331

SAVED FILE: 2281

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.42 SIDE 2




TITLE: VOLATILE ORGANIC ANALYSIS 2:09 26 MAR 86

CHANNEL NO: 2 SAMPLE: 718 VOC CEN METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 0.398 | | 39084 | BV | | 11.25 |
| 2 | | 0.0 | 1.573 | | 25773 | VB | | 16.15 |
| 3 | | 0.0 | 6.221 | | 1337 | BV | ? | 28.10 |
| 4 | CH2CL2 | 0.1 | 7.076 | 0.046 | 1446 | VB | | 14.75 |
| 5 | | 0.0 | 10.147 | | 4023 | BV | ? | 27.30 |
| 6 | | 0.0 | 10.472 | | 2637 | VV | ? | 5.50 |
| 7 | | 0.0 | 10.605 | | 1500 | VV | ? | 12.95 |
| 8 | 1,1-DCA | 0.9 | 11.180 | 0.010 | 11735 | VV | | 11.55 |
| 9 | C-1,2-DCE | 0.2 | 11.900 | 0.050 | 2637 | VV | | 12.35 |
| 10 | CHCL3 | 0.5 | 12.498 | 0.018 | 8374 | VV | | 11.70 |
| 11 | | 0.0 | 12.868 | | 24910 | VV | | 12.50 |
| 12 | | 0.0 | 13.664 | | 2922 | VV | ? | 17.30 |
| 13 | 1,1,1-TCA | 22.3 | 14.544 | 0.014 | 302596 | VB | | 12.20 |
| TOTALS: | | 24.0 | | 0.138 | 428974 | | | |

GROUP# RESULT
0.5

,TED PKS: 13 REJECTED PKS: 0

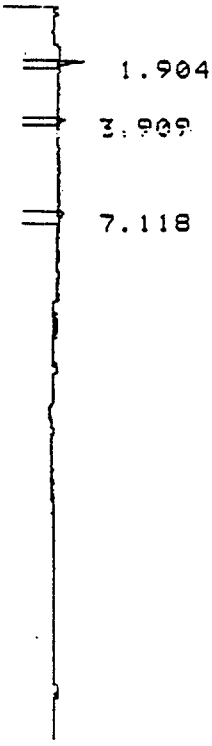
DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 19.4 OFFSET: -45

SAVED FILE: 2280

300332

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK




37

TITLE: VOLATILE ORGANIC ANALYSIS 13:20 25 MAR 86

CHANNEL NO: 2 SAMPLE: 719 NORWICKI METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.904 | | 1790 | BB | 4.55 |
| TOTALS: | | 0.0 | | | 1790 | | |

DETECTED PKS: 3 REJECTED PKS: 2

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 19.4 OFFSET: -51

SAVED FILE: 2275

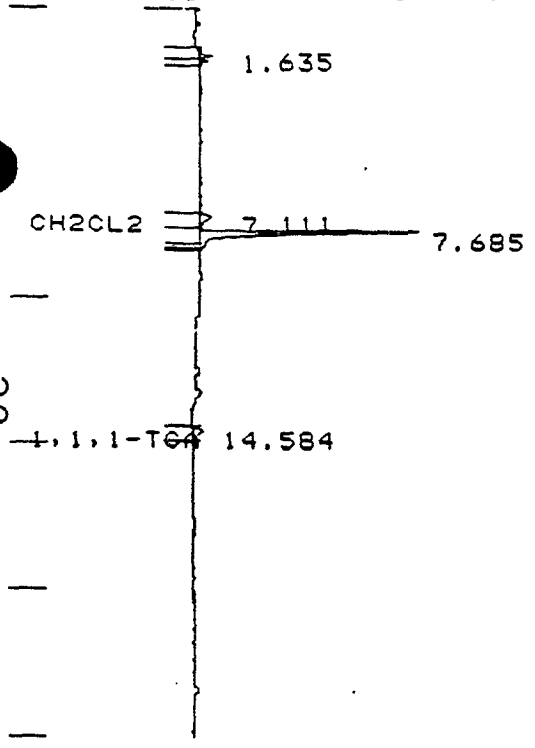
NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.42 SIDE 1

Varian / Sunnyvale, Calif. P/N 03-906362-00

300333

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK




38

TITLE: VOLATILE ORGANIC ANALYSIS 13:58 25 MAR 86

CHANNEL NO: 2 SAMPLE: 720 A. ROTH. METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.635 | | 1494 | BV | 4.75 |
| 2 | | 0.0 | 7.111 | | 2456 | BV | 13.70 |
| 3 | | 0.0 | 7.685 | | 20882 | VV | 5.90 |
| 4 | 1,1,1-TCA | 0.1 | 14.584 | 0.054 | 1679 | BB | 15.00 |
| TOTALS: | | 0.1 | | 0.054 | 26511 | | |

DETECTED PKS: 6 REJECTED PKS: 2

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 19.4 OFFSET: -49

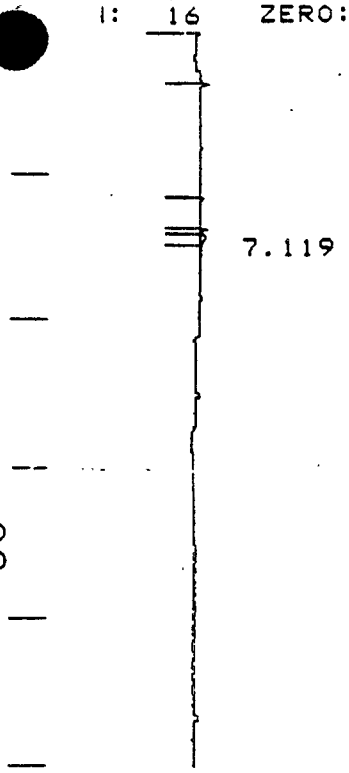
SAVED FILE: 2276

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.42 SIDE 1

300334

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK

CHART SPEED 0.4 CM/MIN
1: 16 ZERO: 5% 5 MIN/TICK




39

TITLE: VOLATILE ORGANIC ANALYSIS 14:37 25 MAR 86

CHANNEL NO: 2 SAMPLE: 721 KIM ROTH METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 7.119 | | 1308 | BB | 12.60 |
| TOTALS: | | 0.0 | | | 1308 | | |

DETECTED PKS: 1 REJECTED PKS: 0

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 19.4 OFFSET: -49

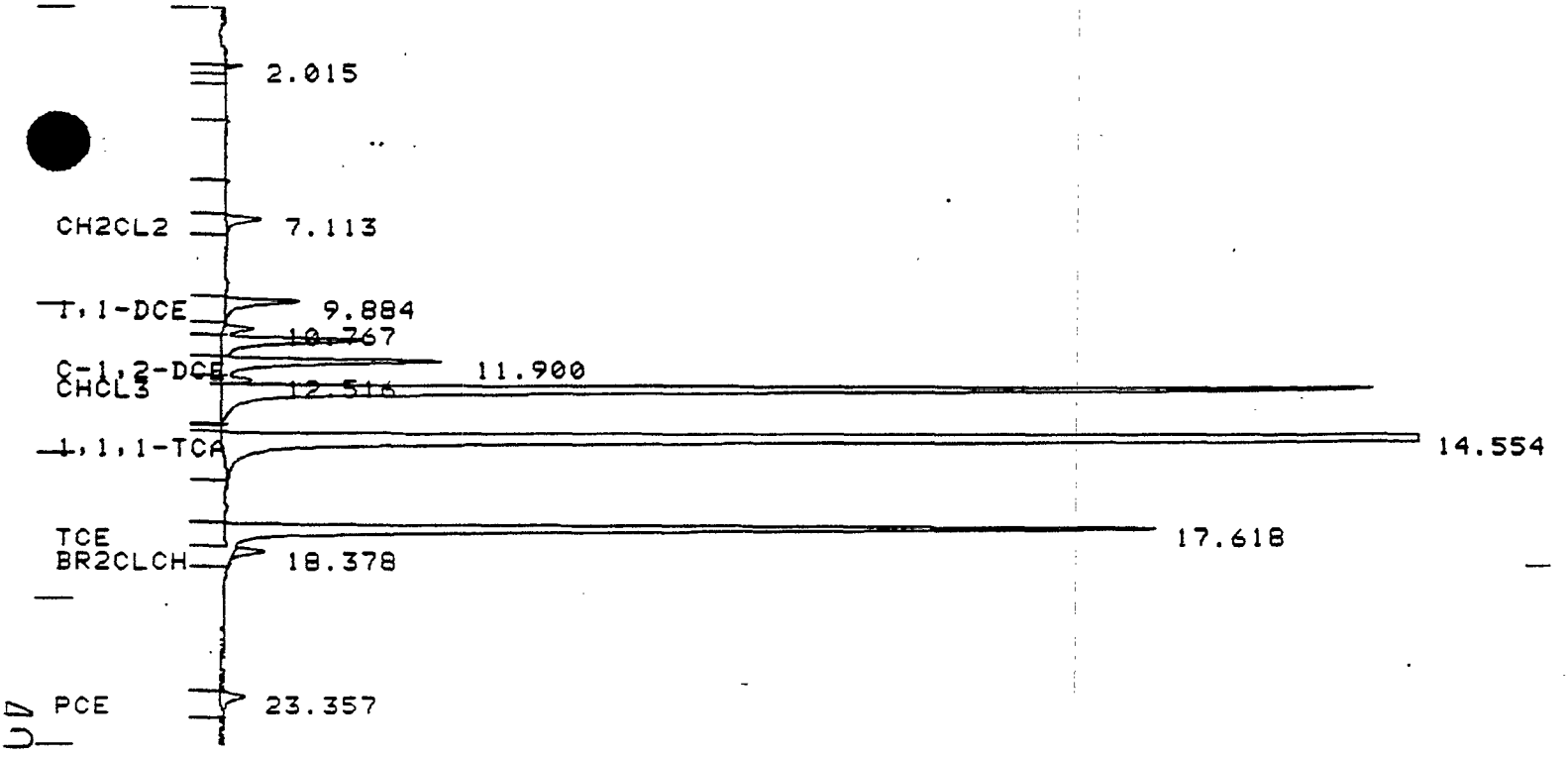
SAVED FILE: 2277

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
LE SAVED ON DISC NO.42 SIDE 1

300335

Varian /sunnyvale, calif 03-906362 00

CHART SPEED 0.4 CM/MIN
ATTEN: 16 ZERO: 5% 5 MIN/TICK




TITLE: VOLATILE ORGANIC ANALYSIS 15:14 25 MAR 86

CHANNEL NO: 2 SAMPLE: 722 TRANSCOI METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 2.015 | | 1073 | BB | | 4.25 |
| 2 | | 0.0 | 7.113 | | 6480 | BB | | 12.15 |
| 3 | 1,1-DCE | 1.1 | 9.884 | 0.034 | 13000 | BV | | 11.20 |
| 4 | | 0.0 | 10.767 | | 4908 | VV | | 11.65 |
| 5 | 1,1-DCA | 1.8 | 11.193 | 0.023 | 24124 | VV | | 11.55 |
| 6 | C-1,2-DCE | 2.7 | 11.900 | 0.050 | 36657 | VV | | 11.35 |
| 7 | CHCL3 | 0.2 | 12.516 | 0.036 | 4420 | VV | ? | 11.80 |
| 8 | | 0.0 | 12.877 | | 201485 | VB | | 12.10 |
| 9 | 1,1,1-TCA | 42.7 | 14.554 | 0.024 | 578923 | BB | | 12.35 |
| 10 | TCE | 13.6 | 17.618 | 0.028 | 157128 | BV | | 11.65 |
| 11 | BR2CLCH | 0.6 | 18.378 | 0.128 | 5027 | T | | 14.70 |
| 12 | PCE | 0.4 | 23.357 | 0.037 | 4941 | BB | | 13.05 |
| TOTALS: | | 63.1 | | 0.360 | 1038170 | | | |

| GROUP# | RESULT |
|---|---|
| 1 | 0.8 |

DETECTED PKS: 12 REJECTED PKS: 0

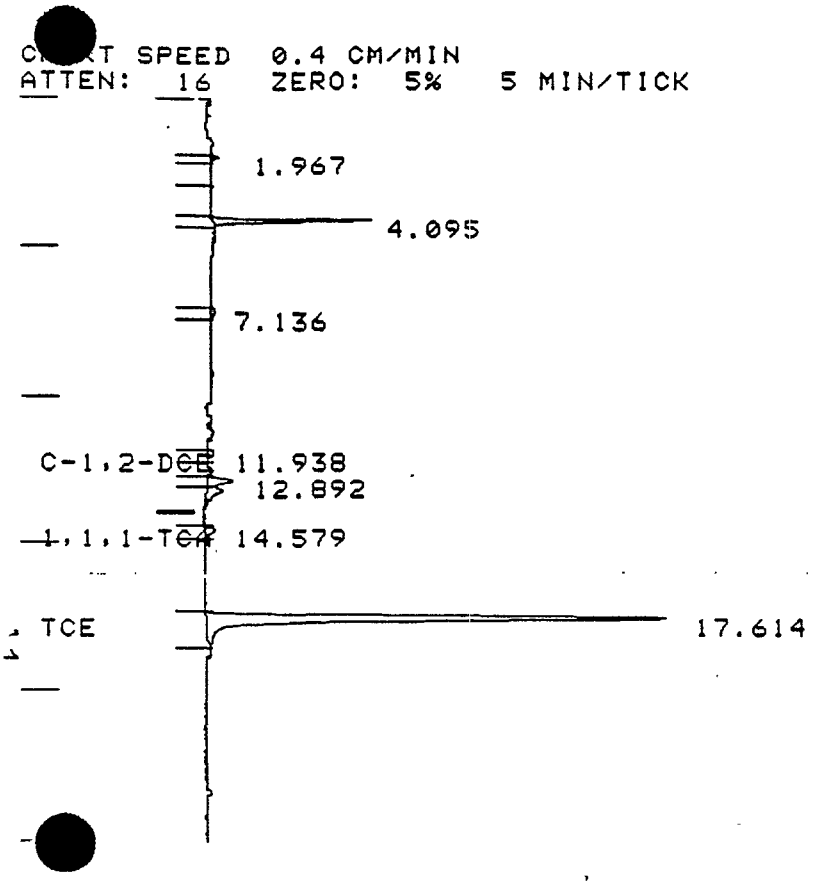
SOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 19.4 OFFSET: -51

SAVED FILE: 2278

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS

300336




TITLE: VOLATILE ORGANIC ANALYSIS 15:52 25 MAR 86

CHANNEL NO: 2 SAMPLE: 723 VARIETY METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 4.095 | | 11646 | BB | | 4.95 |
| 2 | | 0.0 | 12.892 | | 3864 | BV | | 12.15 |
| 3 | 1,2-DCA | 0.4 | 13.242 | 0.042 | 3485 | VB | ? | 13.30 |
| 4 | 1,1,1-TCA | 0.1 | 14.579 | 0.049 | 1650 | BB | | 13.35 |
| 5 | TCE | 6.6 | 17.614 | 0.024 | 76570 | BB | | 11.70 |
| TOTALS: | | 7.1 | | 0.115 | 97215 | | | |

DETECTED PKS: 8 REJECTED PKS: 3

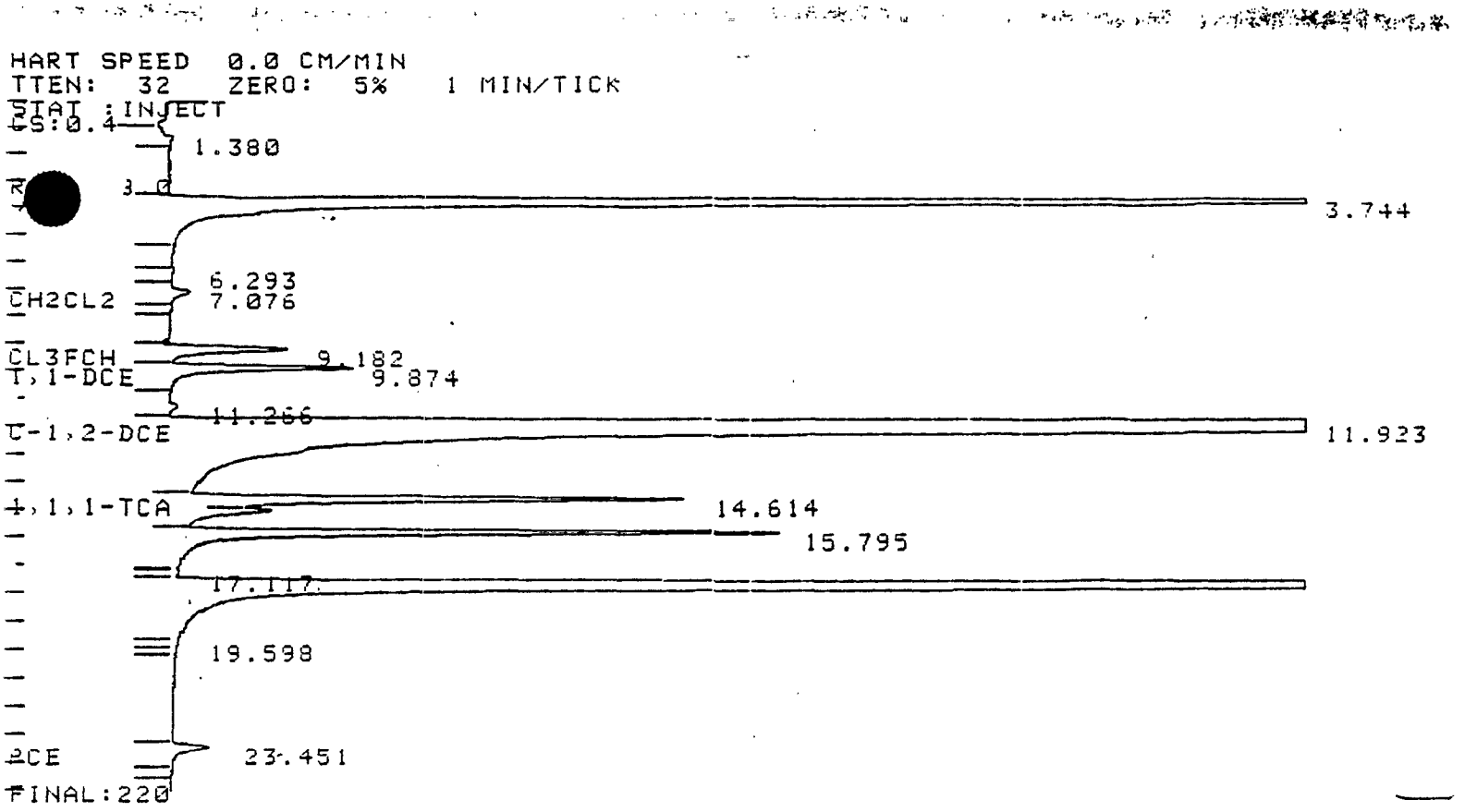
DIVISOR: 1.00000 MULTIPLIER: 1.00000

N 19.4 OFFSET: -47

SAVED FILE: 2279

300337

NOTES:
HECD R:100/TEMP:810°C/5 ML SAMPLE BY ALS
FILE SAVED ON DISC NO.42 SIDE 2




ITLE: VOLATILE ORGANIC ANALYSIS 20:59 30 MAR 84

HANNEL NO: 2 SAMPLE: 372 SF1 1155 METHOD: 502.1

| EAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | REA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.380 | | 3816 | BB | ? | 14.30 |
| 2 | VC | 63.1 | 3.744 | 0.024 | 819887 | BB | | 11.45 |
| 3 | | 0.0 | 6.293 | | 1269 | BV | | 13.70 |
| 4 | CH2CL2 | 0.7 | 7.076 | 0.066 | 8673 | VB | | 15.05 |
| 5 | | 0.0 | 9.182 | | 49315 | BV | | 12.80 |
| 6 | 1,1-DCE | 10.7 | 9.874 | -0.016 | 76049 | VV | | 12.35 |
| 7 | | 0.0 | 11.266 | | 7511 | VV | | 18.10 |
| 8 | C-1,2-DCE | 800.4 | 11.923 | -0.017 | 10699200 | VV | | 12.25 |
| 9 | 1,1,1-TCA | 14.4 | 14.614 | -0.006 | 179243 | T | | 12.75 |
| 10 | CCL4 | 2.2 | 15.005 | 0.005 | 34977 | T | ? | 21.70 |
| 11 | | 0.0 | 15.795 | | 207796 | T | | 11.25 |
| 12 | TCE | 116.1 | 17.673 | 0.003 | 1817320 | VV | | 11.70 |
| 13 | PCE | 1.0 | 23.451 | 0.041 | 17180 | BB | | 14.15 |
| TOTALS: | | 1008.6 | | 0.100 | 13922200 | | | |

ETECTED PKS: 16 REJECTED PKS: 3

.: 1.00000 MULTIPLIER: 1.00000

NOISE: 2.4 OFFSET: 349

SAVED FILE: 6041

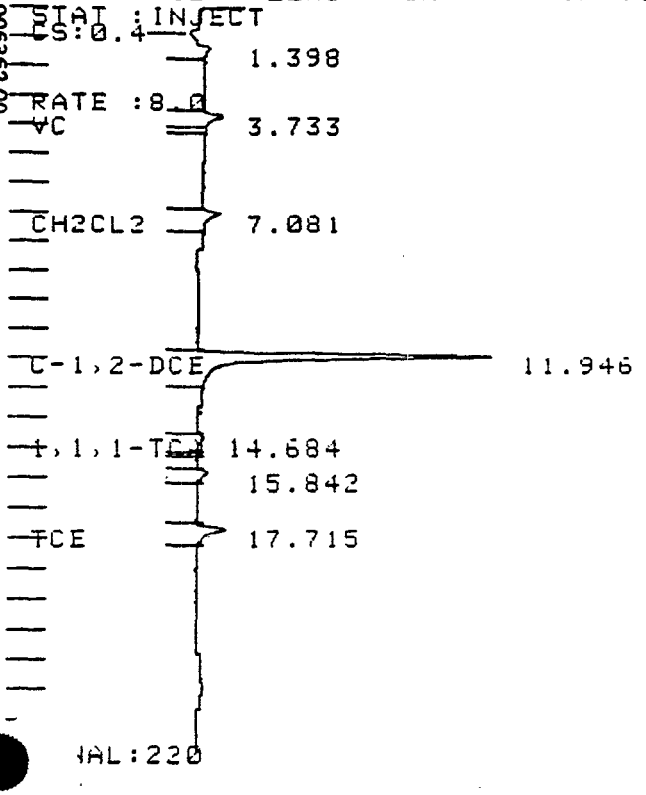
ERRORS:
RESOLUTION PEAK MISSING

300338

/sunnyvale, calif.

3-906362-00

...RT SPEED 0.0 CM/MIN
ATTEN: 32 ZERO: 5% 1 MIN/TICK
STAT :INJECT
LS:0.4




IAL:220

56

TITLE: VOLATILE ORGANIC ANALYSIS 20:22 30 MAR 84

CHANNEL NO: 2 SAMPLE: 372 SF1 1155 METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.398 | | 5158 | BB | ? | 14.70 |
| 2 | VC | 50.0 | 3.733 | 0.013 | 6497 | BV | | 13.60 |
| 3 | | 0.0 | 7.081 | | 7151 | BB | | 15.30 |
| 4 | C-1,2-DCE | 774.9 | 11.946 | 0.006 | 103584 | BB | | 12.00 |
| 5 | 1,1,1-TCA | 19.2 | 14.684 | 0.064 | 2384 | BB | ? | 16.30 |
| 6 | | 0.0 | 15.842 | | 2720 | BB | | 11.55 |
| 7 | TCE | 69.0 | 17.715 | 0.045 | 10305 | BB | | 13.45 |
| TOTALS: | | 913.1 | | 0.128 | 138299 | | | |

TECTED PKS: 8 REJECTED PKS: 1

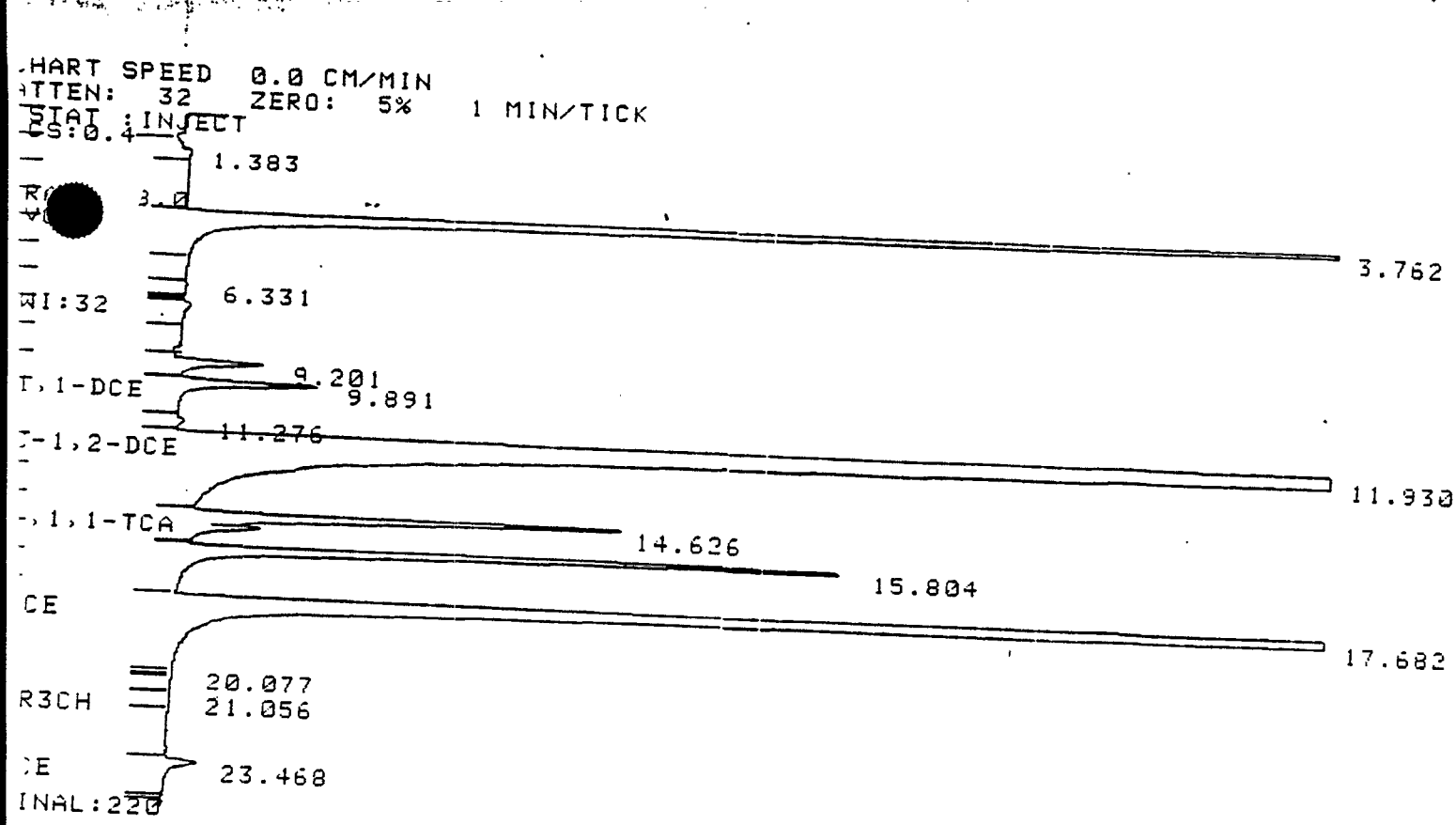
/ISOR: 1.00000 MULTIPLIER: 100.000

NOISE: 2.4 OFFSET: 365

SAVED FILE: 6040

300339

ERRORS:
RESOLUTION PEAK MISSING




LE: VOLATILE ORGANIC ANALYSIS

NNEL NO: 2 SAMPLE: 371 SPI 1033 19:46 30 MAR 84 METHOD: 502.1

| | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.383 | | 4269 | BB | ? | 14.80 |
| 2 | | 0.0 | 3.762 | | 545191 | BB | | 11.45 |
| 3 | | 0.0 | 6.331 | | 1257 | BB | ? | 32.00 |
| 4 | | 0.0 | 7.115 | | 3888 | BB | | 14.25 |
| 5 | | 0.0 | 9.201 | | 35955 | BV | | 13.05 |
| 6 | 1,1-DCE | 8.6 | 9.891 | 0.001 | 61516 | VV | | 12.45 |
| 7 | | 0.0 | 11.276 | | 5729 | VV | | 20.30 |
| 8 | C-1,2-DCE | 744.0 | 11.930 | -0.010 | 9945560 | VV | | 12.30 |
| 9 | 1,1,1-TCA | 12.4 | 14.626 | 0.006 | 153971 | T | | 12.65 |
| 10 | CCL4 | 1.8 | 15.018 | 0.018 | 28376 | T | ? | 23.10 |
| | | 0.0 | 15.804 | | 231387 | T | | 11.55 |
| | TCE | 93.9 | 17.682 | 0.012 | 1470700 | VV | | 11.80 |
| | PCE | 0.9 | 23.468 | 0.058 | 14946 | BB | ? | 11.55 |
| | LS: | 861.6 | | 0.085 | 12502700 | | | |

CTED PKS: 16 REJECTED PKS: 3

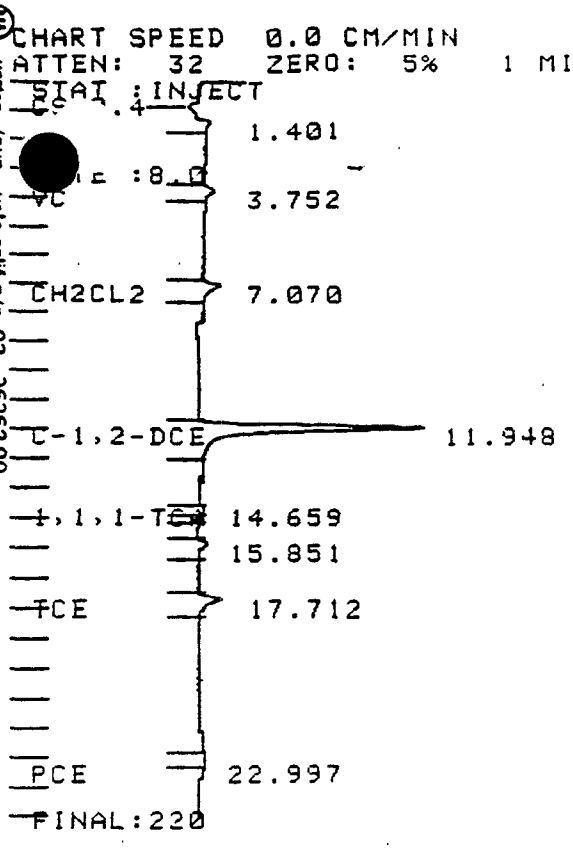
SC .00000 MULTIPLIER: 1.00000

E: 2.4 OFFSET: 360

D FILE: 6039

300340

RS:
SOLUTION PEAK MISSING




TITLE: VOLATILE ORGANIC ANALYSIS 19:09 30 MAR 84

CHANNEL NO: 2 SAMPLE: 371 SF1 1033 METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.401 | | 4837 | BB | ? | 14.40 |
| 2 | VC | 28.6 | 3.752 | 0.032 | 3717 | BB | | 15.45 |
| 3 | CH2CL2 | 58.5 | 7.070 | 0.060 | 6780 | BB | | 15.15 |
| 4 | C-1,2-DCE | 616.2 | 11.948 | 0.008 | 82368 | BB | | 11.95 |
| 5 | 1,1,1-TCA | 10.9 | 14.659 | 0.039 | 1357 | BV | ? | 15.75 |
| 6 | | 0.0 | 15.851 | | 3288 | BB | | 13.10 |
| 7 | TCE | 50.3 | 17.712 | 0.042 | 7870 | BB | | 13.45 |
| 8 | | 0.0 | 22.997 | | 1542 | BB | ? | 20.15 |
| TOTALS: | | 764.5 | | 0.181 | 111759 | | | |

DETECTED PKS: 9 REJECTED PKS: 1

DIVISOR: 1.00000 MULTIPLIER: 100.000

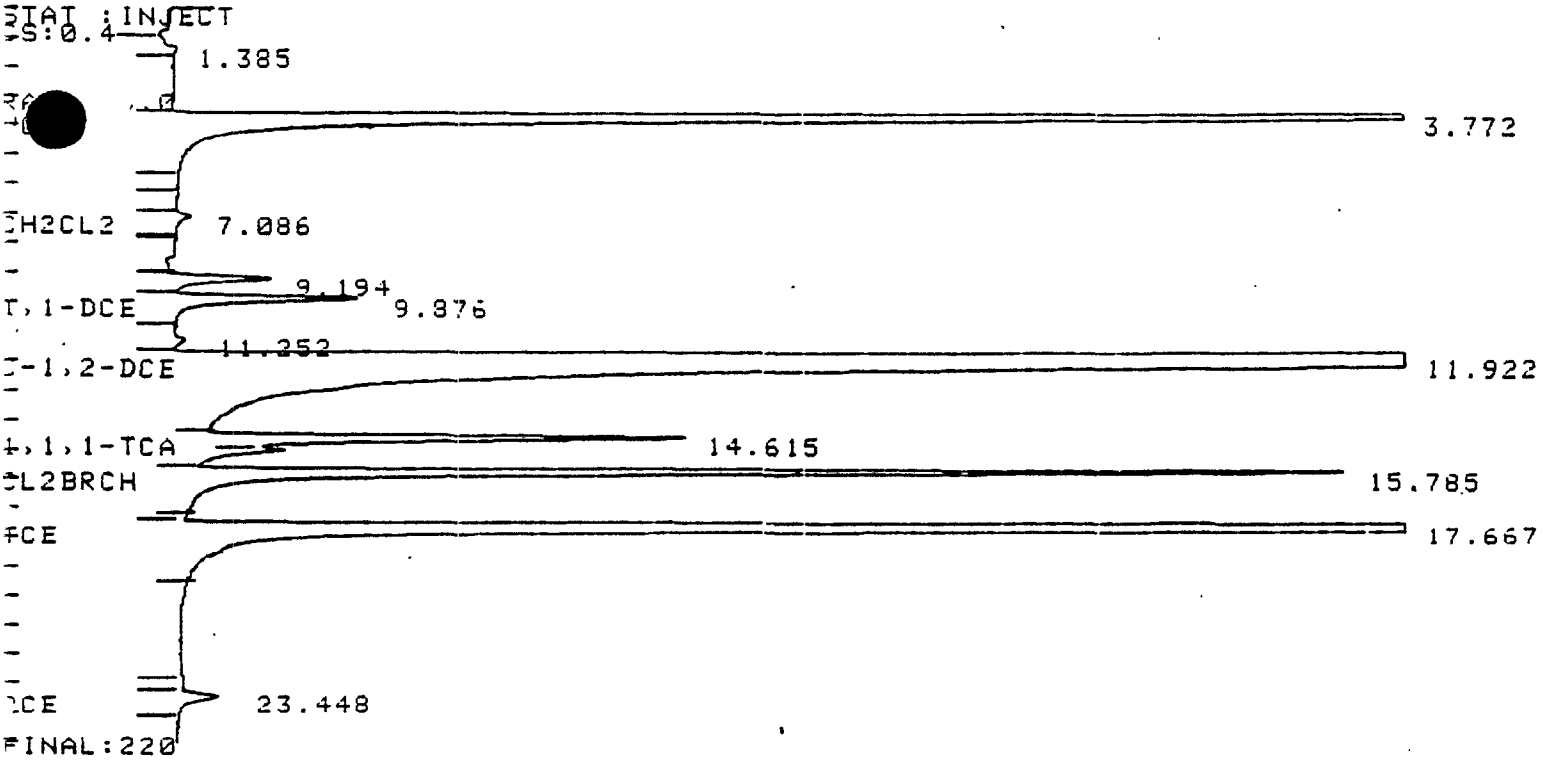
NOISE: 2.4 OFFSET: 381

D FILE: 6038

ERRORS:
RESOLUTION PEAK MISSING

300341

NOTES:
HECD R:100/TEMP:815°C/5 ML SAMPLE BY ALS
FILE TEMPORARILY SAVED ON DISC NO. 45




ITLE: VOLATILE ORGANIC ANALYSIS 18:33 30 MAR 84

HANNEL NO: 2 SAMPLE: 370 SF1 1015 METHOD: 502.1

| EAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.385 | | 2531 | BB | ? | 13.70 |
| 2 | | 0.0 | 3.772 | | 842384 | BB | | 11.60 |
| 3 | | 0.0 | 7.086 | | 6582 | BB | | 15.15 |
| 4 | | 0.0 | 9.194 | | 39354 | BV | | 13.25 |
| 5 | 1,1-DCE | 9.9 | 9.876 | -0.014 | 70256 | VV | | 12.55 |
| 6 | | 0.0 | 11.252 | | 6106 | VV | | 19.15 |
| 7 | C-1,2-DCE | 1021.0 | 11.922 | -0.018 | 13648400 | VV | | 12.65 |
| 8 | 1,1,1-TCA | 13.0 | 14.615 | -0.005 | 161462 | T | | 13.00 |
| 9 | CCL4 | 2.0 | 15.008 | 0.008 | 30398 | T | ? | 24.95 |
| 10 | | 0.0 | 15.785 | | 360191 | T | | 10.95 |
| 11 | TCE | 97.7 | 17.667 | -0.003 | 1529760 | VB | | 11.70 |
| 12 | PCE | 0.9 | 23.448 | 0.038 | 14106 | BB | | 13.30 |
| OTALS: | | 1144.5 | | 0.006 | 16711500 | | | |

ETECTED PKS: 12 REJECTED PKS: 0

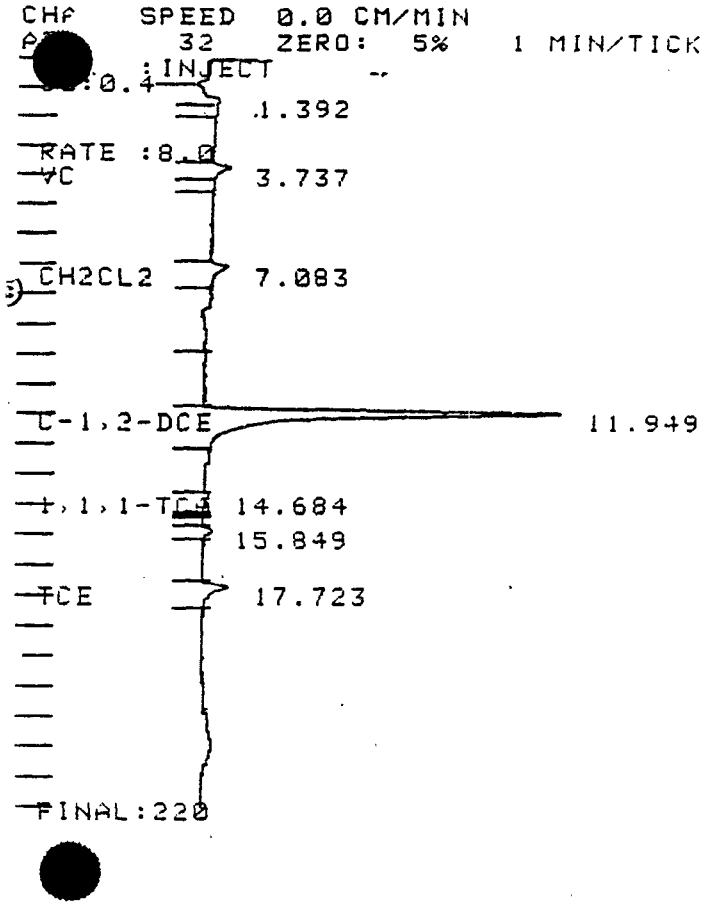
IVI : 1.00000 MULTIPLIER: 1.00000

2.4 OFFSET: 367

AVED FILE: 6037

300342

RRORS:
RESOLUTION PEAK MISSING




TITLE: VOLATILE ORGANIC ANALYSIS 17:56 30 MAR 84

CHANNEL NO: 2 SAMPLE: 370 SF1 1015 METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.392 | | 6493 | BV | ? | 13.40 |
| 2 | | 0.0 | 1.574 | | 2911 | VB | ? | |
| 3 | VC | 51.0 | 3.737 | 0.017 | 6619 | BV | | 14.10 |
| 4 | | 0.0 | 4.114 | | 963 | VB | ? | |
| 5 | | 0.0 | 7.083 | | 7973 | BB | | 15.40 |
| 6 | C-1,2-DCE | 1094.2 | 11.949 | 0.009 | 146272 | BB | | 12.60 |
| 7 | 1,1,1-TCA | 16.1 | 14.684 | 0.064 | 2002 | BB | | 13.00 |
| 8 | | 0.0 | 15.849 | | 2742 | BB | | 14.15 |
| 9 | TCE | 61.7 | 17.723 | 0.053 | 9669 | BB | | 13.85 |
| TOTALS: | | 1223.0 | | 0.143 | 185644 | | | |

DETECTED PKS: 9 REJECTED PKS: 0

.: 1.00000 MULTIPLIER: 100.000

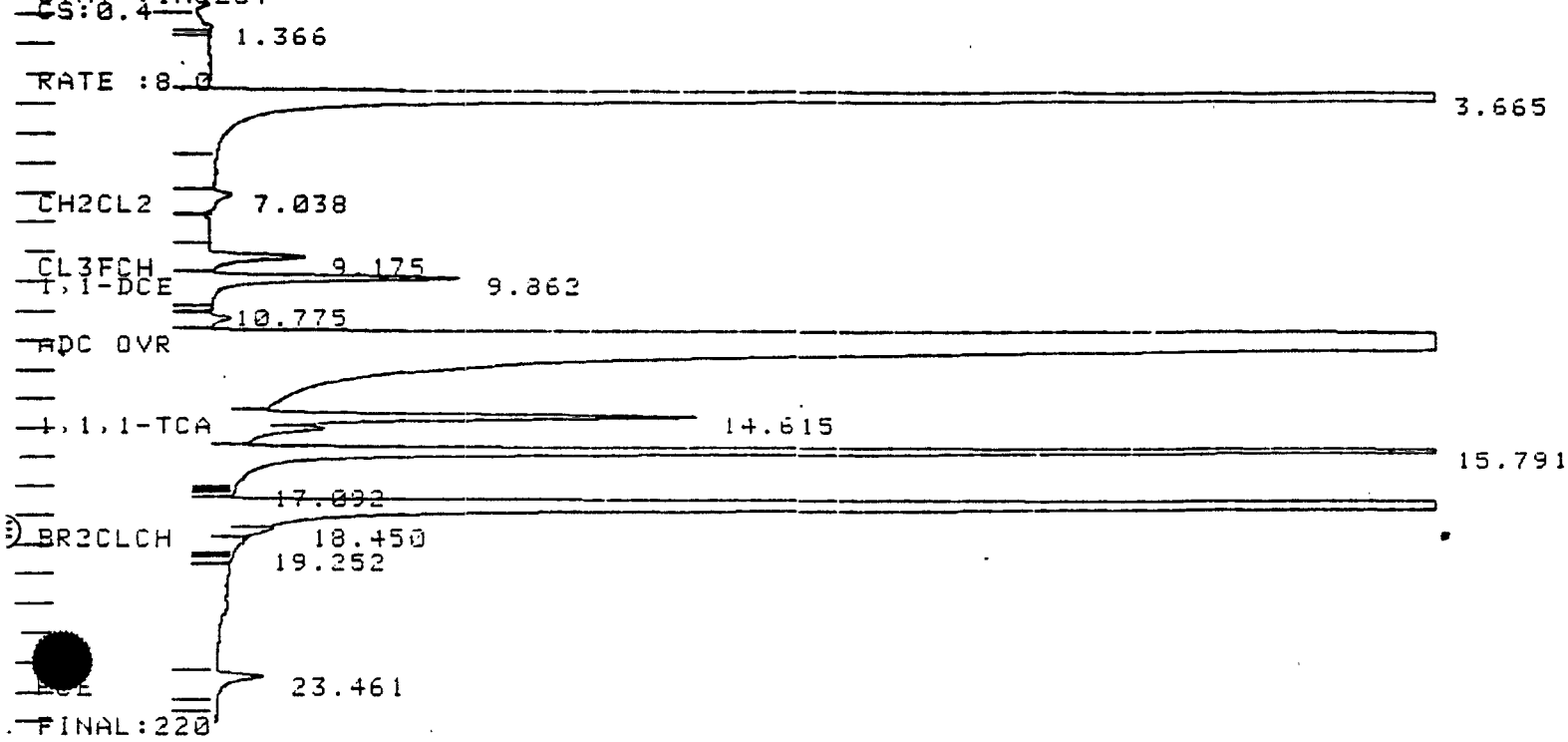
NOISE: 2.4 OFFSET: 398

SAVED FILE: 6036

ERRORS:
RESOLUTION PEAK MISSING

300343

HECD R:100/TEMP:815°C/5 ML SAMPLE BY ALS
FILE TEMPORARILY SAVED ON DISC NO. 45



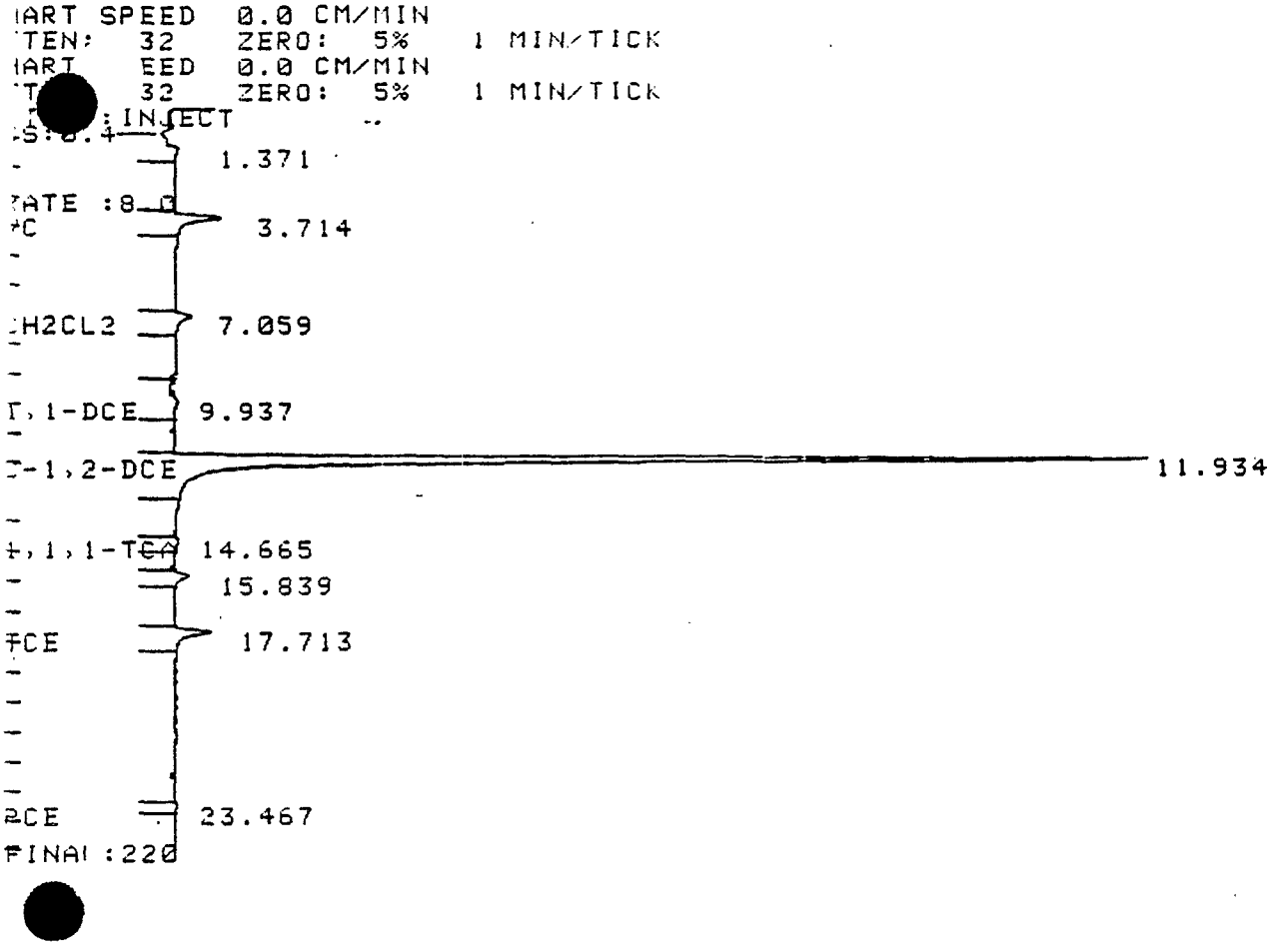

TITLE: VOLATILE ORGANIC ANALYSIS 17:20 30 MAR 84

CHANNEL NO: 2 SAMPLE: 369 SFI 1009 METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.366 | | 2621 | BV | ? | 13.20 |
| 2 | | 0.0 | 3.665 | | 1890560 | BB | | 10.40 |
| 3 | CH2CL2 | 0.9 | 7.038 | 0.028 | 10245 | BB | | 15.00 |
| 4 | | 0.0 | 9.175 | | 35526 | BV | | 12.65 |
| 5 | 1,1-DCE | 12.6 | 9.862 | -0.028 | 89972 | VV | | 12.20 |
| 6 | | 0.0 | 11.245 | | 6361 | VV | | 14.65 |
| 7 | C-1,2-DCE | 1416.2 | 11.947 | 0.007 | 18931500 | VV | | 16.40 |
| 8 | 1,1,1-TCA | 12.0 | 14.615 | -0.005 | 148739 | T | | 13.85 |
| 9 | CCL4 | 1.7 | 15.018 | 0.018 | 25863 | T | ? | 31.60 |
| 10 | | 0.0 | 15.791 | | 559584 | T | | 11.15 |
| 11 | CE | 93.9 | 17.674 | 0.004 | 1470400 | VV | | 11.85 |
| 12 | BR2CLCH | 0.2 | 18.450 | 0.090 | 1727 | T | ? | 1.30 |
| 13 | PCE | 1.1 | 23.461 | 0.051 | 18353 | BB | | 14.05 |
| TOTALS: | | 1538.6 | | 0.165 | 23192000 | | | |

300344

GROUP# RESULT




ITLE: VOLATILE ORGANIC ANALYSIS 16:40 30 MAR 84

HANNEL NO: 2 SAMPLE: 369 SF1 1009 METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.371 | | 5049 | BB | ? | 13.00 |
| 2 | VC | 125.3 | 3.714 | -0.006 | 16265 | BB | | 12.50 |
| 3 | CH2CL2 | 59.7 | 7.059 | 0.049 | 6912 | BB | | 15.55 |
| 4 | 1,1-DCE | 52.7 | 9.937 | 0.047 | 3752 | BB | | 22.90 |
| 5 | C-1,2-DCE | 2451.1 | 11.934 | -0.006 | 327656 | BB | | 11.50 |
| 6 | 1,1,1-TCA | 13.2 | 14.665 | 0.045 | 1646 | BB | | 15.10 |
| 7 | | 0.0 | 15.839 | | 5246 | BB | | 13.00 |
| 8 | TCE | 86.7 | 17.713 | 0.043 | 13575 | BB | | 13.60 |
| TOTALS: | | 2788.7 | | 0.172 | 380101 | | | |

ETECTED PKS: 9 REJECTED PKS: 1

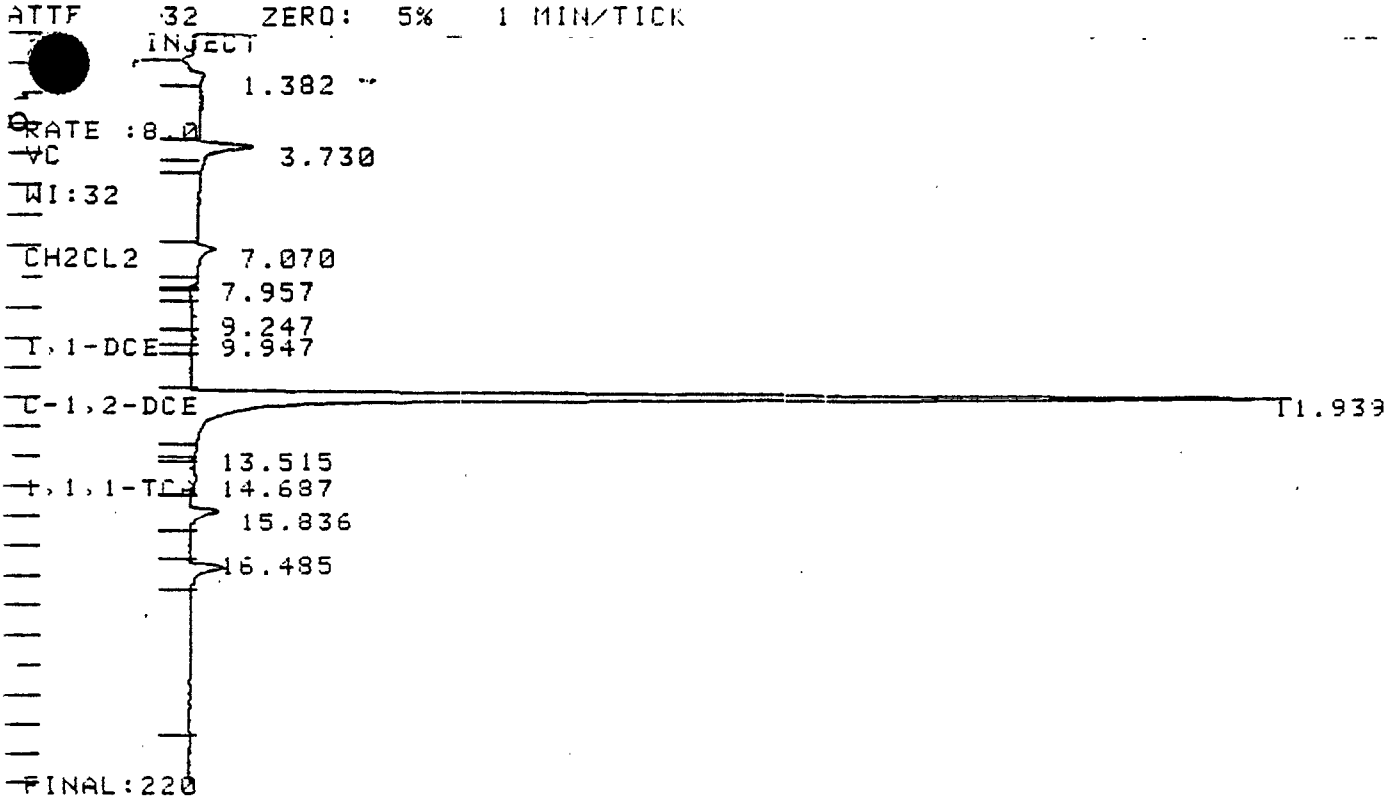
: 1.00000 MULTIPLIER: 100.000

OISE: 2.4 OFFSET: 353

300345

SAVED FILE: 6034

ERRORS:
RESOLUTION PEAK MISSING




TITLE: VOLATILE ORGANIC ANALYSIS 15:46 30 MAR 84

CHANNEL NO: 2 SAMPLE: 368 SF1 1005 METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.382 | | 4869 | BB | ? | 13.30 |
| 2 | VC | 153.8 | 3.730 | 0.010 | 19966 | BV | | 12.80 |
| 3 | | 0.0 | 4.171 | | 1541 | VB | ? | 29.60 |
| 4 | CH2CL2 | 130.2 | 7.070 | 0.060 | 15082 | BV | | 14.60 |
| 5 | | 0.0 | 7.957 | | 900 | T | ? | 26.10 |
| 6 | | 0.0 | 9.247 | | 2906 | VV | ? | 52.10 |
| 7 | 1,1-DCE | 23.1 | 9.947 | 0.057 | 1646 | VV | ? | 11.30 |
| 8 | C-1,2-DCE | 3042.2 | 11.939 | -0.001 | 406672 | BV | ? | 8.70 |
| 9 | 1,1,1-TCA | 24.5 | 14.687 | 0.067 | 3043 | T | ? | 29.40 |
| 10 | | 0.0 | 15.836 | | 11358 | T | | 12.65 |
| 11 | | 0.0 | 16.485 | | 1310 | T | ? | 103.70 |
| 12 | TCE | 89.5 | 17.719 | 0.049 | 14011 | T | | 13.65 |
| TOTALS: | | 3463.3 | | 0.242 | 483304 | | | |

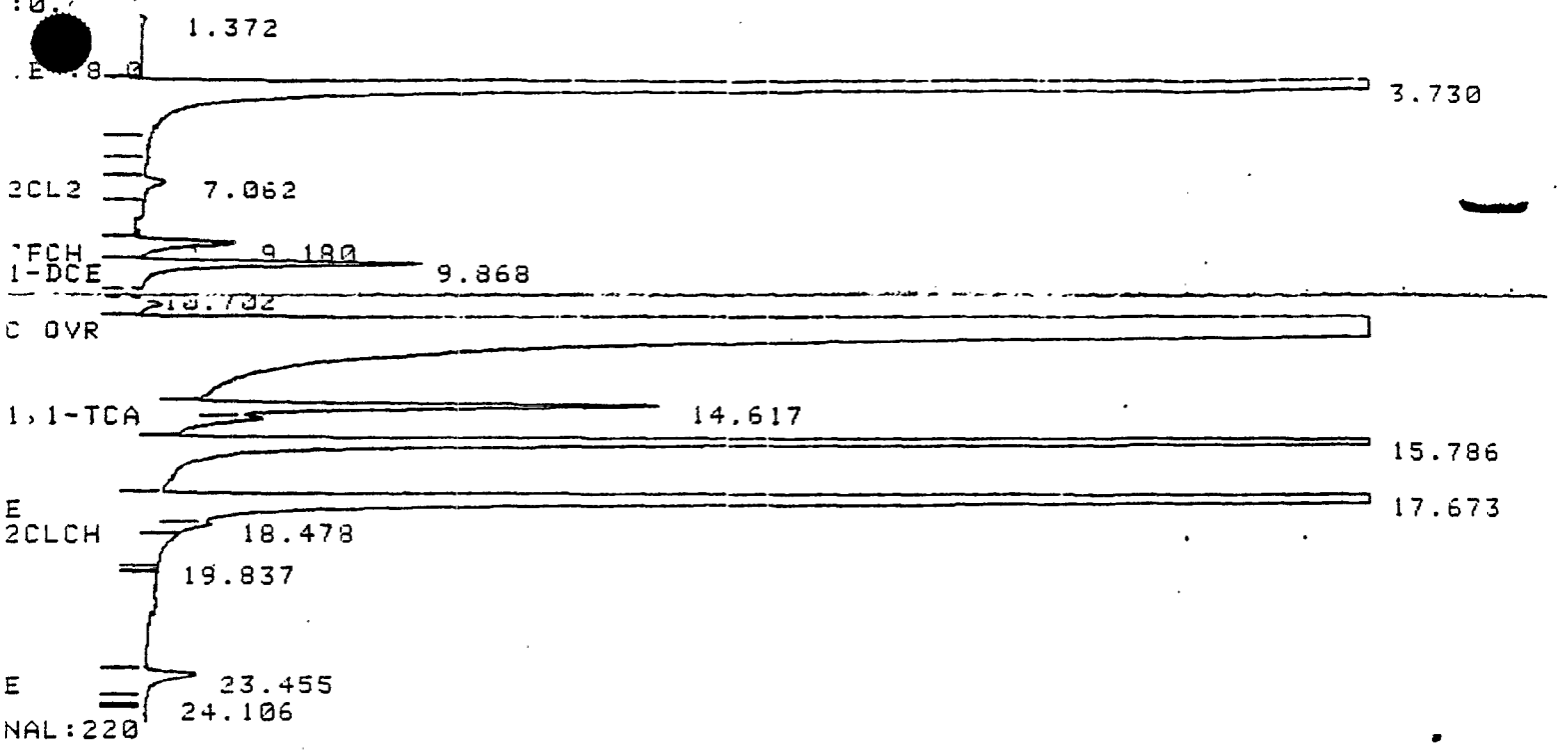
[redacted]ED PKS: 15 REJECTED PKS: 3

DIVISOR: 1.00000 MULTIPLIEP: 100.000

NOISE: 2.4 OFFSET: 400

300346

[redacted]ED FILE: 6033




LE: VOLATILE ORGANIC ANALYSIS 15:06 30 MAR 84

NNEL NO: 2 SAMPLE: 368 SF1 1005 METHOD: 502.1

| K | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.372 | | 3692 | BB | ? | 14.10 |
| 2 | VC | 161.4 | 3.730 | 0.010 | 2096010 | BB | | 11.55 |
| 3 | CH2CL2 | 0.8 | 7.062 | 0.052 | 8719 | BB | | 14.45 |
| 4 | | 0.0 | 9.180 | | 36015 | BV | | 12.90 |
| 5 | 1,1-DCE | 14.1 | 9.868 | -0.022 | 100482 | VV | | 11.95 |
| 6 | | 0.0 | 11.250 | | 7436 | VV | | 14.20 |
| 7 | C-1,2-DCE | 1489.4 | 11.946 | 0.006 | 19910300 | VV | | 17.25 |
| 8 | 1,1,1-TCA | 12.5 | 14.617 | -0.003 | 155402 | T | | 13.40 |
| 9 | CCL4 | 1.8 | 15.015 | 0.015 | 27560 | T | ? | 32.65 |
| 0 | | 0.0 | 15.786 | | 877480 | VV | | 11.00 |
| 1 | TCE | 103.8 | 17.673 | 0.003 | 1625700 | VV | | 11.85 |
| 2 | BR2CLCH | 0.3 | 18.478 | 0.118 | 2700 | T | ? | 7.80 |
| 3 | PCE | 1.4 | 23.455 | 0.045 | 22445 | BV | | 14.45 |
| TALS: | | 1785.5 | | 0.224 | 24873900 | | | |

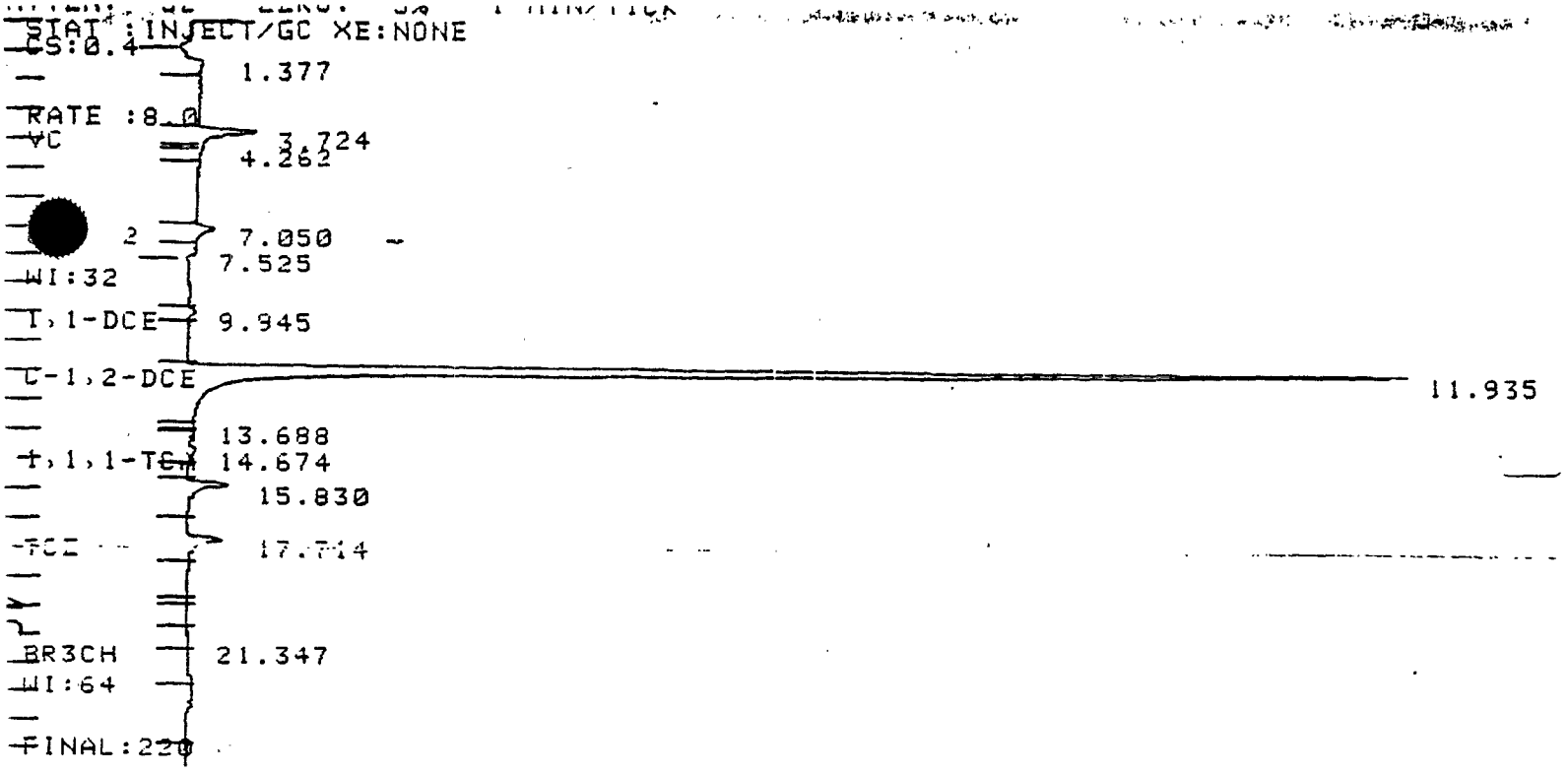
| | RESULT |
|---|---|
| | 0.3 |

TECTED PKS: 16 REJECTED PKS: 3

/ISOR: 1.00000 MULTIPLIER: 1.00000

ISE: 2.4 OFFSET: 375

300347




ITLE: VOLATILE ORGANIC ANALYSIS 14:32 30 MAR 84

HANNEL NO: 2 SAMPLE: 367 SF1 1002 METHOD: 502.1

| EAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.3 | 1.377 | | 6905 | BB | ? | 13.10 |
| 2 | VC | 163.3 | 3.724 | 0.004 | 21202 | BV | | 12.45 |
| 3 | | 0.0 | 4.126 | | 941 | VV | ? | |
| 4 | | 0.0 | 4.262 | | 1153 | VB | ? | |
| 5 | CH2CL2 | 88.2 | 7.050 | 0.040 | 10214 | BV | | 15.60 |
| 6 | | 0.0 | 7.525 | | 4119 | VB | ? | 50.60 |
| 7 | 1,1-DCE | 23.4 | 9.945 | 0.055 | 1667 | BB | | 13.55 |
| 8 | C-1,2-DCE | 3377.1 | 11.935 | -0.005 | 451433 | BV | | 11.50 |
| 9 | 1,1,1-TCA | 14.2 | 14.674 | 0.054 | 1765 | T | ? | 20.95 |
| 10 | | 0.0 | 15.830 | | 14972 | T | | 12.30 |
| 11 | TCE | 85.1 | 17.714 | 0.044 | 13331 | T | | 12.75 |
| 12 | | 0.0 | 21.347 | | 1114 | BB | ? | 54.60 |
| 13 | | 0.0 | 25.084 | | 1419 | BB | | 27.60 |
| TALS: | | 3751.3 | | 0.192 | 530235 | | | |

TECTED PKS: 14 REJECTED PKS: 1

VISOR: 1.00000 MULTIPLIER: 100.000

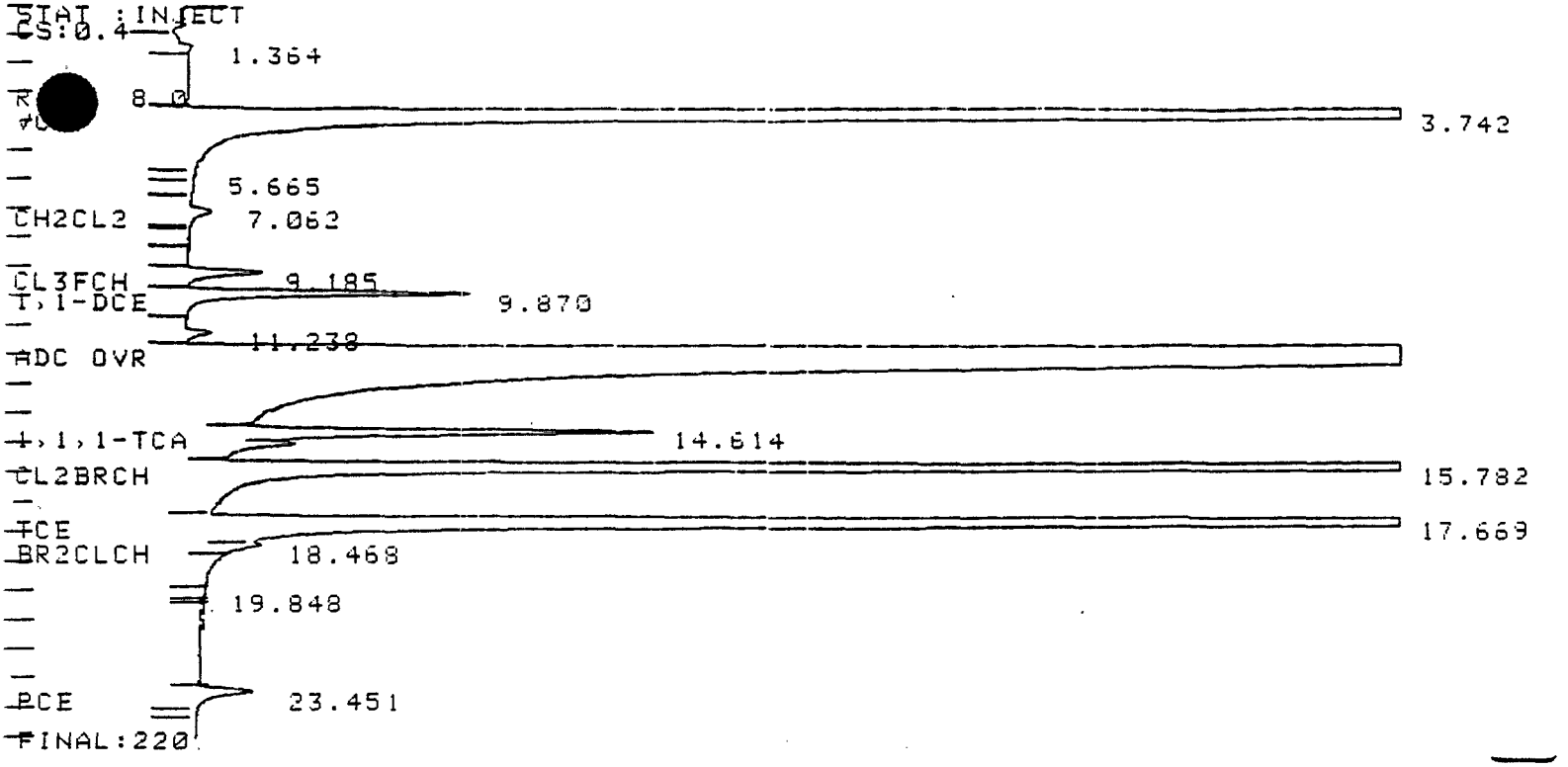
ISE: 2.4 OFFSET: 408

V E: 6031

RORS:
RESOLUTION PEAK MISSING

TES:
HECD R:100/TEMP:815°C/5 ML SAMPLE BY ALS
FILE TEMPORARILY SAVED ON DISC NO. 44

300348




TITLE: VOLATILE ORGANIC ANALYSIS 13:55 30 MAR 84

CHANNEL NO: 2 SAMPLE: 367 SF1 1002 METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.364 | | 3432 | BB | ? | 12.10 |
| 2 | VC | 180.7 | 3.742 | 0.022 | 2346830 | BV | | 11.35 |
| 3 | CH2CL2 | 0.8 | 7.062 | 0.052 | 8931 | T | | 18.00 |
| 4 | | 0.0 | 9.185 | | 27376 | BV | | 13.05 |
| 5 | 1,1-DCE | 13.6 | 9.870 | -0.020 | 96955 | VV | | 11.90 |
| 6 | | 0.0 | 11.238 | | 7239 | VV | | 11.75 |
| 7 | C-1,2-DCE | 1540.0 | 11.933 | -0.007 | 20586600 | VV | | 17.85 |
| 8 | 1,1,1-TCA | 11.4 | 14.614 | -0.006 | 142153 | T | | 13.85 |
| 9 | CCL4 | 1.4 | 15.018 | 0.018 | 21776 | T | ? | 33.45 |
| 10 | | 0.0 | 15.782 | | 1192030 | VV | | 11.00 |
| 11 | TCE | 102.1 | 17.669 | -0.001 | 1598270 | VV | | 11.80 |
| 12 | BR2CLCH | 0.4 | 18.468 | 0.108 | 3794 | T | ? | 9.80 |
| 13 | PCE | 1.3 | 23.451 | 0.041 | 21720 | BB | | 13.60 |
| TOTALS: | | 1851.7 | | 0.207 | 26057100 | | | |

GROUP# RESULT
0.4

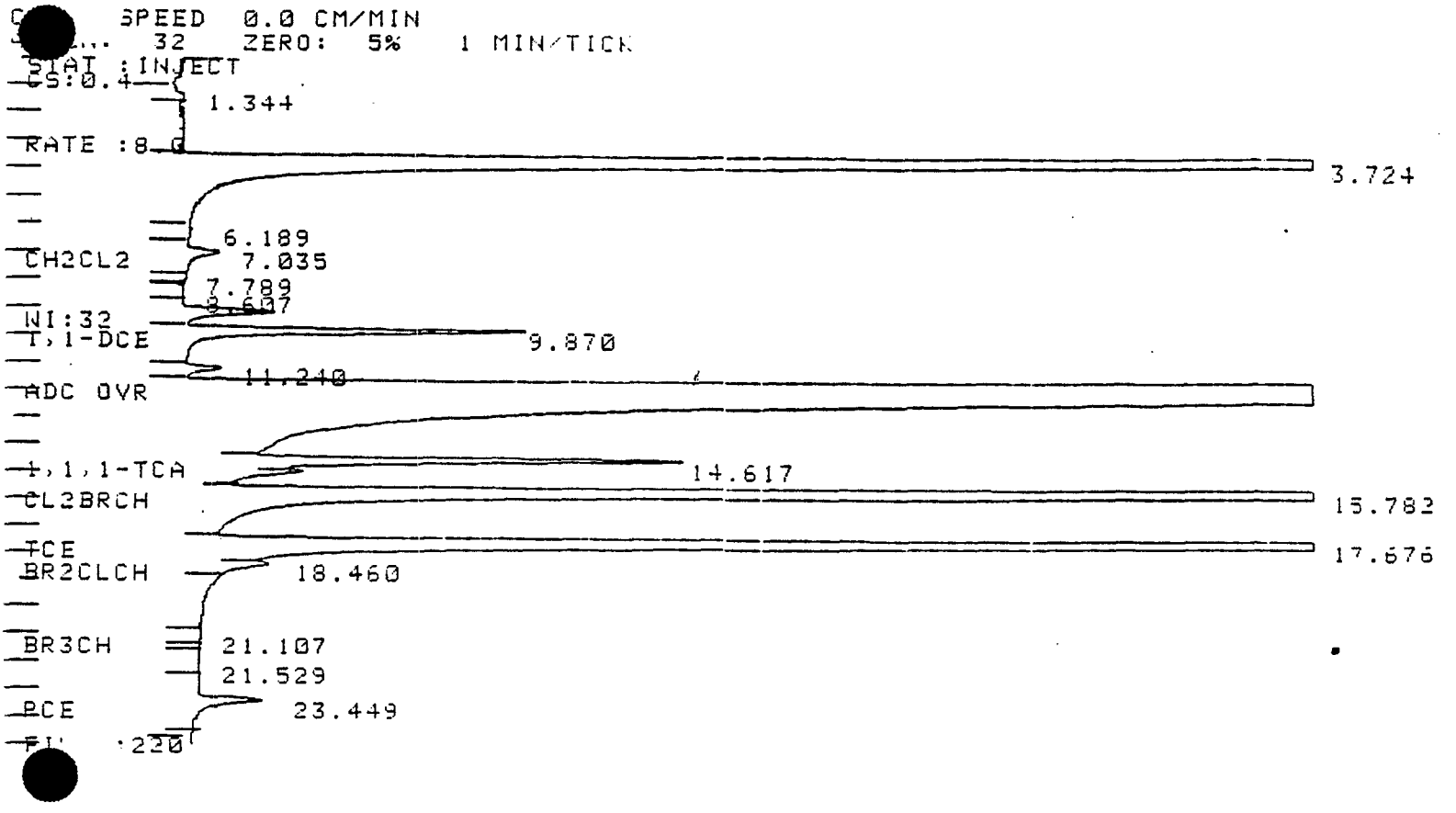
DETECTED PKS: 16 REJECTED PKS: 3

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: 2.4 OFFSET: 371

SAVED FILE: 6030

300349

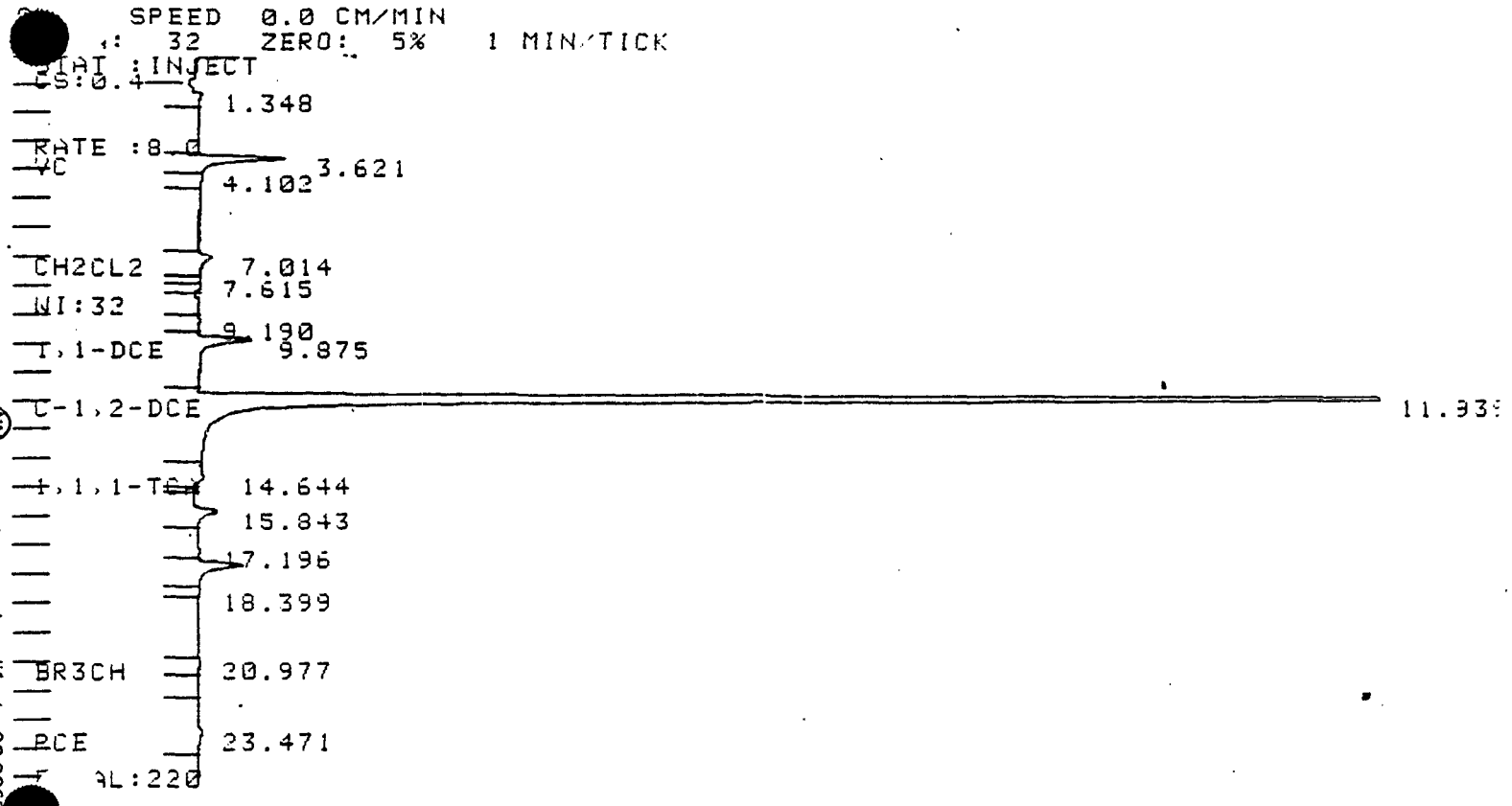



TITLE: VOLATILE ORGANIC ANALYSIS 13:06 30 MAR 84

CHANNEL NO: 2 SAMPLE: 366 SF1 1000 METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | WI/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.344 | | 1288 | BB | ? | 11.70 |
| 2 | | 0.0 | 3.724 | | 3261410 | BV | | 11.35 |
| 3 | | 0.0 | 6.189 | | 1361 | T | ? | 6.70 |
| 4 | CH2CL2 | 1.7 | 7.035 | 0.025 | 19615 | T | ? | 14.90 |
| 5 | | 0.0 | 7.789 | | 2097 | T | ? | 31.10 |
| 6 | | 0.0 | 8.607 | | 868 | T | ? | 28.10 |
| 7 | | 0.0 | 9.183 | | 38228 | T | ? | 10.45 |
| 8 | 1,1-DCE | 18.4 | 9.870 | -0.020 | 131095 | T | | 12.05 |
| 9 | | 0.0 | 11.240 | | 12113 | T | | 13.70 |
| 10 | C-1,2-DCE | 1632.5 | 11.946 | 0.006 | 21822900 | VV | | 18.85 |
| 11 | 1,1,1-TCA | 12.9 | 14.617 | -0.003 | 163363 | T | | 14.05 |
| 12 | CCL4 | 1.4 | 15.006 | 0.006 | 21304 | T | ? | 31.40 |
| 13 | | 0.0 | 15.782 | | 2675150 | VV | | 10.90 |
| 14 | E | 119.9 | 17.676 | 0.006 | 1876910 | VV | | 11.90 |
| [redacted] | 2CLCH | 0.7 | 18.460 | 0.100 | 6526 | T | ? | 10.50 |
| [redacted] | BR3CH | 0.3 | 21.107 | 0.007 | 1345 | T | ? | 27.40 |
| 17 | | 0.0 | 21.529 | | 2186 | T | ? | |
| 18 | PCE | 2.0 | 23.443 | 0.039 | 33694 | T | ? | 15.15 |
| TOTALS: | | 1789.8 | | 0.166 | 30068500 | | | |

300350




TITLE: VOLATILE ORGANIC ANALYSIS 12:24 30 MAR 84

CHANNEL NO: 2 SAMPLE: 366 SF1 1000 METHOD: 502.1

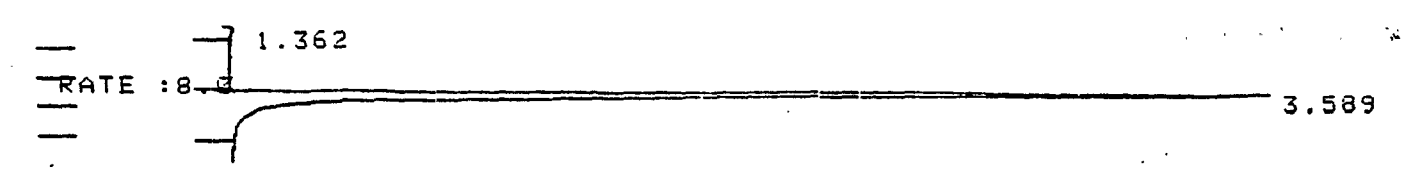
| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.348 | | 3785 | BB | ? | 12.00 |
| 2 | VC | 230.9 | 3.621 | 0.031 | 29382 | BV | | 11.20 |
| 3 | | 0.0 | 4.102 | | 1912 | VB | ? | |
| 4 | CH2CL2 | 80.1 | 7.014 | 0.004 | 9280 | BV | | 14.95 |
| 5 | | 0.0 | 7.615 | | 1533 | VV | ? | 29.80 |
| 6 | | 0.0 | 7.880 | | 1649 | VV | ? | 29.80 |
| 7 | | 0.0 | 8.803 | | 2599 | VV | ? | 53.20 |
| 8 | | 0.0 | 9.190 | | 2998 | VV | ? | 16.40 |
| 9 | 1,1-DCE | 429.6 | 9.875 | -0.015 | 30578 | VV | ? | 10.25 |
| 10 | C-1,2-DCE | 4412.4 | 11.939 | -0.001 | 589828 | VV | | 11.70 |
| 11 | 1,1,1-TCA | 27.5 | 14.644 | 0.024 | 3421 | T | ? | 20.75 |
| 12 | | 0.0 | 15.843 | | 9739 | T | | 13.20 |
| 13 | | 0.0 | 17.196 | | 2626 | T | ? | 14.00 |
| | TCE | 122.4 | 17.720 | 0.050 | 19172 | T | ? | 10.85 |
| | BR3CH | 48.0 | 20.977 | -0.123 | 2440 | BV | ? | 139.15 |
| | PCE | 17.8 | 23.471 | 0.061 | 2935 | VB | | 25.20 |
| TOTALS: | | 5368.7 | | 0.031 | 714477 | | | |

300351

| GROUP# | RESULT |
|---|---|
| 1 | 48.0 |

42

varian /sunnyvale, calif p/n 03-905362-00




TITLE: VOLATILE ORGANIC ANALYSIS 12:05 30 MAR 84

CHANNEL NO: 2 SAMPLE: VC METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT FACTOR | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | | 1.362 | | 3451 | BB | ? | 14.30 |
| 2 | | | 3.589 | | 324632 | BB | | 10.35 |
| TOTALS: | | | | | 328083 | | | |

DETECTED PKS: 2 REJECTED PKS: 0

AMT STD: 1.00000

NOISE: 1.2 OFFSET: 326

SAVED FILE: 6027

ERRORS:
RESOLUTION PEAK MISSING

S:
HECD R:100/TEMP:815°C/5 ML SAMPLE BY ALS
FILE TEMPORARILY SAVED ON DISC NO. 44

RECALC
TITLE: VOLATILE ORGANIC ANALYSIS 12:05 30 MAR 84

CHANNEL NO: 2 SAMPLE: VC METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT FACTOR | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | | 1.362 | | 3451 | BB | ? | 14.30 |
| 2 | | | 3.589 | | 324632 | BB | | 10.35 |
| TOTALS: | | | | | 328083 | | | |

DETECTED PKS: 2 REJECTED PKS: 0

AMT STD: 1.00000

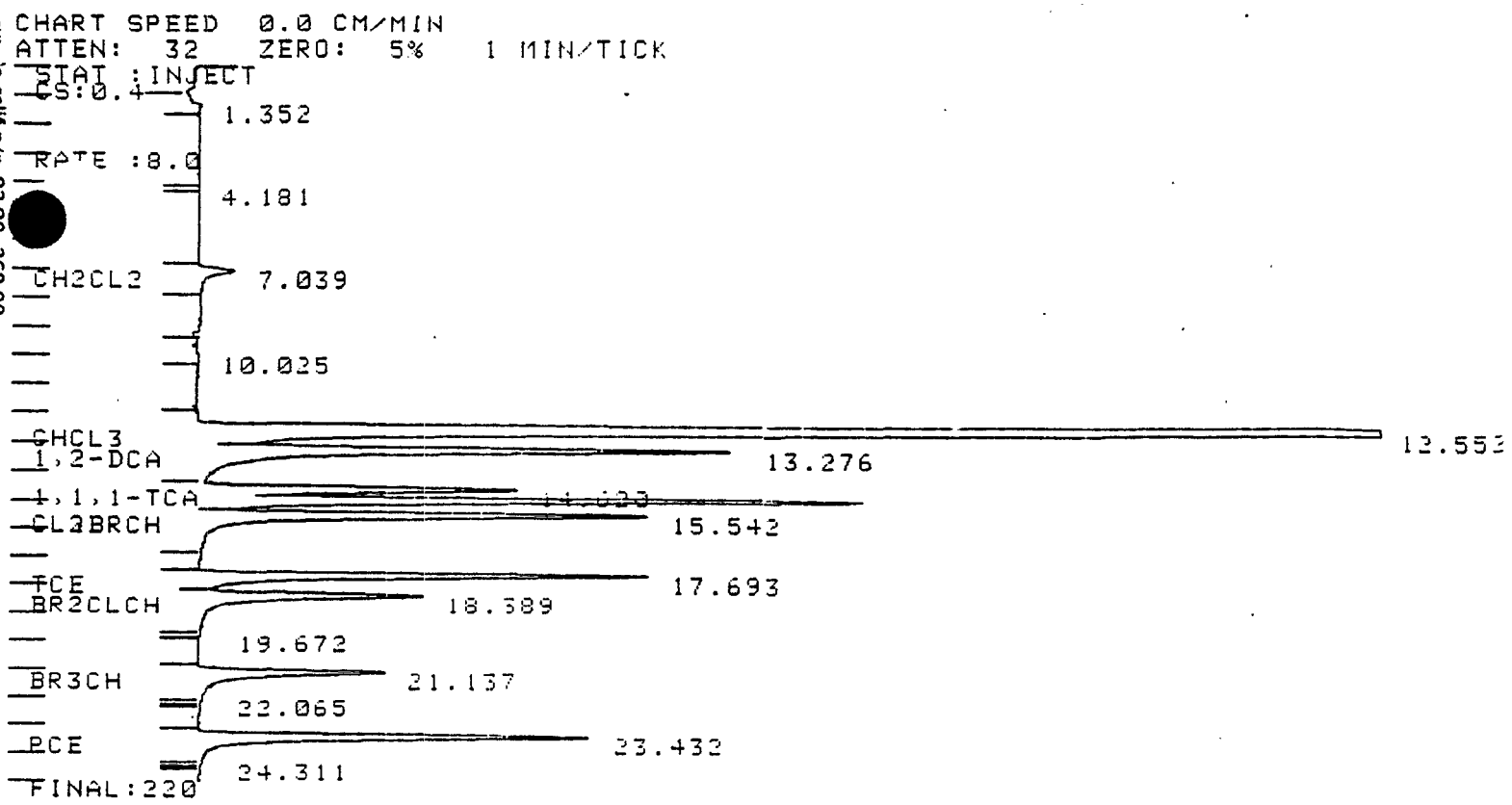
NOISE: 1.2 OFFSET: 326

ERRORS:
RESOLUTION PEAK MISSING

NOTES:
HECD R:100/TEMP:815°C/5 ML SAMPLE BY ALS
FILE TEMPORARILY SAVED ON DISC NO. 44

300352

varian /sunnyvale calif.p/n 03-906352-0




TITLE: VOLATILE ORGANIC ANALYSIS 11:19 30 MAR 84

CHANNEL NO: 2 SAMPLE: HIGH QC METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT UG/L | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | | 0.0 | 1.352 | | 2718 | BB | ? | 11.60 |
| 2 | CH2CL2 | 1.4 | 7.039 | 0.029 | 16470 | BB | | 14.90 |
| 3 | CHCL3 | 75.9 | 12.552 | -0.008 | 1387710 | BV | | 11.65 |
| 4 | 1,2-DCA | 18.7 | 13.276 | 0.006 | 230031 | VV | | 12.75 |
| 5 | 1,1,1-TCA | 8.7 | 14.620 | 0.000 | 108725 | VV | | 12.85 |
| 6 | CCL4 | 15.5 | 15.006 | 0.006 | 240469 | VV | | 12.60 |
| 7 | CL2BRCH | 12.6 | 15.542 | 0.002 | 175049 | VB | | 12.80 |
| 8 | TCE | 10.1 | 17.693 | 0.023 | 157463 | BV | | 12.00 |
| 9 | BR2CLCH | 10.4 | 18.389 | 0.029 | 96725 | VV | | 13.65 |
| 10 | BR3CH | 16.2 | 21.137 | 0.037 | 82239 | BV | | 13.45 |
| 11 | PCE | 8.9 | 23.432 | 0.022 | 146475 | BV | | 12.65 |
| TOTALS: | | 178.4 | | 0.146 | 2644070 | | | |

| GROUP# | RESULT |
|---|---|
| 1 | 115.1 |

DETECTED PKS: 16 REJECTED PKS: 5

DILUTION OR: 1.00000 MULTIPLIER: 1.00000

RESOLUTION: 3.71

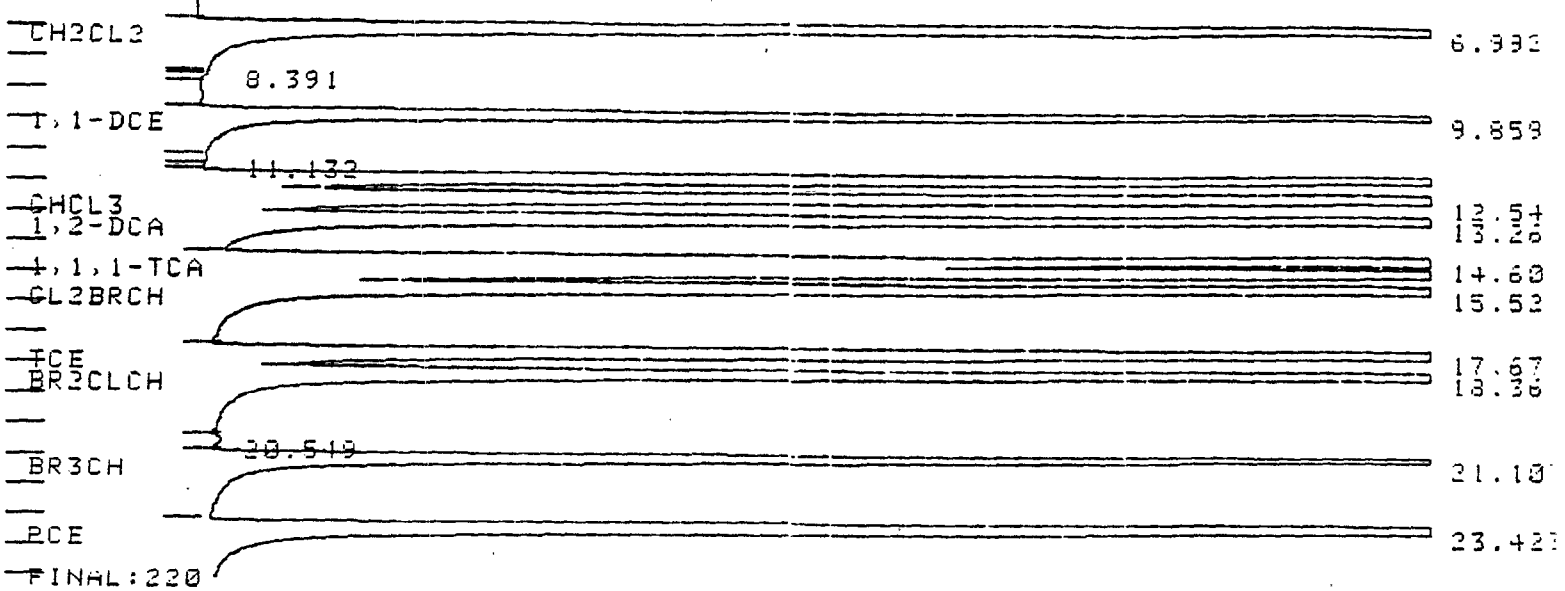
NOISE: 1.2 OFFSET: 325

SAVED FILE: 6026

ERRORS:

300353

CHART SPEED 0.0 CM/MIN
ATTEN: 32 ZERO: 5% 1 MIN/TICK
STAT : INJECT
CS:0.4
1.359
RATE :8.0




TITLE: VOLATILE ORGANIC ANALYSIS 9:46 30 MAR 84

CHANNEL NO: 2 SAMPLE: VOA MIX METHOD: 502.1

| PEAK NO | PEAK NAME | RESULT FACTOR | TIME (MIN) | TIME OFFSET | AREA COUNTS | SEP CODE | W1/2 (SEC) |
|---|---|---|---|---|---|---|---|
| 1 | | | 1.359 | | 4269 | BB | ? 12.50 |
| 2 | CH2CL2 | 0.858281 | 6.992 | -0.018 | 1165120 | BV | 12.65 |
| 3 | 1,1-DCE | 1.409120 | 9.859 | -0.031 | 709663 | BV | 11.80 |
| 4 | C-1,2-DCE | 0.746249 | 11.922 | -0.018 | 1340030 | VV | 11.75 |
| 5 | CHCL3 | 0.548233 | 12.549 | -0.011 | 1822380 | VV | 11.70 |
| 6 | 1,2-DCA | 0.729752 | 13.263 | -0.017 | 1370330 | VV | 11.70 |
| 7 | 1,1,1-TCA | 0.812087 | 14.606 | -0.014 | 1231400 | VV | 12.40 |
| 8 | CCL4 | 0.653322 | 14.994 | -0.006 | 1530640 | VV | 12.65 |
| 9 | CL2BRCH | 0.708476 | 15.526 | -0.014 | 1411480 | VV | 12.05 |
| 10 | TCE | 0.639708U | 17.678 | -0.012 | 1563210 | VV | 11.85 |
| 11 | BR2CLCH | 0.952150 | 18.369 | -0.011 | 1050260 | VV | 12.45 |
| 12 | | | 20.549 | | 2556 | T | ? 21.20 |
| 13 | BR3CH | 1.551950 | 21.107 | -0.023 | 644349 | VV | ? 10.75 |
| 14 | PCE | 0.601780U | 23.423 | -0.007 | 1661740 | VB | 12.60 |
| TOTALS: | | | | -0.182 | 15507400 | | |

DETECTED PKS: 16 REJECTED PKS: 2

A[illegible]): 1.00000

RESOLUTION: 3.94

OISE: 1.2 OFFSET: 306

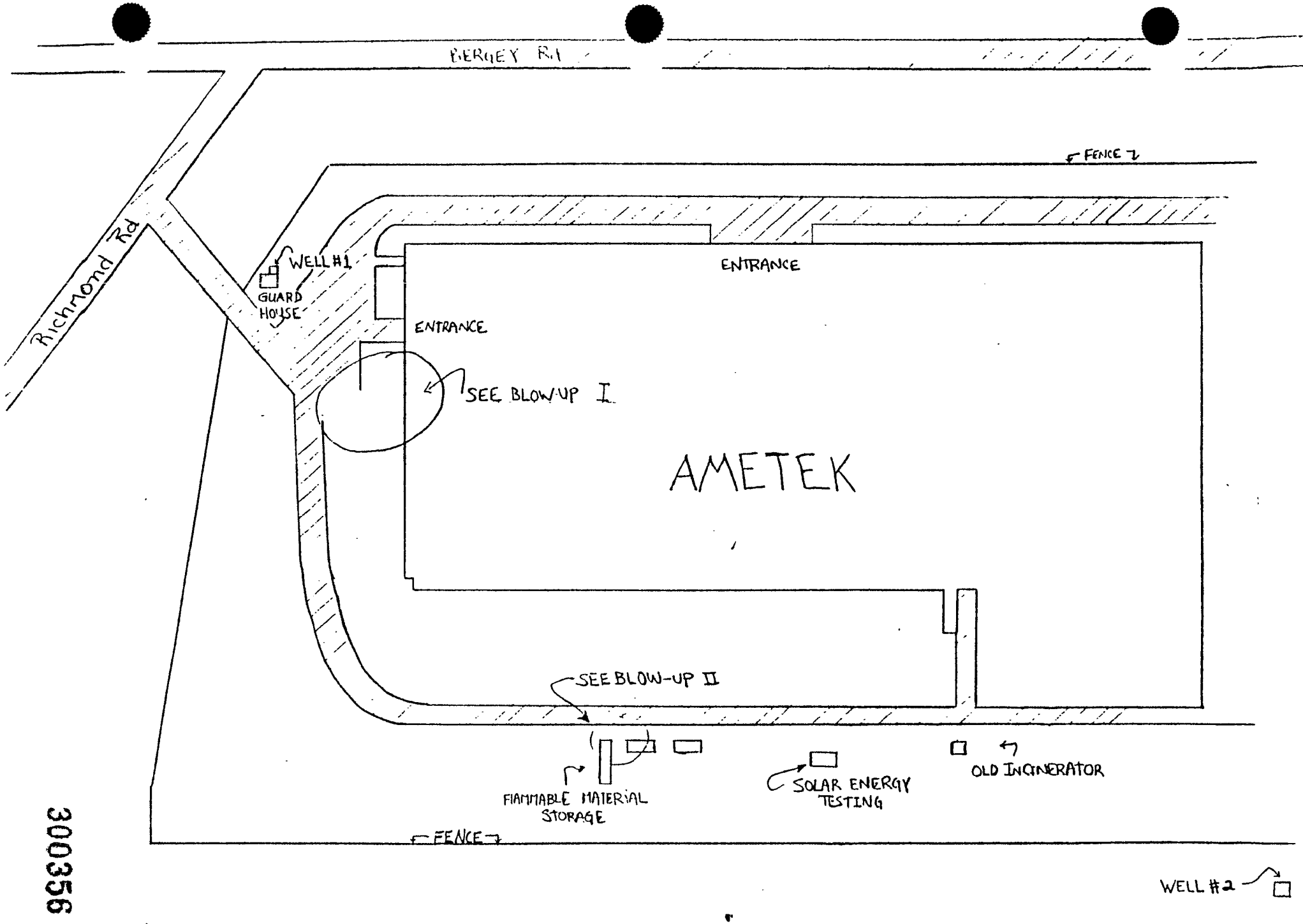
300354

VED FILE: 6024

ORS:

AMETEK

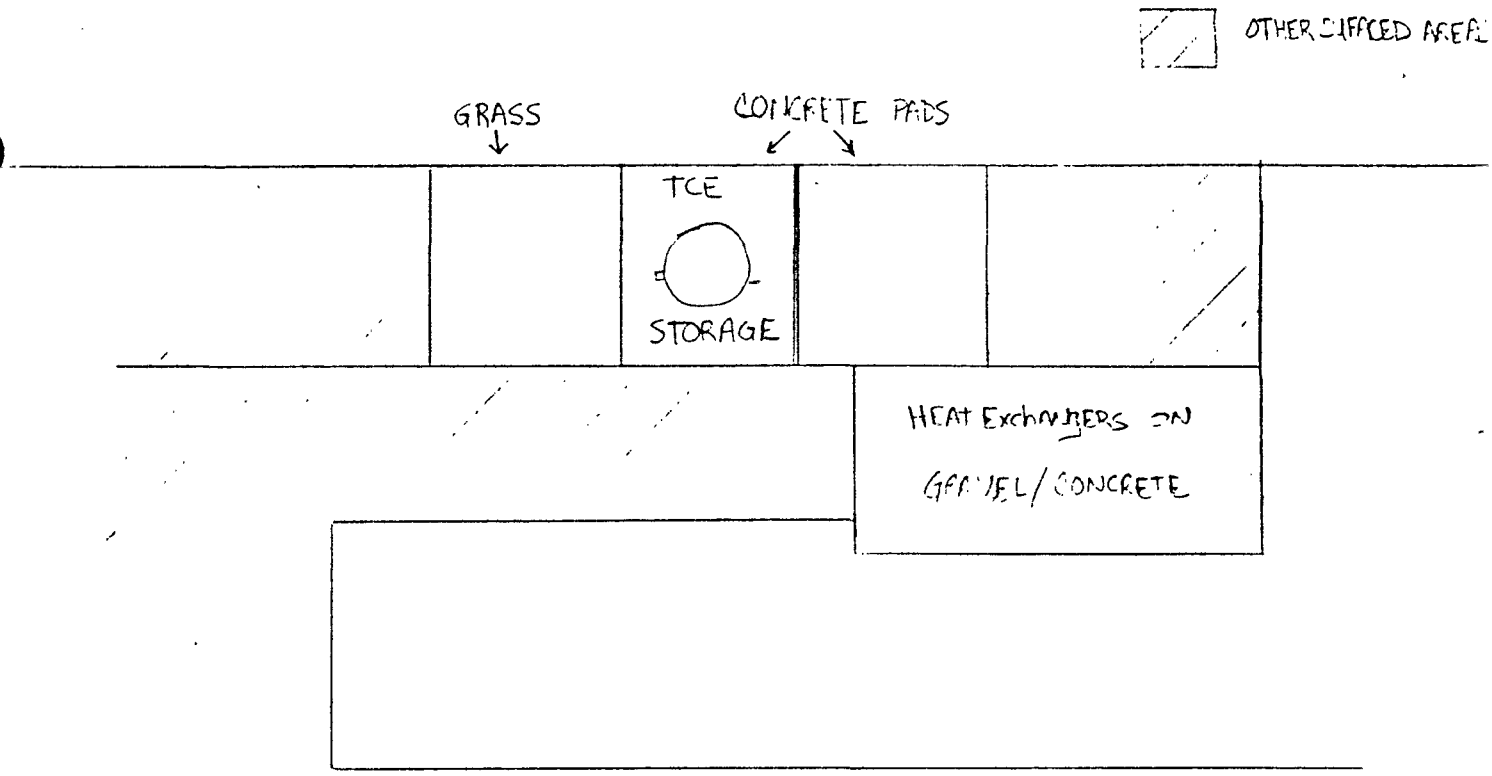
**REFERENCE NO. 3**

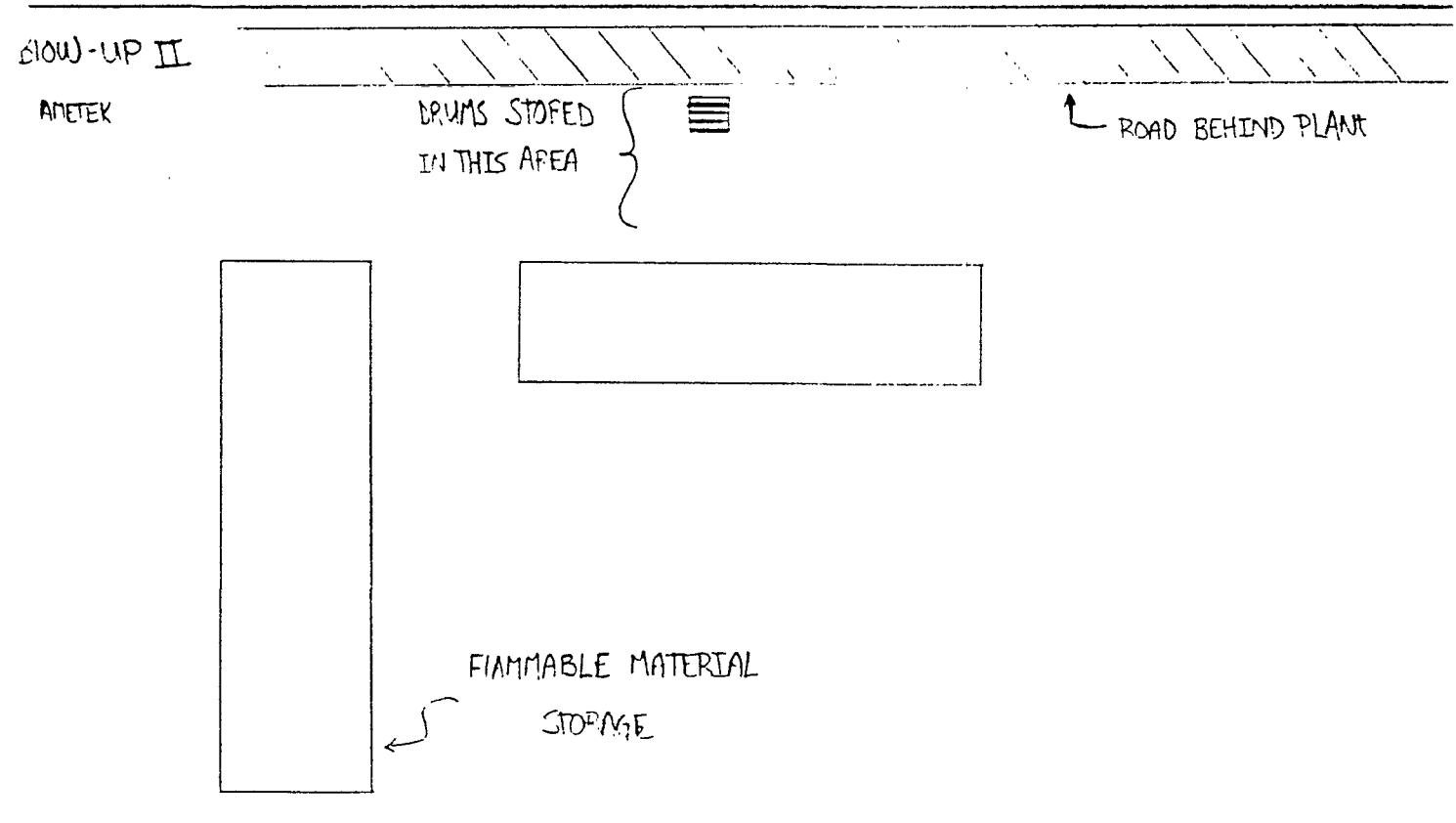

BERGEY Rd
Richmond Rd
FENCE
WELL #1
GUARD HOUSE
ENTRANCE
ENTRANCE
SEE BLOW-UP I
AMETEK
SEE BLOW-UP II
FLAMMABLE MATERIAL STORAGE
SOLAR ENERGY TESTING
OLD INCINERATOR
FENCE
WELL #2

900356

BLOW-UP I

AMETEK




300357

REFERENCE NO. 4

300358

**NUS CORPORATION** — **TELECON NOTE**

| CONTROL NO: | DATE: | TIME: |
|---|---|---|
| F3-8607-06 | August 4, 1986 | 4:00 pm |

DISTRIBUTION:

| BETWEEN: | OF: | PHONE: |
|---|---|---|
| Terry Gabriel | North Penn Water Authority | (215) 855-3617 |

AND: Timothy Silar (NUS)

DISCUSSION:

Mr. Gabriel sampled the Ametek facility well. He stated that the sample was taken inside the plant from a tap. He allowed the water to run about 5 minutes before sampling. He is aware that there are two production wells on-site and believes that the water from the wells is mixed.

Timothy Silar 8/4/86

ACTION ITEMS:

NUS 067 REVISED 0581

AR300359

REFERENCE NO. 5

HAZARDOUS WASTE INSPECTION REPORT
Generators - Part A

of inspection 3-22-89 Time start 1000 Time finish 1200

Name of inspector ROBERT ALLEN

Company, installation name AMETEK - HUNTER SPRING DIV.

Location ONE SPRING AVE. HATFIELD

County MONTGOMERY Municipality HATFIELD TWP.

Identification number PAD002342475

Name of responsible official WILLIAM SPENCER

Title VP, GEN MGR

Mailing address SAME

Area code and phone no.

Name of person interviewed WILLIAM PANZETER

Title MGR, MFG. ENGINEERING

Mailing address (if different from above)

Area code and phone no. 215-822-2971

1. Current waste handling method:

   a. ☐ On-site ☐ treatment, ☐ storage, ☐ disposal

   b. ☐ On-site ☐ use, ☐ reuse, ☐ recycle, ☐ reclaim

   c. ☑ Off-site ☑ treatment, ☑ storage, ☑ disposal

   d. ☐ Off-site ☐ use, ☐ reuse, ☐ recycle, ☐ reclaim

2. Amount of hazardous waste produced:

   a. ~120 kg./mo.

   b. _____ kg./yr.

3. Types of hazardous waste produced by Hazardous Waste Number:

   F001 F006

Are hazardous wastes transported off-site by the generator? ☑ Yes ☐ No

300361

Date of inspection 3-22-84 Identification number PAD002342475

Company, Installation name AMETEK - HUNTER SPRING

County MONTGOMERY Municipality HATFIELD TWP.

THIS FACILITY IS A SMALL QUANTITY GENERATOR OF TCE FROM DEGREASING & ELECTROPLATING TREATMENT - SLUDGE. AT PRESENT TWO WASTE SHIPMENTS PER YEAR WOULD BE NECESSARY TO REMAIN W/IN SMALL QUANTITY LIMITATIONS.

MANIFESTS - SLUDGE WAS MANIFESTED AS D002 INSTEAD OF F006 ON SOME MANIFESTS.

TCE WASTE IS BEING HAULED TO U.S. GUAGE DIV. PLANT IN SELLERSVILLE, WHERE IT IS SHIPPED WITH U.S. GUAGE'S WASTE TO HTSD FACILITY. THIS CANNOT BE DONE SINCE U.S. GUAGE IS NOT A LICENSED TRANSPORTER & DOES NOT HAVE A PERMIT TO RECEIVE WASTE FROM OFF SITE SOURCES.

IT IS SUGGESTED THAT A REVIEW OF THE ELECTROPLATING PROCESS BE UNDERTAKEN WITH REGARD TO HAZ. WASTE GENERATION SINCE ZINC PLATING ON CARBON STEEL IS SPECIFICALLY EXCLUDED FROM THE F006 LISTING - THUS THIS TREATMENT SLUDGE MAY NOT BE HAZARD

This inspection report is official notification that a representative of the Department of Environmental Resources, Bureau of Solid Waste Management, inspected the above installation. The findings of this inspection are shown in this report. Any violations which were uncove during the inspection are indicated. Violations may also be discovered upon examination of results of laboratory analyses and review of Department records. Notification will be forthcoming, confirming any violations indicated herein and listing any additional violations.

Person Interviewed (signature) MAILED TO: WM. RANZETER Date

Inspector (signature) [signature] Date 4-6-84

300362

REFERENCE NO. 6

300363

Office of Solid Waste
Washington, DC 20460

EPA

# Identification and Listing of Hazardous Waste

This package is a complete reprint of the EPA regulations identifying and listing hazardous waste that were promulgated under Section 3001 of the Resource Conservation and Recovery Act *(RCRA)* on May 19, 1980. If you need a copy of the preamble discussion to this regulation or a copy of other regulations for hazardous waste management that were promulgated under Subtitle C of RCRA please contact:

Mr. Ed Cox
U.S. Environmental Protection Agency
P.O. Bldg. B
Dalton and Liberty Streets
Dock 14
Cincinnati, Ohio 45214
(513) 684—5362

300364

(2) It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that is creates a hazard.

(3) It is an ignitable compressed gas as defined in 49 CFR 173.300 and as determined by the test methods described in that regulation or equivalent test methods approved by the Administrator under §§ 260.20 and 260.21.

(4) It is an oxidizer as defined in 49 CFR 173.151.

(b) A solid waste that exhibits the characteristic of ignitability, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D001.

### § 261.22 Characteristic of corrosivity.

(a) A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

(1) It is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5, as determined by a pH meter using either the test method specified in the "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" [2] (also described in "Methods for Analysis of Water and Wastes" EPA 600/4-79-020, March 1979), or an equivalent test method approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21.

(2) It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by the test method specified in NACE (National Association of Corrosion Engineers) Standard TM-01-69 [3] as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods," or an equivalent test method approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21.

(b) A solid waste that exhibits the characteristic of corrosivity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D002.

[2] This document is available from Solid Waste Information, U.S. Environmental Protection Agency, 26 W. St. Clair Street, Cincinnati, Ohio 45268.

[3] The NACE Standard is available from the National Association of Corrosion Engineers, P.O. Box 986, Katy, Texas 77450.

### § 261.23 Characteristic of reactivity.

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has *any* of the following properties:

(1) It is normally unstable and readily undergoes violent change without detonating.

(2) It reacts violently with water.

(3) It forms potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.51, or a Class A explosive as defined in 49 CFR 173.53 or a Class B explosive as defined in 49 CFR 173.88.

(b) A solid waste that exhibits the characteristic of reactivity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D003.

### § 261.24 Characteristic of EP Toxicity.

(a) A solid waste exhibits the characteristic of EP toxicity if, using the test methods described in Appendix II or equivalent methods approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21, the extract from a representative sample of the waste contains any of the contaminants listed in Table I at a concentration equal to or greater than the respective value given in that Table. Where the waste contains less than 0.5 percent filterable solids, the waste itself, after filtering, is considered to be the extract for the purposes of this section.

(b) A solid waste that exhibits the characteristic of EP toxicity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number specified in Table I which corresponds to the toxic contaminant causing it to be hazardous.

**Table I.—Maximum Concentration of Contaminants for Characteristic of EP Toxicity—Continued**

| EPA hazardous waste number | Contaminant | Maximum concentration (milligrams per liter) |
|---|---|---|
| D004 | Arsenic | 5.0 |
| D005 | Barium | 100.0 |
| D006 | Cadmium | 1.0 |
| D007 | Chromium | 5.0 |
| D008 | Lead | 5.0 |
| D009 | Mercury | 0.2 |
| D010 | Selenium | 1.0 |
| D011 | Silver | 5.0 |
| D012 | Endrin (1,2,3,4,10,10-hexachloro-1,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo, endo-5,8-dimethano naphthalene | 0.02 |
| D013 | Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer | 0.4 |
| D014 | Methoxychlor (1,1,1-Trichloro-2,2-bis [p-methoxyphenyl] ethane) | 10.0 |
| D015 | Toxaphene ($C_{10}H_{10}Cl_8$, Technical chlorinated camphene, 67-69 percent chlorine) | 0.5 |
| D016 | 2,4-D, (2,4-Dichlorophenoxyacetic acid) | 10.0 |
| D017 | 2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid) | 1.0 |

## Subpart D—Lists of Hazardous Wastes

### § 261.30 General.

(a) A solid waste is a hazardous waste if it is listed in this Subpart, unless it has been excluded from this list under §§ 260.20 and 260.22.

(b) The Administrator will indicate his basis for listing the classes or types of wastes listed in this Subpart by employing one or more of the following Hazard Codes:

| | |
|---|---|
| Ignitable Waste | (I) |
| Corrosive Waste | (C) |
| Reactive Waste | (R) |
| EP Toxic Waste | (E) |
| Acute Hazardous Waste | (H) |
| Toxic Waste | (T) |

Appendix VII identifies the constituent which caused the Administrator to list the waste as an EP Toxic Waste (E) or Toxic Waste (T) in §§ 261.31 and 261.32.

(c) Each hazardous waste listed in this Subpart is assigned an EPA Hazardous Waste Number which precedes the name of the waste. This number must be used in complying with the notification requirements of Section 3010 of the Act and certain recordkeeping and reporting requirements under Parts 262 through 265 and Part 122 of this Chapter.

(d) Certain of the hazardous wastes listed in § 261.31 or § 261.32 have exclusion limits that refer to § 261.5(c)(5).

300365

## § 261.31 Hazardous waste from nonspecific sources.

| Industry and EPA hazardous waste No | Hazardous waste | Hazard code |
|---|---|---|
| Generic | | |
| F001 | The spent halogenated solvents used in degreasing, tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and the chlorinated fluorocarbons, and sludges from the recovery of these solvents in degreasing operations. | (T) |
| F002 | The spent halogenated solvents, tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, o-dichlorobenzene, trichlorofluoromethane and the still bottoms from the recovery of these solvents. | (T) |
| F003 | The spent non-halogenated solvents, xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, n-butyl alcohol, cyclohexanone, and the still bottoms from the recovery of these solvents | (I) |
| F004 | The spent non-halogenated solvents, cresols and cresylic acid, nitrobenzene, and the still bottoms from the recovery of these solvents. | (T) |
| F005 | The spent non-halogenated solvents, methanol, toluene, methyl ethyl ketone, methyl isobutyl ketone, carbon disulfide, isobutanol, pyridine and the still bottoms from the recovery of these solvents | (I, T) |
| F006 | Wastewater treatment sludges from electroplating operations | (T) |
| F007 | Spent plating bath solutions from electroplating operations | (R, T) |
| F008 | Plating bath sludges from the bottom of plating baths from electroplating operations | (R, T) |
| F009 | Spent stripping and cleaning bath solutions from electroplating operations | (R, T) |
| F010 | Quenching bath sludge from oil baths from metal heat treating operations | (R, T) |
| F011 | Spent solutions from salt bath pot cleaning from metal heat treating operations | (R, T) |
| F012 | Quenching wastewater treatment sludges from metal heat treating operations | (T) |
| F013 | Flotation tailings from selective flotation from mineral metals recovery operations | (T) |
| F014 | Cyanidation wastewater treatment tailing pond sediment from mineral metals recovery operations | (T) |
| F015 | Spent cyanide bath solutions from mineral metals recovery operations | (R, T) |
| F016 | Dewatered air pollution control scrubber sludges from coke ovens and blast furnaces | (T) |

## § 261.32 Hazardous waste from specific sources.

| Industry and EPA hazardous waste No | Hazardous waste | Hazard code |
|---|---|---|
| Wood Preservation K001 | Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol | (T) |
| Inorganic Pigments | | |
| K002 | Wastewater treatment sludge from the production of chrome yellow and orange pigments | (T) |
| K003 | Wastewater treatment sludge from the production of molybdate orange pigments | (T) |
| K004 | Wastewater treatment sludge from the production of zinc yellow pigments | (T) |
| K005 | Wastewater treatment sludge from the production of chrome green pigments | (T) |
| K006 | Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated) | (T) |
| K007 | Wastewater treatment sludge from the production of iron blue pigments | (T) |
| K008 | Oven residue from the production of chrome oxide green pigments | (T) |
| Organic Chemicals | | |
| K009 | Distillation bottoms from the production of acetaldehyde from ethylene | (T) |
| K010 | Distillation side cuts from the production of acetaldehyde from ethylene | (T) |
| K011 | Bottom stream from the wastewater stripper in the production of acrylonitrile | (R, T) |
| K012 | Still bottoms from the final purification of acrylonitrile in the production of acrylonitrile | (T) |
| K013 | Bottom stream from the acetonitrile column in the production of acrylonitrile | (R, T) |
| K014 | Bottoms from the acetronitrile purification column in the production of acrylonitrile | (T) |
| K015 | Still bottoms from the distillation of benzyl chloride | (T) |
| K016 | Heavy ends or distillation residues from the production of carbon tetrachloride | (T) |
| K017 | Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin | (T) |
| K018 | Heavy ends from fractionation in ethyl chloride production | (T) |
| K019 | Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production. | (T) |
| K020 | Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production | (T) |
| K021 | Aqueous spent antimony catalyst waste from fluoromethanes production | (T) |
| K022 | Distillation bottom tars from the production of phenol/acetone from cumene | (T) |
| K023 | Distillation light ends from the production of phthalic anhydride from naphthalene | (T) |
| K024 | Distillation bottoms from the production of phthalic anhydride from naphthalene | (T) |
| K025 | Distillation bottoms from the production of nitrobenzene by the nitration of benzene | (T) |
| K026 | Stripping still tars from the production of methyl ethyl pyridines | (T) |
| K027 | Centrifuge residue from toluene diisocyanate production | (R, T) |
| K028 | Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane | (T) |
| K029 | Waste from the product stream stripper in the production of 1,1,1-trichloroethane | (T) |
| K030 | Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene. | (T) |
| Pesticides | | |
| K031 | By-products salts generated in the production of MSMA and cacodylic acid | (T) |
| K032 | Wastewater treatment sludge from the production of chlordane | (T) |
| K033 | Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane | (T) |
| K034 | Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane | (T) |
| K035 | Wastewater treatment sludges generated in the production of creosote | (T) |
| K036 | Still bottoms from toluene reclamation distillation in the production of disulfoton | (T) |
| K037 | Wastewater treatment sludges from the production of disulfoton | (T) |
| K038 | Wastewater from the washing and stripping of phorate production | (T) |
| K039 | Filter cake from the filtration of diethylphosphorodithoic acid in the production of phorate | (T) |
| K040 | Wastewater treatment sludge from the production of phorate | (T) |
| K041 | Wastewater treatment sludge from the production of toxaphene | (T) |
| K042 | Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T | (T) |
| K043 | 2,6-Dichlorophenol waste from the production of 2,4-D | (T) |
| Explosives | | |
| K044 | Wastewater treatment sludges from the manufacturing and processing of explosives | (R) |
| K045 | Spent carbon from the treatment of wastewater containing explosives | (R) |
| K046 | Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds. | (T) |
| K047 | Pink/red water from TNT operations | (R) |
| Petroleum Refining: | | |
| K048 | Dissolved air flotation (DAF) float from the petroleum refining industry | (T) |
| K049 | Slop oil emulsion solids from the petroleum refining industry | (T) |
| K050 | Heat exchanger bundle cleaning sludge from the petroleum refining industry | (T) |
| K051 | API separator sludge from the petroleum refining industry | (T) |
| K052 | Tank bottoms (leaded) from the petroleum refining industry | (T) |
| Leather Tanning Finishing: | | |
| K053 | Chrome (blue) trimmings generated by the following subcategories of the leather tanning and finishing industry: hair pulp/chrome tan/retan/wet finish; hair save/chrome tan/retan/wet finish, retan/wet finish, no beamhouse, through-the-blue, and shearling. | (T) |

AR300366

REFERENCE NO. 7

AR300367

# MANAGEMENT OF UNCONTROLLED HAZARDOUS WASTE SITES

AR300368

THE 5TH NATIONAL CONFERENCE ON

# MANAGEMENT OF UNCONTROLLED HAZARDOUS WASTE SITES

NOVEMBER 7-9, 1984 • WASHINGTON, DC

AFFILIATES

U.S. Environmental Protection Agency
Hazardous Materials Control Research Institute
U.S. Corps of Engineers
U.S. Geological Survey
Federal Emergency Management Agency
American Society of Civil Engineers
Association of State & Territorial Solid Waste Management Officials
National Association of Local Governments on Hazardous Wastes
Portland Cement Association
Centers for Disease Control

AR300369

# MIGRATION AND DEGRADATION PATTERNS OF VOLATILE ORGANIC COMPOUNDS

PATRICIA V. CLINE
DANIEL R. VISTE
Warzyn Engineering Inc.
Madison, Wisconsin

## INTRODUCTION

Volatile organic priority pollutants have been detected in groundwater all across the country. These compounds, widely used as solvents, are considered environmentally mobile and persistent. Improved analytical methods using gas chromotography and/or mass spectroscopy now allow their detection at extremely low levels. The presence of the synthetic organics in groundwater coupled with an improved ability to detect them has resulted in increasing numbers of contamination investigations.

Biodegradation is not typically an integral part of today's groundwater investigations. There is considerable controversy regarding whether degradation is an important factor in determining the fate of the chlorinated volatile organic priority pollutant. Increasing evidence indicates chlorinated solvents can be degraded in an anaerobic environment by reductive dehalogenation. It is reported this process occurs when the oxidation/reduction potential is less than 0.75V. The sequential removal of chlorine atoms from halogenated 1 and 2 carbon aliphatic compounds results in formation of other volatile, chlorinated priority pollutants which can be detected during investigations of solvent contamination.[1,2,3]

In this paper, the authors present data from a variety of sites having documented chlorinated solvents contamination. Three types of sites were selected to illustrate breakdown patterns which may develop as a result of diverse environmental conditions. Data from landfills are presented to demonstrate presence of degradation products in biologically active anaerobic environments. Two solvent recovery facilities which handle both chlorinated and non-chlorinated solvents showed similar migration and degradation patterns. Finally, an industrial site with no apparent degradation demonstrates conditions in which reductive dehalogenation may not be a primary degradation mechanism.

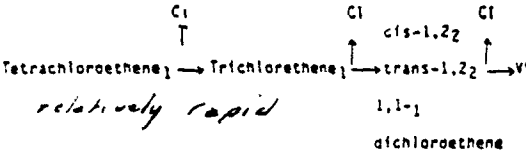
Research data indicates chlorinated solvents have varying rates of breakdown. The data were therefore evaluated for a dominance of compounds which show longer half-lives, including 1,2-dichloroethenes and vinyl chloride.[4]

## BACKGROUND

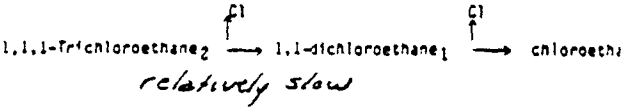
For purposes of this evaluation, selected compounds were designated as "parent" compounds based on their widespread use and/or known presence at these specific sites. They include methylene chloride, 1,1,1-trichloroethane, trichlorethene and tetrachloroethene.

Breakdown products are designated as compounds which would result from reductive dehalogenation of these parent compounds and include dichloroethanes, chloroethane, dichloroethenes and vinyl chloride. For purposes of this evaluation, methylene chloride is disregarded, since it is a commonly used solvent, p degradation product and common laboratory contamina phasis is placed on the ethene and ethane series because the ambiguity in the assignment of parent and breakdown p The anaerobic breakdown sequence for the chlorinated eth ethanes via reductive halogenation is shown below:

*Chlorinated Ethenes*




*Chlorinated Ethanes*




1. Research indicates substantial degradation.
2. Research indicates degradation is slow.

In work performed at the Florida International Univer: Parsons, Wood and DeMarco,[1] biodegradation of trichloroethene or tetrachloroethene produced higher conc tions of cis- 1,2-dichlorethene when compared to the trans-is

Trans-1,2-Dichloroethene is a priority pollutant and has a allowed concentration in drinking water (272 µg/l) than th isomer (400 µg/l).[5] USEPA's rationale for selection of the isomer as the priority pollutant was based on the availability analytical standard.[6]

## DATA PRESENTATION

In the authors' first attempts to correlate the ethene break series with data from contaminated sites, it became apparen the dominant dichloroethene compound detected was trans-1 chlorethene. The cis-isomer is not a priority pollutant therefore, is not mentioned in the methods for analysis o volatile organic priority pollutants using Method 601 or Me 624.

These methods recommend the use of - ...sed o SP 1000 on Carbopack B. Th... ...arate ing the above columi ...tical

...ATE OF CONTAMINANTS

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spectra, the isomer pair will not be differentiated by mass spectrometry and will subsequently be identified as the trans-isomer.

The above theory was verified by the submittal of a standard mix containing both the cis- and trans-isomers to a prominent midwestern laboratory. Analysis by Method 624 found only the trans-isomer, but the quantitated result equalled the known total of the isomer pair.

The Michigan Department of Health can separate the cis- and trans-isomers and, in a current investigation, has determined that the major contaminant at a site is not trans-1,2-dichloroethene as found by a USEPA contract laboratory, but is the cis-isomer. They have indicated that frequently they find the cis-isomer and, if concentrations are high, they occasionally find traces of the trans-isomer.

Based on this information, the authors conclude that much of what is typically reported as the trans-isomer, which is a priority pollutant, is in fact cis-1,2-dichloroethene. In the subsequent evaluations, the authors will refer to these compounds as 1,2-dichlorethenes.

## Landfills

Landfills which accept municipal waste have an anaerobic environment in which substantial breakdown of compounds occurs. At sites which have also accepted waste products containing solvents, a number of volatile organic priority pollutants can be detected in the leachate. The analyses of five leachate samples from Site #1 which accepted both municipal and industrial wastes are found in Table 1. The site also received significant quantities of hazardous and nonhazardous liquid wastes. Based on records of waste accepted, there is a dominance of "breakdown products" at this site.

The amount of breakdown products detected in groundwater at two other sites where volatile organic contaminants have migrated off-site is shown in Table 2. Site #2 is a small municipal landfill in a sand and gravel environment and Site #3 is a large clay-lined site which has accepted waste similar to Site #1. At these sites, the authors have also documented a dominance of the breakdown products in groundwater downgradient from the waste disposal boundaries.

The purpose of presenting leachate data from these landfills is to demonstrate that in an anaerobic, high-organic matrix, one is likely

**Table 1**
**Landfill Leachate, Site #1**

| | Leachate Sample Number | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| **Chlorinated Ethanes** | | | | | |
| 1 Trichloroethanes | ND[3] | 68 | ND | ND | ND |
| 2 1,1-Dichloroethane | 1,500 | 240 | 130 | 11 | 13 |
| 1,2-Dichloroethane | ND | 12 | 21 | ND | ND |
| Chloroethane | ND | 21 | 18 | 160 | ND |
| **Chlorinated Ethanes** | | | | | |
| 1 Tetrachloroethene | ND | 13 | ND | ND | ND |
| Trichloroethene | ND | 100 | 62 | ND | ND |
| 2 1,2-Dichloroethenes | 3,200 | 990 | 950 | 150 | ND |
| 1,1-Dichloroethene | ND | ND | ND | ND | ND |
| Vinyl Chloride | ND | 120 | 59 | 100 | ND |
| **Other Volatile Priority Pollutants** | | | | | |
| Methylene Chloride | 5,200 | 120 | 770 | ND | 14 |
| Toluene | 2,000 | 410 | 660 | 460 | 58 |
| Benzene | ND | 30 | 37 | 110 | 16 |
| Ethylbenzene | ND | 93 | 64 | 140 | 68 |
| 1,2-Dichloropropane | ND | 18 | 37 | ND | ND |

1. Parent Compounds
2. Breakdown Products
3. ND — <10 ug/l
4. All Concentrations in Mg/l

**Table 2**
**Breakdown Products Present in Contaminated Groundwater Near Disposal Facilities**

| | Site #2 | Site #3 |
|---|---|---|
| No. of Samples from Wells showing Solvent Contamination | 10 | 8 |
| No. of Samples with 50% Breakdown Products* | 2 | 0 |
| No. of Samples with 50-75% Breakdown Products* | 3 | 0 |
| No. of Samples with 75- 100% Breakdown Products* | 5 | 8 |

*Breakdown defined as monochloro- and dichloro- ethanes and ethenes compared to total chlorinated ethanes and ethenes.

to find compounds which are a result of reductive dehalogenation. It is unlikely that these compounds were the dominant disposal compounds at these sites based on site records, general production and common use. Of particular interest is the fact that all eight of the leachate samples from the large co-disposal facility were comprised of greater than 75% breakdown products.

## Solvent Recovery Facilities

Solvent recovery facilities handle a wide variety of organic compounds including chlorinated solvents. In addition, varying hydrogeologic conditions can result in complex migration patterns. The two facilities discussed in this section differ in operation and location, but have similarities in migration and degradation patterns. Geologic and hydrologic characteristics at these solvent recovery facilities are given in Table 3.

**Table 3**
**Solvent Recovery Site Geological Conditions**

| | Site 1 | Site 2 |
|---|---|---|
| Location | Connecticut | Wisconsin |
| Date of Investigation | 1980 | 1983 |
| Geology | Alluvial sands and gravel in relatively impermeable bedrock valley | Thick, sandy glacial till deposits overlying limestone bedrock |
| Hydrology | Shallow groundwater, 10 ft. alluvial sands constitute primary municipal aquifer | Till supports only minimal groundwithdrawal, permeability approx. $10^{-4}$ to $10^{-5}$ cm/sec. Limestone is aquifer in the area. |

The analytical data for the above sites are found in Tables 4 and 5. Both sites handled chlorinated and nonchlorinated solvents. High concentrations of both the chlorinated and nonchlorinated compounds were present near the on-site handling areas. The off-site contamination showed a dominance of the chlorinated compounds. Nonchlorinated compounds detected were priority pollutants. In cases where analyses were performed, the presence of compounds like toluene and benzene were indicative of a much higher concentration of other nonpriority pollutant hydrocarbons.

At the Wisconsin site, dichlorethanes, dichlorethenes and vinyl chloride were detected in significant concentrations in the groundwater. These compounds were not handled at the facility, and this is supported by records of routine gas chromatographic analyses at the recycling facility. Further evaluation failed to indicate the presence of other possible sources of the breakdown products. Information was not available to evaluate this question at the Connecticut site.

An evaluation was then performed to assess whether data from these facilities show patterns which would be a result of anaerobic degradation. The evaluation includes an analysis of the percentage of breakdown products measured at the source and at a downgradient location.

To illustrate trends, the data have been summarized in Figure 1. Results are shown for the priority pollutant analyses for a wate



300371

table well and piezometer located on-site that had the highest concentrations, as well as a downgradient water table well and piezometer. At both of the sites, primarily horizontal hydraulic gradients were observed during the hydrogeological assessment based on water level measurements. Elevated concentrations of contaminants were anticipated at the downgradient water table wells.

**Table 4**
**Solvent Recovery Operations**
**Summary of Volatile Organic Priority Pollutants Detected at On-Site and Downgradient Piezometers: Connecticut Site**

| | On-Site | | 250' Downgradient | |
|---|---|---|---|---|
| | Water Table | At Depth | Water Table | At Depth |
| **Chlorinated Ethanes** | | | | |
| 1 1,1,1-Trichloroethane | $ND_3$ | 3,700 | 260 | ND |
| 2 1,1-Dichloroethane | 8,300 | 3,000 | 2,500 | ND |
| **Chlorinated Ethenes** | | | | |
| 1 Tetrachloroethene | 2,900 | ND | 34 | ND |
| Trichloroethene | 39,000 | 330 | ND | ND |
| 2 1,2-Dichloroethenes | 30,000 | 2,700 | ND | 4,300 |
| 1,1-Dichloroethene | ND | ND | ND | ND |
| Vinyl chloride | ND | 200 | ND | 2,700 |
| **Other Solvents Detected** | | | | |
| Methylene Chloride | 100,000 | 7,000 | 25 | 3,900 |
| Ethylbenzene | 12,000 | 440 | ND | 3,700 |
| Toluene | 34,000 | 5,100 | ND | 7,600 |

1. Parent Compounds
2. Breakdown Products
3. ND — < 10 µg/l
4. All Concentrations are in µg/l

**Table 5**
**Solvent Recovery Operations**
**Summary of Volatile Organic Priority Pollutants Detected at On-Site and Downgradient Piezometers: Wisconsin Site**

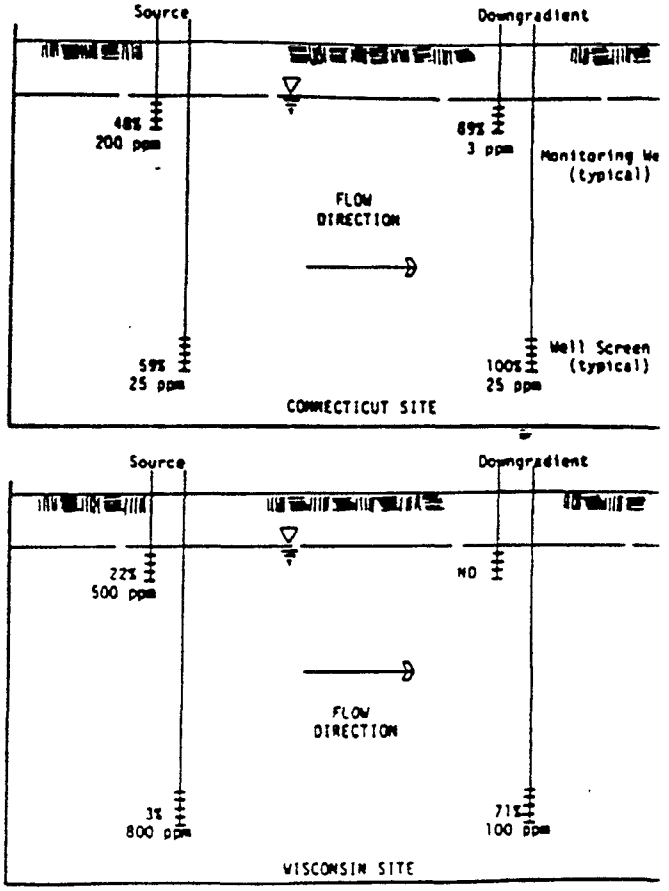
| | On-Site | | 250' Downgradient | |
|---|---|---|---|---|
| | Water Table | Depth | Water Table | Depth |
| **Chlorinated Ethanes** | | | | |
| 1 1,1,2,2-Tetrachloroethane | 19,000 | $ND_3$ | ND | ND |
| 1,1,2-Trichloroethane | ND | ND | ND | 60 |
| 1,1,1-Trichloroethane | 22,000 | 270,000 | ND | 20,000 |
| 2 1,2-Dichloroethane | ND | ND | ND | 230 |
| 1,1-Dichloroethane | ND | 6,200 | ND | 5,100 |
| Chloroethane | ND | ND | ND | 90 |
| **Chlorinated Ethenes** | | | | |
| 1 Tetrachloroethene | ND | 22,000 | ND | 610 |
| Trichloroethene | 63,000 | 250,000 | ND | 1,000 |
| 2 1,2-Dichloroethenes | 30,000 | 8,700 | ND | 47,000 |
| 1,1-Dichloroethene | ND | ND | ND | 720 |
| Vinyl Chloride | ND | ND | ND | 210 |
| **Other Solvents Detected** | | | | |
| Methylene Chloride | 230,000 | 170,000 | ND | 20,000 |
| Benzene | 12,000 | ND | ND | 20 |
| Ethylbenzene | 28,000 | 9,200 | ND | 630 |
| Toluene | 100,000 | 42,000 | ND | 4,100 |

1. Parent Compounds
2. Breakdown Products
3. ND — < 10 µg/l
4. All Concentrations are in µg/l

The figure shows the total volatile organic concentr detected at the above described well locations for both sides an percentage of breakdown products compared to the sum o chlorinated ethanes and ethenes.

Both of the sites exhibited high levels of chlorinated organic tamination at the source. Nonchlorinated organics were also sent at the sources in high concentrations, providing a chlorinated carbon source. These nonchlorinated organic pounds were present in highest concentrations at the water t At the Wisconsin site, a floating layer of fuel oil type material detected at one well.

With distance downgradient from the source, the contamin were detected at greater concentrations with depth even thc groundwater flow was near horizontal. There are various expl tions for this phenomenon, including changing groundwater




% Values = % Breakdown Products ppm Values = Total of all Volatile Priority Poll

Figure 1
Anaerobic Breakdown Patterns of Organic Materials

patterns, recharge or impermeable barriers which may hampered migration of contaminants to the water table w These parameters will be evaluated further with addit hydrogeologic study, where funding is available.

Other explanations include density effects, volatilization selective degradation. It is well documented that chlorinated pounds will sink in the aquifer at the source when in excess o solubility of water.' For subsequent density effects to be appa in the contaminated groundwater where concentrations are lo the overall density of that solution must be greater than tha background water quality. Preliminary calculations indicate th the concentrations measured at the sites, the density differ would not be sufficient to account for sinking of the contamin groundwater plumes.

The USEPA had indicated that a primary environmental fat these compounds in aquatic systems would be volatilization.[4] tors which affect volatilization of these compounds from a gro


300372

water system include: soil porosity and temperature, depth to water table and the various solubilities of the compounds in water. Although it is recognized that some volatilization will occur, it is not expected to be a primary fate of organics at these sites.

Selective degradation is presented as another possible explanation for preferential loss of the constituents at the water table wells. The biodegradation of chlorinated compounds may be affected by the co-metabolism of other carbon sources. Solvent recovery operations can provide a nonchlorinated carbon source which tends to accumulate near the water table surface. These compounds are typically not detected with distance from the source, due to rapid breakdown and may be responsible for preferential loss of the chlorinated compounds from the more shallow zone of the aquifer.

The breakdown of the chlorinated compounds can occur rapidly in the presence of a nonchlorinated carbon source which promotes rapid co-metabolism to dehalogenate the chlorinated compounds. The data suggest that degradation continues to occur deeper in the aquifer, perhaps at a slower rate.

### Industrial Site

For purposes of contrast with sites which have high levels of contamination and a substantial carbon source, the authors have presented data from an industrial site having primarily sandy soils, shallow groundwater and little or no detectable nonchlorinated organic priority pollutants (Table 6).

**Table 6**
**Industrial Site Solvent Contamination of a City Well**

| Well | 1,1,1-Trichloroethane | Trichloroethene | 1,1-Dichloroethene |
|---|---|---|---|
| 1 | ND | 81 | ND |
| 2 | 13,800 | 2,040 | 250 |
| 3 | 2,660 | 410 | ND |
| 4 | 7 | 1 | ND |
| 5 | 8 | 2 | ND |
| 6 | ND | 68 | ND |
| 7 | 10 | 12 | ND |

1. All Concentrations are in µg/l  2. ND — < 1 µg/l

Three major contrasts with data from the solvent recovery facilities are noted:

- Overall contaminant concentrations detected are lower and all compounds are chlorinated
- A dominance of the parent compounds exists
- The plume was detected in highest concentrations at the water table wells. The lack of a significant carbon source to promote degradation can account for the minimal breakdown occurring at the industrial site

## CONCLUSIONS

Parameters which would assist in determining biodegradation activity are typically not incorporated into standard hydrogeologic investigations. A better understanding of the role of degradation could be obtained through a more comprehensive investigative program including biological assessment as well as the standard groundwater flow and chemistry analyses

Data from the authors' investigations suggest that if a site has a substantial carbon source, anaerobic degradation will occur, resulting in the formation of dichloro- and monochloro- ethane and ethene compounds. The presence of these compounds follows the predictions in the literature regarding the degradability of the parent compounds. In addition, the dominance of the cis-isomer of 1,2-dichloroethene formed during degradation will result in its presence in these investigations rather than the priority pollutant trans-isomer.

A floating organic layer near a contamination site may enhance the rate of degradation near the water table as the chlorinated compounds would more readily be co-metabolized in that zone of the aquifer.

## RECOMMENDATIONS

At sites where degradation is indicated, additional measurements should be made to better understand the potential role and controlling mechanisms of biodegradation. This would include measurement of the overall organic content in water or soil and measurements of oxidation reduction potential (Eh), oxygen concentration and plate counts of bacteria.[11,12,13,14,15] Density measurements of the contaminated groundwater will allow clarification of potential density effects on migration patterns. During interpretation of the data, one can evaluate the presence of breakdown products and the pattern of their occurrence in relation to the parent compounds. One should report "1,2-dichloroethenes" without specifying the specific cis- or trans-isomer, unless that specific distinction can be made by the analytical laboratory.

It is hoped that increased awareness of the conditions under which maximum degradation can occur will improve the approach and substantially increase the conclusions which can be drawn from groundwater contamination investigations.

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300373

REFERENCE NO. 8

300374

# Dangerous Properties of Industrial Materials

Sixth Edition


## N. IRVING SAX

Assisted by:

Benjamin Feiner/Joseph J. Fitzgerald/Thomas J. Haley/Elizabeth K. Weisburger



VAN NOSTRAND REINHOLD COMPANY

NEW YORK CINCINNATI TORONTO LONDON MELBOURNE



AR300375

SYNS:

4-AETHYL-1-PHOSPHA-2,6,7-TRIOXABICYCLO(2.2.2)OCTAN-1-OXID (GERMAN)
4-ETHYL-1-PHOSPHA-2,6,7-TRIOXABICYCLO(2.2.2)OCTANE-1-OXIDE
4-ETHYL-2,6,7-TRIOXA-1-PHOSPHABICYCLO(2.2.2)OCTANE-1-OXIDE

| TOXICITY DATA: | 3 | CODEN: |
|---|---|---|
| orl-rat LD50:3080 ug/kg | | ARTODN 35,149,76 |
| ihl-rat LC50:30 mg/m3/1H | | ARTODN 35,149,76 |
| skn-rat LD50:50 mg/kg | | ARTODN 35,149,76 |
| ipr-rat LD50:960 ug/kg | | ARTODN 35,149,76 |
| orl-mus LD50:3550 ug/kg | | ARTODN 35,149,76 |
| ipr-mus LD50:1 mg/kg | | SCIEAS 182,1135,73 |
| ivn-mus LDLo:500 ug/kg | | EJMCA5 13,207,78 |
| orl-dog LD50:1 mg/kg | | ARTODN 35,149,76 |
| orl-cat LD50:5 mg/kg | | ARTODN 35,149,76 |
| orl-rbt LD50:5 mg/kg | | ARTODN 35,149,76 |
| orl-gpg LD50:2500 ug/kg | | ARTODN 35,149,76 |
| orl-ham LD50:13 mg/kg | | ARTODN 35,149,76 |
| orl-ckn LD50:75 mg/kg | | ARTODN 35,149,76 |

*THR:* HIGH orl, ihl, skn, ipr, ivn.
*Disaster Hazard:* When heated to decomp it emits tox fumes of $PO_x$.

## ETHYL 4-HYDROXY-3-MORPHOLINOMETHYL-BENZOATE

NIOSH #: DH 2528000

mf: $C_{13}H_{19}NO_4$; mw: 253.33

SYN: 4-HYDROXY-3-MORPHOLINOMETHYLBENZOIC ACID ETHYL ESTER

| TOXICITY DATA: | 2 | CODEN: |
|---|---|---|
| orl-mus LDLo:3000 mg/kg | | ARZNAD 11,85,61 |
| scu-mus LDLo:460 mg/kg | | ARZNAD 11,85,61 |

*THR:* MOD orl, scu.
*Disaster Hazard:* When heated to decomp it emits tox fumes of $NO_x$.

## 3-ETHYL-4-HYDROXY-1,2,5-OXADIAZOLE

mf: $C_4H_6N_2O_2$; mw: 114.10

*Disaster Hazard:* When heated to decomp it emits tox fumes of $NO_x$.
*Incomp:* Sodium hydroxide.

## ETHYL(m-HYDROXYPHENYL) DIMETHYLAMMONIUM HYDROXIDE

CAS RN: 473370 NIOSH #: BQ 5900000
mf: $C_{10}H_{16}NO{\cdot}HO$; mw: 183.28

SYNS:

EDROPHONIUM
TENSILON

| TOXICITY DATA: | 3-2 | CODEN: |
|---|---|---|
| orl-mus LD50:600 mg/kg | | 27ZIAQ -,102,73 |
| ipr-mus LD50:37 mg/kg | | 27ZIAQ -,102,73 |
| scu-mus LD50:130 mg/kg | | 27ZIAQ -,102,73 |
| ivn-mus LD50:9 mg/kg | | 27ZIAQ -,102,73 |
| ivn-rbt LD50:29 mg/kg | | 27ZIAQ -,102,73 |

*THR:* HIGH ivn, scu, ipr. MOD orl. See also ammonium hydroxide.
*Disaster Hazard:* When heated to decomp it emits tox fumes of $NO_x$.

## ETHYL-p-HYDROXYPHENYL KETONE

CAS RN: 70702 NIOSH #: UH 1925000
mf: $C_9H_{10}O_2$; mw: 150.19

SYNS:

P-HYDROXYPHENYL-1-PROPANONE
1-(4-HYDROXYPHENYL)-1-PROPANONE
HYDROXYPROPIOPHENONE
P-HYDROXYPROPIOPHENONE
4-HYDROXYPROPIOPHENONE
P-OXYPROPIOPHENONE
PAROXYPROPIONE
P-PROPIONYLPHENOL
USAF EK-3302

| TOXICITY DATA: | 3-2 | CODEN: |
|---|---|---|
| ipr-mus LD50:200 mg/kg | | NTIS** AD277-689 |
| scu-mus LD50:4100 mg/kg | | ARZNAD 5,559,55 |

Reported in EPA TSCA Inventory, 1980.
*THR:* HIGH ipr; MOD scu.
*Disaster Hazard:* When heated to decomp it emits acrid smoke and fumes.

## N-ETHYL-N-(3-HYDROXYPROPYL) NITROSAMINE

CAS RN: 61734881 NIOSH #: UB 5618000
mf: $C_5H_{12}N_2O_2$; mw: 132.19

| TOXICITY DATA: | CODEN: |
|---|---|
| mma-sat 15 umol/plate | CNREA8 37,399,77 |

*THR:* MUT data.
*Disaster Hazard:* When heated to decomp it emits tox fumes of $NO_x$.

## ETHYL HYPOCHLORITE

mf: $C_2H_5ClO$; mw: 80.52

*THR:* Very unstable.
*Explosion Hazard:* Self-explodes.
*Incomp:* Copper, light.

## ETHYLIDENE DICHLORIDE

CAS RN: 75343 NIOSH #: KI 0175000
mf: $C_2H_4Cl_2$; mw: 98.96

Colorless liquid, aromatic, ethereal odor, hot saccharine taste. mp: −97.7°, lel = 5.6%, bp: 57.3°, flash p: 22°F (TOC), d: 1.174 @ 20°/4°, vap. press: 230 mm @ 25°, vap. d: 3.44, autoign. temp.: 856°F.

SYNS:

AETHYLIDENCHLORID (GERMAN)
CHLORINATED HYDROCHLORIC ETHER
CHLORURE D'ETHYLIDENE (FRENCH)
1,1-DICHLOORETHAAN (DUTCH)
CLORURO DI ETILIDENE (ITALIAN)
1,1-DICHLORAETHAN (GERMAN)
1,1-DICHLOROETHANE
1,1-DICLOROETANO (ITALIAN)
ETHYLIDENE CHLORIDE
NCI-C04535

| TOXICITY DATA: | 3 | CODEN: |
|---|---|---|
| ihl-rat TCLo:6000 ppm/7H (6-15D preg) | | TXAPA9 28,452,74 |
| ihl-rat TCLo:6000 ppm/(6-15D preg):TER | | TXAPA9 28,452,74 |
| orl-mus TDLo:185 gm/kg/78W-I:ETA | | NCITR* NCI-CG-TR-66,78 |

| | |
|---|---|
| orl-mus TD:1300 gm/kg/78W-I:ETA | NCITR* NCI-CG-TR-66,78 |
| orl-rat LD50:725 mg/kg | HYSAAV 32,349,67 |

*TLV:* Air: 200 ppm DTLVS* 4,130,80. *Toxicology Review:* AIHAAP 40,A46,79; 27ZTAP 3,49,69. OSHA Standard: Air: TWA 100 ppm (SCP-I) FEREAC 39,23540,74. NCI Carcinogenesis Bioassay Completed; Results Indefinite: Mouse, Rat (NCITR* NCI-CG-TR-66,78). "NIOSH Manual of Analytical Methods" VOL 2 S123. NIOSH Current Intelligence Bulletin 27, 1978. Reported in EPA TSCA Inventory, 1980. EPA TSCA 8(a) Preliminary Assessment Information Proposed Rule FERREAC 45,13646,80.

*THR:* An exper TER, ETA. MOD orl. Liver damage report in exper animals.

*Fire Hazard:* Dangerous, when exposed to heat or flame.

*Explosion Hazard:* Mod, when exposed to heat or flame.

*Disaster Hazard:* Dangerous; when heated to decomp it emits highly tox fumes of phosgene; can react vigorously with oxidizing materials.

*To Fight Fire:* Alcohol foam, water, foam, $CO_2$, dry chemical.

## ETHYLIDENE DIFLUORIDE

CAS RN: 75376 NIOSH #: KI 1410000
mf: $C_2H_4F_2$; mw: 66.06

Colorless gas. mp: −117.0°, bp: −26.5°, d: 1.004 @ 25°, vap. d: 2.28.

SYNS:
DIFLUOROETHANE ETHYLIDENE FLUORIDE
ETHYLENE FLUORIDE

| TOXICITY DATA: 1 | CODEN: |
|---|---|
| skn-dmg-ihl 98 pph/10M | ENVRAL 7,275,74 |
| ihl-rat LCLo:50 pph/10M | AIHOAX 2,335,50 |

*Toxicology Review:* FAZMAE 18,365,74. DOT: Flammable Gas, Label: Flammable Gas FEREAC 41,57018,76. Reported in EPA TSCA Inventory, 1980. EPA TSCA 8(a) Preliminary Assessment Information Proposed Rule FERREAC 45,13646,80.

*THR:* LOW inhal; LOW to MOD irr. Narcotic in high conc. MUT data.

*Fire Hazard:* Dangerous, when exposed to heat or flame.

*Disaster Hazard:* Dangerous; see fluorides; can react vigorously with oxidizing materials.

## ETHYLIDENE DIURETHAN

CAS RN: 539719 NIOSH #: FA 9460000
mf: $C_8H_{16}N_2O_4$; mw: 204.26

SYN: N,N'-ETHYLIDENE-BIS(ETHYL CARBAMATE)

| TOXICITY DATA: 3 | CODEN: |
|---|---|
| ipr-mus TDLo:6500 mg/kg/13W-I:ETA | JNCIAM 9,35,48 |

*THR:* An exper ETA.

*Disaster Hazard:* When heated to decomp it emits tox fumes of $NO_x$.

## 5-ETHYLIDENE-2-NORBORNENE

CAS RN: 16219753 NIOSH #: RB 9450000
mf: $C_9H_{12}$; mw: 120.21

SYN: 5-ETHYLIDENEBICYCLO(2.2.1)HEPT-2-ENE

| TOXICITY DATA: 2 | CODEN: |
|---|---|
| skn-rbt 445 mg open MLD | UCDS** 11/28/67 |
| ihl-hmn TCLo:6 ppm/30M:IRR | TXAPA9 20,250,71 |
| orl-rat LD50:2830 mg/kg | UCDS** 11/28/67 |
| ihl-rat LC50:4000 ppm/4H | AIHAAP 30,470,69 |
| ihl-rat LC50:1246 ppm/4H | TXAPA9 20,250,71 |
| ihl-mus LC50:732 ppm/4H | TXAPA9 20,250,71 |
| ihl-rbt LC50:3104 ppm/4H | TXAPA9 20,250,71 |
| skn-rbt LD50:9170 mg/kg | UCDS** 11/28/67 |
| ihl-gpg LC50:2896 ppm/4H | TXAPA9 20,250,71 |

*TLV:* Air: 5 ppm DTLVS* 4,188,80. Reported in EPA TSCA Inventory, 1980. EPA TSCA 8(a) Preliminary Assessment Information Proposed Rule FERREAC 45,13646,80.

*THR:* MLD skn. Ihl IRR in hmn. MOD orl, ihl, skn.

*Disaster Hazard:* When heated to decomp it emits acrid smoke and fumes.

## N-ETHYL-2,2'-IMINODIETHANOL

CAS RN: 139877 NIOSH #: KK 9800000
mf: $C_6H_{15}NO_2$; mw: 133.22

| TOXICITY DATA: 1 | CODEN: |
|---|---|
| skn-rbt 10 mg/24H MLD | AMIHBC 10,61,54 |
| eye-rbt 750 ug SEV | AMIHBC 10,61,54 |
| orl-rat LD50:4570 mg/kg | AMIHBC 10,61,54 |

Reported in EPA TSCA Inventory, 1980.

*THR:* LOW orl in rat. MLD skn irr in rbt. SEV eye irr in rbt.

*Disaster Hazard:* When heated to decomp it emits tox fumes of $NO_x$.

## ETHYL IODIDE

CAS RN: 75036 NIOSH #: KI 4750000
mf: $C_2H_5I$; mw: 155.97

Clear, colorless liquid, turns brown on exposure to light, refractive, heavy. mp: −108°, bp: 72.4°, d: 1.90-1.93 @ 25°/25°, vap. press: 100 mm @ 18.0°, vap. d: 5.38. Misc in alc and ether.

SYNS:
HYDRIODIC ETHER IODOETHANE

| TOXICITY DATA: 1 | CODEN: |
|---|---|
| mmo-esc 20 umol/L | ARTODN 46,277,80 |
| ihl-rat LC50:65000 mg/m3/30M | FAVUAI 7,35,75 |

Reported in EPA TSCA Inventory, 1980.

*THR:* MOD irr to skin, eyes, mu mem. Narcotic in high conc. LOW ihl tox in rat.

*Fire Hazard:* Mod, when exposed to heat or flame.

*Disaster Hazard:* Dangerous; when heated to decomp, emits highly toxic fumes of iodides; will react with water or steam to produce toxic and corrosive fumes; can react vigorously with oxidizing materials.

*To Fight Fire:* Water, $CO_2$, dry chemical.

300377

SYN: 2-(P-((DI-2-CHLOROETHYL)AMINO)PHENYLAZO)-BENZOIC ACID

CITY DATA: CODEN:
g-par 194 ng BCPCA6 5,206,60

*THR:* MUT data.
*Disaster Hazard:* When heated to decomp it emits very tox fumes of $Cl^-$ and $NO_x$.

## 9-(2-(DI(2-CHLOROETHYL)AMINO)-ETHYLAMINO)-6-CHLORO-2-METHOXY-ACRIDINE

CAS RN: 10072250 NIOSH #: AR 7525000
mf: $C_{20}H_{22}Cl_3N_3O \cdot 2ClH \cdot H_2O$; mw: 517.74

SYNS:
ICR-48B QUINACRINE ETHYL MUSTARD
NSC-34372

TOXICITY DATA: 3 CODEN:
ipr-mus TDLo:16 mg/kg/4W:CARC JNCIAM 36,915,66

*THR:* An exper CARC.
*Disaster Hazard:* When heated to decomp it emits very tox fumes of $Cl^-$, $NO_x$ and HCl.

## DICHLOROETHYLARSINE

CAS RN: 598141 NIOSH #: CH 3500000
mf: $C_2H_5AsCl_2$; mw: 174.89

Colorless liquid. fruity, biting, irr odor. mp: −65°, bp: decomp, d: 1.742 @ 14°. vap. press: 2.29 mm @ 21.5°, vap d: 6.03.

SYNS:
ARSENIC DICHLOROETHANE ETHYLDICHLOROARSINE
DICHLOROETHYLARSINE

TOXICITY DATA: 3 CODEN:
[illegible] LCLo:14 ppm 30M NTIS** PB214-270
[illegible] LCLo:94 ppm 20M ZGEMAZ 13,523,21
[illegible] LCLo:12 ppm/40M ZGEMAZ 13,523,21
[illegible] LDLo:1 mg/kg ZGEMAZ 13,523,21

Aquatic Toxicity Rating: TLm96:under 1 ppm WQCHM* 2.-,74.
*THR:* VERY HIGH via inhal and ivn, probably HIGH via oral routes as well. Very irr. See arsenic compounds. Used as a military poison gas.
*Disaster Hazard:* Dangerous; on contact with acid or acid fumes it emits highly tox fumes of arsenic and phosgene; will react with water or steam to produce tox and corrosive fumes. Can react with oxidizing materials.

## 2,2-DICHLOROETHYLCARBAMIC ACID ETHYL ESTER

CAS RN: 67049756 NIOSH #: EZ 4075000
mf: $C_5H_9Cl_2NO_2$; mw: 186.05

TOXICITY DATA: 3-2 CODEN:
[illegible] LDLo:625 mg/kg JPETAB 42,1,31
[illegible] LDLo:1550 mg/kg JPETAB 42,1,31
[illegible] LDLo:500 mg/kg JPETAB 42,1,31

*THR:* HIGH par. MOD ipr, scu. See also esters.
*Disaster Hazard:* When heated to decomp it emits very tox fumes of $Cl^-$ and $NO_x$.

## O,O-DI(2-CHLOROETHYL)-O-(3-CHLORO-4-METHYLCOUMARIN-7-YL) PHOSPHATE

CAS RN: 321551 NIOSH #: GN 5250000
mf: $C_{14}H_{14}Cl_3O_6P$; mw: 415.60

SYNS:
O,O-BIS(2-CHLOROETHYL) O-(3-CHLORO-4-METHYL-7-COUMARINYL) PHOSPHATE
3-CHLORO-7-HYDROXY-4-METHYLCOUMARIN BIS(2-CHLOROETHYL)PHOSPHATE
DI-(2-CHLOROETHYL)-3-CHLORO-4-METHYL-7-COUMARINYL PHOSPHATE
DI-(2-CHLOROETHYL) 3-CHLORO-4-METHYLCOUMARIN-7-YL PHOSPHATE

TOXICITY DATA: 2 CODEN:
orl-dom LD50:763 mg/kg AJVRAH 41,1857,80
orl-rat LD50:900 mg/kg FAZMAE 17,108,73
ipr-ckn LD50:800 mg/kg BCPCA6 16,1183,67

*Toxicology Review:* RREVAH 46,1,73; PMDCAY 10, 85,74.
*THR:* MOD orl, ipr.
*Disaster Hazard:* When heated to decomp it emits very tox fumes of $PO_x$ and $Cl^-$.

## DICHLOROETHYLENE

CAS RN: 25323302 NIOSH #: KV 9250000
mf: $C_2H_2Cl_2$; mw: 96.94

TOXICITY DATA: 2 CODEN:
ihl-mus LCLo:76 gm/m3/2H AEXPBL 83,235,18
ihl-gpg LCLo:155 gm/m3/1H AEXPBL 83,235,18

*THR:* MOD ihl in mus and gpg.
*Disaster Hazard:* When heated to decomp it emits tox fumes of $Cl^-$.

## 1,1-DICHLOROETHYLENE

CAS RN: 75354 NIOSH #: KV 9275000
mf: $C_2H_2Cl_2$; mw: 96.94

Colorless volatile liquid. bp: 31.6°, lel = 7.3%, uel = 16.0%, fp: −122°, flash p: 0°F (OC), d: 1.213 @ 20°/4°, autoign. temp.: 1058°F.

SYNS:
CHLORURE DE VINYLIDENE (FRENCH) 1-1-DCE
1,1-DICHLOROETHENE NCI-C54262
VINYLIDENE DICHLORIDE

TOXICITY DATA: 3 CODEN:
orl-rat TDLo:200 mg/kg (6-15D preg) TXAPA9 49,189,79
ihl-rat TCLo:80 ppm/7H (6-15D preg) TXAPA9 49,189,79
ihl-rbt TCLo:160 ppm/7H (6-15D preg) TXAPA9 49,189,79
mmo-sat 5 pph MUREAV 57,141,78
mma-sat 3 pph/2H MUREAV 58,183,78
ihl-rat TCLo:55 ppm/52W-I:ETA JTEHD6 4,15,78
ihl-mus TCLo:55 ppm/6H/1Y-I:ETA EVHPAZ 21,25,77
skn-mus TDLo:4840 mg/kg:NEO JJIND8 63,1433,79
ihl-rat TC:55 ppm/1Y-I:ETA EVHPAZ 21,25,77

300378

| | |
|---|---|
| ihl-mus TC:55 ppm/43W-I:ETA | JTEHD6 4,15,78 |
| ihl-hmn TCLo:25 ppm:SYS | CHINAG 11,463,76 |
| [illegible] LD50:200 mg/kg | DCTODJ 1,63,77 |
| [illegible] LCLo:10000 ppm/24H | EXMPA6 20,187,74 |
| [illegible]us LC50:98 ppm/22H | JTEHD6 3(5-6),913,77 |
| orl-dog LDLo:5750 mg/kg | QJPPAL 7,205,34 |
| ivn-dog LDLo:225 mg/kg | QJPPAL 7,205,34 |
| scu-rbt LDLo:3700 mg/kg | QJPPAL 7,205,34 |

Aquatic Toxicity Rating: TLm96:1000-100 ppm WQCHM* 3,-,74. Carcinogenic Determination: Animal Positive IARC** 19,439,79.

*TLV:* Air: 10 ppm DTLVS* 4,432,80. *Toxicology Review:* CTOXAO 8,633,75; CMTVAS 10(3),49,73; NTIS** ORNL/TIRC-77/3. Occupational Exposure to Vinyl Halides recm std: Air: TWA 1 ppm; CL 5 ppm/15M NTIS**. NTP Carcinogenesis Bioassay Completed as of December 1980. "NIOSH Manual of Analytical Methods" VOL 4 266*. NIOSH Current Intelligence Bulletin 28, 1978. Reported in EPA TSCA Inventory, 1980. EPA TSCA 8(a) Preliminary Assessment Information Proposed Rule FERREAC 45,13646,80.

*THR:* An exper MUT, ETA, NEO, CARC. HIGH acute orl, ihl. See also vinyl chloride.

*Fire Hazard:* Highly dangerous, when exposed to heat or flame.

*Explosion Hazard:* Mod, in the form of gas, when exposed to heat or flame. Also can explode spontaneously; reacts violently with chlorosulfonic acid, $HNO_3$, oleum.

*Disaster Hazard:* Highly dangerous; see chlorides; can react vigorously with oxidizing materials.

*To Fight Fire:* Alcohol foam, $CO_2$, dry chemical.

*Incomp:* Air; chlorotri-fluoroethylene; ozone; perchloryl fluoride.

## cis-DICHLOROETHYLENE

CAS RN: 156592 NIOSH #: KV 9420000
mf: $C_2H_2Cl_2$; mw: 96.94

Colorless liquid, pleasant odor. mp: −80.5°, bp: 59°, lel = 9.7%, uel = 12.8%, flash p: 39°F, d: 1.2743 @ 25°/4°, vap. press: 400 mm @ 41.0°, vap. d: 3.34.

SYNS:
1,2-DICHLOROETHYLENE ACETYLENE DICHLORIDE

| TOXICITY DATA: 1 | CODEN: |
|---|---|
| ihl-mus LCLo:65000 mg/m3/2H | AHBAAM 116,131,36 |
| ihl-cat LCLo:20000 mg/m3/6H | AHBAAM 116,131,36 |

Reported in EPA TSCA Inventory, 1980.

*THR:* LOW via oral route. In high conc it is irr and narcotic. Has produced liver and kidney injury in exper animals.

*Fire Hazard:* Dangerous, when exposed to heat or flame. Reacts violently with $N_2O_4$, KOH, Na, NaOH.

*Spontaneous Heating:* No.

*Explosion Hazard:* Mod, in the form of vapor when exposed to flame.

*Disaster Hazard:* Dangerous; see chlorides; can react vigously with oxidizing materials.

*To Fight Fire:* Water spray, foam, $CO_2$, dry chemical.

## cis, 1,2-DICHLOROETHYLENE

mf: $C_2H_2Cl_2$; mw: 96.94

Flash p: 42.8°F; lel = 3.3%; uel = 15%.

## trans-1,2-DICHLOROETHYLENE

mf: $C_2H_2Cl_2$; mw: 96.94

Flash p: 35.6°F; lel = 9.7%; uel = 12.8%.
Can cause fire hazard.

*Incomp:* Alkalies; difluoromethylene dihypofluorite; nitrogen tetraoxide.

## 1,2-DICHLOROETHYLENE CARBONATE

CAS RN: 3967553 NIOSH #: JH 7400000
mf: $C_3H_2Cl_2O_3$; mw: 156.95

| TOXICITY DATA: 3 | CODEN: |
|---|---|
| scu-mus TDLo:648 mg/kg/54W-I:ETA | JNCIAM 48,1431,72 |

*THR:* An exper ETA.

*Disaster Hazard:* When heated to decomp it emits tox fumes of $Cl^-$.

## DICHLORO(ETHYLENEDIAMMINE)-PLATINUM(II)

CAS RN: 14096516 NIOSH #: TP 2497100
mf: $C_2H_8Cl_2N_2Pt$; mw: 326.11

| TOXICITY DATA: 3 | CODEN: |
|---|---|
| mmo-sat 2 ug/plate | MUREAV 77,45,80 |
| mma-sat 2 ug/plate | MUREAV 77,45,80 |
| ipr-mus LDLo:14 mg/kg | BICHBX 2,187,73 |

*THR:* MUT data. HIGH ipr. See also platinum compounds.

*Disaster Hazard:* When heated to decomp it emits very tox fumes of $Cl^-$ and $NO_x$.

## DI-2-CHLOROETHYL MALEATE

CAS RN: 63917066 NIOSH #: ON 1050000
mf: $C_8H_{10}Cl_2O_4$; mw: 241.08

| TOXICITY DATA: 3 | CODEN: |
|---|---|
| orl-rat LD50:71 mg/kg | TXAPA9 28,313,74 |
| skn-rbt LD50:140 mg/kg | TXAPA9 28,313,74 |

*THR:* HIGH orl, skn.

*Disaster Hazard:* When heated to decomp it emits tox fumes of $Cl^-$.

## 2,3-DICHLORO-N-ETHYLMALEINIMIDE

CAS RN: 20198770 NIOSH #: ON 5175000
mf: $C_6H_5Cl_2NO_2$; mw: 194.02

SYN: N-ETHYL-DICHLOROMALEINIMIDE

| TOXICITY DATA: 3 | CODEN: |
|---|---|
| ipr-mus TDLo:6200 ug/kg/(9D preg):TER | ARTODN 37,15,76 |
| ipr-mus LD50:15 mg/kg | ARTODN 37,15,76 |
| ivn-mus LD50:5600 ug/kg | CSLNX* NX#03694 |

300379

## TRICHLOROETHANOL

CAS RN: 115208 NIOSH #: KM 3850000
mf: $C_2H_3Cl_3O$; mw: 149.40

Liquid. mp: 17.8°, bp: 150° @ 765 mm, d: 1.54 @ 25°/4°, vap. press: 1 mm @ 20°, vap. d: 5.16.

SYNS:
2,2,2-TRICHLOROETHANOL
2,2,2-TRICHLOROETHYL ALCOHOL
TRICHLOROETHYL ALCOHOL

| TOXICITY DATA: 3-2 | CODEN: |
|---|---|
| mmo-asn 5 uL/plate/2H | CBINA8 30,9,80 |
| orl-rat LD50:600 mg/kg | 12VXA5 8,1069,68 |
| ipr-rat LDLo:300 mg/kg | JPETAB 63,453,38 |
| ivn-mus LD50:201 mg/kg | 28ZPAK -,78,72 |
| ivn-rbt LDLo:50 mg/kg | JPETAB 63,453,38 |

Reported in EPA TSCA Inventory, 1980.
*THR:* HIGH via ivn and ipr routes. MOD via oral route. An anesthetic. MUT data.
*Disaster Hazard:* Dangerous; see chlorides.

## TRICHLOROETHENYLSILANE

CAS RN: 75945 NIOSH #: VV 6125000
mf: $C_2H_3Cl_3Si$; mw: 161.49

Fuming liquid. bp: 90.6°; d: 1.265 @ 25°/25°; flash p: 16°F.

SYNS:
TRICHLORO(VINYL)SILANE
VINYLSILICON TRICHLORIDE
TRICHLOROVINYL SILICANE
VINYL TRICHLOROSILANE

| TOXICITY DATA: 2 | CODEN: |
|---|---|
| skn-rbt 1 mg/24H | AMIHBC 10,61,54 |
| skn-rbt 625 mg open SEV | UCDS** 1/19/72 |
| eye-rbt 50 ug SEV | AMIHBC 10,61,54 |
| orl-rat LD50:1280 mg/kg | AMIHBC 10,61,54 |
| ihl-rat LCLo:500 ppm/4H | UCDS** 1/19/72 |
| orl-mus LD50:3160 mg/kg | HYSAAV 34,334,69 |
| ihl-mus LC50:3020 mg/m3/4H | HYSAAV 34,334,69 |
| skn-rbt LD50:680 mg/kg | AMIHBC 10,61,54 |

Aquatic Toxicity Rating: TLm96:100-10 ppm WQCHM* 4,-,74. DOT: Flammable Liquid, Label: Flammable Liquid FEREAC 41,57018,76. Reported in EPA TSCA Inventory, 1980.
*THR:* MOD orl, ihl, skn. A skn, eye irr. See also chlorosilanes.
*Fire Hazard:* Dangerous; reacts violently with water, moist air.
*Disaster Hazard:* When heated to decomp it emits tox fumes of $Cl^-$. Will react with water or steam to produce tox and corrosive fumes.

## 2,2,2-TRICHLORO-1-ETHOXYETHANOL

CAS RN: 515833 NIOSH #: KM 4725000
mf: $C_4H_7Cl_3O_2$; mw: 193.46

Crystals, less sol in water than chloral hydrate, sol in organic solvents. d: 1.143, mp: 47.5°, bp: 116°.

SYNS:
CHLORAL ALCOHOLATE
CHLORAL, ETHYL HEMIACETAL
CHLORAL ETHYLALCOHOLATE
TRICHLOROACETALDEHYDE MONOETHYLACETAL

| TOXICITY DATA: 2 | CODEN: |
|---|---|
| orl-rat LD50:880 mg/kg | JPETAB 78,340,43 |
| orl-dog LDLo:1200 mg/kg | JPETAB 78,340,43 |
| orl-cat LDLo:500 mg/kg | JPETAB 78,340,43 |
| orl-rbt LDLo:1100 mg/kg | JPETAB 78,340,43 |

Reported in EPA TSCA Inventory, 1980.
*THR:* MOD via oral route.
*Disaster Hazard:* When heated to decomp it emits to fumes of $Cl^-$.

## TRICHLOROETHYLAMINE

NIOSH #: KR 985000
mf: $C_2H_4Cl_3N$; mw: 148.41

SYN: TCEA

| TOXICITY DATA: | CODEN: |
|---|---|
| mmo-asn 1700 umol/L | SOGEBZ 6,220,70 |

*THR:* MUT data.
*Disaster Hazard:* When heated to decomp it emits very tox fumes of $Cl^-$ and $NO_x$.

## TRICHLOROETHYL CARBAMATE

CAS RN: 107697 NIOSH #: FD 1750000
mf: $C_3H_4Cl_3NO_2$; mw: 192.43

SYN: CARBAMIC ACID 2,2,2-TRICHLOROETHYL ESTER

| TOXICITY DATA: 3 | CODEN: |
|---|---|
| ipr-mus TDLo:3250 mg/kg/13W-I TFX:NEO | JNCIAM 8,99,47 |
| ipr-mus LD50:500 mg/kg | JNCIAM 8,99,47 |

*THR:* An exper NEO. MOD ipr. See also esters, carbamates.
*Disaster Hazard:* When heated to decomp it emits very tox fumes of $Cl^-$ and $NO_x$.

## TRICHLORO ETHYLENE

CAS RN: 79-01-6 NIOSH #: KX 4550000
mf: $C_2HCl_3$; mw: 131.38

Mobile liquid; characteristic odor of chloroform. d: 1.4649 @ 20°/4°; bp: 86.7°; flash p: 89.6°F; lel = 12.5%; uel = 90% @ above 30°; mp: −73°; fp: −86.8°; autoign. temp.: 788°F; vap. press: 100 mm @ 32°; vap. d: 4.53.

SYNS:
ACETYLENE TRICHLORIDE
1-CHLORO-2,2-DICHLOROETHYLENE
1,1-DICHLORO-2-CHLOROETHYLENE
DOW-TRI
ETHYLENE TRICHLORIDE
NCI-C04546
TRICHLOORETHEEN (DUTCH)
TRICHLORAETHEN (GERMAN)
TRI-CLENE
TRICLORETENE (ITALIAN)
VESTROL

| SKIN AND EYE IRRITATION DATA: 3 | CODEN: |
|---|---|
| eye-hmn 5 ppm | JOCMA7 2,383,60 |
| skn-rbt 500 mg/24H SEV | 28ZPAK -,28,72 |
| eye-rbt 20 mg 24HSEV | 28ZPAK -,28,72 |

| MUTATION DATA: | CODEN: |
|---|---|
| mmo-sat 100 uL/plate | NIOSH* 5AUG77 |
| mma-sat 5 pph/2H | ARTODN 41,249,79 |
| mma-smc 10 mL/L | MUREAV 48,173,77 |

AR300380

| | |
|---|---|
| slt-mus-ipr 1 mmol/L | MUREAV 46,202,77 |
| dns-mus-orl 2500 mg/L | NTIS** AD-A080-636 |
| ns:bmr 1 mmol/L | NTIS** AD-A080-636 |
| us/smc 400 mg/kg | JEPTDQ 1,411,78 |

REPRODUCTIVE EFFECTS

| DATA: | CODEN: |
|---|---|
| ihl-rat TCLo:1800 ppm/24H (1-2D preg) | APTOD9 19,A22,80 |
| ihl-rat TCLo:100 ppm/4H (6-22D preg) | JPHYA7 276,24P,78 |
| ihl-rat TCLo:1800 ppm/6H (1-20D preg) | TXCYAC 14,153,79 |

| TUMORGENIC DATA: | CODEN: |
|---|---|
| ihl-rat TCLo:500 ppm/6H/77W-I:ETA | ARTODN 43,237,80 |
| orl-mus TDLo:455 g/kg/78W-I:CAR | NCITR* NCI-CG-TR-2,76 |
| ihl-mus TCLo:100 ppm/6H/77W-I:ETA | ARTODN 43,237,80 |
| ihl-ham TCLo:100 ppm/6H/77W-I:ETA | ARTODN 43,237,80 |
| orl-mus TDLo:912 g/kg/78W-I:CAR | NCITR* NCI-CG-TR-2,76 |
| ihl-mus TCLo:500 ppm/6H/77W-I:ETA | ARTODN 43,237,80 |

| TOXICITY DATA: | CODEN: |
|---|---|
| orl-hmn LDLo:7 g/kg | ARTODN 35,295,76 |
| ihl-hmn TCLo:6900 mg/M³/10M:CNS | AHBAAM 116,131,36 |
| ihl-hmn TCLo:160 ppm/83M:CNS | AIHAAP 23,167,62 |
| ihl-hmn TDLo:812 mg/kg:SYS | BMJOAE 2,689,45 |
| ihl-man TCLo:110 ppm/8H:IRR | BJIMAG 28,293,71 |
| ihl-man LCLo:2900 ppm | NZMJAX 50,119,51 |
| orl-rat LD50:4920 mg/kg | AIHAAP 30,470,69 |
| ihl-rat LCLo:8000 ppm/4H | AIHAAP 30,470,69 |
| orl-mus LD50:2402 mg/kg | NTIS** AD-A080-636 |
| LCLo:3000 ppm/2H | AEPPAE 141,19,29 |
| LD50:3000 mg/kg | JETOAS 7(4),247,74 |
| ...us LD50:34 mg/kg | CBCCT* 6,141,54 |
| orl-dog LDLo:5860 mg/kg | 12VXA5 8,1069,68 |
| ipr-dog LD50:1900 mg/kg | TXAPA9 10,119,67 |
| scu-dog LDLo:150 mg/kg | HBTXAC 5,76,59 |
| ivn-dog LDLo:150 mg/kg | QJPPAL 7,205,34 |
| orl-cat LDLo:5866 mg/kg | NBTXAC 5,76,59 |
| ihl-cat LCLo:32500 mg/M³/2H | AMBAAM 116,131,36 |
| orl-rbt LDLo:7230 mg/kg | HBTXAC 5,76,59 |
| scu-rbt LDLo:1800 mg/kg | QJPPAL 7,205,34 |
| ihl-gpg LCLo:37200 ppm/40M | HBTXAC 5,76,59 |

Aquatic Toxicity Rating:TLm96:1000-100 ppm WQCHM* 3,-,74. Carcinogenic Determination: Animal Positive IARC** 20,545,79; IARC** 11,263, 76.

*TLV:* TWA 50 ppm; STEL 150 ppm DTLVS* 4,406, 80.

*Toxicology Review:* JTEHD6 2(3),671,77; CLPTAT 8, 91,67; JOCMA7 16(3),194,74; JOCMA7 17(9),603,75; FNSCA6 2,67,73; BNYMAM 54,413,78; 27ZTAP 3,146,69. OSHA Standard: Air: TWA 100 ppm; C1200; Pk 300/5M/2H (SCP-J) FEREAC 39,23540,74. DOT: ORM-A. Label: None FEREAC 41,57018,76. Occupational Exposure to Trichloroethylene recm std: Air: TWA 100 ppm; CL 150 ppm/10M NTIS**. Occupational Exposure to Waste Anesthetic Gases and Vapors recm std: Air: CL 2 ppm/1H NTIS**. NCI Carcinogenesis Bioassay Completed; Results Positive: Mouse NCITR*NCI-CG-TR-2,76); Results Negative: Rat NCITR(NCI-CG-TR-2,76). Currently tested by NTP for carcinogenesis by Standard Bioassay Protocol as of April 1982. NTP Carcinogenesis Bioassay Completed as of April 1982. "NIOSH Manual of Analytical Methods" VOL 1 127, Vol 3, S336. NIOSH Current Intelligence Bulletin 2, 1975. Reported in EPA TSCA Inventory, 1980. EPA TSCA 8e NO: 05780146-Followup sent as of April, 1979.

*THR:* A strong skn, eye irr. MUT data. An exper TER, ETA, CARC. HIGH ivn, scu, ihl; MOD ihl, orl, ipr; LOW orl, ihl. Inhal of high conc causes narcosis and anesthesia. A form of addiction has been observed in exposed workers. Prolonged inhal of mod conc causes headache and drowsiness. Fatalities following severe, acute exposure have been attributed to ventricular fibrillation resulting in cardiac failure. There is damage to liver and other organs from chronic exposure. Cases have been reported but are of questionable validity. Determination of the metabolites trichloracetic acid and trichloroethanol in urine reflects the absorption of trichloroethylene. A food additive permitted in food for human consumption. A common air contaminant.

*Fire Hazard:* Low, when exposed to heat or flame. High conc of trichloroethylene vapor in high-temp air can be made to burn mildly if plied with a strong flame. Though such a condition is difficult to produce, flames or arcs should not be used in closed equipment which contains any solvent residue or vapor.

*Spontaneous Heating:* No.

*Disaster Hazard:* Dangerous. When heated to decomp it emits tox fumes of $Cl^-$. See chlorides.

For further information see Vol. 1, No. 2 and Vol. 3, No. 1 of *DPIM Report.*

*Incomp:* Can react violently with Al, Ba, $N_2O_4$, Li, Mg, liquid $O_2$, $O_3$, KOH, $KNO_3$, Na, NaOH, Ti.

## alpha-TRICHLOROETHYLIDENE GLYCEROL

CAS RN: 4692493 NIOSH #: JI 3380000
mf: $C_5H_7Cl_3O_3$; mw: 221.47

SYN: ALPHA-2-(TRICHLOROMETHYL)-1,3-DIOXOLANE-4-METHANOL

| TOXICITY DATA: 2 | CODEN: |
|---|---|
| ipr-mus LD50:920 mg/kg | JPETAB 81,72,44 |
| ivn-mus LD50:520 mg/kg | JPETAB 81,72,44 |

*THR:* MOD ipr, ivn.

*Disaster Hazard:* When heated to decomp it emits tox fumes of $Cl^-$.

## beta-TRICHLOROETHYLIDENE GLYCEROL

CAS RN: 4692493 NIOSH #: JI 3440000
mf: $C_5H_7Cl_3O_3$; mw: 221.47

SYN: BETA-2-(TRICHLOROMETHYL)-1,3-DIOXOLANE-4-METHANOL

| TOXICITY DATA: 2 | CODEN: |
|---|---|
| ipr-mus LD50:959 mg/kg | JPETAB 81,72,44 |
| ivn-mus LD50:518 mg/kg | JPETAB 81,72,44 |

*THR:* MOD ipr, ivn.

*Disaster Hazard:* When heated to decomp it emits tox fumes of $Cl^-$.

AR300381

## 4,5,7-TRICHLOROBENZTHIADIAZOLE-2,1,3

CAS RN: 1982554 NIOSH #: DL 0175000
mf: $C_6HCl_3N_2S$; mw: 239.50

SYN: 4,5,7-TRICHLORO-2,1,3-BENZOTHIADIAZOLE

| TOXICITY DATA: | 2 | CODEN: |
|---|---|---|
| orl-rat LD50:1620 mg/kg | | WRPCA2 9,119,70 |
| orl-mus LD50:1500 mg/kg | | 31ZOAD 1,423,68 |

*THR:* MOD orl.
*Disaster Hazard:* When heated to decomp it emits very tox fumes of $NO_x$ and $SO_x$.

## TRICHLOROBENZYL CHLORIDE

CAS RN: 1344327 NIOSH #: XT 8575000
mf: $C_7H_4Cl_4$; mw: 229.91

SYN: TCBC

| TOXICITY DATA: | 2 | CODEN: |
|---|---|---|
| orl-rat LD50:3075 mg/kg | | 28ZEAL 4,359,69 |

*Toxicology Review:* 27ZTAP 3,146,69. Reported in EPA TSCA Inventory, 1980.
*THR:* MOD orl.
*Disaster Hazard:* When heated to decomp it emits tox fumes of $Cl^-$.

## 3,4,4'-TRICHLOROCARBANILIDE

CAS RN: 101202 NIOSH #: FE 1250000
mf: $C_{13}H_9Cl_3N_2O$; mw: 315.59

SYN: N-(3,4-DICHLOROPHENYL)-N'-(4-CHLOROPHENYL)UREA

| TOXICITY DATA: | 3 | CODEN: |
|---|---|---|
| ipr-mus LD50:2100 mg/kg | | LPPTAK 27,306,79 |

*Toxicology Review:* 27ZTAP 3,146,69. Reported in EPA TSCA Inventory, 1980. EPA TSCA 8(a) Preliminary Assessment Information Proposed Rule FERREAC 45,13646,80.
*THR:* MOD ipr.
*Disaster Hazard:* When heated to decomp it emits very tox fumes of $Cl^-$ and $NO_x$.

## 4,5,6-TRICHLORO-2-(2,4-DICHLOROPHENOXY) PHENOL

NIOSH #: SL 0532000
mf: $C_{12}H_5Cl_5O_2$; mw: 358.42

SYN: 2-(2,4-DICHLOROPHENOXY)-4,5,6-TRICHLOROPHENOL

| TOXICITY DATA: | CODEN: |
|---|---|
| mlt-mus-ipr 140 umol/L | MUREAV 46,202,77 |

*THR:* MUT data.
*Disaster Hazard:* When heated to decomp it emits tox fumes of $Cl^-$.

## 1,1,2-TRICHLORO-2,2-DIFLUOROETHANE

CAS RN: 354212 NIOSH #: KI 1435000
mf: $CHCl_3F_2$; mw: 157.37

SYN: UCON FLUOROCARBON 122

| TOXICITY DATA: | 2 | CODEN: |
|---|---|---|
| orl-rat LDLo:7500 mg/kg | | 16CZAC 20,459,66 |
| ihl-rat LCLo:4000 ppm/4H | | UCMH** 11,15,62 |

*THR:* MOD orl, ihl.
*Disaster Hazard:* When heated to decomp it emits very tox fumes of $F^-$ and $Cl^-$.

## TRICHLORODINITROBENZENE

CAS RN: 8003461 NIOSH #: CZ 7960000
mf: $C_6HCl_3N_2O_4$; mw: 271.44

SYNS:
BRASSISAN (GERMAN)
DINITROTRICHLOROBENZENE ISOMERIC MIXTURE

| TOXICITY DATA: | 2 | CODEN: |
|---|---|---|
| orl-rat LD50:425 mg/kg | | GUCHAZ 6,516,73 |
| skn-rat LD50:425 mg/kg | | GUCHAZ 6,516,73 |

*THR:* MOD, via oral and dermal routes. See also benzene and nitrobenzene. A pesticide.
*Fire Hazard:* Mod, when exposed to heat or flame. See nitrates.
*Explosion Hazard:* See nitrates.
*Disaster Hazard:* Dangerous; when heated to decomp it emits highly tox fumes of $NO_x$ and $Cl^-$; can react vigorously with reducing materials.

## TRICHLORO ESTERTIN

NIOSH #: WH 8240000

SYN: ESTERTRICHLOROSTANNANE

| TOXICITY DATA: | 1 | CODEN: |
|---|---|---|
| unk-rat LD50:5500 mg/kg | | TIUSAD 107,1,76 |

Occupational Exposure to Organotin Compounds recm std: Air: TWA 0.1 mg(Sn)/m3 NTIS**.
*THR:* LOW unk. See also tin compounds and esters.
*Disaster Hazard:* When heated to decomp it emits tox fumes of $Cl^-$.

## 1,1,1-TRICHLOROETHANE

CAS RN: 71556 NIOSH #: KJ 2975000
mf: $C_2H_3Cl_3$; mw: 133.40

Colorless liquid. bp: 74.1°, fp: −32.5°, flash p: none, d: 1.3376 @ 20°/4°, vap. press: 100 mm @ 20.0°. Insol in water; sol in acetone, benzene, carbon tetrachloride, methanol, ether.

SYNS:
CHLOROETHENE
CHLOROTHANE NU
CHLOROTHENE
METHYL CHLOROFORM
METHYLTRICHLOROMETHANE
NCI-C04626
1,1,1-TRICHLOORETHAAN (DUTCH)
1,1,1-TRICHLORAETHAN (GERMAN)
TRICHLORO-1,1,1-ETHANE (FRENCH)
ALPHA-TRICHLOROETHANE
1,1,1-TRICLOROETANO (ITALIAN)

| TOXICITY DATA: | 2-1 | CODEN: |
|---|---|---|
| ihl-rat TCLo:2100 ppm/24H (14D pre/1-20D preg) | | TOXID9 1,28,80 |
| eye-man 450 ppm/8H | | BJIMAG 28,286,71 |
| skn-rbt 5 gm/12D-I MLD | | AIHAAP 19,353,58 |

AR300382

| | |
|---|---|
| skn-rbt 500 mg/24H MOD | 28ZPAK -,28,72 |
| eye-rbt 100 mg MLD | AIHAAP 19,353,58 |
| eye-rbt 2 mg/24H SEV | 28ZPAK -,28,72 |
| ihl-man LCLo:27 gm/m3/10M | JOCMA7 8,358,66 |
| ihl-man TCLo:350 ppm:PSY | WEHSAL 10,82,73 |
| orl-hmn TDLo:670 mg/kg:GIT | NTIS** PB257-185 |
| ihl-hmn TCLo:920 ppm/70M:CNS | AIHAAP 19,353,58 |
| orl-rat LD50:10300 mg/kg | NTIS** PB257-185 |
| ihl-rat LCLo:1000 ppm | FMCHA2 -,D317,80 |
| ipr-rat LD50:5100 mg/kg | NTIS** PB257-185 |
| orl-mus LD50:11240 mg/kg | NTIS** PB257-185 |
| ihl-mus LCLo:11000 ppm/2H | HBTXAC 5,72,59 |
| ipr-mus LD50:4700 mg/kg | TXAPA9 13,287,68 |
| orl-dog LD50:750 mg/kg | FMCHA2 -,D317,80 |
| ipr-dog LD50:3100 mg/kg | TXAPA9 10,119,67 |
| ivn-dog LDLo:95 mg/kg | HBTXAC 5,72,59 |
| orl-rbt LD50:5660 mg/kg | AIHAAP 19,353,58 |
| scu-rbt LDLo:500 mg/kg | HBTXAC 5,72,59 |
| orl-gpg LD50:9470 mg/kg | AIHAAP 19,353,58 |

Aquatic Toxicity Rating: TLm96:100-10 ppm WQCHM* 3,-,74. Carcinogenic Determination: Indefinite IARC** 20,515,79.

*TLV:* Air: 350 ppm DTLVS* 4,269,80. *Toxicology Review:* FAZMAE 18,365,74; EATR** EB-TR-75047; AIHAAP 40,A46,79. OSHA Standard: Air: TWA 350 ppm (SCP-J) FEREAC 39,23540,74. DOT: ORM-A, Label: None FEREAC 41,57018,76. Occupational Exposure to 1,1,1-Trichloroethane recm std: Air: CL 350 ppm/15M NTIS**. NCI Carcinogenesis Bioassay Completed; Results Negative (NCITR* NCI-CG-TR-3,77). Currently Tested by NTP for Carcinogenesis by Standard Bioassay Protocol as of December 1980. "NIOSH Manual of Analytical Methods" VOL 1 127, VOL 3 S328. NIOSH Current Intelligence Bulletin 27, 1978. Reported in EPA TSCA Inventory, 1980. EPA TSCA 8(a) Preliminary Assessment Information Proposed Rule FERREAC 45,13646,80.

*THR:* In hmn it causes PSY, GIT, CNS effects. A MOD skn irr, a SEV eye irr in rbts. LOW orl, ipr, ihl in rat, mus. MOD orl, ipr dog; Narcotic in high conc. Causes a proarrhythmic activity which sensitizes the heart to epinephrine-induced arrhythmias. This sometimes will cause a cardiac arrest particularly when this material is massively inhaled as in drug abuse for euphoria. Reacts violently with $N_2O_4$, $O_2$, $O_2$ liquid, Na, NaOH, Na-K alloy.

*Disaster Hazard:* Dangerous; see chlorides.

For further information see Vol. 2, No. 1 of *DPIM Report.*

## 1,1,2-TRICHLOROETHANE

CAS RN: 79005 NIOSH #: KJ 3150000

mf: $C_2H_3Cl_3$; mw: 133.40

Liquid, pleasant odor. bp: 114°, fp: −35°, d: 1.4416 @ 20°/4°, vap. press: 40 mm @ 35.2°.

SYNS:

ETHANE TRICHLORIDE
NCI-C04579
BETA-TRICHLOROETHANE
1,2,2-TRICHLOROETHANE
TROJCHLOROETAN(1,1,2) (POLISH)
VINYL TRICHLORIDE

| TOXICITY DATA: 3 | CODEN: |
|---|---|
| skn-rbt 500 mg open MLD | UCDS** 6/28/72 |
| skn-rbt 810 mg/24H SEV | JETOAS 9,171,76 |
| eye-rbt 162 mg MLD | JETOAS 9,171,76 |
| skn-gpg 1440 mg/15M | APTOA6 41,298,77 |
| cyt-gpg-skn 2880 ug/kg | APTOA6 41,298,77 |
| orl-mus TDLo:76 gm/kg/78W-I:CAR | NCITR* NCI-CG-TR-74,78 |
| orl-mus TD:152 gm/kg/78W-I:CAR | NCITR* NCI-CG-TR-74,78 |
| orl-rat LD50:1140 mg/kg | UCDS** 6/28/72 |
| ihl-rat LCLo:500 ppm/8H | AIHAAP 30,470,69 |
| ipr-mus LD50:994 mg/kg | TXAPA9 9,139,66 |
| scu-mus LD50:227 mg/kg | JPETAB 123,224,58 |
| orl-dog LDLo:500 mg/kg | AJHYA2 16,325,32 |
| ipr-dog LD50:450 mg/kg | TXAPA9 10,119,67 |
| ivn-dog LDLo:95 mg/kg | QJPPAL 7,205,34 |
| ihl-cat LCLo:13100 mg/m3/4.5H | AHBAAM 116,131,36 |
| scu-rbt LDLo:500 mg/kg | QJPPAL 7,205,34 |

Aquatic Toxicity Rating: TLm96:100-10 ppm WQCHM* 3,-,74. Carcinogenic Determination: Animal IARC** 20,533,79.

*TLV:* Air: 10 ppm (skin) DTLVS* 4,406,80. *Toxicology Review:* FAZMAE 18,365,74; AIHAAP 40,A46,79; 27ZTAP 3,146,69. OSHA Standard: Air: TWA 10 ppm (skin) (SCP-J) FEREAC 39,23540,74. NCI Carcinogenesis Bioassay Completed; Results Positive: Mouse (NCITR* NCI-CG-TR-74,78). NCI Carcinogenesis Bioassay Completed; Results Negative: Rat (NCITR* NCI-CG-TR-74,78). "NIOSH Manual of Analytical Methods" VOL 1 127, VOL 2 S134. NIOSH Current Intelligence Bulletin 27, 1978. Reported in EPA TSCA Inventory, 1980. EPA TSCA 8(a) Preliminary Assessment Information Proposed Rule FERREAC 45, 13646,80.

*THR:* HIGH ivn, scu and MOD orl, ihl, ipr and dermal. MOD skn irr and SEV eye irr in rbts. Trichloroethane has narcotic properties and acts as a local irr to the eyes, nose and lungs. It may also be injurious to the liver and kidneys. A fumigant. An exper CARC. MUT data.

*Disaster Hazard:* Dangerous; see chlorides.

*Incomp:* K.

For further information see Vol. 2, No. 6 and Vol. 3, No. 2 of *DPIM Report.*

## 1,1,1-TRICHLOROETHANE mixed with TETRACHLOROETHYLENE (3:1)

NIOSH #: KJ 3950000

SYNS:

DOWCLENE
EC CLEANER

| TOXICITY DATA: 2-1 | CODEN: |
|---|---|
| orl-rat LD50:15 gm/kg | AIHAAP 24,541,63 |
| ihl-rat LC50:3700 ppm/7H | AIHAAP 24,541,63 |
| orl-mus LD50:10 gm/kg | AIHAAP 24,541,63 |
| orl-rbt LD50:13 gm/kg | AIHAAP 24,541,63 |
| orl-gpg LD50:6 gm/kg | AIHAAP 24,541,63 |

*THR:* LOW orl, ihl in rat; LOW orl in mus; orl in rbt and orl in gpg.

*Disaster Hazard:* When heated to decomp it emits very tox fumes of $Cl^-$.

AR300383

**REFERENCE NO. 9**

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3

**NUS CORPORATION**
**SUPERFUND DIVISION**

**PROJECT NOTES**

TO: File DATE: 7-30-86

FROM: Timothy Silar COPIES:

SUBJECT: HRS package for North Penn Area Study

REFERENCE: Dale Richenbach (Engineer North Penn Water Authority)
North Penn Distribution System (map Available, on file at NUS)
NPWA would have no alternative source of water
if totally shut down.

(1) Main system has 13,816 hook-ups. 33 wells are used in the
main area, 10 are off at time due to contamination these
include S-9, NP-33, NP-21, L-2, L-9, L-10, L-21, L-23, L-25, and L-22

(2) Skippack Distribution system has 462 hook-ups. 3 wells
are used in this area

(3) Harrison town distribution system (Stump Hill Road, Kerr Road,
and Hedrick Road) has 25 hook-ups. 1 well is
used in this area

(4) Small system directly east of northern Skippack
system. This system has 6 hook-ups and
used 1 well.

(5) Small system east of southern Skippack system.
This system has 28 hook-ups and uses 1 well

(6) System at West Point and Morris Roads has
132 hook-ups and buys water from
North Wales Water Authority.

(7) Hilltown system (Bucks County) has 15 hook-up
and 1 well.

All NPWA well are constructed as open-holes and
draw water from the Brunswick and/or Lockatong Fms.

Timothy Silar 9/16/86

300386

NUS 443A 58 1182

REFERENCE NO. 10

**NUS CORPORATION**
**SUPERFUND DIVISION**

**PROJECT NOTES**

TO: File

DATE: 7-29-86

FROM: Timothy Silar

COPIES:

SUBJECT: Hatfield Borough Water Authority

REFERENCE: Bob Hickson

Hatfield Borough Water Company (HBWC) serves approximately 10,000 people.
The system is free-flowing and utilizes 8 to 9 wells at a time.
The borough would have no other source of water if the company were shut-down.
They have no water quality problems at this time (Mr Hickson provided recent sample results for the wells).
All wells are constructed in the Brunswick Formations and are constructed as open-holes
Bob Hickson provided a distribution map which shows areas served by the company and well locations (map on file at NUS).

Timothy Silar 7-29-86

NUS 443A 58 1182

AR300388

REFERENCE NO. 11

300389

**NUS CORPORATION**
**SUPERFUND DIVISION**

**PROJECT NOTES**

TO: File

DATE: 7-30-86

FROM: Timothy Silar

COPIES:

SUBJECT: Telford Borough Water Authority

REFERENCE: Don Beck

4000 people served in the borough
7000 people served by the borough (total)

No water quality problems to date

505 000 gpd allowable withdraw

The borough does not purchase any water, have sold water to Hatfield on occasion.

Would have no alternative source of water if shut-down.

[illegible] - flowing system utilizing 6 wells.

Mr Beck provided a distribution map with well locations. (Map on file at NUS).

All Telford Borough wells are constructed in the Brunswick and/or Lockatong formations

Timothy Silar 7/30/86

300390

NUS 440A 88 1182

**REFERENCE NO. 12**

300391

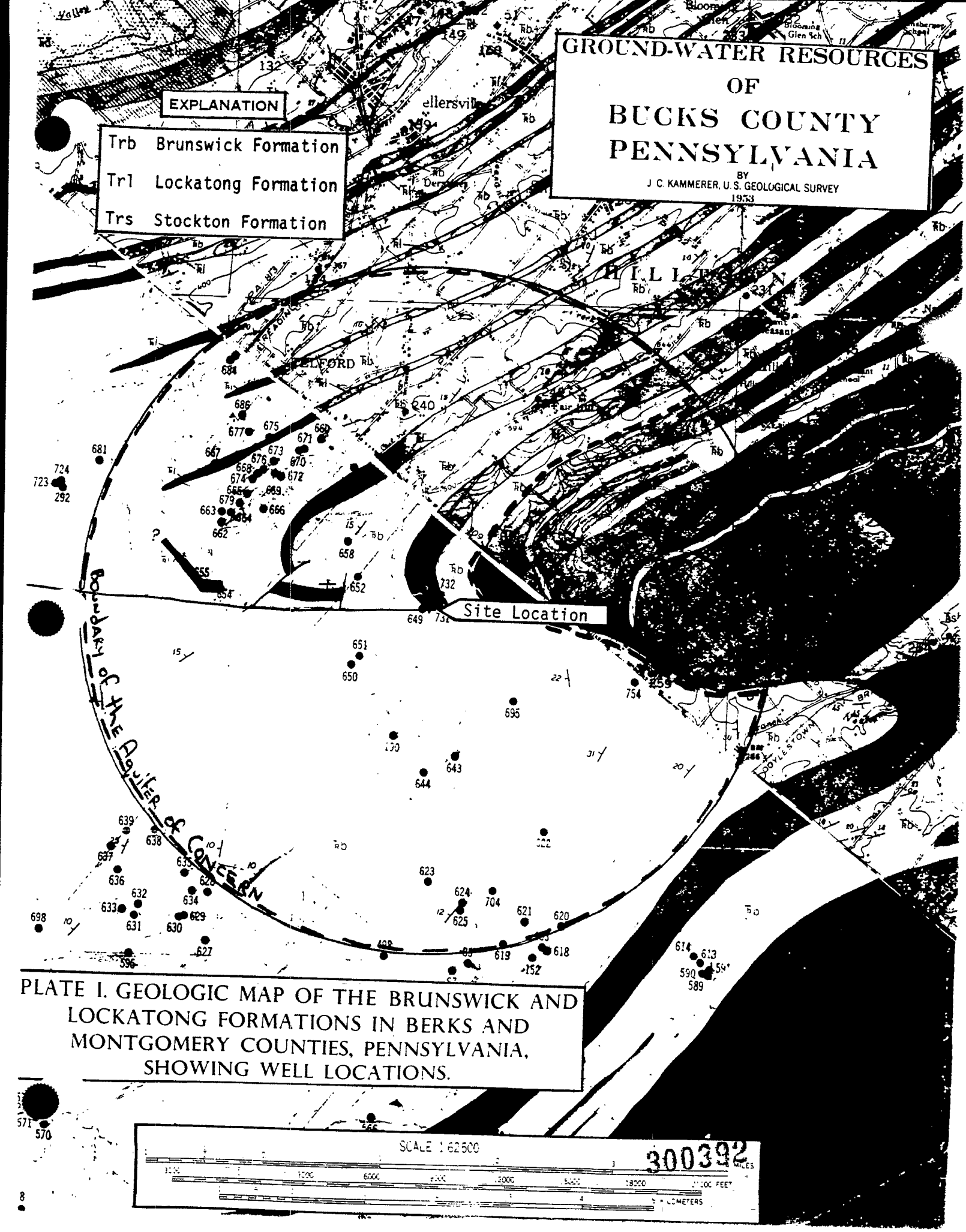
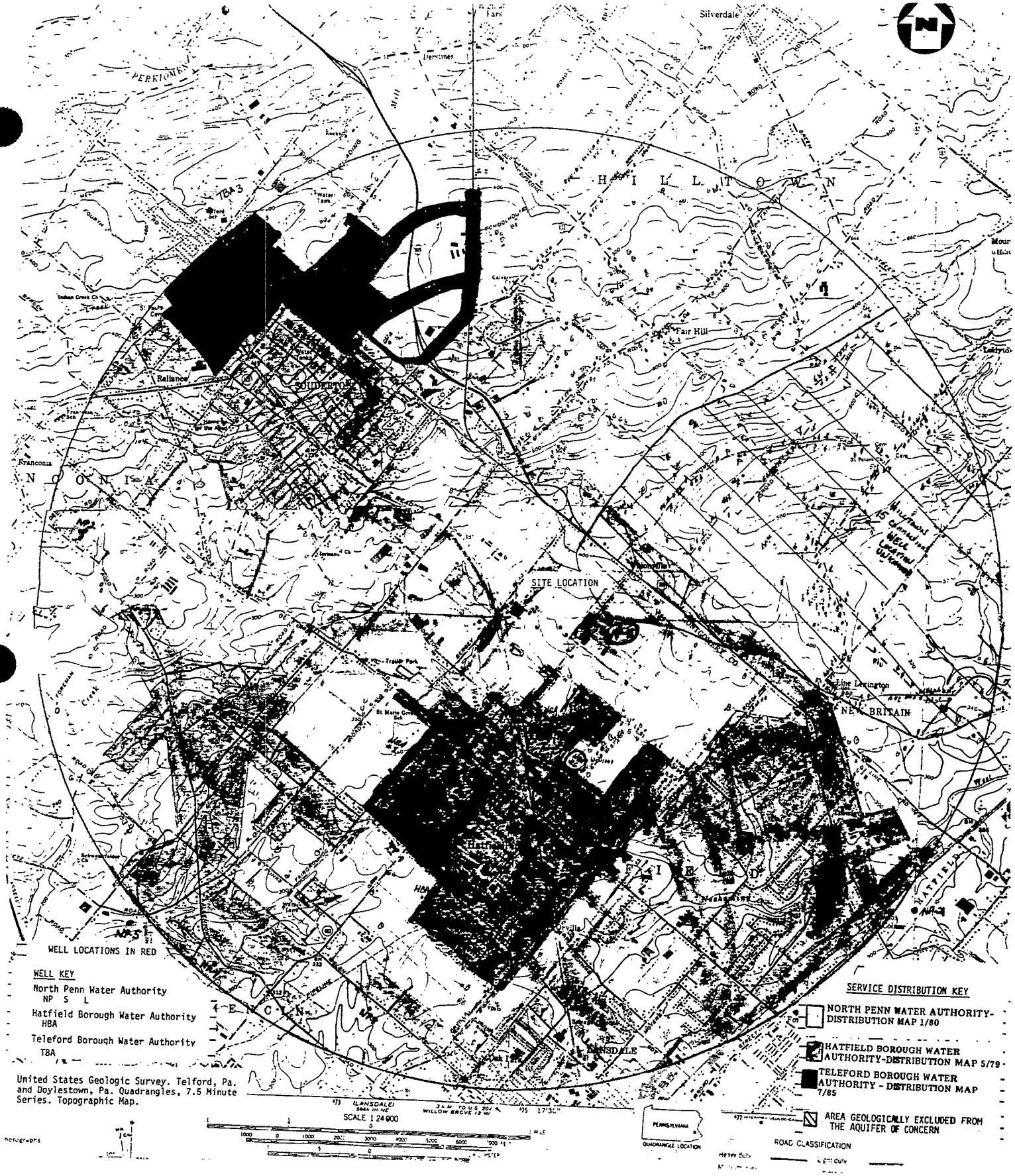



PLATE I. GEOLOGIC MAP OF THE BRUNSWICK AND LOCKATONG FORMATIONS IN BERKS AND MONTGOMERY COUNTIES, PENNSYLVANIA, SHOWING WELL LOCATIONS.

REFERENCE NO. 12A

300393




United States Geologic Survey. Telford, Pa. and Doylestown, Pa. Quadrangles, 7.5 Minute Series. Topographic Map.

300394

QUALITY CONTROL LABORATORY DIVISION
1205 Industrial Highway, Southampton, PA 18966
(215) 673-4900
355-3900
E. W. Cook, V.M.D.
A. F. Zimmermann

RECD
9 42 AM '80
A DIV. OF
HATFIELD, PA.

Hunter Spring Division
1 Spring Avenue
Hatfield, Pa. 19440

## BACTERIOLOGICAL WATER ANALYSIS REPORT

| | |
|---|---|
| date sampled | March 12, 1980 |
| date tested | March 13, 1980 |
| date reported | March 18, 1980 |
| sampled by | DH |
| frequency | |
| copies to | |

| SAMPLE | Standard Plate Count per ml | Total Coliform Count per 100 ml MPN | Fecal Coliform Count per 100 ml MPN | TCE ppb | PCE ppb | 1,1,1 Trichloro-ethane ppb | |
|---|---|---|---|---|---|---|---|
| Well #1 (guardhouse) (QC #3565) | | | | 440 | 12.2 | 694 | |
| Well #2 (QC #3566) | | | | 175 | 13.0 | 48.2 | |
| Employee's Drinking Ftn. (QC #3567) | | | | 469 | 15.6 | 887 | |
| | | | | | | | |
| | | | | | | | |

EPA standards:
4.5 - TCE
3.55 - PCE

Q C INC.

Albert F Zimmermann

300395

All analyses conform to the current edition of "Standard Methods for the Examination of Water and Wastewater"
Approved for the bacteriological examination of water by the Pennsylvania Department of Health, Certificate I-388

REFERENCE NO. 14

300396

**NUS CORPORATION AND SUBSIDIARIES** — **TELECON NOTE**

| CONTROL NO: | DATE: 8/8/86 | TIME: 0950 |
|---|---|---|

DISTRIBUTION:

| BETWEEN: | OF: | PHONE: |
|---|---|---|
| Paul Reber (PR) | Penn State Agricultural Extension Service | (215) 489-4315 |

AND: Bill Hose

DISCUSSION:

PR informed me that there is no irrigation for agricultural crops within the following areas:

1) North Wales and surrounding area
2) Souderton and surrounding area
3) Lansdale and surrounding area
4) Hatfield and surrounding area
5) Worcester Township
6) East and West Norriton Township

Only Graterford State Correctional Institution has any type of crop irrigation; however, that facility lies outside all North Penn Water Authority study areas.

ACTION ITEMS:

300397

Bill Hose 8/8/86

REFERENCE NO. 15

300398

**NUS CORPORATION** — **TELECON NOTE**

| CONTROL NO: | DATE: | TIME: |
|---|---|---|
| F3-8607-06 | 8/4/86 | 2:30 PM |

DISTRIBUTION:

| BETWEEN: | OF: | PHONE: |
|---|---|---|
| Dave Tindall | Bucks County Soil Conservation Survey | (215) 348-1164 |

AND: Timothy Silar (NUS)

DISCUSSION:

Mr. Tindall is the district soil conservationist and is familiar with the study area. He stated that to his knowledge there are no irrigation systems in the study area, in fact there are no large crop lands in the area.

Timothy Silar 8/4/86

ACTION ITEMS:

300399

NUS 157 REVISED 0681

REFERENCE NO. 16

300400

**NUS CORPORATION** — **TELECON NOTE**

| CONTROL NO: | DATE: | TIME: |
|---|---|---|
| F3-8607-0L | 8/5/86 | 1355 |

DISTRIBUTION:

| BETWEEN: | OF: | PHONE: |
|---|---|---|
| Ralph Rehrig (RR) | Hatfield Borough Fire Marshall | (215) 855-2121 |

AND: Bill Hose (NUS)

DISCUSSION:

RR stated that AMETEK Inc. - Hunter Spring Division has never been certified as a fire and/or explosion hazard and the site presents no problems

ACTION ITEMS:

300401

Bill Hose 8/5/86

REFERENCE NO. 17

300402

NUS CORPORATION AND SUBSIDIARIES — TELECON NOTE

| CONTROL NO: | DATE: | TIME: |
|---|---|---|
| | 10/7/86 | 1340 |

DISTRIBUTION:
HRS Package for the North Penn study area

| BETWEEN: | OF: | PHONE: |
|---|---|---|
| DALE RICHENBACH (DR) | NORTH PENN WATER AUTH | (215)855-3617 |

AND:
BILL HOSE

DISCUSSION:

DR stated that the number of main system hookups listed under the meeting notes dated July 30, 1986 between Tim Silar NUS FIT III and Dale Richenbach is the total number of all systems including the six satellite systems; therefore the total number of hookups within the main system equals 13816 (total hookups) minus the six satellite system's total hookups.

Satellites

Skippack Dist. system 469 hookups
Harristown Dist. system 25 hookups
system east of northern Skippack 6 hookups
System east of southern Skippack 28 hook-ups
West Pt. and Morris Road system 132 hookups

ACTION ITEMS:
Hilltown system 15 hookups
Total satellite systems 675 hookups

Main system total equals 13141 hookups
(13816 − 675 = 13141)

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Bulletin W 29

# Ground-Water Resources of Montgomery County, Pennsylvania

by Thomas G. Newport
U. S. Geological Survey

**Prepared by the United States Geological Survey Water Resources Division in cooperation with the Pennsylvania Geological Survey**

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# GROUND-WATER RESOURCES OF MONTGOMERY COUNTY, PENNSYLVANIA

by

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U.S. Geological Survey
Water Resources Division

## ABSTRACT

The bedrock formations in Montgomery County range in age from Quaternary to Precambrian. The Quaternary and Tertiary rocks are thin, discontinuous, and small in areal extent, and are not considered as aquifers. The Brunswick and Stockton Formations of Triassic age occur over a large part of the county. Other Triassic rocks, the diabase and Lockatong Formation, have a smaller areal extent. The rocks of Paleozoic age occur in a narrow band near the southern border of Montgomery County. These Paleozoic rocks are grouped as one unit on the geologic map. Precambrian rocks are also grouped together in this report.

Ground water in the bedrock occurs largely in secondary openings, such as joint planes or solution openings. These secondary openings are more abundant in the Brunswick and Stockton Formations and wells in these formations will yield sufficient water for industrial and municipal supplies. The Lockatong Formation and the diabase have fewer joints and, consequently, yield only enough water for domestic supplies. Large solution openings have been encountered at different places in the carbonate rocks, and wells with very high yields have been developed. Well yields in the igneous and metamorphic rocks are generally small. Data are tabulated for more than 800 wells in Montgomery County.

Chemical analyses are available for ground water from 121 wells in Montgomery County. Ground water in the Triassic rocks is largely of the calcium-bicarbonate type. However, water from these rocks having concentrations of dissolved solids greater than 500 mg/l (milligrams per liter) are of the calcium-sulfate type. Ground-water quality differs greatly from one unit to another in the Paleozoic rocks. Dissolved-solids content ranges from 32 mg/l in the quartzites to 243 mg/l in the carbonate rocks. Hardness ranges from 15 mg/l in the quartzites to 270 mg/l in the carbonates. The quality of water from the igneous rocks is generally good. The quality of water from metamorphic rocks differs considerably between formations. In some of these rocks the water is very highly mineralized and is not used.



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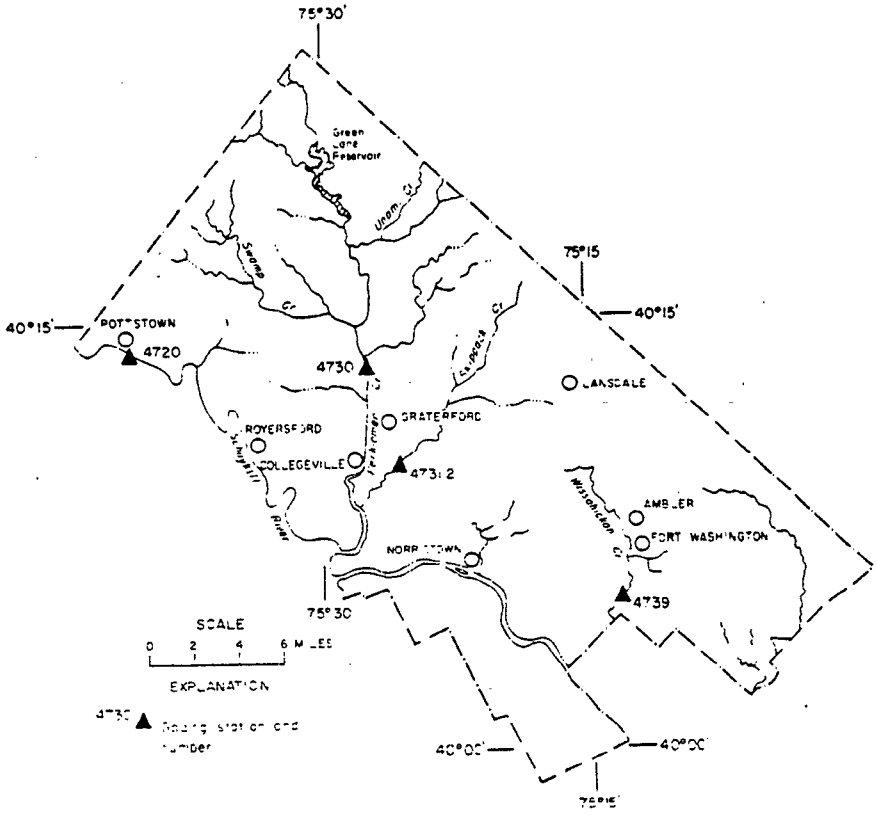


Figure 4. Location of stream-gaging stations.

## GROUND WATER

Much of the water falling on the land surface returns to the atmosphere or reaches the streams as overland runoff. The remainder infiltrates through the soil and through fractures and void spaces in the underlying rock. Its downward movement continues until it reaches the zone of saturation, a zone below which all the interconnected voids are filled with water. This is illustrated in Figure 5. After reaching the zone of saturation the water moves downward and laterally toward lower elevations and eventually returns to the surface, either naturally from springs and seeps or from wells.

Ground water in Montgomery County occurs under both water-table (free, unconfined) and artesian (confined, under pressure) conditions. Water-table conditions are those in which ground water is unconfined

Table 1. *Discharge*

Schuylkill
Average
Maximu
Minimu
Perkiomen
Average
Maximu
Minimu
Skippack
Average
Maximu
Minimu
Wissahick
Average
Maximu
Minimu
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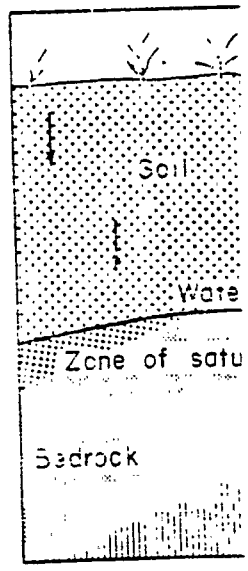


Figure 5. Downw
the wa

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Table 1. *Discharge data of the gaged streams in Montgomery County*

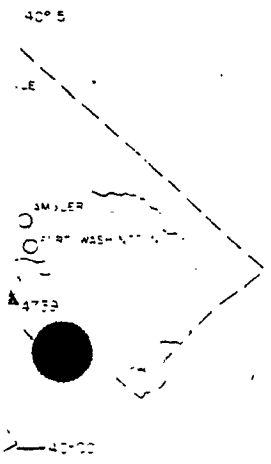
Schuylkill River at Pottstown, Pa. 1-4720
Average discharge, 41 years of record: 1,805 cfs.[1]
Maximum discharge, May 23, 1943: 50,800 cfs.
Minimum discharge, August 13, 1930: 87 cfs.

Perkiomen Creek at Graterford, Pa. 1-4730
Average discharge, 53 years of record: 370 cfs.
Maximum discharge, July 9, 1935: 39,900 cfs.
Minimum discharge, October 5, 1941: 4.7 cfs.

Skippack Creek near Collegeville, Pa. 1-4731.2
Average discharge, 2 years of record: 65.5 cfs.
Maximum discharge, March 7, 1967: 4,620 cfs.
Minimum discharge, September 12, 1967: 0.1 cfs.

Wissahickon Creek at Fort Washington, Pa. 1-4739
Average discharge, 6 years of record: 43.2 cfs.
Maximum discharge, March 7, 1967: 3,490 cfs.
Minimum discharge, September 2, 1963: 2.9 cfs.

[1] Cubic feet per second



stations.

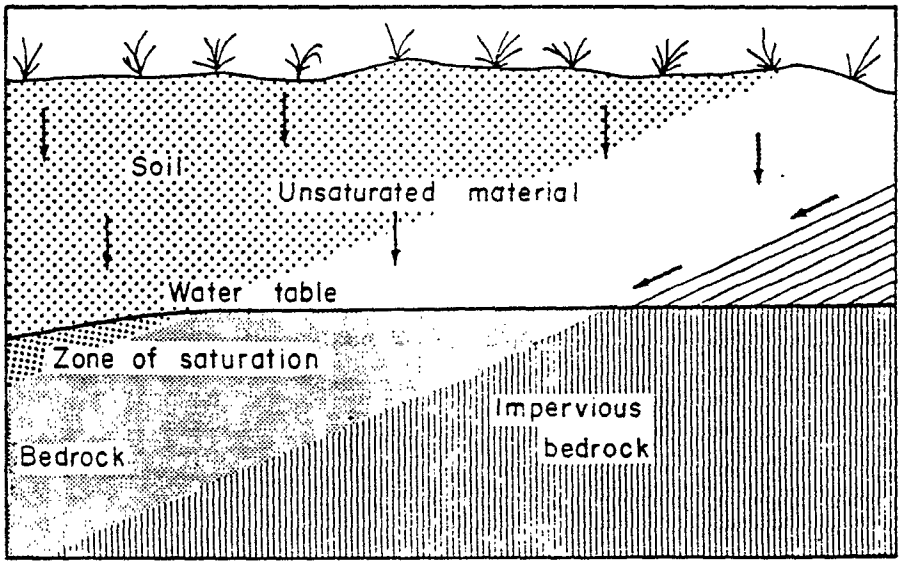



Figure 5. Downward movement of water through soil and rock to the water table.

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and the upper surface of the water is free to rise or fall. Artesian conditions exist where the ground water is confined in a permeable (having interconnected openings) formation that is overlain by a relatively impermeable formation. The upper surface is not free to rise or fall, but the water is under enough pressure to rise above the containing aquifer in wells penetrating it. The imaginary surface to which water will rise in wells tapping an artesian aquifer is called the piezometric surface in this report.

The water table fluctuates according to the relative amounts of recharge (additions to the aquifer) and discharge (losses to seeps, springs and wells). Because of the heavy evapotranspiration losses through the growing season (April to October) little recharge reaches the zone of saturation and water levels decline; water levels generally rise throughout the rest of the year.

Water levels in the county are at or near the land surface in the valleys and rise toward the drainage divides. The rate of water level rise, however, is less than that of the land surface, so wells on the higher elevations must be drilled deeper to reach the water table than those in the valleys.

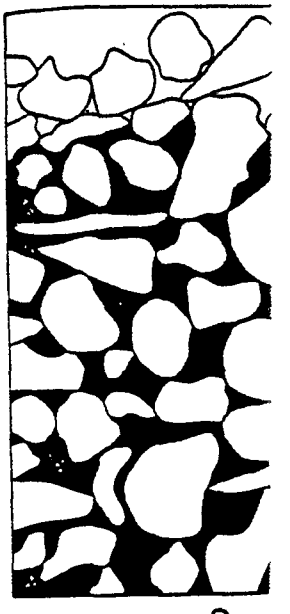
The occurrence and movement of ground water is in and through interconnected openings (Figure 6) either primary or secondary in nature. Primary openings are void spaces between the individual grains of material, such as in sandstone and shale. In a coarse-grained sandstone the openings are relatively large; in a shale the grains and openings are very small. The larger interconnecting openings allow much more ground-water movement than the smaller ones.

Secondary openings are those formed subsequent to the deposition and consolidation of the formations. In Montgomery County they result from the fracture or solution of rock. The fractures are the result of external forces that caused rupture of the rock; solution cavities are formed by the solution and removal, by water, of parts of rocks such as limestone. Large quantities of water move through connected fractures and solution cavities.

## HOW AND WHERE THE WATER IS FOUND

### SUBSURFACE WATER

Ground water in Montgomery County is found in both artesian and water-table aquifers. These aquifers yield water to wells at various rates which vary over a wide range, both from one geologic formation to another and within the same geologic formation. Well yields range from a fraction of a gallon per minute to more than 1,500 gpm (gallons per minute). Data on seven hundred wells drilled in the various geologic



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Primary openings

Figure

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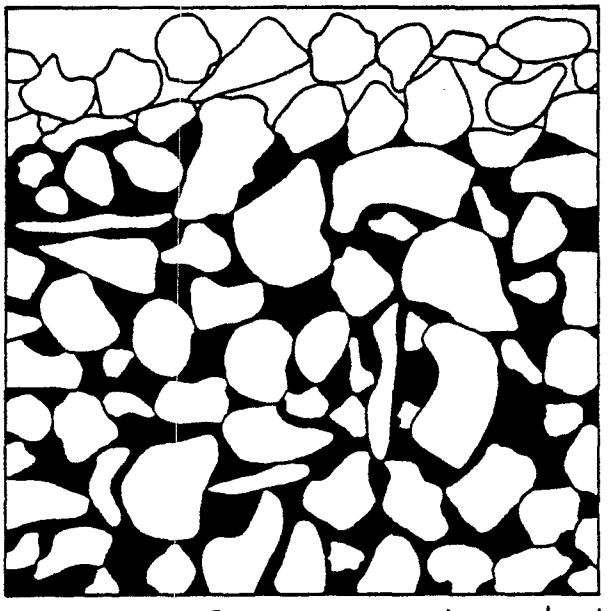
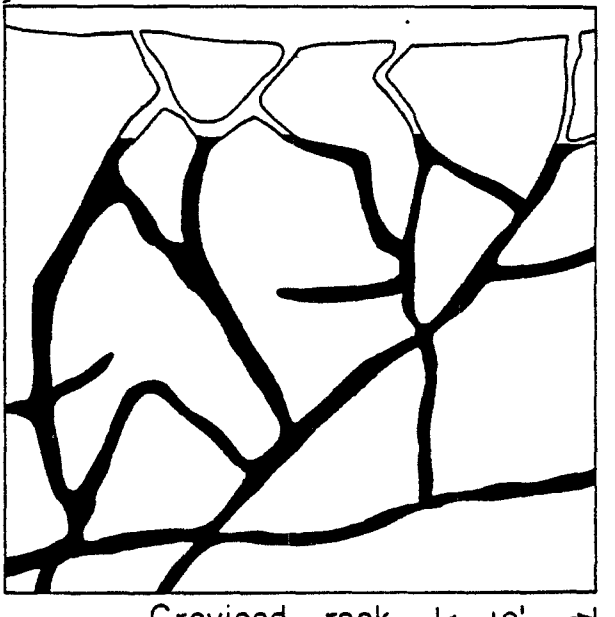



Primary openings in unconsolidated material




Secondary openings in consolidated rock

Figure 6. How water occurs in the rocks.

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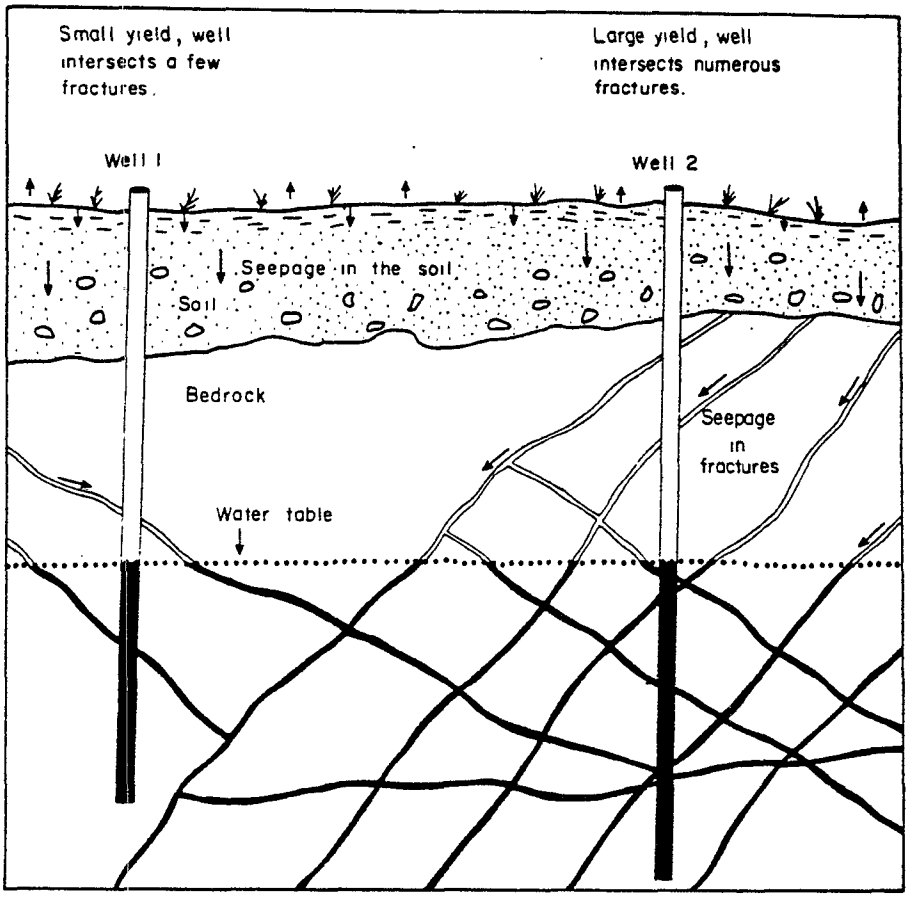


Figure 7. How fractures in bedrock formations will affect the yield of wells.

formations that underlie the county have been described in several published reports. (See Selected References)

When precipitation has reached the zone of saturation it moves by gravity down the hydraulic gradient toward points of discharge. The direction of movement is determined by the slope of the water table or the piezometric surface. The movement of ground water is through interconnected openings in the rock, and, as these openings are normally small, they do not allow rapid movement of water.

The aquifers in Montgomery County are primarily consolidated rocks, and water occurs in fractures, bedding planes, or solution openings. Small amounts of ground water occur in the pore spaces in the weathered

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zone but this weathered material is thin and discontinuous. Wells drilled into consolidated rock will yield water if they intersect saturated openings in the rock. This is illustrated in Figure 7. Well No. 1 intercepts only one fracture below the water table, and the yield of this well would be less than the yield of well No. 2 because the latter well intersects several fractures below the water table.

A geologic column for Montgomery County (Table 2) is shown below and is followed by a generalized geologic map. (Figure 8)

Table 2. *Geologic section for Montgomery County, Pennsylvania*

| Era, System and Epoch | Formation | Thickness (feet) | Character |
|---|---|---|---|
| Cenozoic<br>Quaternary<br>Holocene | Alluvium | 0-10 | Soil, sand, gravel, and clay; deposits in stream valleys. |
| Pleistocene | Pensauken Formation | 0-10 | Sand, gravel, clay, yellowish-brown; small areal extent. |
| Tertiary<br>Pliocene (?) | Bryn Mawr Gravel | 0-10 | Sand and gravel; small areal extent. |
| Mesozoic<br>Cretaceous | Patapsco Formation | 0-10 | Clay and sand, highly colored; small areal extent. |
| Triassic | Diabase | 5-1,800 | Medium to coarse grained igneous rock, dark gray, occurs as dikes and sills. |
| | Brunswick Formation | 9,000-16,000 | Shale, mudstone, sandstone, and conglomerate beds; reddish-brown. |
| | Lockatong Formation | 0-2,000 | Argillite, mudstone, and shale; dark gray to black, thick bedded. |
| | Stockton Formation | 1,000-6,000 | Shale and siltstone in upper member; sandstone, fine-to coarse-grained, arkosic, middle member; conglomerate lower member. |

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Table 2. *(Continued)*

| Era, System and Epoch | Formation | Thickness (feet) | Character |
|---|---|---|---|
| Paleozoic | | | Limestone, impure, thin-bedded upper part; middle dark graphitic phyllite, lower limestone, granular thick-bedded, |
| Ordovician | Conestoga Limestone | 500-800 | dark gray. |
| Cambrian | Elbrook Formation | 800 | Limestone, fine-grained, light gray to cream-colored, thin-bedded. |
| | Ledger Dolomite | 1,000 | Dolomite, granular, gray to bluish gray. |
| | Harpers Formation | 500-800 (?) | Phyllite, fine-grained, greenish-gray, some beds of quartzite and schist. |
| | Chickies Quartzite | 500-1,000 | Quartzite, vitreous, light-colored thick-bedded, conglomerate at base. |
| Precambrian (?) | Wissahickon Formation | — | Schist, albite chlorite, and oligoclase mica, includes hornblende gneiss and phyllite. |
| Precambrian | Granite gneiss | — | Composed chiefly of quartz, feldspar, biotite, and hornblende. |
| | Hornblende gneiss | — | Composed of quartz, feldspar, and hornblende. |
| | Serpentine | — | Soft, fine grained, green. |

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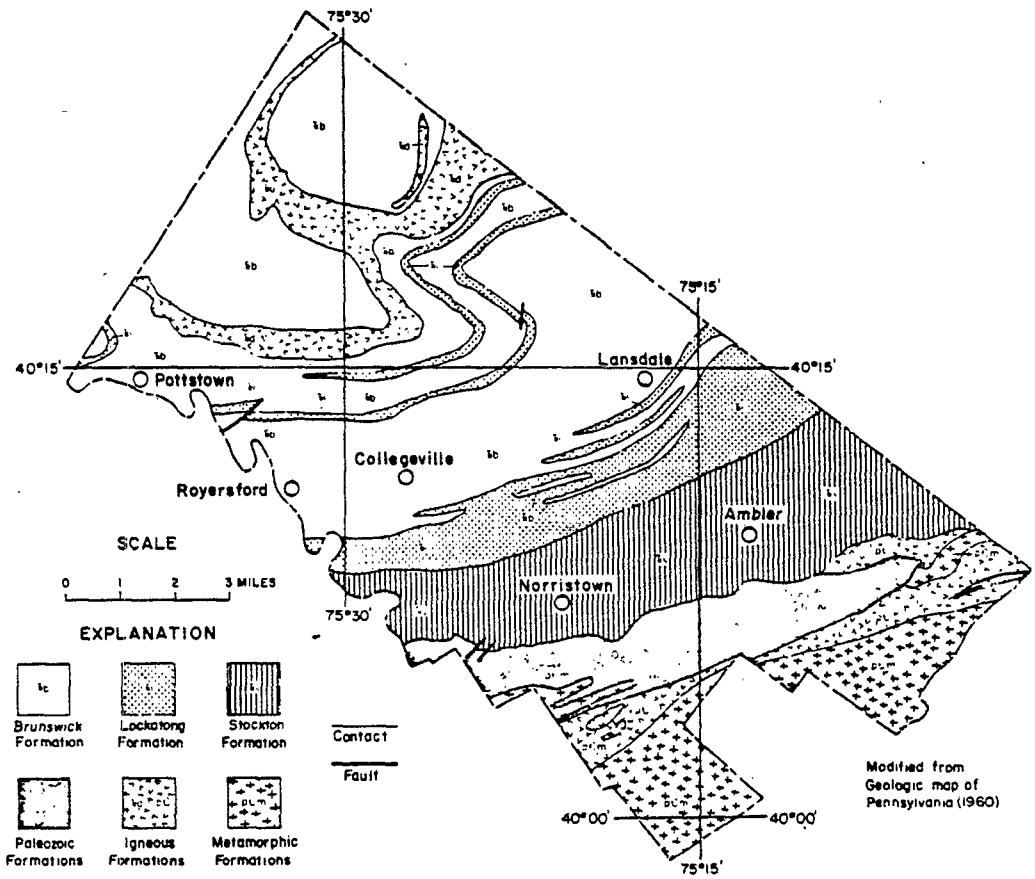


Figure 8. Generalized geologic map.

The water-bearing characteristics of the mapped units are summarized in the following pages.

## Brunswick Formation

### *Lithology and structure*

The Brunswick Formation in Montgomery County consists of consolidated reddish-brown shale and sandstone. Along the northern edge of the county conglomerate is interbedded with the shale and sandstone. The beds of the Brunswick Formation generally dip an average of 20° to the north and northwest, but several broad synclines and anticlines

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have been superimposed on the major structure. The Brunswick Formation has been cut by many small faults and one or two large ones. There is a well-developed system of nearly vertical joints in many of the beds of the Brunswick Formation. Sample logs of wells in the Brunswick Formation are listed in Table 3.

### *Water-bearing characteristics*

Because pore spaces in the Brunswick Formation are very small, most of the ground water occurs in and moves through secondary openings and the nearby vertical joints that intersect at various angles throughout the formation. The number and width of these vertical joints differ from bed to bed within the formation; thus, some beds yield much more water to wells than others. These vertical joints also allow downward percolation of precipitation to recharge the aquifer.

Table 3. *Sample logs of wells in the Brunswick Formation in Montgomery County, Pennsylvania*

Well Mg-632

Owner: U.S. Geological Survey

| Description | Depth (feet) |
|---|---|
| Soil, red | 0 — 2 |
| Shale, red, moderately calcareous; calcite joint filling | 2 — 5 |
| Shale, red, slightly calcareous | 5 — 10 |
| Shale, red, slightly calcareous; calcite joint filling | 10 — 15 |
| Shale, red, slightly calcareous | 15 — 18 |
| Shale, red, slightly calcareous; calcite joint filling | 18 — 25 |
| Shale, red, moderately calcareous; calcite joint filling | 25 — 30 |
| Shale, red, slightly calcareous; calcite joint filling | 30 — 40 |
| Shale, red, slightly calcareous | 40 — 45 |
| Shale, red, moderately calcareous; calcite joint filling | 45 — 52 |
| Shale, red, slightly calcareous; calcite joint filling | 52 — 85 |
| Shale, red, moderately calcareous; calcite joint filling | 85 — 90 |
| Shale, red, slightly calcareous, micaceous; calcite joint filling | 90 — 95 |
| Shale, red, slightly calcareous, micaceous; quartz and calcite joint filling | 95 — 100 |
| Shale, red, slightly calcareous, micaceous; calcite joint filling | 100 — 110 |
| Siltstone, red, moderately calcareous, micaceous; calcite and quartz joint filling | 110 — 120 |
| Shale, red, slightly calcareous; calcite and quartz joint filling | 120 — 125 |
| Shale, red, moderately calcareous, micaceous; calcite joint filling | 125 — 130 |
| Shale, red, moderately calcareous; calcite joint filling | 130 — 135 |
| Shale, red, moderately calcareous | 135 — 140 |

300415

Table 3. *(Continued)*

| Description | Depth (feet) |
|---|---|
| Shale, red, slightly calcareous; calcite joint filling | 140 — 170 |
| Shale, red, slightly calcareous; calcite and quartz joint filling | 170 — 185 |
| Shale, red, moderately calcareous; calcite joint filling | 185 — 200 |
| Siltstone, red, slightly calcareous, micaceous; calcite joint filling | 200 — 210 |
| Shale, red, slightly calcareous, micaceous; quartz joint filling | 210 — 215 |
| Shale, red, slightly calcareous, micaceous; quartz and calcite joint filling | 215 — 220 |
| Shale, red, slightly calcareous; calcite and quartz joint filling | 220 — 225 |
| Shale, red, slightly calcareous; calcite joint filling | 225 — 235 |
| Shale, red, slightly calcareous | 235 — 240 |
| Shale, red; calcite joint filling | 240 — 250 |
| Shale, red; calcite and quartz joint filling | 250 — 260 |
| Shale, red, slightly calcareous; calcite joint filling | 260 — 290 |
| Shale, red, moderately calcareous | 290 — 300 |
| Shale, red, slightly calcareous | 300 — 310 |
| Shale, red, slightly calcareous; quartz and calcite joint filling | 310 — 315 |
| Siltstone, buff, moderately calcareous; red shale; quartz joint filling | 315 — 320 |
| Shale, red, slightly calcareous, micaceous; calcite joint filling | 320 — 325 |
| Shale, red, slightly calcareous, micaceous; calcite and quartz joint filling | 325 — 330 |
| Shale, red, slightly calcareous; calcite joint filling | 330 — 335 |
| Shale, red, micaceous; calcite and quartz joint filling | 335 — 340 |
| Shale, red, moderately calcareous; calcite and quartz joint filling | 340 — 345 |
| Shale, red, moderately calcareous; calcite joint filling | 345 — 350 |
| Shale, red, slightly calcareous; calcite joint filling | 350 — 360 |
| Shale, red, micaceous; calcite and quartz joint filling | 360 — 363 |
| Shale, red, moderately calcareous; calcite joint filling | 363 — 370 |
| Shale, red, slightly calcareous | 370 — 375 |
| Shale, red, slightly calcareous; calcite joint filling | 375 — 379 |
| Shale, green, moderately calcareous | 379 — 381 |
| Shale, red, slightly calcareous; calcite joint filling | 381 — 385 |
| Shale, red, slightly calcareous | 385 — 405 |
| Shale, red, slightly calcareous; calcite joint filling | 405 — 425 |
| Shale, red, slightly calcareous | 425 — 450 |
| Shale, red, slightly calcareous; calcite joint filling | 450 — 460 |
| Shale, red, slightly calcareous; calcite and quartz joint filling | 460 — 465 |
| Shale, red, slightly calcareous | 465 — 470 |
| Shale, red, slightly calcareous; calcite joint filling | 470 — 475 |
| Shale, red, moderately calcareous; calcite joint filling | 475 — 480 |
| Shale, red, slightly calcareous | 480 — 490 |
| Shale, red, moderately calcareous; calcite joint filling | 490 — 500 |

Well Mg-633

Owner: U.S. Geological Survey

| Description | Depth (feet) |
|---|---|
| Shale, red; quartz joint filling | 0 — 5 |

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Table 3. *(Continued)*

| Description | Depth (feet) |
|---|---|
| Shale, red, slightly calcareous, calcite joint filling | 5 — 20 |
| Shale, red, moderately calcareous; calcite joint filling | 20 — 25 |
| Shale, red, slightly calcareous; calcite joint filling | 25 — 30 |
| Shale, red, moderately calcareous | 30 — 35 |
| Shale, red, moderately calcareous; calcite joint filling | 35 — 40 |
| Shale, red; calcite joint filling | 40 — 45 |
| Shale, red, slightly calcareous; calcite joint filling | 45 — 55 |
| Shale, red, slightly calcareous; goethite | 55 — 60 |
| Shale, red, slightly calcareous; calcite joint filling | 60 — 70 |
| Shale, red, slightly calcareous | 70 — 90 |
| Shale, red, moderately calcareous; calcite joint filling | 90 — 100 |
| Shale, red; calcite joint filling | 100 — 105 |
| Shale, red, slightly calcareous; abundant quartz and calcite joint filling. Quartz is in crystals up to half an inch long | 105 — 108 |
| Shale, red, slightly calcareous; calcite joint filling | 108 — 110 |
| Shale, red, slightly calcareous; abundant calcite joint filling | 110 — 112 |
| Shale, red, slightly calcareous; calcite and quartz joint filling and goethite | 112 — 115 |
| Shale, red; calcite joint filling | 115 — 118 |
| Shale, red | 118 — 120 |
| Shale, red, slightly calcareous | 120 — 123 |
| Shale, red | 123 — 125 |
| Shale, red, moderately calcareous; calcite joint filling | 125 — 128 |
| Shale, red, slightly calcareous | 128 — 138 |
| Shale, red, slightly calcareous; calcite joint filling | 138 — 140 |
| Shale, red, slightly calcareous | 140 — 142 |
| Shale, red, slightly calcareous; calcite joint filling | 142 — 148 |
| Shale, red, slightly calcareous | 148 — 150 |
| Shale, red, slightly calcareous; calcite joint filling and goethite | 150 — 152 |
| Shale, red, slightly calcareous; calcite joint filling | 152 — 165 |
| Shale, red, slightly calcareous | 165 — 168 |
| Shale, red, slightly calcareous; calcite joint filling | 168 — 170 |
| Shale, red; calcite joint filling | 170 — 172 |
| Shale, red | 172 — 175 |
| Shale, red, moderately calcareous | 175 — 178 |
| Shale, red, moderately calcareous; calcite joint filling | 178 — 185 |
| Shale, red; calcite joint filling | 185 — 205 |
| Shale, red, slightly calcareous; calcite joint filling | 205 — 210 |
| Shale, red; calcite joint filling | 210 — 212 |
| Shale, red, slightly calcareous; calcite joint filling | 212 — 215 |
| Shale, red, slightly calcareous; calcite and quartz joint filling | 215 — 220 |
| Shale, red, slightly calcareous; calcite joint filling | 220 — 225 |
| Shale, red; calcite joint filling | 225 — 230 |
| Shale, red; calcite and quartz joint filling and goethite | 230 — 232 |
| Shale, red, moderately calcareous; quartz and calcite joint filling | 232 — 233 |
| Shale, red; calcite joint filling | 233 — 235 |

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Table 3. *(Continued)*

| Description | Depth (feet) |
|---|---|
| Shale, red, moderately calcareous; calcite joint filling | 235 — 237 |
| Shale, red; calcite joint filling | 237 — 240 |
| Shale, red, slightly calcareous; calcite joint filling | 240 — 243 |
| Shale, red, slightly calcareous | 243 — 245 |
| Shale, red; calcite joint filling | 245 — 263 |
| Shale, red, slightly calcareous; calcite joint filling | 263 — 270 |
| Shale, red | 270 — 275 |
| Shale, red, slightly calcareous; calcite joint filling | 275 — 278 |
| Siltstone, red, moderately calcareous; calcite joint filling | 278 — 280 |
| Shale, red, slightly calcareous; calcite joint filling | 280 — 283 |
| Shale, red; calcite joint filling | 283 — 288 |
| Shale, red, slightly calcareous; calcite joint filling | 288 — 290 |
| Shale, red, slightly calcareous | 290 — 295 |
| Shale, red; calcite joint filling | 295 — 300 |
| Shale, red | 300 — 302 |
| Shale, red; calcite joint filling | 302 — 307 |
| Shale, red, slightly calcareous, calcite joint filling | 307 — 310 |
| Shale, red, moderately calcareous; calcite joint filling | 310 — 312 |
| Shale, red, slightly calcareous | 312 — 314 |
| Shale, red, slightly calcareous; calcite joint filling | 314 — 325 |
| Shale, red, slightly calcareous; quartz joint filling | 325 — 327 |
| Shale, red, slightly calcareous | 327 — 330 |
| Shale, red | 330 — 335 |
| Shale, red; calcite joint filling | 335 — 348 |
| Shale, red, slightly calcareous; calcite joint filling | 348 — 350 |
| Shale, red, slightly calcareous | 350 — 355 |
| Shale, red, slightly calcareous; calcite joint filling | 355 — 358 |
| Shale, red; calcite joint filling | 358 — 360 |
| Shale, red, moderately calcareous | 360 — 362 |
| Shale, red, slightly calcareous; calcite and quartz joint filling | 362 — 365 |
| Shale, red; calcite joint filling | 365 — 380 |
| Shale, red, moderately calcareous | 380 — 383 |
| Shale, red, moderately calcareous, micaceous | 383 — 385 |
| Shale, red, slightly calcareous; calcite joint filling | 385 — 390 |
| Shale, red, slightly calcareous | 390 — 392 |
| Shale, red | 392 — 395 |
| Shale, red, slightly calcareous | 395 — 402 |
| Shale, red, moderately calcareous; calcite joint filling | 402 — 405 |
| Shale, red, slightly calcareous; calcite and quartz joint filling | 405 — 408 |
| Shale, red, moderately calcareous | 408 — 410 |
| Shale, red, slightly calcareous | 410 — 412 |
| Shale, red, slightly calcareous; calcite joint filling | 412 — 415 |
| Shale, red, moderately calcareous; calcite joint filling | 415 — 417 |
| Shale, red, slightly calcareous; calcite joint filling, pyrite and goethite | 417 — 420 |
| Shale, red, slightly calcareous | 420 — 422 |
| Shale, red, slightly calcareous; calcite joint filling | 422 — 428 |

| | Depth (feet) |
|---|---|
| ..... | 5 — 20 |
| ..... | 20 — 25 |
| ..... | 25 — 30 |
| ..... | 30 — 35 |
| ..... | 35 — 40 |
| ..... | 40 — 45 |
| ..... | 45 — 55 |
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| ..... | 210 — 212 |
| ..... | 212 — 215 |
| ng ..... | 215 — 220 |
| ..... | 220 — 225 |
| ..... | 225 — 230 |
| ..... | 230 — 232 |
| filling .... | 232 — 233 |
| ..... | 233 — 235 |

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Table 3. *(Continued)*

| Description | Depth (feet) |
|---|---|
| Shale, red, slightly calcareous | 428 — 430 |
| Shale, red | 430 — 432 |
| Shale, red, slightly calcareous; calcite joint filling | 432 — 435 |
| Shale, red, moderately calcareous; calcite joint filling | 435 — 437 |
| Shale, red; slightly calcareous; calcite joint filling | 437 — 460 |
| Shale, red; calcite joint filling | 460 — 465 |
| Shale, red; calcite joint filling, pyrite and goethite | 465 — 467 |
| Shale, red, slightly calcareous; calcite and quartz joint filling | 467 — 470 |
| Shale, red, slightly calcareous | 470 — 473 |
| Shale, red, slightly calcareous; calcite joint filling | 473 — 497 |
| Shale, red | 497 — 500 |

Well Mg-679

Owner: Souderton Borough

| Description | Depth (feet) |
|---|---|
| Shale, red | 0 — 40 |
| Shale, red, moderately calcareous; calcite joint filling | 40 — 100 |
| Shale, dark reddish-gray, slightly calcareous | 100 — 110 |
| Shale, red, slightly calcareous; calcite joint filling and pyrite | 110 — 120 |
| Shale, red, slightly calcareous; calcite joint filling | 120 — 130 |
| Shale, dark red, moderately calcareous | 130 — 140 |
| Shale, red, slightly calcareous; calcite joint filling | 140 — 180 |
| Argillite, blue-gray, slightly calcareous; calcite joint filling. Thin beds of red shale are in this interval | 180 — 190 |
| Argillite, blue-gray, moderately calcareous; calcite and quartz joint filling. About 4 feet of this interval is red shale | 190 — 200 |
| Sandstone, gray, very fine grained; calcite joint filling and pyrite | 200 — 210 |
| Argillite, blue-gray, moderately calcareous; calcite joint filling and pyrite | 210 — 230 |
| Argillite, blue-gray, slightly calcareous; pyrite and goethite | 230 — 260 |
| Siltstone, blue-gray, slightly calcareous; pyrite | 260 — 270 |
| Argillite, blue-gray, moderately calcareous; pyrite. Red shale, moderately calcareous; calcite joint filling and pyrite | 270 — 278 |
| Argillite, blue-gray, moderately calcareous; pyrite | 278 — 285 |
| Shale, reddish-brown, moderately calcareous; About 4 feet of this interval is blue-gray, moderately calcareous argillite | 285 — 308 |

Well Mg-700

Owner: Stanley G. Flagg, Inc.

| Description | Depth (feet) |
|---|---|
| Fill | 0 — 20 |
| Sandstone, buff, fine grained. About half of this interval is red shale | 20 — 30 |
| Shale, red, micaceous | 30 — 60 |

300419

Table 3. *(Continued)*

| Description | Depth (feet) |
|---|---|
| Shale, red | 60 — 90 |
| Shale, red, slightly calcareous; quartz joint filling | 90 — 100 |
| Shale, red, slightly calcareous | 100 — 130 |
| Shale, dark brown, slightly calcareous | 130 — 140 |
| Shale, red, slightly calcareous | 140 — 150 |
| Shale, red, moderately calcareous | 150 — 160 |
| Shale, red; calcite joint filling | 160 — 170 |
| Shale, red, slightly calcareous | 170 — 190 |
| Shale, red, moderately calcareous | 190 — 200 |
| Shale, red, moderately calcareous, micaceous; calcite joint filling | 200 — 250 |
| Shale, red, micaceous; calcite joint filling | 250 — 260 |
| Shale, red, slightly calcareous; calcite joint filling | 260 — 280 |
| Shale, gray-brown, slightly calcareous; micaceous; calcite joint filling | 280 — 290 |
| Shale, red, slightly calcareous; calcite joint filling | 290 — 330 |
| Siltstone, red, slightly calcareous; calcite joint filling | 330 — 340 |
| Shale, red, moderately calcareous | 340 — 350 |
| Shale, red, moderately calcareous; calcite joint filling | 350 — 360 |
| Siltstone, red, moderately calcareous; calcite joint filling | 360 — 370 |
| Shale, red, moderately calcareous; calcite joint filling | 370 — 390 |
| Shale, red, moderately calcareous; calcite and quartz joint filling | 390 — 400 |
| Shale, red, moderately calcareous; calcite joint filling | 400 — 456 |
| Sandstone, white, fine grained | 456 — 461 |
| Shale, red, moderately calcareous; calcite joint filling | 461 — 480 |
| Argillite, blue-gray, moderately calcareous, interbedded with about 3 feet of buff sandstone | 480 — 500 |
| Sandstone, light-brown, fine grained | 500 — 510 |
| Sandstone, light-brown, medium grained | 510 — 520 |
| Shale, brown, slightly calcareous, micaceous; calcite joint filling | 520 — 530 |
| Shale, brown, slightly calcareous, micaceous; quartz joint filling | 530 — 540 |
| Shale, red, moderately calcareous; calcite joint filling | 540 — 560 |
| Shale, red, moderately calcareous; calcite and quartz joint filling | 560 — 600 |
| Shale, red, slightly calcareous; calcite joint filling | 600 — 610 |
| Shale, red, moderately calcareous; calcite joint filling. About 1 foot of this interval is buff, fine grained sandstone | 610 — 620 |
| Shale, red, moderately calcareous; calcite joint filling | 620 — 640 |

Well Mg-704

Owner: Lansdale Municipal Authority

| Description | Depth (feet) |
|---|---|
| Shale, red | 0 — 10 |
| Shale, red, slightly calcareous; calcite joint filling | 10 — 20 |
| Shale, red | 20 — 40 |
| Shale, red, slightly calcareous | 40 — 70 |
| Shale, red, slightly calcareous; calcite joint filling | 50 — 70 |
| Shale, red, moderately calcareous; calcite joint filling | 70 — 80 |

300420

Table 3. *(Continued)*

| Description | Depth (feet) |
|---|---|
| Shale, red, slightly calcareous; calcite joint filling | 80 — 140 |
| Shale, red, moderately calcareous; calcite joint filling | 140 — 190 |
| Shale, red, slightly calcareous; calcite joint filling | 190 — 200 |
| Shale, red, slightly calcareous; calcite joint filling and pyrite | 200 — 210 |
| Shale, red, slightly calcareous; calcite joint filling | 210 — 220 |
| Siltstone, red, slightly calcareous; goethite | 220 — 230 |
| Argillite, blue-gray to greenish-gray, slightly calcareous; calcite joint filling and goethite | 230 — 240 |
| Shale, gray-brown, slightly calcareous; calcite joint filling and goethite | 240 — 250 |
| Shale, red, moderately calcareous; calcite joint filling and goethite | 250 — 260 |
| Shale, red, moderately calcareous; calcite joint filling | 260 — 290 |
| Shale, red, slightly calcareous; calcite joint filling, pyrite and goethite | 290 — 310 |
| Shale, red, slightly calcareous; calcite joint filling | 310 — 330 |
| Argillite, blue-gray, moderately calcareous; calcite joint filling and pyrite | 330 — 360 |
| Argillite, blue-gray, moderately calcareous; calcite joint filling and goethite | 360 — 370 |

Well Mg-725

Owner: Schwenksville Water Co.

| Description | Depth (feet) |
|---|---|
| Shale, red, slightly calcareous; calcite joint filling | 0 — 20 |
| Shale, red, slightly calcareous; quartz joint filling, pyrite and goethite | 20 — 30 |
| Shale, red, moderately calcareous; calcite joint filling, pyrite and goethite | 30 — 40 |
| Shale, red, slightly calcareous; joint filling | 40 — 50 |
| Shale, red, a few green spots, moderately calcareous | 50 — 60 |
| Shale, red, moderately calcareous. About 4 feet of this interval is purplish-brown | 60 — 70 |
| Shale, red, slightly calcareous; calcite joint filling | 70 — 80 |
| Shale, red, moderately calcareous; calcite and quartz joint filling | 80 — 90 |
| Shale, red, slightly calcareous; quartz joint filling | 90 — 100 |
| Shale, red, moderately calcareous; calcite joint filling | 100 — 110 |
| Shale, red, slightly calcareous; calcite and quartz joint filling | 110 — 120 |
| Shale, red, slightly calcareous; calcite joint filling | 120 — 150 |
| Shale, red, slightly calcareous | 150 — 160 |
| Shale, red, slightly calcareous; calcite joint filling | 160 — 180 |
| Shale, red, slightly calcareous; calcite and quartz joint filling | 180 — 190 |
| Shale, red, slightly calcareous; calcite joint filling | 190 — 200 |
| Shale, red, moderately calcareous; calcite and quartz joint filling | 200 — 210 |
| Shale, red, moderately calcareous; calcite joint filling | 210 — 220 |
| Shale, red, slightly calcareous; calcite joint filling | 220 — 240 |
| Shale, red; calcite joint filling | 240 — 250 |
| Shale, red, slightly calcareous; calcite joint filling | 250 — 290 |

300421

| | Depth (feet) |
|---|---|
| ..... | 80 — 140 |
| ..... | 140 — 190 |
| ..... | 190 — 200 |
| ..... | 200 — 210 |
| ..... | 210 — 220 |
| ..... | 220 — 230 |
| joint | |
| ..... | 230 — 240 |
| :thite | 240 — 250 |
| te .... | 250 — 260 |
| ..... | 260 — 290 |
| ethite | 290 — 310 |
| ..... | 310 — 330 |
| ; and | |
| ..... | 330 — 360 |
| g and | |
| ... | ) — 370 |

| | Depth (feet) |
|---|---|
| ..... | 0 — 20 |
| goethite | 20 — 30 |
| ite and | |
| ..... | 30 — 40 |
| ..... | 40 — 50 |
| ..... | 50 — 60 |
| terval is | |
| ..... | 60 — 70 |
| ..... | 70 — 80 |
| filling .... | 80 — 90 |
| ..... | 90 — 100 |
| ..... | 100 — 110 |
| ıg ..... | 110 — 120 |
| ..... | 120 — 150 |
| ..... | 150 — 160 |
| ..... | 160 — 180 |
| ng ..... | 180 — 190 |
| ..... | 190 — 200 |
| filling .... | 200 — 210 |
| ..... | 210 — 220 |
| ..... | 220 — 240 |
| ..... | 240 — 250 |
| ... | 250 — 290 |

### *Well depths and yields*

The Brunswick Formation is a reliable source of small to moderate supplies of ground water. Some wells yield more than 200 gpm, and if yields of 100 gpm or more are desired wells should be drilled to depths of at least 200 feet. According to Longwill and Wood (1965, p. 12), . . . "wells drilled to depths between 200 and 550 feet deep are most likely to obtain maximum yields."

Sufficient water for domestic purposes can be obtained at almost any location from wells that are drilled 40 or 50 feet below the water table, but yields large enough for industrial and municipal purposes are more difficult to obtain. If large supplies are sought, test wells should be drilled to find the best site for a production well.

### *Well location and spacing*

Wells located in the valleys, where the water table is close to the land surface, have more available drawdown than wells of the same depth located on hills. This is illustrated in Figure 9. Well spacing is generally not critical when water is being pumped for domestic purposes, but wells should be spaced as far apart as is necessary, within economic limits, when wells are pumped for industrial and municipal purposes. Where several pumping wells are closely spaced, the cones of depression coalesce and the interference may be so great that the yield of each well is reduced. Wells less than 2,000 feet apart in the Brunswick Formation have generally shown some interference. In the Brunswick Formation, interference between wells is greatest between wells that are located parallel to the strike of the beds, because the boreholes penetrate the same beds and fracture systems.

### *Water quality*

Ground water in the Brunswick Formation is of the calcium bicarbonate type when the concentrations of dissolved solids are less than 500 mg/l (milligrams per liter) and of the calcium sulfate type when the dissolved solids are greater than 500 mg/l. The median dissolved-solids content is about 300 mg/l. Median hardness as $CaCo^3$ is about 220 mg/l. Almost all the water meets U.S. Public Health Service standards for mineral content.

300422

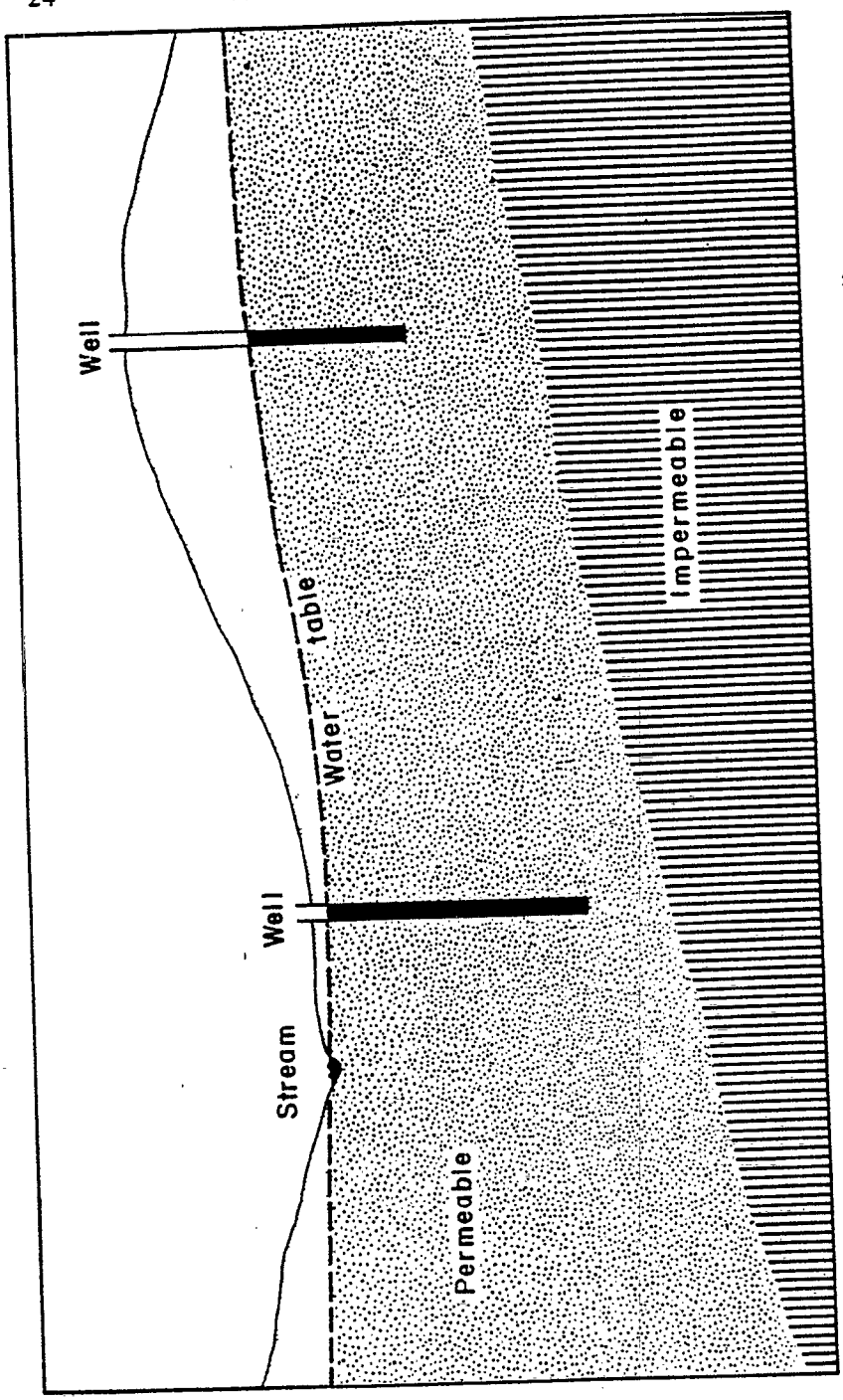


Figure 9. Wells in valleys have more available drawdown than wells on hills.

300423

## Lockatong Formation

### *Lithology and structure*

The Lockatong Formation lies immediately below the Brunswick Formation. It consists of thick-bedded argillite (very dense shale and mudstone). The Lockatong Formation is resistant to erosion and forms a low ridge where it is exposed along the south edge of the Brunswick Formation. Thinner beds of similar black argillite are interbedded with the overlying Brunswick Formation. Like the Brunswick Formation, the Lockatong dips to the northwest an average of 20°.

### *Water-bearing characteristics*

The pore spaces in the Lockatong Formation are very small, and most of the ground water moves through a system of interconnected joints and fractures. The fractures are narrower and more widely spaced than those in the Brunswick Formation.

### *Well depths and yields*

The yields of wells in the Lockatong Formation are low because of the smallness and scarcity of fractures. Well yields range from 4 to 40 gpm, and the average yield is about 7 gpm. Yields greater than those required for domestic purposes are not available from wells in this formation. Large-diameter wells drilled in this formation will yield larger volumes of water than small-diameter wells for short periods of time because the amount of water stored in the well is greater in the large-diameter wells. Aside from the storage factor, the drilling of deeper wells in the Lockatong Formation does not materially increase the potential yields of wells. Pumps should be set near the bottom of wells because drawdown is large.

### *Well location and spacing*

Because the Lockatong Formation is resistant to erosion, it forms ridges. Therefore, wells pumping water from this formation will not usually divert water from the streams. The cones of depression developed by pumping wells in the Lockatong Formation are not extensive because of the poor water-bearing characteristics, therefore, interference between wells is not a problem. A typical cone of depression in the Lockatong Formation is shown in Figure 10.

Figure 9. Wells in valleys have more available drawdown than wells on hills.

300424

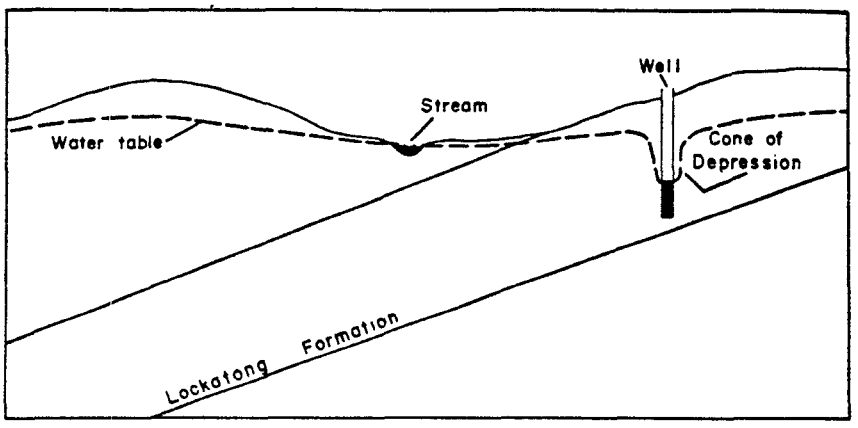


Figure 10. Cone of depression in the Lockatong Formation.

### *Water quality*

The water in the Lockatong Formation is very similar in quality to that in the Brunswick Formation, but it has a slightly lower hardness and dissolved-solids content.

## Stockton Formation

### *Lithology and structure*

The Stockton Formation which immediately underlies the Lockatong, is made up of three distinct members: (1) A lower member consisting chiefly of sandstone and conglomerate, (2) a middle member consisting chiefly of sandstone, and (3) an upper member consisting chiefly of red shale. The outcrop of the three members of the Stockton Formation is shown in Figure 11. The formation dips to the north and northwest an average of 12°.

Sample logs of wells in the Stockton Formation are given in Table 4.

### *Water-bearing characteristics*

Water in the Stockton Formation occurs in pore spaces between the grains and in secondary openings (such as fractures) in the rock. The size of the openings between the grains differs with the degree of sorting

300425

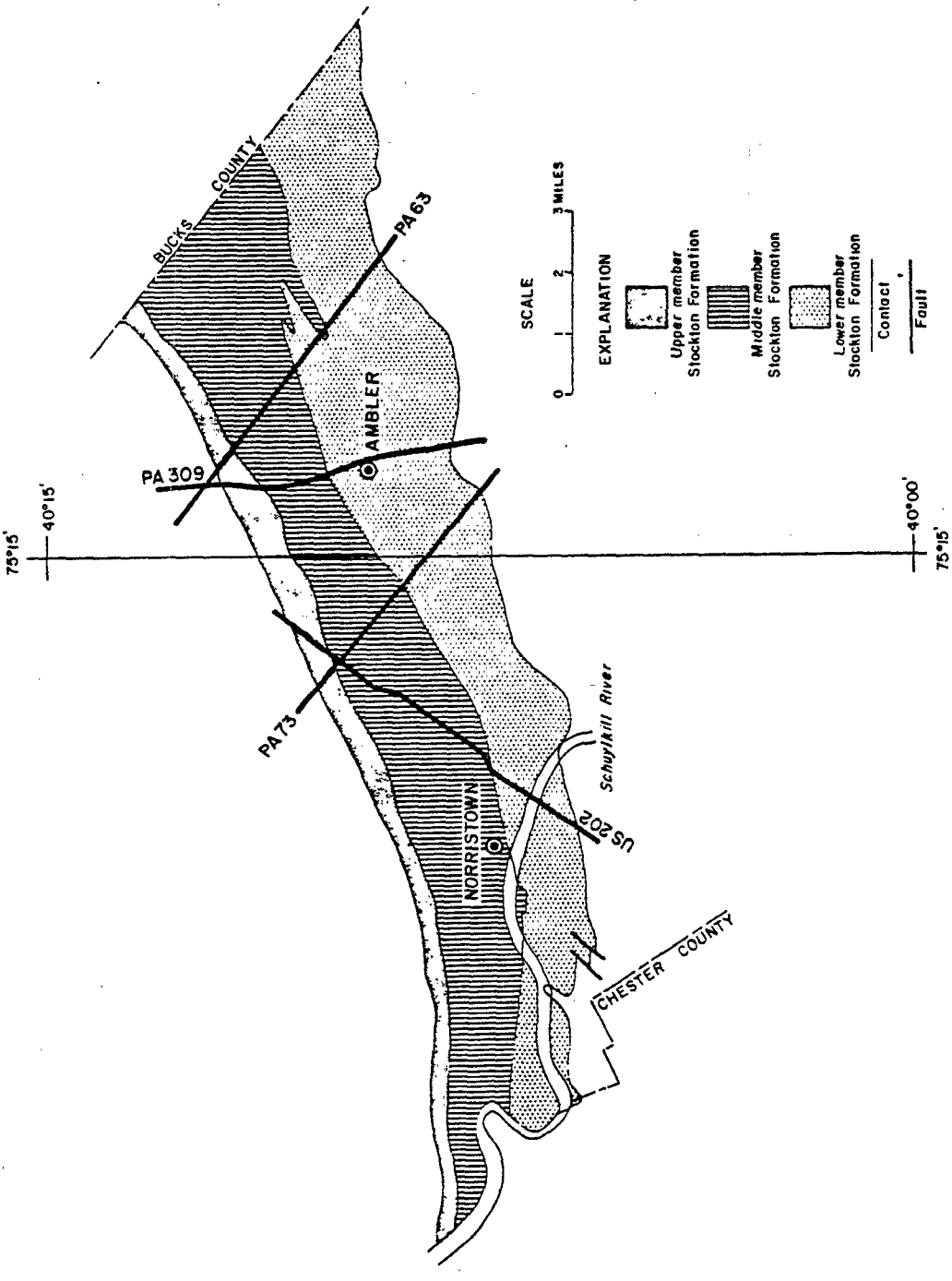


Figure 11. Outcrop of the three members of the Stockton Formation.

300426

of the original material and with the amount of cementation that binds the grains together. The three members differ in their water-bearing characteristics because of the difference in the grain size and the degree of sorting. The middle member consists of well-sorted sandstone and is the best water-producing unit. The lower member is less well sorted and, therefore, does not yield as much water to wells. The upper member of the Stockton Formation is the poorest producer because the fineness of the sediments allows little water storage or movement.

Table 4. *Sample logs of wells in the Stockton Formation in Montgomery County, Pennsylvania*

Well Mg-216
Owner: Hatboro Borough Authority
Driller: Stothoff

| Description | Depth (feet) |
|---|---|
| Soil | 0 — 5 |
| Middle arkose member: | |
| Shale, red | 5 — 80 |
| Sandstone, arkosic, gray, fine- to medium-grained, weakly cemented | 80 — 100 |
| Shale, red | 100 — 176 |
| Sandstone, arkosic, gray, well-cemented | 176 — 182 |
| Shale, red | 182 — 196 |
| Sandstone, arkosic, gray | 196 — 203 |
| Shale, red | 203 — 230 |
| Sandstone, arkosic, gray, fine- to medium-grained, weakly cemented | 230 — 260 |
| Shale, red, and gray arkosic sandstone | 260 — 274 |
| Shale, red | 274 — 280 |
| Sandstone, arkosic, gray, and red shale | 280 — 297 |

Well Mg-219
Owner: Hatboro Borough Authority
Driller: Stothoff

| Description | Depth (feet) |
|---|---|
| No Sample | 0 — 21 |
| Middle arkose member: | |
| Siltstone, gray to red, sandy | 21 — 38 |
| Sandstone, arkosic, gray, fine- to medium-grained | 38 — 78 |
| Sandstone, arkosic, buff-colored, medium-grained; some brown siltstone | 78 — 115 |
| Sandstone, arkosic, gray, fine-grained, calcareous | 115 — 128 |
| No Sample | 128 — 143 |
| Sandstone, arkosic, buff-colored, fine- to medium-grained, calcareous | 143 — 158 |
| Siltstone, reddish-brown, sandy, calcareous | 158 — 164 |

300427

Table 4. *(Continued)*

| Description | Depth (feet) |
|---|---|
| Sandstone, arkosic, gray, medium-grained, calcareous | 164 — 200 |
| Siltstone, reddish-brown, sandy | 200 — 215 |
| Sandstone, arkosic, gray, medium-grained; some reddish-brown siltstone | 215 — 265 |
| Sandstone, arkosic, reddish-brown, medium-grained | 265 — 275 |
| Sandstone, arkosic, gray, fine- to medium-grained, calcareous | 275 — 300 |

Well Mg-230

Owner: Blue Bell Water Works
Driller: Ridpath and Potter

| Description | Depth (feet) |
|---|---|
| Soil, yellowish-brown | 0 — 5 |
| Middle arkose member: | |
| Siltstone, grayish-red, weakly cemented | 5 — 25 |
| Sandstone, arkosic, light-brown, very fine to fine-grained | 25 — 40 |
| Siltstone, grayish-red, firmly cemented | 40 — 65 |
| Sandstone, arkosic, pale-brown, fine- to coarse-grained | 65 — 89 |
| Siltstone, brownish-gray | 89 — 100 |
| Sandstone, arkosic, brownish-gray, medium-grained, weakly cemented; some brownish-gray siltstone | 100 — 120 |
| Siltstone, reddish-brown and brownish-gray | 120 — 155 |
| Sandstone, arkosic, pale-orange, medium- to coarse-grained | 155 — 160 |
| Siltstone, brownish-gray and grayish-red | 160 — 175 |
| Sandstone, arkosic, pale-brown, fine-to medium-grained | 175 — 195 |
| Siltstone, grayish-red, sandy, firmly cemented | 195 — 200 |
| Sandstone, arkosic, brownish-gray and yellowish-brown, very fine to fine-grained, firmly cemented | 200 — 235 |
| Siltstone, brownish-gray, sandy, firmly cemented | 235 — 250 |

Well Mg-270

Owner: Blue Bell Water Works
Driller: Ridpath and Potter

| Description | Depth (feet) |
|---|---|
| Silt, Clayey, light-brown | 0 — 20 |
| Middle arkose member: | |
| Sandstone, arkosic, pale-brown, medium-grained | 20 — 27 |
| Silt, brown, clayey | 27 — 32 |
| Sandstone, arkosic, yellowish-brown, coarse-grained | 32 — 42 |

300428

Table 4. *(Continued)*

| Description | Depth (feet) |
|---|---|
| Siltstone, brown | 42 — 52 |
| Sandstone, arkosic, pale-brown, very fine-grained | 52 — 62 |
| Shale, brown, silty, calcareous | 62 — 72 |
| Sandstone, arkosic, pale-brown, medium-grained | 72 — 102 |
| Sandstone, arkosic, yellow, fine-grained | 102 — 112 |
| Sandstone, arkosic, grayish-yellow, medium- to coarse-grained | 112 — 122 |
| Sandstone, arkosic, yellowish-gray, fine-grained | 122 — 142 |
| Sandstone, arkosic, brownish-gray, very fine-grained | 142 — 176 |
| Sandstone, arkosic, brownish-gray, fine- to medium-grained | 176 — 203 |
| Siltstone, brownish-gray | 203 — 210 |
| Sandstone, arkosic, light-gray, medium-grained | 210 — 235 |
| Shale, silty, brownish-gray | 235 — 241 |
| Sandstone, arkosic, light-gray | 241 — 258 |
| Shale, silty, light-gray, calcareous | 258 — 270 |
| Sandstone, arkosic, light-gray | 270 — 282 |
| Shale, grayish-red, silty, calcareous | 282 — 300 |
| Sandstone, arkosic, grayish-red, medium- to coarse-grained, calcareous | 300 — 310 |

Well Mg-275

Owner: Horsham Township Authority
Driller: Unknown

| Description | Depth (feet) |
|---|---|
| No sample | 0 — 50 |
| Middle arkose member: | |
| Sandstone, arkosic, grayish-red, very fine and fine-grained, clayey | 50 — 150 |
| No sample | 150 — 160 |
| Sandstone, arkosic, gray, fine-grained, clayey | 160 — 170 |
| Limestone, gray, fine-grained | 170 — 180 |
| Sandstone, arkosic, brownish-gray, medium-grained | 180 — 197 |
| Sandstone, arkosic, grayish-red, very fine and fine-grained | 197 — 270 |
| Siltstone, grayish-red, sandy | 270 — 350 |

Well Mg-276

Owner: Horsham Township Authority
Driller: Unknown

| Description | Depth (feet) |
|---|---|
| Middle arkose member: | |
| Siltstone, red, some very fine gray sandstone | 0 — 12 |
| Sandstone, arkosic, brown | 12 — 25 |
| Arkose, gray, medium-grained | 25 — 50 |
| Siltstone, red | 50 — 72 |

300429

Table 4. *(Continued)*

| Description | Depth (feet) |
|---|---|
| Arkose, gray, medium- to coarse-grained | 72 — 80 |
| Arkose, gray, medium-grained | 80 — 90 |
| Sandstone, arkosic, yellowish-brown, medium-grained | 90 — 140 |
| Siltstone, red, hard; some medium-grained gray arkose | 140 — 230 |
| Arkose, gray, fine-grained | 230 — 250 |
| Sandstone, arkosic, yellowish-brown, medium-grained | 250 — 298 |
| Sandstone, arkosic, yellowish-brown, medium-grained; grayish-red siltstone | 298 — 320 |
| Sandstone, arkosic, brown, medium-grained | 320 — 340 |

Well Mg-285

Owner: Fort Washington Industrial Park
Driller: Pennsylvania Drilling Co.

| Description | Depth (feet) |
|---|---|
| Soil, yellowish-brown, sandy | 0 — 5 |
| Lower arkose member: | |
| Siltstone, reddish-brown | 5 — 55 |
| Sandstone, arkosic, reddish-brown, fine-grained, silty | 55 — 65 |
| Sandstone, arkosic, reddish-brown, medium-grained | 65 — 105 |
| Sandstone, arkosic, pale-red, coarse-grained | 105 — 115 |
| Sandstone, arkosic, grayish-red, fine- to medium-grained | 115 — 145 |
| Sandstone, arkosic, pale-red, medium- to coarse-grained | 145 — 175 |
| Sandstone, arkosic, pale-red, very fine to medium-grained | 175 — 180 |
| Sandstone, arkosic, pale reddish-brown, medium- to coarse-grained | 180 — 198 |
| Siltstone, grayish-red, sandy | 198 — 199 |
| Sandstone, arkosic, pale reddish-brown, medium- to coarse-grained | 199 — 215 |
| No sample | 215 — 220 |
| Siltstone, grayish-red, sandy | 220 — 225 |
| No sample | 225 — 230 |
| Chickies quartzite: | |
| Quartzite, white, gray, and red | 230 — 290 |

Well Mg-290

Owner: Borough of Ambler
Driller: Ridpath and Potter

| Description | Depth (feet) |
|---|---|
| Lower arkose member: | |
| Arkose, gray, medium-grained | 0 — 5 |
| Arkose, brown, coarse- to very coarse-grained | 5 — 20 |
| Arkose, brown, medium- to coarse-grained | 20 — 93 |
| Arkose, brown, medium-grained | 93 — 110 |
| Siltstone, grayish-red | 110 — 120 |

300430

Table 4. *(Continued)*

| Description | Depth (feet) |
|---|---|
| Arkose, brown, medium- to coarse-grained | 120 — 135 |
| Diabase; red siltstone | 135 — 140 |
| Arkose, brown, coarse-grained | 140 — 144 |
| Arkose, gray, medium- to coarse-grained | 144 — 161 |
| Arkose, yellowish-brown, coarse-grained | 161 — 171 |
| Arkose, yellowish-brown, medium- to coarse-grained | 171 — 175 |
| Arkose, gray, medium-grained | 175 — 185 |
| Arkose, yellowish-brown, coarse-grained | 185 — 195 |
| Shale, grayish-red | 195 — 198 |
| Arkose, yellowish-brown and gray, coarse- to very coarse-grained | 198 — 250 |
| Arkose, medium- to coarse-grained | 250 — 276 |
| Arkose, brownish-gray, fine grained: red siltstone | 276 — 286 |
| Siltstone, red | 286 — 344 |
| Arkose, coarse- to very coarse-grained | 344 — 354 |
| Arkose, medium- to coarse-grained; grayish-red siltstone; diabase | 354 — 384 |
| Arkose, yellowish-brown, coarse-grained; grayish-red siltstone | 384 — 400 |
| Arkose, pale-orange, medium- to coarse-grained; red siltstone | 400 — 410 |
| Siltstone, red | 410 — 440 |
| Arkose, gray, coarse-grained; red shale | 440 — 450 |
| Arkose, gray, medium-grained | 450 — 470 |
| Siltstone, grayish-red | 470 — 490 |
| Arkose, gray, medium-grained | 490 — 500 |

Well Mg-300

Owner: North Wales Water Authority
Driller: Ridpath and Potter

| Description | Depth (feet) |
|---|---|
| Lockatong formation: | |
| Shale, gray | 0 — 30 |
| Shale, dark grayish-red; dark-gray shale | 30 — 60 |
| Stockton formation: | |
| Upper shale member: | |
| Shale, grayish-red | 60 — 80 |
| Siltstone, grayish-red; some fine-grained arkosic sandstone | 80 — 90 |
| Shale, grayish-red | 90 — 355 |
| Sandstone, arkosic, white, fine-grained | 355 — 360 |
| Arkose, light-gray, fine- to medium-grained; some red shale | 360 — 390 |
| Shale, grayish-red; some grayish-red siltstone | 390 — 450 |
| Arkose, light-gray, fine- to medium-grained | 450 — 495 |
| Limestone, gray | 495 — 500 |
| Sandstone, arkosic, medium-grained | 500 — 505 |
| Shale, grayish-red | 505 — 520 |
| Sandstone, arkosic, brownish-gray, fine- to medium-grained | 520 — 550 |

300431

Table 4. *(Continued)*

Well Mg-465

Owner: Arvid E. Lyden
Driller: Ridpath and Potter

| Description | Depth (feet) |
|---|---|
| Soil | 0 — 2 |
| Lower arkose member: | |
| Sandstone, arkosic, yellowish-brown, medium- to coarse-grained | 2 — 22 |
| Sandstone, arkosic, pale-brown, fine- to medium-grained | 22 — 62 |
| Sandstone, arkosic, gray, very coarse-grained | 62 — 90 |
| Sandstone, arkosic, brown, very fine-grained | 90 — 97 |
| Sandstone, arkosic, brown, medium-grained | 97 — 130 |

Well Mg-489

Owner: U.S. Naval Air Station
Driller: Pennsylvania Drilling Co.

| Description | Depth (feet) |
|---|---|
| Soil, reddish-brown, sandy | 0 — 7 |
| Middle arkose member: | |
| Sandstone, arkosic, yellowish-brown, fine- to medium-grained | 7 — 17 |
| Siltstone, grayish-red | 17 — 21 |
| Sandstone, arkosic, yellowish-brown, fine- to medium-grained | 21 — 29 |
| Sandstone, arkosic, grayish-red, fine-grained | 29 — 33 |
| Limestone, light-gray, clayey | 33 — 41 |
| Sandstone, arkosic, yellowish-brown, fine-grained | 41 — 48 |
| Sandstone, arkosic, yellowish-brown, medium- to coarse-grained | 48 — 50 |
| Sandstone, arkosic, grayish-orange, fine- to medium-grained | 50 — 60 |

Well Mg-490

Owner: U.S. Naval Air Station
Driller: Philadelphia Drilling Co.

| Description | Depth (feet) |
|---|---|
| No sample | 0 — 22 |
| Middle arkose member: | |
| Sandstone, arkosic, grayish-orange and yellowish-brown, very fine- to medium-grained, silty | 22 — 32 |
| Siltstone, pale-brown and grayish-orange, sandy | 32 — 41 |
| Sandstone, arkosic, yellowish-brown, very fine- to fine-grained | 41 — 47 |
| Siltstone, brownish-gray, sandy | 47 — 51 |
| Arkose, yellowish-gray, very fine- to medium-grained | 51 — 67 |
| Siltstone, gray and grayish-red, sandy | 67 — 75 |
| Sandstone, arkosic, grayish-orange, very fine- to coarse-grained | 75 — 120 |

AR300432

Table 4. *(Continued)*

| Description | Depth (feet) |
|---|---|
| Siltstone, arkosic, grayish-orange and brown, very fine- to medium-grained | 140 — 158 |
| Siltstone, gray | 158 — 165 |
| Sandstone, arkosic, grayish-orange, medium- to coarse-grained | 165 — 178 |
| Siltstone, grayish-red; some orange arkosic sandstone | 178 — 185 |

Well Mg-495

Owner: American Chemical Paint Co.
Driller: Ridpath and Potter

| Description | Depth (feet) |
|---|---|
| Upper shale member: | |
| Soil and clay | 0 — 17 |
| Sandstone, arkosic, light-gray, fine- to medium-grained | 17 — 20 |
| Shale, grayish-red, silty | 20 — 39 |
| Arkose, yellowish-orange, fine- to medium-grained | 39 — 48 |
| Shale, grayish-red, silty | 48 — 110 |
| Sandstone, arkosic, grayish-red and brownish-gray, fine-grained | 110 — 130 |
| Shale, grayish-red | 130 — 150 |
| Middle arkose member: | |
| Sandstone, arkosic, pale-brown, fine- to medium-grained | 150 — 160 |
| Sandstone, arkosic, pale-brown, very fine to fine-grained; some red shale | 160 — 180 |
| Arkose, gray, fine- to medium-grained | 180 — 190 |
| Sandstone, arkosic, brown, medium- to coarse-grained | 190 — 200 |
| Siltstone, grayish red | 200 — 210 |
| Siltstone, arkosic, pale-brown, fine- to medium-grained | 210 — 245 |
| Shale, grayish-red, silty | 245 — 260 |
| Sandstone, arkosic, yellowish-brown, medium-grained | 260 — 266 |

Well Mg-499

Owner: Borough of Ambler
Driller: Ridpath and Potter

| Description | Depth (feet) |
|---|---|
| Lower arkose member: | |
| Shale, brown and grayish-red | 0 — 20 |
| Sandstone, arkosic, brownish-gray and yellowish-brown, very fine- to fine-grained | 20 — 30 |
| Siltstone, grayish-brown | 30 — 40 |
| Sandstone, arkosic, grayish-red, very fine-grained | 40 — 42 |
| Shale, grayish-red, silty | 42 — 52 |
| Sandstone, arkosic, light-gray, fine- to medium-grained | 52 — 72 |
| Shale, grayish-red, silty | 72 — 82 |

AR300433

Table 4. *(Continued)*

| Description | Depth (feet) |
|---|---|
| Sandstone, arkosic, light-gray, medium- to coarse-grained | 82 — 115 |
| Sandstone, arkosic, pale-brown, medium- to coarse-grained | 115 — 172 |
| Shale, grayish-red, silty | 172 — 175 |
| Sandstone, arkosic, gray, coarse-grained | 175 — 185 |
| Arkose, light-gray, medium- to coarse-grained | 185 — 225 |
| Arkose, yellowish-brown, fine- to medium-grained | 225 — 235 |
| Arkose, yellowish-brown, medium- to coarse-grained | 235 — 300 |

Well Mg-500

Owner: Borough of Ambler
Driller: Ridpath and Potter

| Description | Depth (feet) |
|---|---|
| Soil | 0 — 5 |
| Lower arkose member: | |
| Sandstone, arkosic, yellowish-orange, very coarse grained, conglomeratic | 5 — 28 |
| Shale, grayish-red, sandy | 28 — 40 |
| Sandstone, arkosic, pale-orange, coarse- to very coarse-grained | 40 — 70 |
| Sandstone, arkosic, brown, fine-grained | 70 — 110 |
| Siltstone, brown, sandy | 110 — 120 |
| Sandstone, arkosic, gray, medium- to coarse-grained; some red shale | 120 — 150 |
| Shale, grayish-red | 150 — 190 |
| Sandstone, arkosic, pale-brown, fine- to medium-grained | 190 — 220 |
| Shale, grayish-red | 220 — 230 |

Well Mg-532

Owner: Selas Corporation of America
Driller: Ridpath and Potter

| Description | Depth (feet) |
|---|---|
| Soil, yellowish-brown | 0 — 5 |
| Lower arkose member: | |
| Siltstone, reddish-brown, pebbly | 5 — 50 |
| Chickies quartzite: | |
| Quartzite | 50 — 184 |

Well Mg-533

Owner: A. F. Picolet d'Hermillion
Driller: Ridpath and Potter

| Description | Depth (feet) |
|---|---|
| Soil | 0 — 1 |

300434

Table 4. *(Continued)*

| Description | Depth (feet) |
|---|---|
| Lower arkose member: | |
| Silt, dark yellowish-brown | 1 — 20 |
| Sandstone, arkosic, brown, very fine- and fine-grained | 20 — 32 |
| Sandstone, arkosic, grayish-brown, fine- to coarse-grained | 32 — 60 |
| Sandstone, arkosic, brown, coarse- to very coarse-grained; some brown siltstone | 60 — 100 |
| Sandstone, arkosic, brown, medium- to coarse-grained | 100 — 110 |
| Shale, grayish-red, silty | 110 — 112 |
| Sandstone, arkosic, yellowish-brown, coarse-grained | 112 — 134 |

### *Well depths and yields*

The highest yields and specific capacities (yield per unit of drawdown) reported are for wells tapping the middle sandstone member. The average reported for wells in this member is 131 gpm. Next in order of water-yielding capacity is the lower member of the formation, with an average yield of 106 gpm. The lowest average yields (19 gpm) and specific capacities are those reported for wells drilled in the upper shale member. In some of the tests made on wells tapping the Stockton Formation, it was noted from brine tracing tests that some zones were thieving water from zones of higher artesian head. That is, water from a zone of higher artesian head is entering the well, moving up or down to a zone of lower head, and flowing back into the rock.

### *Well location and spacing*

Wells drilled in the Stockton Formation should be located where they will penetrate the greatest saturated thickness of the most permeable bed. This means that a well should not be drilled on the outcrop of the permeable bed but, rather, at a location downdip from the outcrop. This might even require that a well be started in the least permeable bed. Data concerning proper well spacing are lacking, but wells should be as far apart as practicable.

The topography in the area underlain by the Stockton Formation gives good clues concerning its lithology. The more erosion-resistant, coarse-grained beds of the formation stand as ridges; the softer sediments have been more deeply eroded and underline the valleys. Wider ridges tend to indicate the presence of thicker, coarse-grained sections of the

300435

Stockton and, probably, better sources of water. The best sites for high-yielding wells can be located by combining this information with the knowledge that the formation dips to the northwest. The cross section in Figure 12 shows an application of this knowledge. Well A penetrates the permeable, high-yielding bed as well as the lower impermeable bed. Well B is drilled to the same depth, but, being downdip from the outcrop area, it penetrates a greater thickness of the permeable bed and is likely to yield more water. Penetration of the higher yielding members of the Stockton Formation is more important than well depth.

### *Water quality*

Ground water in the Stockton Formation in Montgomery County is largely of the calcium bicarbonate type. The median dissolved-solids content is 200 mg/1. Median hardness as $CaCO_3$ is 130 mg/1. Water in the rural areas has the lowest median dissolved-solids content, and water in urban areas has the highest. This indicates that contaminants are entering the Stockton Formation in the urban areas.

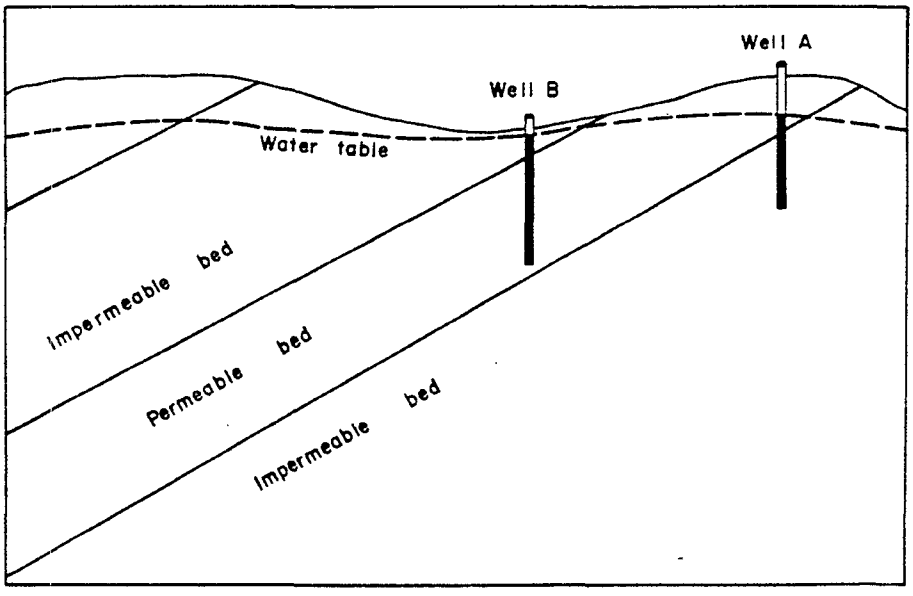


Figure 12. Well (B) drilled to take advantage of more saturated permeable material.

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REFERENCE NO. 19

BULLETIN W 22

# Ground-Water Resources of the Brunswick Formation in Montgomery and Berks Counties, Pennsylvania

by Stanley M. Longwill and Charles R. Wood
Hydraulic Engineers, U. S. Geological Survey

Prepared by the United States Geological Survey,
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HARRISBURG
1965

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# Ground-water Resources of the Brunswick Formation in Montgomery and Berks Counties, Pennsylvania

By

Stanley M. Longwill and Charles R. Wood

## ABSTRACT

The Brunswick Formation in Montgomery and Berks Counties, Pa., consists of reddish-brown shale, mudstone, and siltstone, which are interbedded with sandstone and fanglomerate near the northern border of the Triassic basin. In places the Brunswick Formation has been intruded by diabase dikes and sills, and throughout much of its outcrop area it is interbedded with the Lockatong Formation. The Lockatong Formation in Montgomery County consists principally of massively bedded medium- to dark-gray argillite interbedded with thin beds of gray to black shale, siltstone, and marlstone.

Ground water in the Brunswick and Lockatong Formations occurs largely in secondary openings such as joint planes. These secondary openings are more abundant and much more closely spaced in the Brunswick Formation than in the Lockatong Formation. Consequently, wells in the Lockatong Formation generally yield water for domestic purposes only whereas many wells in the Brunswick Formation yield sufficient water for industrial and municipal use.

Data from 199 wells that obtain water from only the Brunswick Formation in Montgomery County indicate that wells should be drilled at least 200 feet deep, if yields of more than 100 gpm (gallons per minute) are desired. Wells drilled to depths between 200 and 550 feet are most likely to obtain maximum yields.

Pumping tests in the Brunswick Formation, using observation wells, were made at six localities. Coefficients of transmissibility computed from drawdown data at the observation wells are much higher than transmissibilities calculated at the pumped wells, demonstrating the poor hydraulic connection between the pumped wells and the observation wells. The excessively high transmissibilities are useful for estimating the effect of pumping upon nearby wells and indicate that interference between wells during brief periods of pumping may be somewhat less in the Brunswick Formation than in an ideal aquifer. Water levels in the observation wells declined to a greater extent than predicted by the transmissibilities computed from data obtained during the early part of a pumping test, however, because impermeable boundaries appear in the test data of almost all observation wells. Transmissibilities computed for the pumped wells at the six test localities range from 100 to 5,000 gpd (gallons per day) per foot, and the median transmissibility is 1,100 gpd per foot.

Transmissibilities determined from additional pumping tests in the Brunswick Formation, which were made without observation wells, range from 140 to 4,000 gpd per foot, and the median is 600 gpd per foot. Transmissibilities determined from pumping tests in the Lockatong Formation, all of which were made without observation wells, range from 60 to 2,600 gpd per foot, and the median is 150 gpd per foot.

Observation wells situated along a line from the pumping well that is perpendicular to the strike of the beds show much less drawdown in response to pumping than do wells situated along a line parallel to the strike, because the former do not penetrate the same strata as the pumped well. The resultant cone of depression surrounding a pumping well is ellipsoidal in shape—being elongated parallel to strike.



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Chemical analyses of ground-water are available from 36 wells in the Brunswick Formation and six wells in the Lockatong Formation. Ground water in both formations is largely of the calcium-bicarbonate type. However, water samples from the Brunswick Formation having concentrations of dissolved solids greater than 500 ppm (parts per million) are of the calcium-sulfate type. Median dissolved-solids content is 302 ppm in water from the Brunswick Formation and 268 ppm in water from the Lockatong Formation. Median hardness as $CaCO_3$ is 218 ppm in water from the Brunswick Formation and 206 ppm in water from the Lockatong Formation.

## INTRODUCTION

### PURPOSE AND SCOPE

Prior to 1940, the area in Montgomery and Berks Counties that lies to the north and northwest of Philadelphia, Pa., consisted chiefly of small towns surrounded by farm land. The industrialization and urbanization of this area increased rapidly after the Second World War. For example, the population of Montgomery County as determined by the 1940 census was only 289,247, but by 1960 the population had risen to 516,682, almost double the 1940 figure. Most of the population increase and industrial investment occurred in the southern part of Montgomery County while the northern part retained its rural character.

The development of new ground-water supplies to meet the increased demands of industries, municipalities, and individual consumers in this rapidly growing area has been seriously handicapped by a lack of geologic and hydrologic data. Having recognized that maximum utilization of the available supply depends on understanding the occurrence, movement, and distribution of the ground water in the area, a study of the occurrence of ground-water in the Triassic rocks of southeastern Pennsylvania was begun in 1956 by the U.S. Geological Survey in cooperation with the Pennsylvania Topographic and Geologic Survey.

This report deals chiefly with the ground-water resources of the Brunswick Formation in Montgomery and Berks Counties, although some attention is directed to the water-bearing properties of the Lockatong Formation in the same area. It is one of a series of reports that will eventually describe the ground-water resources of the rocks of Triassic age in southeastern Pennsylvania. The first of these, a report on the Stockton Formation in southeastern Pennsylvania, was published in 1962 (Rima, D. R., and others, 1962).

### LOCATION OF THE AREA

The area covered by this report is in Montgomery and Berks Counties, in southeastern Pennsylvania, between lat. 40°08′ and 40°27′ N. and long. 75°09′ and 75°56′ W. (See Fig. 1.) The area extends for 41 miles from the eastern border of Montgomery County to its most western point, on

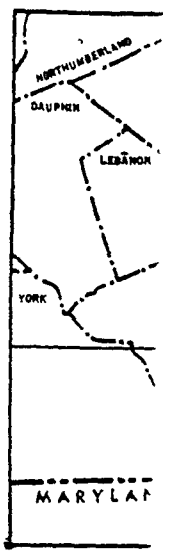


Figure 1. Map of
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coastal storms and by melting snow and heavy rain in the spring. Major flooding occurred along the Schuylkill River in 1902, 1935, 1942, and 1955.

## GEOLOGY

### NEWARK GROUP

Rocks of Triassic age occupy a series of disconnected, downfaulted basins that extend from Nova Scotia to North Carolina. These rocks, known as the Newark Group, often have a reddish color and consist principally of conglomerate, arkose, sandstone, siltstone, argillite, and shale. They are interbedded with basaltic lava flows and are intruded by diabase dikes and sills.

McLaughlin (1957, p. 1492-1493) believes that the Newark Group is of Late Triassic age. Paleontologic data support this conclusion (Wherry, 1959, p. 124). Rocks of the group overlie Paleozoic and Precambrian rocks unconformably, and in New Jersey the Newark Group is overlain unconformably by Cretaceous rocks.

The Triassic rocks of Montgomery and Berks Counties are part of the largest Triassic basin in the eastern United States. This basin extends from the Hudson River in southeastern New York, across New Jersey, southeastern Pennsylvania, Maryland, and into northern Virginia. In Pennsylvania the width of the basin ranges from about 30 miles in eastern Montgomery County to about 4 miles southeast of Lebanon, Pa.

In southeastern Pennsylvania and western New Jersey the Newark Group has been divided, proceeding from the oldest sediments to the youngest, into the Stockton, Lockatong, and Brunswick Formations. (See Pl. 1.) These formations were described at the type locality in New Jersey by Kummel (1897). The Stockton Formation is composed of interbedded arkosic sandstone and conglomerate, red shale, and red siltstone. The Stockton is overlain to the north by the Lockatong Formation, which is made up principally of dark gray argillite. The Lockatong is overlain to the north by the Brunswick Formation, which consists chiefly of red shale and siltstone although there is some interbedded sandstone and conglomerate near the north border of the outcrop. The Brunswick Formation is equivalent to the Gettysburg Shale in Adams, York, and Lancaster Counties, Pa., the two formations having been deposited almost contemporaneously.

Although the sum of the thicknesses of the individual formations in the Newark Group is about 18,000 feet, the total thickness of the Newark Group present at any one place in southeastern Pennsylvania probably does not exceed the 12,000 feet believed to be present at the center of the basin (McLaughlin and Willard, 1949, p. 43). The absence of the total

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thickness at any one place is postulated because the floor of the basin probably shelved northward and deposition did not start along the northern edge of the basin until several thousand feet of sediments had accumulated in the central part of the basin. This theory is supported by the fact that the Brunswick Formation was deposited directly upon Paleozoic and Precambrian rocks along part of the northern border of the Triassic basin in Pennsylvania.

## LOCKATONG FORMATION

The Lockatong Formation occurs principally in a single continuous belt along the southern edge of the Brunswick Formation. The width of this belt in Montgomery and Berks Counties varies from 4 miles at the Bucks County-Montgomery County line to 1¼ miles at the Schuylkill River. This main body of Lockatong Formation underlies an area of 46 square miles in Montgomery County. A few relatively thin tongues of Lockatong occur well up-section (northward) in the Brunswick Formation, and although most of these tongues do not extend far to the west of the Bucks County line, some of them can be traced for about 30 miles westward to the Schuylkill River.

The Lockatong Formation in Montgomery County consists principally of medium-to dark-gray argillite interbedded with thin beds of gray to black shale, siltstone, and marlstone. Bedding is principally massive. Van Houten (1960, p. 666) indicates that the Lockatong contains a large percentage of analcime (up to 40 percent) along with dolomite, feldspar, and clay. Quartz is a very minor constituent of the Lockatong Formation. Pyrite is scattered throughout the formation and calcite is common, especially in joints.

In the area of this investigation the Lockatong Formation attains its maximum stratigraphic thickness at the Bucks County line. A stratigraphic section measured by McLaughlin (1959, p. 88) at this locality shows a thickness of slightly over 4,000 feet. The Lockatong Formation thins rapidly to the west and is only about 1,500 feet thick at the Schuylkill River (Bascom and Stose, 1938, p. 72).

The Lockatong Formation overlies the Stockton Formation conformably, and probably there is some interfingering of the two formations (McLaughlin, 1959, p. 77). The Lockatong is overlain conformably by the Brunswick Formation, and there is considerable interfingering between these formations—especially in eastern Montgomery County. Where there is interfingering, the percentage of red beds in the section increases upward in the stratigraphic column until the red beds of the Brunswick Formation predominate over the gray shale and argillite of the Lockatong.

The Lockatong Formation grades westward along strike into the typical red shale, mudstone, and siltstone of the Brunswick Formation. This

300442

gradation and thinning westward continues until the Lockatong Formation disappears a few miles west of Phoenixville.

## BRUNSWICK FORMATION

In Montgomery and Berks Counties, the Brunswick Formation, together with the associated diabase intrusives, occupies an area of 301 square miles. Two large areas of Brunswick, one of about 25 square miles (lying mostly in Upper Hanover Township, Montgomery County) and the other of 50 square miles (lying mostly in Douglass and New Hanover Townships, Montgomery County) are separated from the main body of the Brunswick Formation by diabase intrusives.

The Brunswick Formation consists typically of reddish-brown shale, mudstone, and siltstone. A few very thin beds of green shale and brown shale are present in the Brunswick, and in some places they can be used as marker beds for distances up to 1 mile. Van Houten (1960, p. 669) indicates that the Brunswick Formation consists chiefly of feldspar, illite, chlorite, quartz, and calcite. Some beds are finely micaceous. Joints in the Brunswick Formation commonly are partly filled with calcite and quartz. Occasionally barite and pyrite are present as joint filling, and very small crystals of pyrite may be disseminated throughout the rock.

The total apparent thickness of the Brunswick Formation in Bucks County is about 9,000 feet (McLaughlin, 1959, p. 99). The maximum thickness is greater to the west and is about 16,000 feet near Pottstown, Pa. (Bascom and Stose, 1938, p. 76).

Near the base of the Brunswick much of the rock is tough thick-bedded red argillite and is interbedded with dark-gray argillite of the Lockatong Formation. This red argillite grades upward and also along strike into red shale, mudstone, and siltstone. Near the north border of the Triassic basin, the typical shales, mudstones, and siltstones of the Brunswick Formation are interbedded with and grade laterally into sandstone and fanglomerate.

There are many excellent exposures of the Brunswick Formation—especially along streams and railroad cuts. For detailed geologic sections the reader is referred to McLaughlin (1933) and Bascom and Stose (1938). Table 7 contains seven sample logs that illustrate the relatively uniform character of the Brunswick Formation. Some of them (Be-125 for example) show that beds of gray argillite typical of the Lockatong are present also in the Brunswick Formation.

## FANGLOMERATES

Fanglomerates occupy about 6 square miles along the northern border of the area of investigation. These fanglomerates were deposited as alluvial fans by streams flowing into the basin from the north. They are mostly limestone breccias consisting of angular gray limestone pebbles in a red-

300443

dish-brown or buff, fine-grained, sandy-to-argillaceous matrix. Some pebbles of quartzite and other rocks are also present.

These fanglomerates occur at several locations along the northern border and are extensively interbedded with typical shale and siltstone of the Brunswick. The beds of limestone breccia grade along strike into reddish-brown sandstone and then into reddish-brown shale.

Outcrops of fanglomerate are very scarce in Montgomery County; however, in Berks County the area of fanglomerate that crosses the Schulykill River south of Reading is exposed in many places.

The fanglomerates are some of the youngest beds within the Brunswick Formation. However, west of the Schuylkill River, fanglomerates were deposited throughout most of the period of deposition of the Brunswick Formation. Several tongues of fanglomerate extend eastward towards the Schulykill River, and are represented at the river by a few thin sandstone beds.

The areas mapped as fanglomerate on Plate 1 are areas in which breccia and conglomerate are more prevalent than the interbedded shale, siltstone, and mudstone.

## METAMORPHISM

Near the diabase intrusives the shales of the Brunswick Formation are altered to dark, tough hornfels. These hornfels closely resemble the Lockatong Formation because of the change of color caused by the reduction of ferric to ferrous oxide. The effect of the metamorphism on the color of the sediments is gradational, the first effect being the change from red to purplish red. With increased baking the beds change from purple to dark gray or blue black.

The width of the altered zone differs greatly from place to place. Adjacent to the smaller dikes the zone is usually between 40 and 100 feet wide, and in the vicinity of the larger intrusives the altered zone may be more than 1 mile wide. The rocks near the outer limit of the altered zone show very little change in lithology.

## DIABASE

The Brunswick Formation has been intruded by many diabase dikes and sills in southeastern Pennsylvania. The dikes are generally 5 to 100 feet thick, and their outcrops may extend for several miles. The diabase in these narrow dikes is black, dense, very fine-grained, and consists of 90 to 95 percent labradorite and augite.

The sills, with few exceptions, are much thicker than the dikes. The largest sills in the area are more than 1,000 feet thick. The diabase in the larger intrusives, except in the chilled border zone, is medium to coarse grained, greenish gray, and also consists of 90 to 95 percent labradorite and augite (Ryan, 1959, p. 155).

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### STRUCTURE

The average dip of the beds in the Brunswick and Lockatong Formations is to the north and northwest at about 20°. Several broad synclines and anticlines, whose axes trend about N. 60° W., are superimposed on this homocline.

The Brunswick and Lockatong Formations have been cut by many faults, most of which are relatively small. Some of these small faults may be observed in the railroad cut south of North Wales. McLaughlin (1942) gives the location of several faults.

The largest fault observed in Berks and Montgomery Counties passes between Hatfield and Souderton in an east-west direction. It has a throw of about 3,000 feet at the Bucks County-Montgomery County line (McLaughlin, 1959, p. 129). The Brunswick Formation is in fault contact with the underlying Paleozoic and Precambrian rocks along part of the northern border of the Triassic basin.

Joint systems are well developed in many of the beds in the Brunswick Formation. A very small set of joints strikes about N. 30° E., and one or both of two additional, less well-developed sets may be observed at most outcrops. These additional sets strike about N. 45° W. and N. 75° E. All of the joints are nearly vertical, and the average distance between joints in most sets is about 6 inches. The strike of the Joint sets appears to be independent of the dip and strike of the beds.

## HYDROLOGY

### PRINCIPLES

Ground water is the subsurface water in that part of the zone of saturation in which all the interconnected pores, crevices, and voids in the rock are filled with water under pressure equal to or greater than atmospheric. Precipitation is the source of ground water in southeastern Pennsylvania. Although most of the water that reaches the land surface from the atmosphere either runs off as overland flow or is returned to the atmosphere by evaporation and transpiration, some infiltrates downward through the soil to the zone of saturation, where it becomes recharge to the main groundwater body. Upon reaching the zone of saturation, it begins to move downward and laterally toward lower elevations, and eventually it may return to the surface either naturally (through springs) or artificially (through wells). Under natural conditions and over long periods of time, the amount of water that leaves the zone of saturation as discharge is balanced by the amount of water that enters it as recharge.

Ground water may be roughly divided into two classes: (1) that which occurs in the shallow formations, mostly under nonartesian conditions, and (2) that which occurs in the deeper formations, under artesian condi-

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tions. Nonartesian conditions are those in which ground water is unconfined, so that its upper surface (the water table) is free to rise and fall. Artesian conditions are those in which the ground water is confined in a permeable formation that is overlain by a relatively impermeable formation, so that the upper surface of the confined water is not free to rise and fall, and the water is under sufficient pressure to rise above the top of the formation that contains it where that formation is penetrated by wells. The imaginary surface to which water will rise in tightly cased wells tapping the artesian aquifer is called the piezometric surface.

In humid areas, such as southeastern Pennsylvania, the water table stands at or near the land surface in valleys and rises toward adjacent topographic divides. The slope of the water table is generally less than that of the land surface; hence, the depth to the water table below the land surface is usually greatest beneath topographic highs and least beneath topographic lows.

The water table does not remain in a fixed position but fluctuates in response to additions to and withdrawals from the zone of saturation. As the seasonal variation in precipitation in southeastern Pennsylvania is small, the dominant factor controlling the fluctuation of the water table in areas remote from pumped wells is the seasonal variation in the rate of evaporation and transpiration. Thus the water table generally declines throughout the warm growing season (April to October) and rises throughout the remainder of the year.

Within the zone of saturation, the rocks of the earth's crust differ greatly in their capacity to store and transmit ground water. Rocks that are capable of yielding usable quantities of ground water to wells are called aquifers. An aquifer may consist of all or part of a geologic formation or group of formations.

Most of ground water, like water in other phases of the hydrologic cycle, is continually in motion. It flows by gravity from intake or recharge areas, where hydraulic potentials are high, through permeable zones or aquifers to points of discharge, where hydraulic potentials are low.

## OCCURRENCE OF GROUND WATER IN THE BRUNSWICK FORMATION

The Brunswick Formation is composed of very fine-grained rocks. The pore spaces within the rock matrix are very small and offer great resistance to the flow of ground water. Therefore, the permeability due to the primary porosity of the Brunswick Formation is small.

Most of the ground-water movement within these rocks follows secondary openings that were developed by external forces, following deposition of the beds. Some of these openings are fractures that parallel the bedding planes. They are usually narrow and probably contribute little to the permeability. The most important openings are nearly vertical joint

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planes that cross each other at various angles throughout the beds. These vertical joints provide an interconnected series of channels through which ground water can flow.

The number and width of secondary openings and, consequently, the permeability differ from one bed to another. In a series of beds 100 feet thick there may be only one or two beds in which the secondary openings are well developed. These beds range in thickness from a few inches to a few feet; the average thickness is about 2 feet.

Because of conditions under which the rocks of the Brunswick Formation were deposited, lateral changes in the lithology take place within the formation. The rocks are a series of overlapping lens-shaped beds that are discontinuous in all directions along the plane of bedding. Examination of rock outcrops in the area indicates, however, that many of these lens-shaped beds extend for several thousand feet along strike.

The Brunswick Formation is generally a reliable source of small to moderate supplies of ground water, and in many places wells yield more than 100 gpm.

Analysis of data from 199 wells, which obtain water from only the Brunswick Formation in Montgomery and Berks Counties, indicates that there is a significant relationship between well yields and well depths. (See Fig. 2.) If yields of 100 gpm or more are desired, wells should be drilled at least 200 feet deep. According to the data shown on Figure 2, wells drilled to depths between 200 and 550 feet deep are most likely to obtain maximum yields.

For example, of 35 wells less than 185 feet deep, only 1 well yields more than 100 gpm, and only 5 yield more than 50 gpm. But 45 percent (68 of 151) of the wells between 185 feet and 550 feet deep yield more than 100 gpm, and about 75 percent (115 of 151) of them yield more than 50 gpm.

Thirty-two wells yield 200 gpm or more, and all but two of these wells are between 185 and 545 feet deep. Only seven wells yield more than 300 gpm, and all but one of these are between 200 and 510 feet deep.

Data were obtained for only 14 wells more than 550 feet deep; so, the yields of wells more than 550 feet deep are perhaps not evaluated conclusively in this report.

Data such as these can be misleading if the use of the wells is not considered, because wells drilled for domestic purposes commonly show lower yields than wells drilled for industrial use or public supply. Presumably this is because domestic water needs are small and the drilling of such wells is stopped when a small but adequate water supply is obtained. Also, many domestic wells may not be tested rigorously to determine their maximum yield. This effect of domestic wells is not believed to be significant in the data here discussed, as 174 of the 199 wells shown in Figure 2, and 24 of the 34 less than 185 feet deep, are either used as industrial or public-supply

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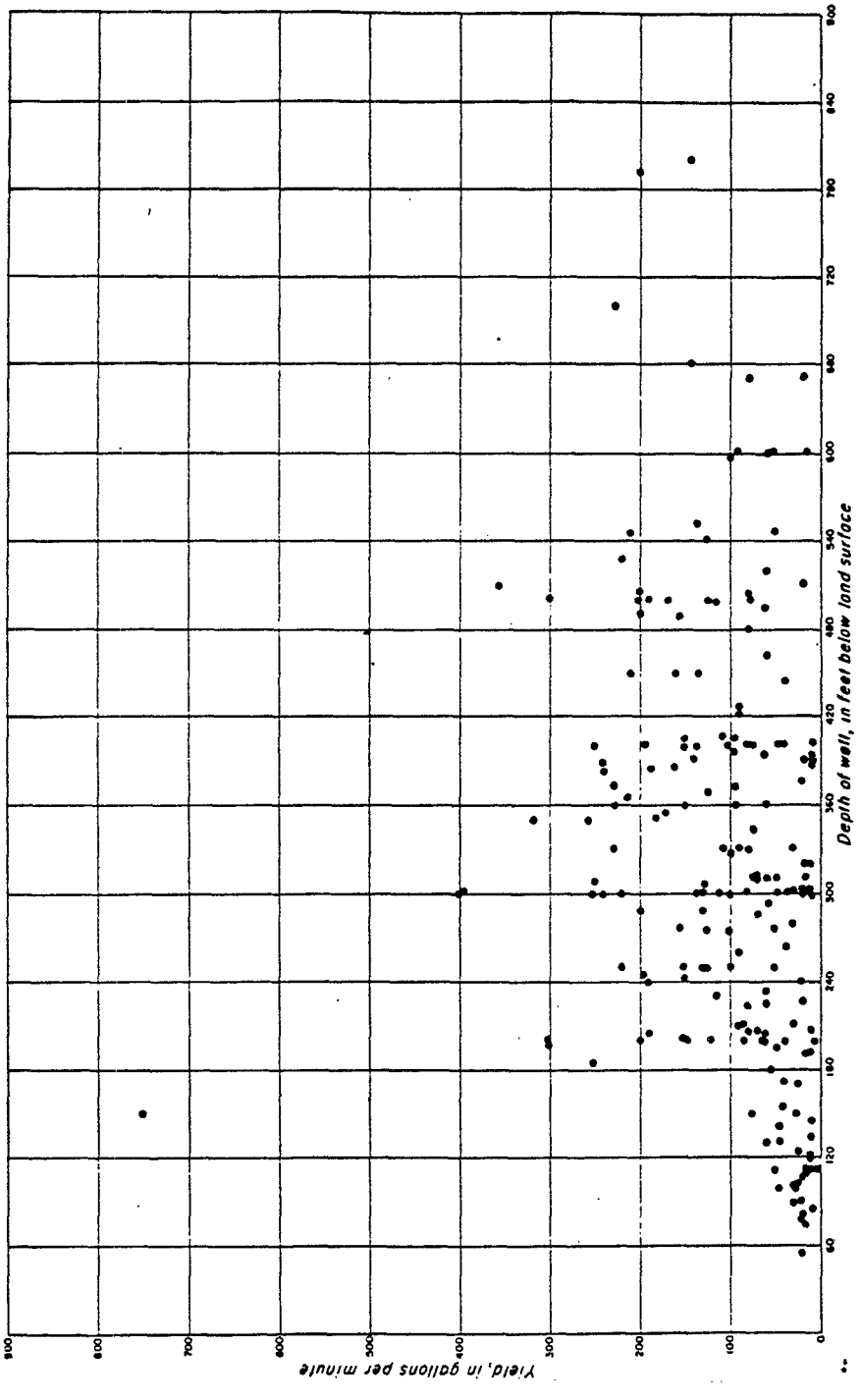


Figure 2. Diagram showing the relation between yields and depths of wells in the Brunswick Formation.

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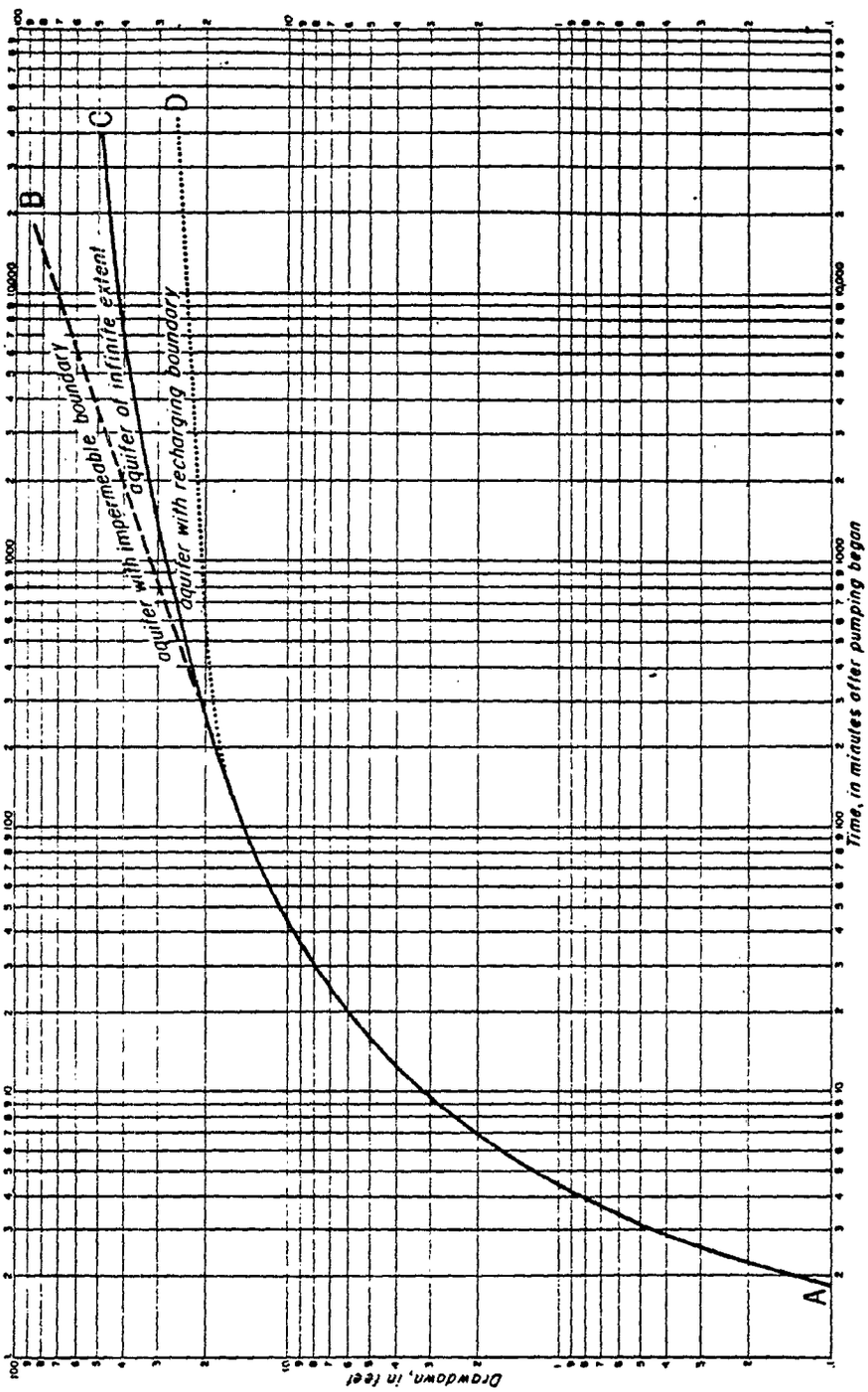


Figure 3. Logarithmic graph of drawdown in a theoretical aquifer.

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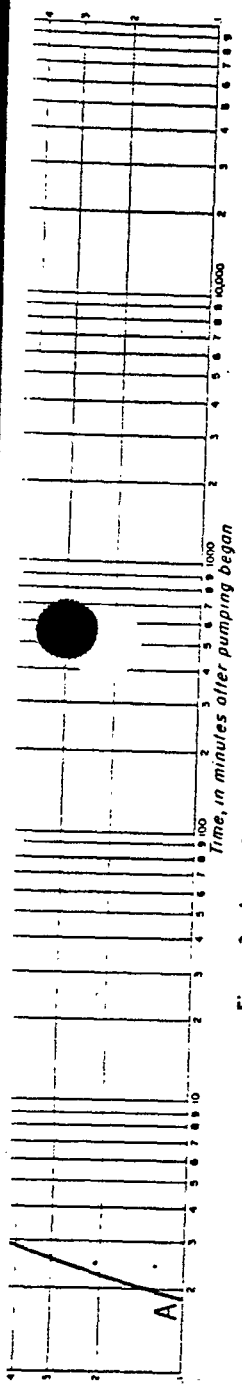


Figure 3. Logarithmic graph of drawdown in a theoretical aquifer.

wells or were tested for such use. The data contained in this report, therefore are believed to fairly represent the relationship of well yields versus depth of wells.

The sharply defined increase in the yield of wells at a depth of about 200 feet is believed to be the result of a rather abrupt change in the nature of rock weathering at depth. In the area of this investigation it appears that the zone of greatest decomposition—where the rock voids are believed to be partly plugged with residual clay—lies above a depth of 200 feet. Similar depths of intense weathering in the Brunswick Formation were reported by Barksdale and others (1958, p. 86).

## OCCURRENCE OF GROUND WATER IN THE LOCKATONG FORMATION

The lithology and structure of the Lockatong Formation is similar to that of the Brunswick Formation. It consists of interbedded dark-gray argillite and shale that dip to the northwest at an average angle of 20°. The rock is fine grained and well cemented. As in the Brunswick Formation, the interconnected pore spaces are very narrow and most of the ground-water flow is confined to a system of interconnected vertical joints and bedding-plane fractures. However, the fractures are narrower and more widely spaced than those in the Brunswick Formation. Yields of 15 wells that tap the Lockatong Formation ranged from 4 to 40 gpm, and the median yield was 10 gpm.

## PUMPING TESTS

When a well is pumped, water levels in the area are lowered and a cone of depression is formed in the piezometric surface or the water table. As pumping continues, the cone of depression enlarges until one of the following conditions exist: (1) The recharge of the aquifer has been increased by an amount equal to the pumping rate, (2) the natural discharge from the aquifer has been decreased by an amount equal to the pumping rate. (3) The sum of the increased recharge and decreased natural discharge is equal to the pumping rate.

Line AC on Figure 3 is a theoretical plot of drawdown against time in a well pumping at a constant rate from a homogeneous isotropic aquifer of infinite areal extent and uniform thickness. Other assumptions made in constructing the theoretical curve are: (1) the discharge well has an infinitesimal diameter and completely penetrates the aquifer; (2) no recharge to the aquifer occurs; (3) the water withdrawn from storage in the aquifer is discharged instantaneously with decline in head; and (4) the coefficient of transmissibility is constant at all places and all times.

A plot of recovery against time would coincide with a plot of drawdown against time. If flow occurs under conditions different from those stated in

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the assumptions, the plotted curve will deviate from the theoretical curve. For example, line AD in Figure 3 is one path the plotted data may follow if the cone of depression expands to a recharge boundary and induces recharge from some outside source. The slope of this curve decreases from that of the theoretical curve, indicating that drawdown has been diminished due to the inflow of recharge. If the slope of the plotted curve increases from that of the theoretical curve, as in line AB, the cone of depression has expanded to an impermeable boundary—that is, an area that is less permeable than the part of the aquifer near the pumping well. Many boundary conditions can cause this. For example, the cone of depression reaches the end of the aquifer and lateral expansion of the cone is stopped or retarded. The presence of this type of boundary may be caused by a marked decrease in the permeability of the aquifer at some distance from the well.

By means of a graphical technique that involves matching a theoretical curve to plots of drawdown in wells versus time, it is possible to compute the coefficients of transmissibility and storage for an aquifer.

The coefficient of transmissibility is a measure of the ability of the aquifer to transmit water. It is defined as the quantity of water, in gallons per day, that will flow through a vertical section of the aquifer 1-foot wide and extending the full height of the aquifer under a unit hydraulic gradient at the prevailing temperature of the water.

The coefficient of storage of an aquifer is the volume of water it releases from or takes into storage per unit surface area of the aquifer per unit change in the component of head normal to that surface. Under water-table conditions, the water released from storage is obtained by draining a part of the aquifer. However, under artesian conditions, water is released from storage by compression of the network of openings within the aquifer in response to a decrease in head at a well. For this reason the coefficient of storage of an artesian aquifer is many times smaller than that of a water-table aquifer. The coefficients of storage for artesian aquifers range from 0.00001 to 0.001, and those of water-table aquifers range from 0.05 to 0.30.

Systematic aquifer tests to determine the hydraulic properties of the Brunswick Formation were made at the following locations: Kulpsville, North Wales, Spring City, Douglassville, Souderton, and Royersford. At each of these sites one well was pumped at a constant rate for a period ranging from several hours to several days while water levels were measured in the pumped well and in one or more adjacent observation wells. After pumping ceased, water levels in all these wells were measured again for an equal length of time. Results of these tests, including the coefficients of transmissibility and storage and the total drawdown during pumping, are shown in Table 1.

Table 1. Summary of pumping tests with observation wells in the Brunswick Formation.

| Pumping Duration of | Transmissibility | Storage |
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Table 1. Summary of pumping tests with observation wells in the Brunswick Formation.

| Area | Observation well | Date | Pumping rate (gpm) | Duration of pumping (hours) | Transmissibility T (gpd/ft) | Storage coefficient S | Boundary type | Total drawdown (feet) | Distance from pumped well |
|---|---|---|---|---|---|---|---|---|---|
| Kulpsville | Mg-631[1] | Aug. 1960 | 140 | 48 | 5,000 | ..... | Recharge | .... | .... |
| | Mg-632 | Aug. 1960 | 140 | 48 | 43,000 | $10x10^{-5}$ | Impermeable | 10.6 | 730 |
| | Mg-633 | Aug. 1960 | 140 | 48 | 180,000 | $12x10^{-5}$ | Impermeable | 4.4 | 730 |
| North Wales | Mg-56[1] | Sept. 1960 | 127 | 4 | 1,100 | ..... | Recharge | 64.4 | .... |
| | Mg-180 | Sept. 1960 | 127 | 4 | 56,000 | $9x10^{-5}$ | Impermeable | 1.2 | 1,200 |
| | Mg-223 | Sept. 1960 | 127 | 4 | 69,000 | $10x10^{-5}$ | Impermeable | 1.1 | 1,700 |
| | Mg-223[1] | Oct. 1960 | 180 | 101 | ..... | ..... | ..... | 79 | .... |
| | Mg-56 | Oct. 1960 | 180 | 101 | 56,000 | $12x10^{-5}$ | Impermeable | 7.4 | 1,700 |
| | Mg-180 | Oct. 1960 | 180 | 101 | 82,000 | $9x10^{-5}$ | Impermeable | 13.8 | 575 |
| | Mg-167[1] | Oct. 1960 | 152 | 4 | ..... | ..... | ..... | 26.8 | .... |
| | Mg-179 | Oct. 1960 | 152 | 4 | 51,000 | $6x10^{-5}$ | Impermeable | 3.5 | 400 |
| Spring City | Ch-181[1] | Apr. 1963 | 225 | 72 | 1,000 | ..... | Recharge | 107.9 | .... |
| | Ch-144 | Apr. 1963 | 225 | 72 | 6,000 | ..... | Impermeable | 6.5 | 830 |
| | Ch-145 | Apr. 1963 | 225 | 72 | 13,000 | $29x10^{-5}$ | Impermeable | 10.3 | 1,650 |
| | Ch-147 | Apr. 1963 | 225 | 72 | ..... | ..... | ..... | 0.0 | 1,850 |
| Douglassville | Be-115[1] | July 1962 | 30 | 67 | 100 | ..... | Recharge | 112.2 | .... |
| | Be-125 | July 1962 | 30 | 67 | 600 | $3.8x10^{-5}$ | Recharge | 14.9 | 200 |
| | Be-125[1] | June 1963 | 21 | 4.5 | 1,100 | ..... | None | 18.9 | .... |
| | Be-115 | June 1963 | 21 | 4.5 | 1,500 | $3.3x10^{-5}$ | None | 7.3 | 200 |
| Souderton | Mg-665[1] | Mar. 1961 | 150 | 69 | 3,500 | ..... | Recharge | 80.5 | .... |
| | Mg-679 | Mar. 1961 | 150 | 69 | 9,000 | $4x10^{-5}$ | Impermeable | 27.6 | 400 |
| Royersford | Mg-542[1] | Jan. 1962 | 55 | 3 | ..... | ..... | ..... | .... | .... |
| | Mg-541 | Jan. 1962 | 55 | 3 | 30,000 | $6x10^{-5}$ | Impermeable | .61 | 1,200 |

[1] Pumped well.



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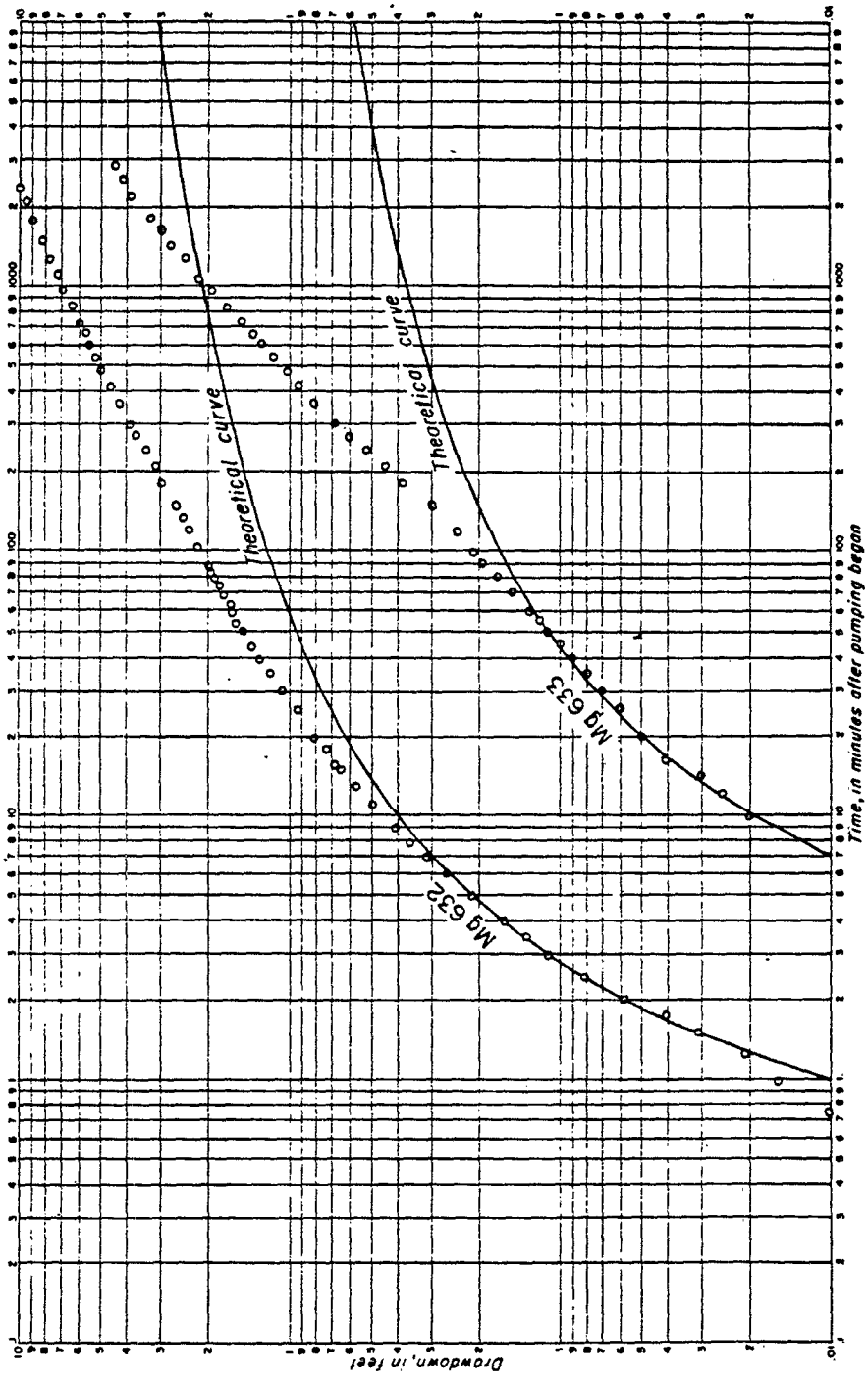


Figure 4. Logarithmic graph drawdown in wells Mg-632 and Mg-633.

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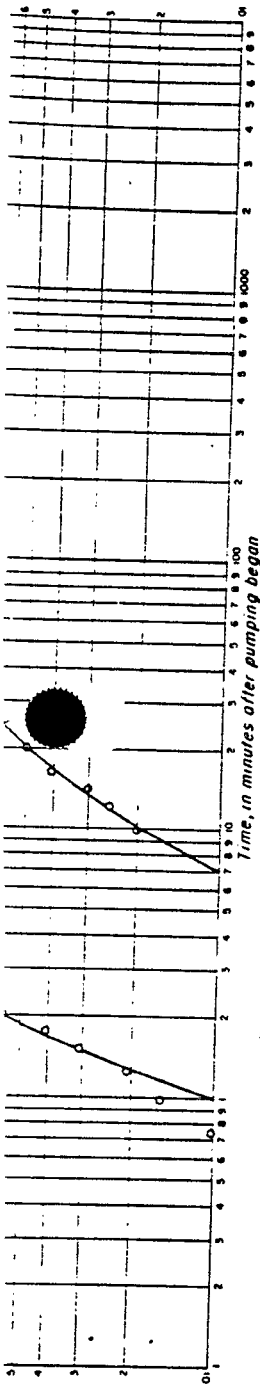


Figure 4. Logarithmic graph drawdown in wells Mg-632 and Mg-633.

Because hydrologic conditions in the Brunswick Formation do not fulfill the assumptions for an ideal aquifer, the coefficients of transmissibility and storage calculated from these tests do not truly represent the aquifers tested. Calculated transmissibility at a pumped well may be lower than the actual transmissibility of the aquifer because of well entrance losses during the test. On the other hand, excessively high transmissibilities computed at observation wells for almost all the pumping tests show clearly the poor hydraulic connection between the pumped wells and the observation wells. Despite this poor hydraulic connection, the measurement of water levels in in observation wells and the calculation of transmissibility and storage coefficients are useful for estimating the effect of pumping upon nearby wells —where the effect is controlled by recognizable geologic or topographic features.

*Tests at Kulpsville.*—In August 1960 well Mg-631, at Kulpsville, was pumped for 48 hours at a constant rate of 140 gpm and wells Mg-632 and Mg-633 were used for observation. Coefficients of transmissibility and storage calculated from these tests are shown in Table 1. Observation well Mg-632 is 730 feet from the pumped well in a direction parallel to the strike of the beds, whereas observation well Mg-633 is the same distance from the pumped well along a line perpendicular to the strike. Consequently, well Mg-632 penetrates the same strata as the pumped well, but well Mg-633 penetrates entirely different strata.

Analysis of data from these wells indicates coefficients of transmissibility of 5,000 gpd per foot at the pumped well (Mg-631), 40,000 gpd per foot at the observation well along strike (Mg-632), and 180,000 gpd per foot at the observation well perpendicular to strike (Mg-633). Poor hydraulic connection between the pumped well and the observation wells is indicated by these high transmissibilities calculated from the observation-well data. A poor hydraulic connection is especially evident at observation well Mg-633, perpendicular to the strike from the pumped well. Drawdown in this observation well is caused by leakage from beds penetrated by the observation well to beds tapped by the pumped well.

The response in observation wells Mg-632 and Mg-633 to pumping at well Mg-631 is shown in Figure 4. The graph shows that drawdown began much sooner and drawdown was much greater in the observation well (Mg-632) penetrating the same strata as the pumped well than in the observation well (Mg-633) penetrating different strata. In both observation wells water levels declined more steeply than the theoretical curve, indicating the presence of an impermeable boundary. Drawdown in the pumped well (not shown) declined more slowly than the theoretical curve, indicating the presence of a recharging boundary.

*Tests at North Wales.*—Three pumping tests were made in North Wales.

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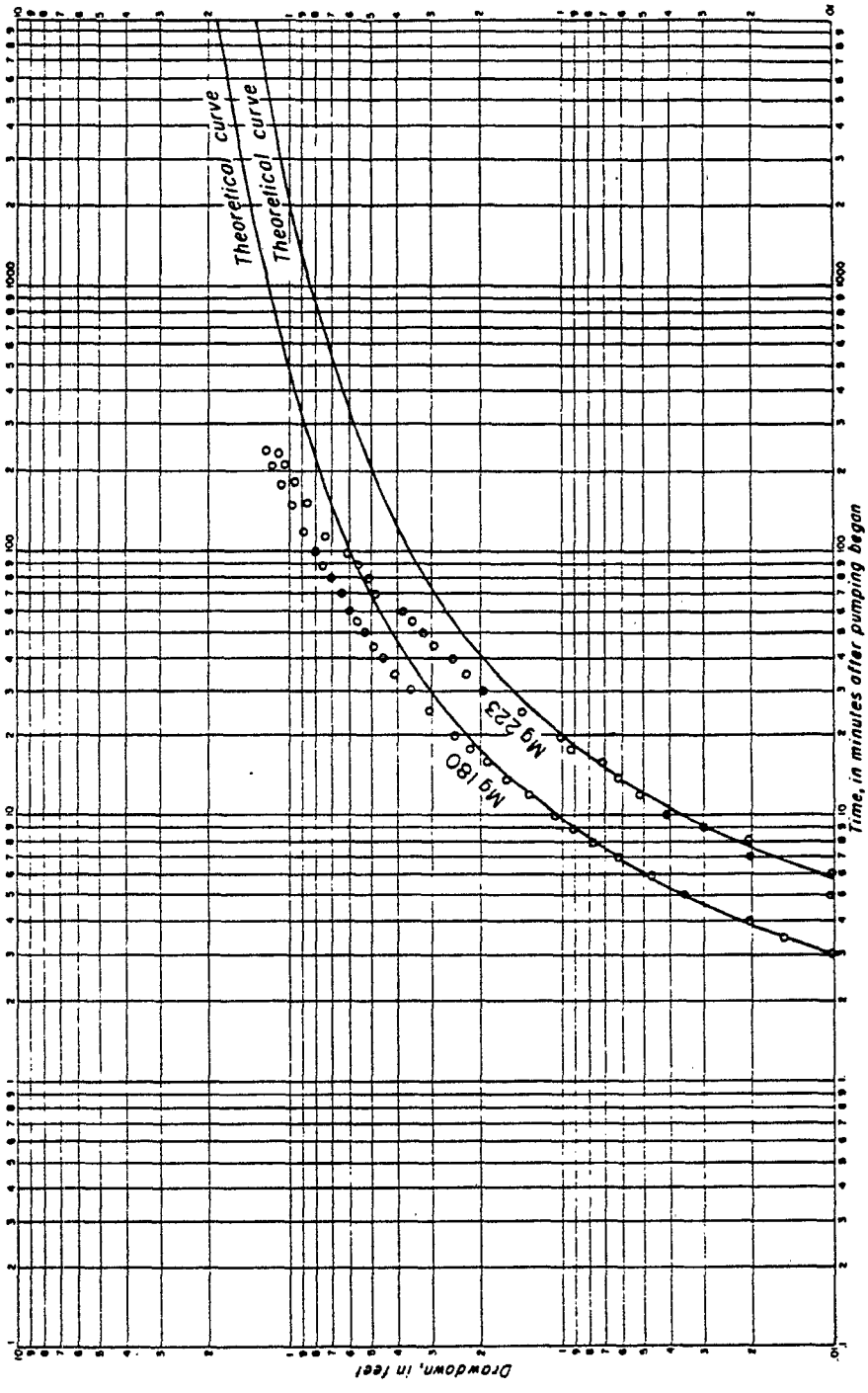


Figure 5. Logarithmic graph of drawdown in wells Mg-180 and Mg-223.

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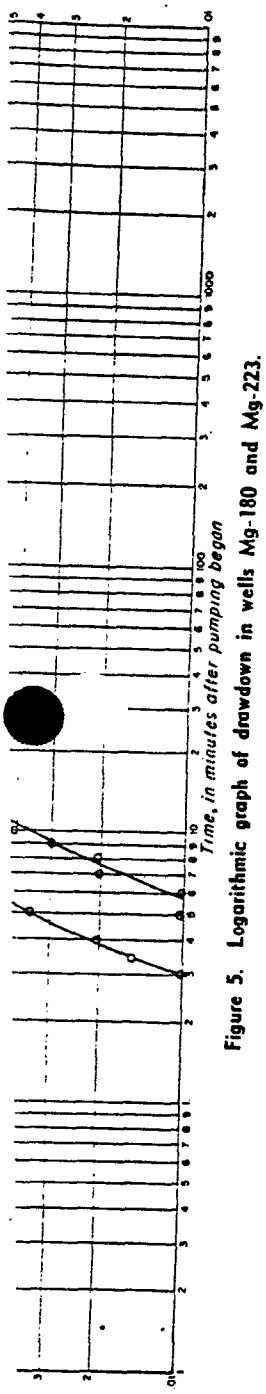


Figure 5. Logarithmic graph of drawdown in wells Mg-180 and Mg-223.

Coefficients of transmissibility and storage calculated from these tests are shown in Table 1. In September 1960, well Mg-56 was pumped for 4 hours at a constant rate of 127 gpm. Water levels were observed in wells Mg-167, Mg-179, Mg-180, and Mg-223.

Analysis of data from the pumped well (Mg-56) indicates a coefficient of transmissibility of 1,100 gpd per foot, which is probably lower than the actual transmissibility of the aquifer because of entrance losses at the well.

No drawdown took place at wells Mg-167 and Mg-179, which are more than 2,500 feet from the pumped well and do not penetrate the same strata as the pumped well.

The coefficient of transmissibility at observation well Mg-180, which is 1,200 feet from the pumped well, is 56,000 gpd per foot. At observation well Mg-223, which is 1,700 feet from the pumped well, the coefficient of transmissibility is 69,000 gpd per foot. The high transmissibilities at the observation wells suggest imperfect hydraulic connection with the pumped well—even though observation well Mg-223 penetrates many of the same strata as the pumped well, and well Mg-180 penetrates some of the same strata. The plots of drawdown in wells Mg-180 and Mg-223 (Fig. 5) show that drawdown started later in well Mg-223 than in well Mg-180, which was nearer to the pumped well. However, after 4 hours of pumping the drawdowns in both wells were almost identical—1.2 feet in Mg-180 and 1.1 feet in Mg-223. The drawdown plot in both observation wells indicated the presence of a discharging boundary, whereas a recharging boundary was observed in the plot of data from the pumped well, Mg-56.

In October 1960, well Mg-223 was pumped at a rate of 180 gpm for 101 hours, and wells Mg-56 and Mg-180 were used as observation wells. The calculated transmissibility was 82,000 gpd per foot at observation well Mg-180 and 56,000 gpd per foot at observation well Mg-56. Drawdown started earlier in well Mg-180, nearest the pumped well, and total drawdown was greater at this well (13.8 feet) then at well Mg-56 (7.4 feet). Drawdown data at both observation wells showed the effects of discharging boundaries.

A third pumping test conducted in October 1960, consisted of pumping well Mg-167 at a constant rate of 152 gpm for 4 hours. Water levels were measured at observation well Mg-179, which is 400 feet from the pumped well and penetrates many of the same strata. Analysis of data from observation well Mg-179 indicates a coefficient of transmissibility of 51,000 gpd per foot. The data from the pumped well were unsuitable for analysis.

*Tests in Spring City.*—Well Ch-181, at the Pennhurst State School in Spring City, was pumped at a constant rate of 225 gpm for 72 hours in April 1963. Water levels were measured at observation wells Ch-144, Ch-145, and Ch-147.

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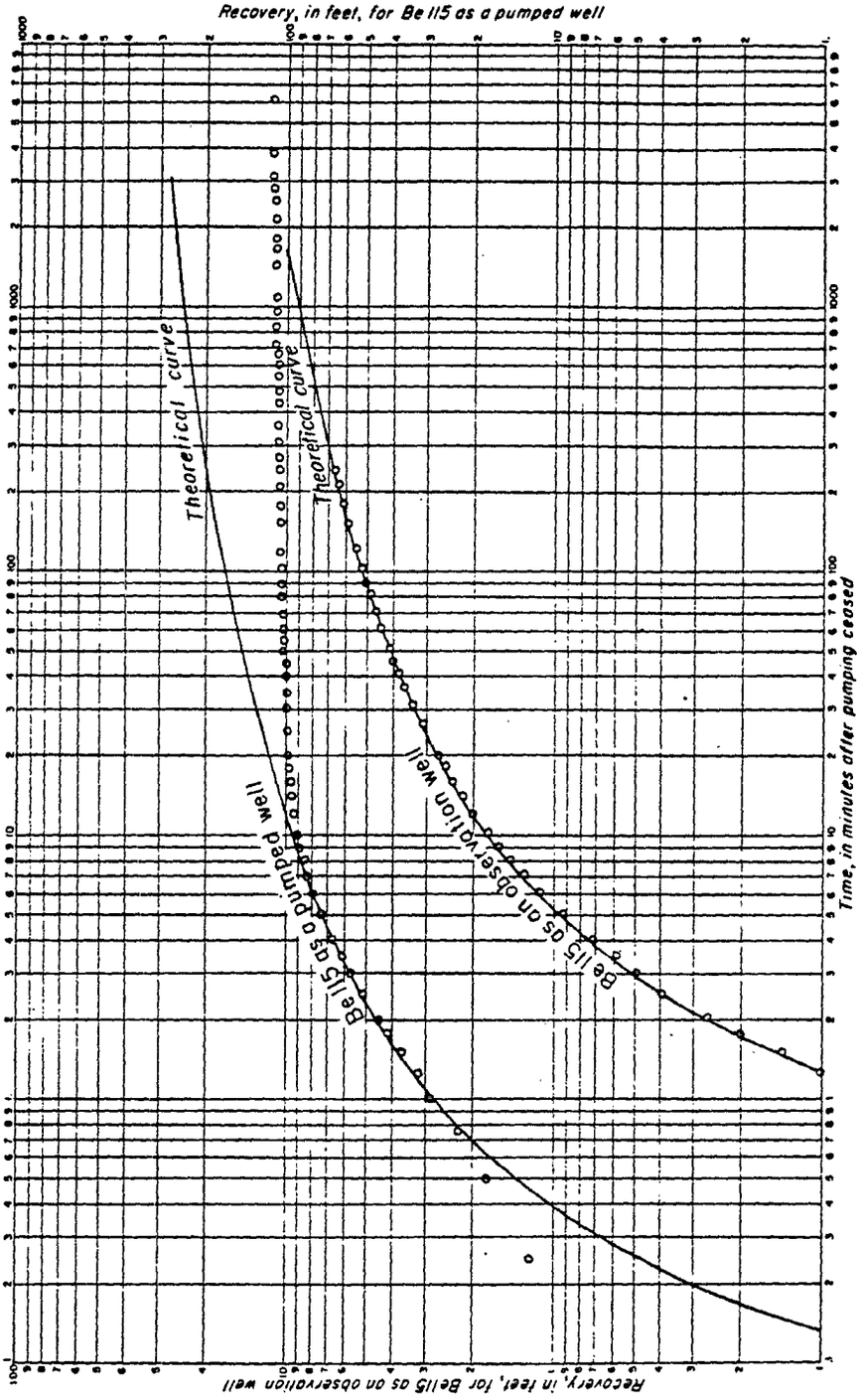


Figure 6. Logarithmic graph of recovery in well Be-115 when used as the pumped well and when used as an observation well.

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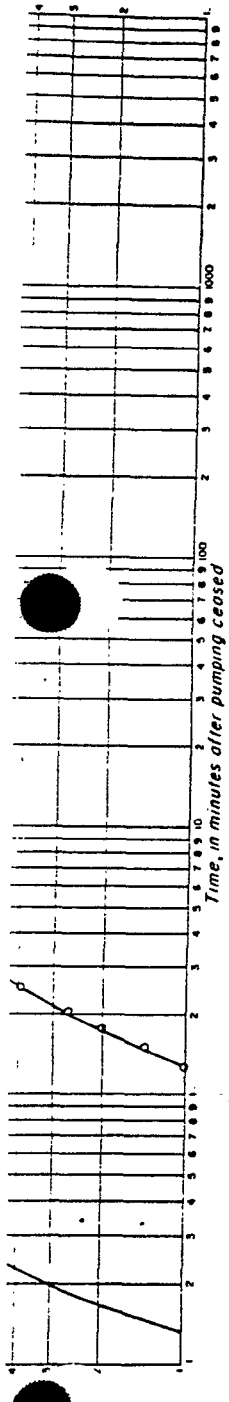


Figure 6. Logarithmic graph of recovery in well Be-115 when used as the pumped well and when used as an observation well.

Analysis of data from the pumped well (Ch-181) indicates a coefficient of transmissibility of 2,000 gpd per foot. Data from observation well Ch-144, which is 830 feet from the pumped well and penetrates many of the same strata, indicates a transmissibility of 6,000 gpd per foot. Data from observation well Ch-145, which is 1,650 feet from the pumped well and penetrates partly the same strata indicates a transmissibility of 13,000 gpd per foot.

The water level was not drawn down in Ch-147, although this well penetrates many of the same strata as the pumped well. This indicates the complexity of the hydrology in this area.

Drawdown commenced considerably earlier and was greater in observation well Ch-145, which was farthest from the pumped well, than in observation well Ch-144. The most distant well (Ch-145) penetrates the same strata as the lower part of the pumped well, whereas well Ch-144 penetrates the same strata as the upper part of the pumped well.

*Tests at Douglassville.*—Two pumping tests were conducted at Douglassville. In July 1962, well Be-115 was pumped at a rate of 30 gpm for 67 hours, and water levels were observed in wells Be-115 and Be-125. The two wells are 200 feet apart along the strike of the beds and are both 300 feet deep; hence, both wells penetrate the same strata. Analysis of data from these wells indicated a cofficient of transmissibility of 100 gpd per foot at the pumped well (Be-115) and 600 gpd per foot at observation well Be-125. However, when Be-125 was pumped at a rate of 21gpm for 4½ hours in June 1963, analysis of data indicated a transmissibility of 1,100 gpd per foot at Be-125 and 1,500 gpd per foot at observation well Be-115. These determinations of transmissibility are not consistent—but they do indicate a transmissibility of low magnitude.

When well Be-115 was pumped, data for both the pumped well and observation well Be-125 showed recharging boundaries. However, when well Be-125 was pumped, the data plot indicated no boundary conditions for either well. Figure 6 shows two plots of the recovery of water-level in well Be-115—one when the well was used as an observation well, and the other when it was used as the pumped well.

*Tests at Souderton.*—Well Mg-665, in Souderton, was pumped at a rate of 150 gpm for 69 hours in March 1961. Water levels were measured in well Mg-665 and in observation well Mg-679, 400 feet away. Analysis of data from this test indicated coefficients of transmissibility of 3,500 gpd per foot at well Mg-665 and 9,000 gpd per foot at well Mg-679.

Although these two wells are only 400 feet apart, a dip of 60° measured in a nearby outcrop suggests that the two wells do not penetrate the same strata. However, because all other dips measured in the Brunswick Forma-

300458

**Table 2. Summary of pumping tests without observation wells in the Brunswick and Lockatong Formations**

| Well | Date | Pumping rate (gpm) | Duration of pumping (hours) | Transmissibility T (gpd/ft) | Boundary type |
|---|---|---|---|---|---|
| | | **Brunswick Formation** | | | |
| Be-101 | June 1963 | 13.8 | 4 | 670 | Recharge |
| 113 | June 1963 | 20 | 4 | 900 | Impermeable |
| 114 | June 1963 | 8.6 | 4 | 150 | ..... |
| Mg-581 | June 1963 | 17.7 | 4 | 600 | Recharge |
| 695 | June 1963 | 3.4 | 1 | 180 | Recharge |
| 696 | June 1961 | 5.1 | 1 | 750 | Recharge |
| 703 | June 1963 | 22.2 | 4 | 500 | Recharge |
| 725 | July 1962 | 136 | 1.25 | 4,000 | None |
| 729 | Aug. 1963 | 14.6 | 3 | 140 | Recharge |
| | | **Lockatong Formation** | | | |
| Mg-699 | June 1961 | 3.9 | 1 | 180 | None |
| Bk-807 | April 1961 | 2.0 | 1 | 70 | Impermeable |
| 814 | May 1961 | 30 | 1.2 | 2,000 | Impermeable |
| 812 | May 1961 | 5.5 | 1 | 60 | Impermeable |
| 822 | May 1961 | 4.1 | 1 | 140 | None |
| 832 | May 1961 | 2.6 | 1 | 160 | None |

are believed to be representative of the Lockatong Formation in the area covered by this report. Coefficients of transmissibility are extremely low—they range from 60 to 2,000 gpd per foot and the median is 150 gpd per foot. Five of the six wells have transmissibilities of less than 200 gpd per foot.

Discharge boundaries were encountered in three of the pumping tests. In the remaining three tests no boundary conditions were indicated.

*Discussion of pumping-test results.*—Because the Brunswick and Lockatong Formations are not ideal aquifers, coefficients of transmissibility and storage computed by matching pumping test data to the theoretical curve are not reliable. However, the pumping-tests in these formations do demonstrate the effect of pumping upon water levels in the pumped well and in nearby wells.

The high transmissibilities computed from the observation-well data reflect imperfect hydraulic connection between pumped wells and nearby wells, but they are useful for estimating the effect other pumping wells will have on water levels in their vicinities. They indicate also that interfer-

300459

ence between wells during brief periods of pumping may be somewhat less in the Brunswick Formation than in an ideal aquifer. However, because impermeable boundaries appeared in the test data of almost all observation wells, water levels in wells near a pumping well will probably draw down to a greater extent than predicted by a transmissibility based on data from the early part of a pumping test.

Wells located on a line perpendicular to the strike of the beds will generally show much less interference than wells located on a line parallel to the strike, because the former generally do not penetrate the same strata, but the latter do. Drawdown in observation wells not penetrating the same strata as a pumped well is caused by leakage from beds penetrated by the observation wells to beds tapped by the pumped well.

## QUALITY OF WATER

All ground waters contain dissolved minerals; some contain suspended particles and pathogenic organisms. These ground-water constituents are important because if they are present in excessive amounts they may limit the usefulness of the water for some purposes and may necessitate treatment of the water.

The chemicals dissolved in ground water are obtained from many sources. Rain and snow, from which ground water is derived, absorb small amounts of carbon dioxide and other gases in the atmosphere. In addition, small particles of mineral matter in the form of dust are caught and carried along with the precipitation; the quantity of material absorbed in this way, however, is very small.

Upon reaching the land surface the water leaches mineral matter from the organic residue of plants, from agricultural fertilizers, animal and human wastes and from solid and semisolid refuse. The waters percolating downward through the soil zone leach out the soluble products of soil weathering. The quantity of mineral matter dissolved depends primarily on the composition of the soil and of the percolating water which may carry chemicals that stimulate dissolution. For example, carbon dioxide absorbed from the atmosphere and decayed vegetable matter forms carbonic acid, which aids in dissolving minerals from the soil. Other factors controlling the quantity of matter dissolved are the length of time the water is in contact with the soil, the surface drainage structure, the amount of precipitation, and the temperature of the water.

Most of the mineral matter in ground water is dissolved from the rocks through which it flows, because the water remains in contact with this material for a longer time than with the atmosphere and soil. The contact time is dependent on the ground-water velocity and the distance of the ground water from the recharge area. High ground-water velocity occurs in

300460

whereas sulfate is the major anion in waters containing more than 500 ppm dissolved solids.

The concentration of other ions present—including potassium, chloride, fluoride, and nitrate—bears no relation to the dissolved-solids content. Graphs of these constituents are not shown.

Figure 13 is a plot of the specific conductance against the dissolved-solids concentration of water from the Brunswick and Lockatong Formations. Two straight lines intersecting near 400 ppm dissolved solids were constructed to represent the relation of these two variables.

Specific conductance is defined as the electrical conductance of a cube of material one centimeter on a side and is commonly expressed as micromhos per centimeter. Specific conductance varies with temperature and is, therefore, usually referenced to the standard temperature of 25°C. Because ground-water is a dilute solution containing ionized substances, it is slightly conductive. The specific conductance of such a soluion is related to the quantity of dissolved solids that it contains.

The specific conductances used in Figure 13 were determined in a laboratory. However, with suitable portable equipment the specific conductance can be quickly and accurately measured in the field. The corresponding value of dissolved-solids content can then be estimated by using Figure13. When the dissolved-solids content is known, the probable concentration of several major ionized constituents of most ground-water samples obtained from the Brunswick and Lockatong Formations can be approximated from Figures 9, 10, 11, and 12.

## CONCLUSIONS

The yield of wells in the Brunswick Formation depends on the number, thickness, and permeability of beds penetrated. Changes in the lithology from place to place are responsible for variations encountered in well yields. Because of the erratic nature of these changes, the location and extent of the best water-bearing zones cannot be predicted; however, if yields of more than 100 gpm are desired, wells should be drilled at least 200 feet deep—as the highest yields are obtained generally from wells ranging in depth from 200 to 550 feet.

Water sufficient for domestic purposes can be obtained at almost any location, but yields large enough for industrial and municipal purposes are more difficult to obtain. To assure an adequate supply over long periods of time, consideration must be given to factors that influence both the natural and artificially induced flow of ground water. For example, the water table is generally nearer the land surface in valleys than on ridges; hence, the available drawdown at wells of equal depth is greatest for wells in valleys. As natural flow from the aquifer is generally discharged into surface

300461

streams, the opportunity to reduce the natural discharge or to induce flow from a stream to the aquifer by means of wells is greatest in stream valleys.

Unless ground water is recovered by either reducing natural discharge, or inducing additional recharge, water withdrawn from a well reduces the quantity in storage in the aquifer. Wells that draw water from storage over long periods of time cause large cones of depression to develop. Where several pumping wells are closely spaced, the cones of depression overlap. As the total decline in water level at any well equals the sum of the drawdowns produced by each well the interference may be so great that the yield of each well is reduced. This effect is particularly severe at wells oriented along lines parallel to the strike of the beds, because these wells generally penetrate the same beds. Wells should be spaced sufficiently far apart to reduce the effect of interference to an acceptable level. Because geologic hydrologic, and pumping conditions within the Brunswick Formation are complex and variable, the best spacing of wells will differ from place to place. Wells less than 2,000 feet apart in the Brunswick Formation have generally shown some interference.

Yields greater than those required for domestic purposes are not generally available from wells in the Lockatong Formation. Furthermore, because the Lockatong Formation is very resistant to erosion, it underlies areas of high elevation which are generally remote from surface streams. Few situations exist, therefore, where ground water can readily be diverted from points of natural discharge to nearby wells in the Lockatong.

One of the best ways to improve the yield of a well in the Lockatong, or any other aquifer of low permeability, is to increase the volume of water stored in the well bore by enlarging its diameter or drilling to greater depth. Such a well permits the well operator to satisfy his need for water during short periods of peak demand. For example, the volume of storage in 100 feet of 6-inch diameter borehole is approximately 150 gallons, but the volume of storage in 100 feet of a 10-inch diameter well is more than 400 gallons. By installing the pump intake pipe near the bottom of the well, most of the water stored in the well bore can be withdrawn. During periods when water is not being withdrawn, ground water flowing into the well will replenish the stored volume—if given enough time.

The cone of depression developed by pumping wells in the Lockatong Formation is rarely extensive. For this reason interference between wells is not a severe problem.

300462

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PENNSYLVANIA
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FOURTH SERIES
PROGRESS REPORT 146

# GROUND WATER RESOURCES
## OF THE
# LANSDALE AREA, PENNSYLVANIA

By
DONALD R. RIMA
U. S. GEOLOGICAL SURVEY

Prepared by
The United States Geological Survey
Ground Water Branch
in cooperation with
The Pennsylvania Geological Survey

DEPARTMENT OF INTERNAL AFFAIRS
GENEVIEVE BLATT, *Secretary*

TOPOGRAPHIC AND GEOLOGIC SURVEY
CARLYLE GRAY, *Acting Director*

1955

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# GROUND-WATER RESOURCES OF THE LANSDALE AREA, PENNSYLVANIA

BY

DONALD R. RIMA[1]

## INTRODUCTION

The Borough of Lansdale for the past 50 years has obtained its supply of water from wells, and until the late summer of 1952 had experienced no serious shortage. As additional supplies were needed new wells were installed, without detailed knowledge of the depth of the aquifers to be tapped or the yield to be expected. The purpose of this investigation, made with the assistance of the Lansdale Municipal Authority, was to identify the sources of recharge and to describe the occurrence and movement of ground water in the Lansdale area. The results are described in this report, and it is hoped that the information presented will aid in the development of additional water supplies for all purposes.

Data on which this report is based were collected as part of a detailed study of ground-water conditions in the rocks of Triassic age in southeastern Pennsylvania. This and similar ground water investigations in Pennsylvania are made by the United States Geological Survey in cooperation with the Pennsylvania Geological Survey.

### LOCATION

The area covered by this report comprises approximately 25 square miles in north-central Montgomery County, Pennsylvania. (See fig. 1.) It includes the boroughs of Lansdale and North Wales, and parts of the sur-

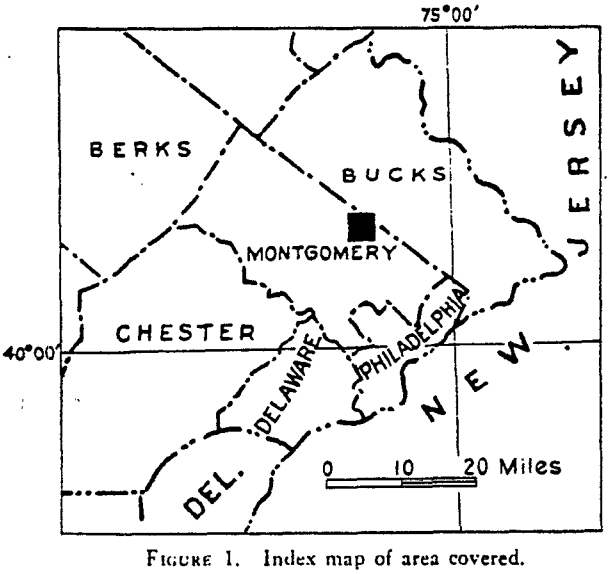


FIGURE 1. Index map of area covered.

[1] Geologist, U. S. Geological Survey, Ground Water Branch.

300465

rounding townships: Hatfield, Montgomery, Upper Gwynedd, and Towamencin. Lansdale is approximately 25 miles northwest of Philadelphia, 30 miles southeast of Allentown, 40 miles east of Reading, and 35 miles west of Trenton, New Jersey. The Lansdale area is served by the Doylestown and Bethlehem branch lines of the Reading Railroad Company, which provides commuter service to Philadelphia in addition to regular freight and passenger service. U. S. Highways 202 and 309 and State Highways 63, 363, and 463 provide convenient routes of transportation by automobile from all directions. The northeast extension of the Pennsylvania Turnpike system now under construction, will pass Lansdale a short distance to the west.

The Lansdale area has a population of slightly more than 20,000. About half this number lives within the borough limits of Lansdale. The most striking cultural feature of the area is the diversification of its industries. More than 200 industrial plants employing more than 8,000 people are located within the area. The list of industries includes foundries, steel fabricators, textile mills, furniture manufacturers, and television tube manufacturers, to name but a few.

## PHYSIOGRAPHY

The Lansdale area is situated within the Piedmont physiographic province (Fenneman, 1938). The Piedmont is a gently sloping upland ranging from an altitude of about 900 feet above mean sea level at the foot of the Appalachian Mountains to the northwest, to about 50 feet above mean sea level at the inner edge of the low-lying, almost featureless Atlantic Coastal Plain to the southeast. Relief in the Piedmont is in part the result of differential weathering of the underlying bedrock and in part a consequence of erosion by the major stream systems draining the plateau.

The Lansdale area occupies a position remote from the [illegible]ams. Land-surface elevations range from about 200 feet to about [illegible] above mean sea level. The relief of the area is believed to express closely the relative resistance to weathering of the underlying bedrock. The more resistant strata form northeast-southwest trending ridges whereas the less resistant strata underlie the intervening lowlands. The lowlands, though less conspicuous, occupy the greater part of the area.

The area is drained by tributaries of the Delaware River. The southern two-thirds of the area is drained by Wissahickon and Towamencin Creeks, which flow southwesterly and empty into the Schuylkill River, the largest tributary of the Delaware River. The northern third of the area is drained by Neshaminy Creek, which flows northeasterly for a short distance and then turns to the southeast, emptying directly into the Delaware River between Philadelphia and Bristol. Drainage patterns generally trend northeast-southwest, parallel to the principal topographic features, but where the ridges are breached the streams flow southeasterly.

## GEOLOGY

The rocks that underlie the Lansdale area are of Triassic age. They form part of the sequence of sedimentary and extrusive igneous rock for-

300466

mations named the Newark group, for exposures in the vicinity of Newark, New Jersey. These formations are exposed in a belt extending from the Hudson River southwestward through New Jersey, Pennsylvania, and Maryland into Virginia. They consist of alternating layers of shale and sandstone having a maximum aggregate thickness greater than 18,000 feet (McLaughlin, unpublished manuscript). The beds have been tilted to the northwest on a northeast-southwest trending axis parallel to their belt of outcrop, and their upturned edges have been beveled by erosion. In many places the rocks have been displaced by faulting and distorted by folding. Igneous rock in the form of dikes, sills, and lava flows are associated with the Newark group.

The Newark group is divided into three formations named, from oldest to youngest, the Stockton formation, the Lockatong formation, and the Brunswick shale. Only the latter two are tapped by wells in the Lansdale area and hence only these are described below.

### LOCKATONG FORMATION

The Lockatong formation has a maximum stratigraphic thickness of about 4,000 feet in southeastern Pennsylvania (McLaughlin, unpublished manuscript) and consists mainly of hard shales and compact sandstones that are characteristically dark colored, fine grained, and well cemented. It crops out at the land surface in the southeastern corner of the Lansdale area and forms the prominent ridge trending northeast from North Wales. (See Plate 1.) The formation dips northwestward beneath the Brunswick shale at an angle of about 10 degrees. It contains very few fractures or other types of openings and, consequently, yields little water to wells. The rocks of the Lockatong formation are much more difficult to drill than those of the overlying Brunswick shale.

### BRUNSWICK SHALE

The Brunswick shale has a maximum stratigraphic thickness of about 9,000 feet in southeastern Pennsylvania (McLaughlin, unpublished manuscript) and consists mainly of soft red shale interbedded with reddish-brown sandstone and siltstone. Some of the shales are sandy or silty, and there are some beds of gray, brownish, and greenish shales. The beds are thin and the bedding planes are irregular and discontinuous, making it extremely difficult to trace a selected bed more than a few tens or hundreds of feet. The shale is fractured in many places and some of the fractures are filled with calcite, a mineral composed of calcium carbonate.

Wherry (Bascom, et al., 1931, p. 30, 31) noted small cavities in several exposures of beds in the Brunswick shale which he thought were formerly occupied by the mineral glauberite (a double sodium-calcium sulfate). Calcareous concretions the size of marbles also have been noted in the Brunswick (Bascom, et al., 1909, p. 8). Some of the thin beds of sandstone in the Brunswick appear to have been cemented partly by calcite soon after deposition. Thin layers that appear to be limestone conglomerate, limestone pebbles in a shaly matrix, occur in the Brunswick shale in the Lansdale area. Solution openings occur in the rocks wherever they

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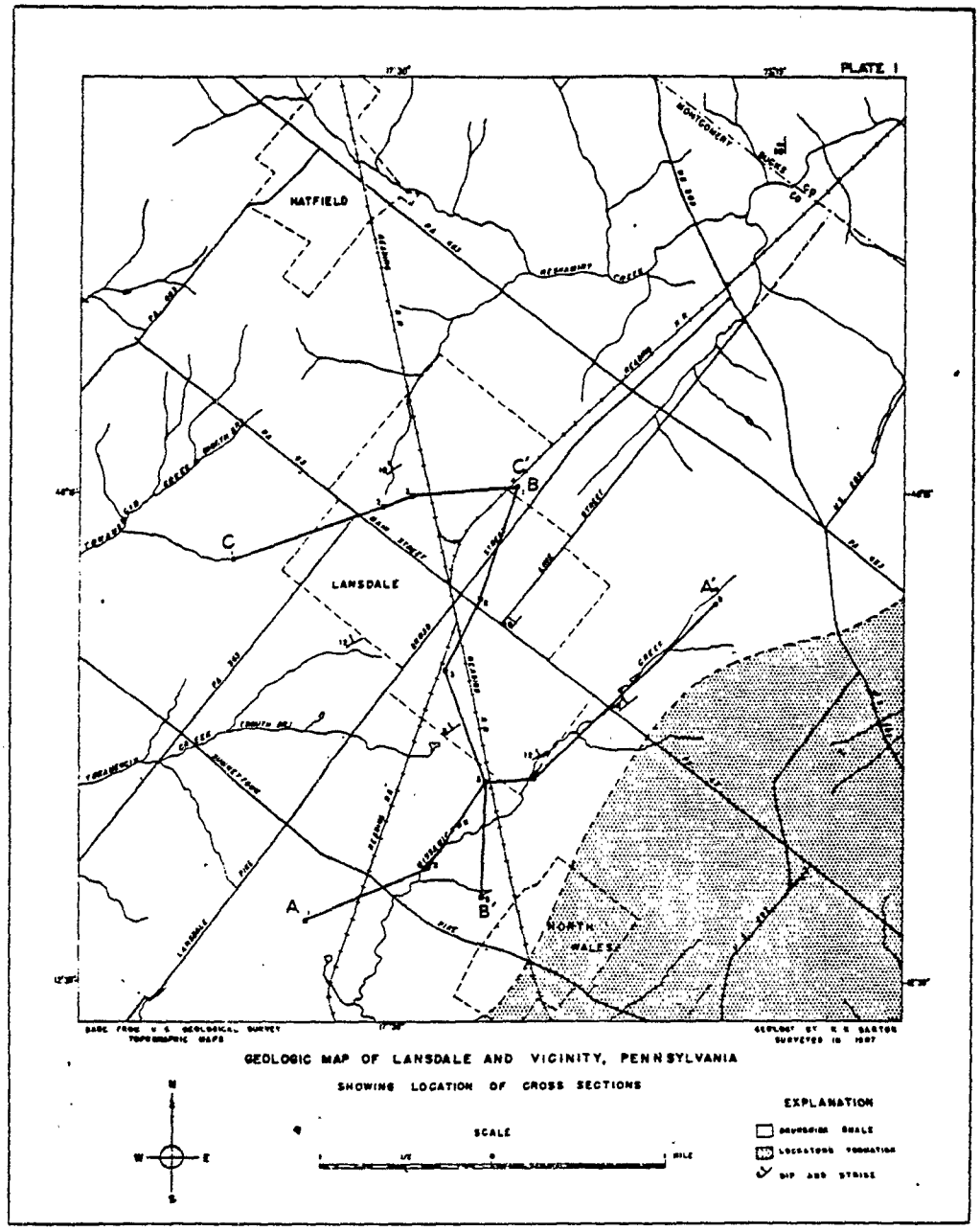


GEOLOGIC MAP OF LANSDALE AND VICINITY, PENNSYLVANIA

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FIGURE 2. Sp

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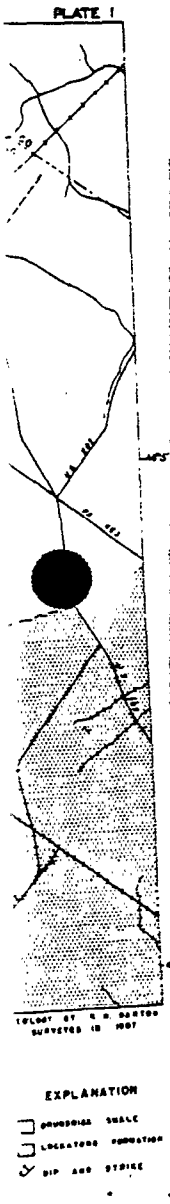
contain soluble material accessible to circulating ground water, and as a result some beds have an almost cellular appearance. (See fig. 2.) These zones yield moderate supplies of water to wells when tapped where they lie below the water table.




## GROUND WATER

### PRINCIPLES OF OCCURRENCE

Water that occurs beneath the land surface moves through and is stored in the numerous openings in the rocks of the earth's crust. Most rocks have many small openings in the form of pores or crevices, and some have larger openings, such as caverns and open fissures. Below a certain depth all the interconnected openings are saturated with water that is free to move by gravity to wells. The upper surface of the zone of saturation, when not formed by an impermeable body, is called the water table, and the water in the zone is referred to as ground water. The amount of ground water available in any area is controlled by the porosity and permeability of the rocks in the zone of saturation.

A rock formation that will yield ground water in sufficient quantity to supply pumped wells or springs is called an aquifer. Ground water may occur under confined or unconfined conditions. If ground water is not confined, it is said to occur under water table conditions, and the water level in a well marks the top of the saturated zone, or water table. If confined between relatively impermeable strata, ground water is said to occur under artesian conditions, and in tightly cased wells the water level rises above the top of the aquifers they tap. The imaginary surface to

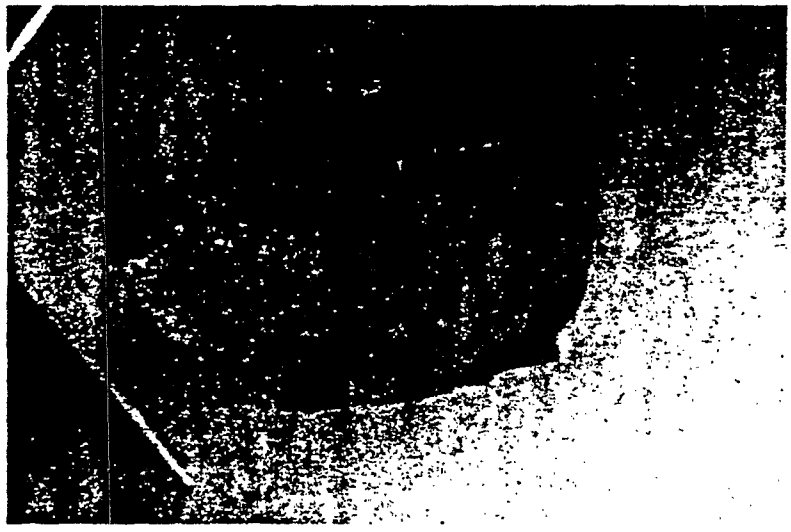


FIGURE 2. Specimen of the Brunswick shale showing the effect of solution of calcareous material

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which the water in an artesian aquifer will rise is called the piezometric surface, and it indicates the pressure head of the water in the aquifer.

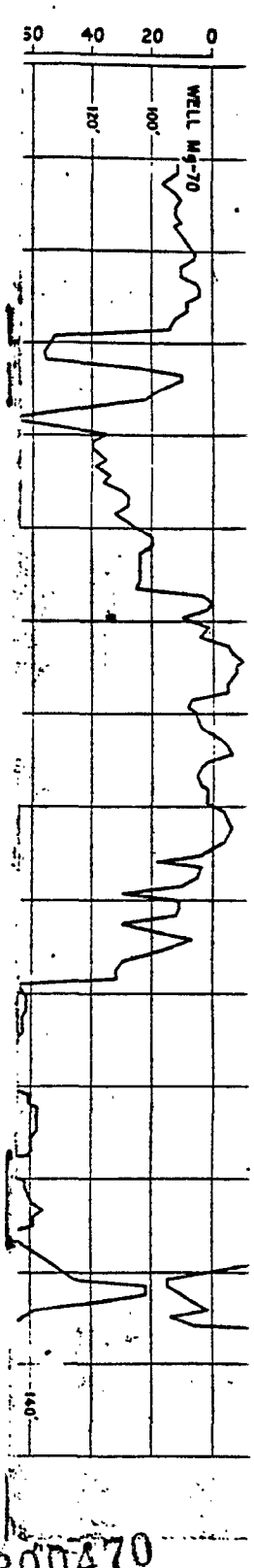
Ground water moves by gravity from intake areas toward areas of lower head, and ultimately to points of discharge. The direction of movement is determined by the slope of the water table or the piezometric surface. The flow of ground water is through openings in the rocks and because these openings are usually small and tortuous they offer considerable resistance to the movement of the ground water. Consequently, the rate of movement of ground water is very slow compared to that of surface water, and generally it can be expressed in feet or even fractions of a foot per day.

The ultimate source of fresh ground water is precipitation. Water falling on the land surface either runs off in streams, sinks into the ground, or evaporates into the atmosphere. Of the part that sinks into the ground, some migrates down to the water table and enters the zone of saturation. As more water is added, the water table rises, reflecting the additional volume of water in storage. Under natural conditions the amount of water that enters the zone of saturation is balanced by the amount that discharges from it. Thus, withdrawal of ground water through wells commonly diverts water that might otherwise discharge naturally. By and large, the withdrawal of water provides an opportunity for increased replenishment, or decreased natural discharge, or both. However, continuing declines of water level in an aquifer, year after year, may indicate that recharge is not keeping pace with discharge, and that depletion of the supply is in prospect.

## AVAILABILITY OF GROUND WATER IN THE LANSDALE AREA

Ground water in the Lansdale area is derived chiefly from the Brunswick shale. Yields of wells tapping the Brunswick shale range from about 10 gallons per minute to about 350 gallons per minute, the average being about 50 gallons per minute. Data for 120 wells are included in the table of well records (Appendix) at the end of this report and the locations are shown on plate 2. There is no apparent statistical relation between the depth of wells and their yields. The deepest well in the area, which is more than 1,100 feet deep, is reported to yield less than 20 gallons per minute. On the other hand, the highest yield, 350 gallons per minute, is reported for a well that is 367 feet deep. The fact that no single lithologic bed or zone of deposits has heretofore been identified as the principal aquifer has resulted in haphazard development of supplies and a loss of confidence in ground water as a source.

As the Brunswick shale underlies a considerable part of southeastern Pennsylvania and is the only source of water supply in much of the area, information on the occurrence and movement of water in the Brunswick shale is of great value. To obtain information on the nature of the openings that store and transmit water to wells that tap the shale, and the yield characteristics of each lithologic zone within the formation, borehole studies in 24 wells were made by the U. S. Geological Survey using geophysical techniques. These data are applicable in this and other areas underlain by the Brunswick shale and other similar rocks.

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shows that the interconnected porosity of the water table aquifer decreases with depth. A marked increase in resistance occurs at the base of the water table aquifer. The water-table zone was identifiable by its low resistance on the electric logs of all wells explored in the Lansdale area.

The generally high resistivity of the artesian aquifers is believed to be a result of the generally wide spacing of their water-filled voids. The voids that contain and transmit the water are apparently vertical joint fractures secondarily enlarged by solution. They comprise but a small part of the total volume of the bed, and are separated by dense, impermeable rock having high electrical resistivity. Enlargement of joint fractures by solution can occur only in beds which contain soluble material, and such beds are of limited areal and vertical extent in the Brunswick shale. It is believed that enlargement seldom exceeds 1 or 2 inches, but it is possible that voids a foot or more in width may occur where two joint systems intersect, or the abundance of soluble material in the rock favors enlargement.

## HYDRAULIC CHARACTERISTICS OF AQUIFERS

The hydraulic characteristics of an aquifer determine its capacity to store and transmit water. The coefficient of storage of an aquifer is the volume of water it releases from or takes into storage per unit surface area of the aquifer per unit change in the component of head normal to that surface. In water table aquifers the coefficient of storage is essentially equal to the specific yield, that is, the drainable interconnected pore space. In artesian aquifers the coefficient of storage is related to the elastic properties of the aquifer skeleton and of the water itself, and is much smaller than under water-table conditions. The coefficient of transmissibility is the number of gallons of water per day that will pass through a cross-section of an aquifer 1 mile wide, with a height equal to the saturated thickness of the aquifer, under a hydraulic gradient of one foot per mile. If these coefficients are known it is possible to determine the proper spacing of wells and the optimum pumping rate, and to predict the effects of pumping on water levels.

Coefficients of transmissibility and storage are determined for an aquifer by measuring the effect of withdrawal at a known rate from a given well for a specified period of time upon water levels in other wells tapping the same aquifer at known distances from the pumped well. Mathematical formulas by which these effects are analyzed were derived from the fundamental heat equations under the direction of C. V. Theis (1935). Application of the formula is based upon the assumption that the aquifer is homogeneous in texture, of great areal extent, and hydraulically isotropic. If the aquifer being tested deviates substantially from these basic assumptions the determinations of the coefficients of transmissibility and storage are invalid unless corrections for the deviations can be made.

From the previous descriptions of the two types of aquifers that occur in the Brunswick shale it is apparent that coefficients of transmissibility and storage for them would be of little value. Determinations of the coefficients of transmissibility and storage using wells that tap more than one aquifer are not valid for any of the aquifers individually, nor for the system they compose collectively. If the water level in a well is affected by

300471

withdrawal from another well in the same vicinity it is evident that both wells tap a common aquifer. However, if one or both of the wells tap two or more aquifers, interference data cannot be used for computation of the hydraulic characteristics of the aquifers. As this is a common occurrence in the Lansdale area, hydraulic tests serve little purpose other than to establish the areal extent of aquifers.

## AQUIFER FUNCTION

### *Recharge*

Precipitation in the Lansdale area seeps into the openings in the rocks at the land surface and a part of it migrates downward to the water table. The addition of water to that already in storage causes the water table to rise. The maximum rise of the water table in the Lansdale area occurs during the spring of the year, when the contribution of water from precipitation and snow melt is high and losses through evapotranspiration are low. As the water must move through small, tortuous openings in the rocks, which offer a great deal of resistance to the movement of water, several days or weeks may elapse before the effect of precipitation on ground-water storage can be recognized, as evidenced by rising water levels in observation wells.

The aquifers that occur below the water table zone act mainly as conduits and serve to drain the less permeable beds above them. Thus water in the artesian zone is derived from the water table zone by downward movement through joints, and the limit of the supply available is the volume in water table storage in the immediate locality.

### *Movement*

The direction of movement of ground water is determined by the direction of slope of the water table or piezometric surface. The pattern of ground water circulation prior to the installation of wells is from areas of high elevation—hills and uplands—toward those of lower altitude, principally stream valleys. Because areas of low altitude are along the natural drainageways, ground-water movement has been concentrated beneath present-day stream valleys. Headwater areas of streams are generally less favorable for ground-water development than those downstream, for this reason, because they have been exposed to less ground-water circulation, and enlargement of fracture openings by solution has not been appreciable. In much of the Lansdale area the water table is at a depth of 50 feet or less, but in the vicinity of heavily pumped wells it may be 125 feet or more beneath the land surface. In localities remote from the centers of pumping the water table is commonly less than 20 feet below the land surface. In those localities the configuration of the water table is a subdued replica of the land surface.

The installation of wells in the Lansdale area has altered the natural gradients. The direction of movement of ground water is now a function of the locus and intensity of withdrawals. Many wells tap both water table and artesian aquifers and their withdrawals are derived in part from both sources. Because the artesian aquifers are more permeable than the water table aquifer and contain much less water in storage, the artesian pressure within them tends to decline rapidly with pumping. Conse-

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quently, the downward pressure gradient from the water table zone through the semiconfining rocks to the artesian zones below is increased.

The lateral rate of ground-water movement is a function of the slope of the water table or piezometric surface and the permeability of the aquifer. As a consquence of the low permeability of the water table aquifer, the rate of lateral movement of water in it is very slow, even though the gradient may be steep. It is for this reason that water levels in wells less than half a mile from areas of heavy pumping may be relatively unaffected. The local nature of water-level declines is illustrated on plate 6, a generalized water-level contour map showing the conditions in the Lansdale area in the late summer of 1954.

*Discharge*

Over long periods of time the water recharged to a ground water reservoir is discharged naturally or artificially. Natural discharge takes place mainly through seeps, springs, or streams which are in effect, points of intersection between the water table and the land surface. Artificial discharge occurs through pumped or flowing wells. The withdrawal of ground water from wells in the Lansdale area decreases the amount of water that otherwise would have discharged naturally.

When more water is withdrawn from an aquifer than is recharged to it during any given period the result is a lowering of the water table or piezometric surface. If the decline persists, and especially if it accelerates over a period of several years when the rate of withdrawal is not increased, the withdrawal is obviously in excess of the replenishment, and the area is said to be overdeveloped.

In the Lansdale area the water table is highest in the spring and early summer and lowest in the fall and early winter. This is true in spite of the fact that average rates of precipitation are greatest during the months of June, July, and August. Evaporation and the transpiration of plants reduce soil moisture so much during those months that rainwater is not able to penetrate below the soil and recharge of ground-water is negligible. Also, withdrawals from wells are generally greater during the latter part of the summer when the rate of recharge is at a minimum.

Except in the immediate vicinity of the borough of Lansdale and in the area between Lansdale and North Wales the general level of the water table has declined very little as a result of withdrawals from storage during the past decade. However, marked declines have occurred in the vicinity of closely spaced wells installed during the past few years. (See hydrographs, pl. 7.)

The total daily withdrawal from wells in the Lansdale area has not been inventoried, but records for about 80 wells now in use indicate that about 5 million gallons a day is pumped during the summer months. The yields of new wells generally decline 50 to 70 percent from their initial discharge rates during the first year of operation, and new wells located within about 1,500 feet of existing wells reduce significantly the yields of the older wells.

Drought years, which result in accelerated rates of withdrawal from wells, are also periods of reduced recharge. The combined effects cause critical declines in water levels and reduced yields from wells. Because

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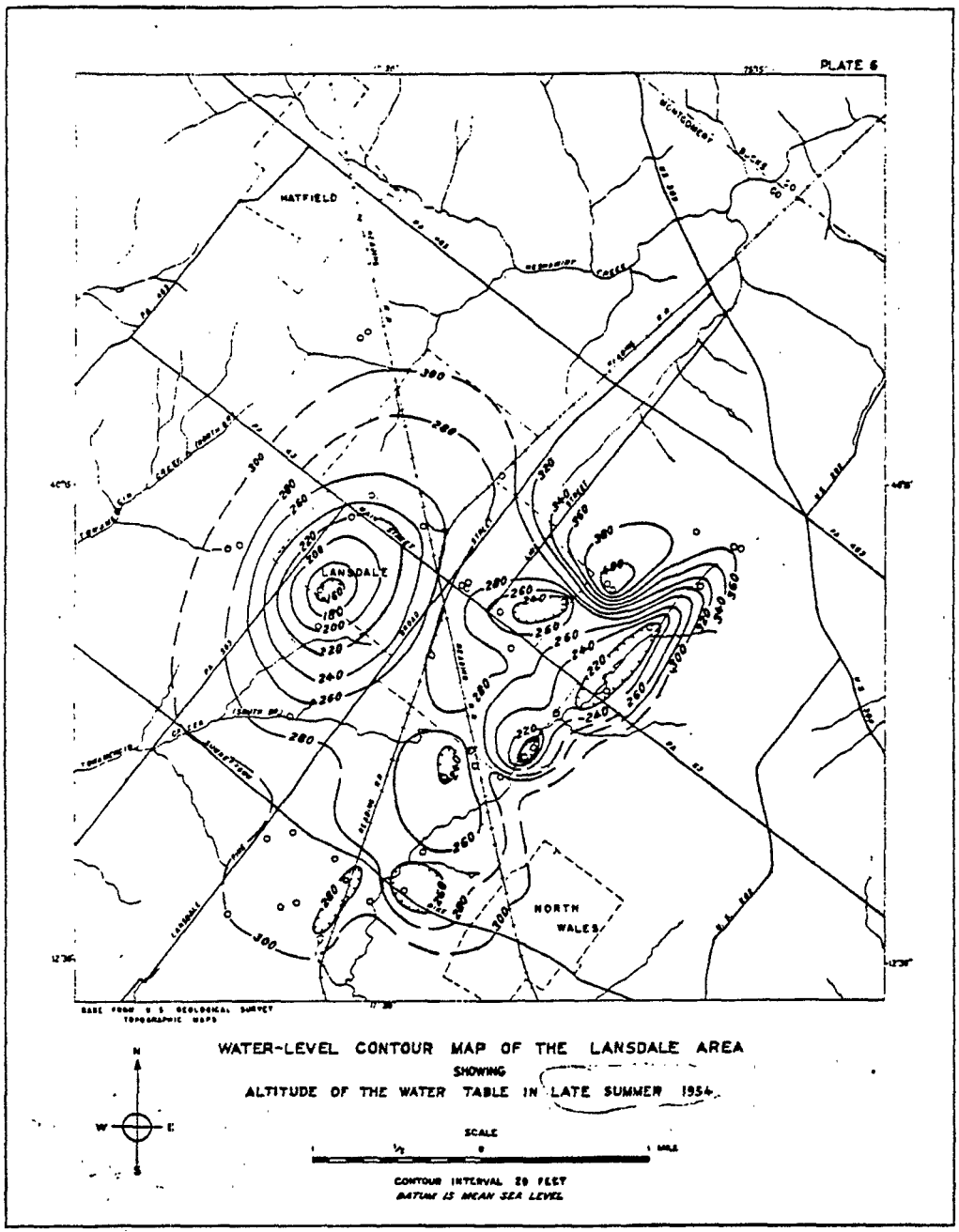


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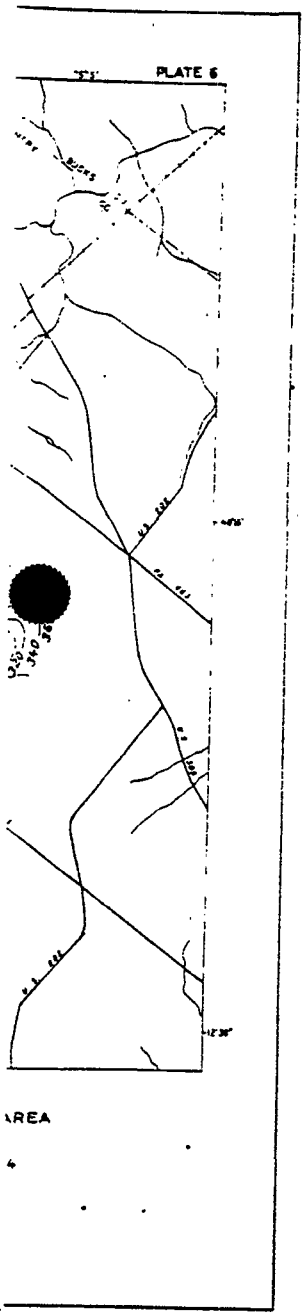


available ground-water storage is not great the annual increment to storage from precipitation must approximate the annual withdrawal from wells if depletion is to be avoided. Prolonged drought would therefore pose a serious threat to the water supplies of the Lansdale area. The water shortage that occurred in the late summer and fall of 1953 is indicative of the conditions that might prevail.

## CHEMICAL QUALITY OF THE GROUND WATER

Ground water from wells that tap the Brunswick shale in the Lansdale area has a relatively low dissolved solids content, is moderately hard, and is slightly acidic. Its iron content is negligible, and its sulfate content (which contributes to non-carbonate or permanent hardness) is not excessive. According to the standards of the U. S. Public Health Service the water is acceptable for use in public supply without treatment.

Although the silica content of the water is not high, it would give trouble if used in high-pressure steam boilers. For most other industrial uses the water would be satisfactory. Its temperature ranges from about 50° F for shallow wells (100-150 feet deep) to about 55° F for deep wells (400-500 feet deep).

Chemical analyses of representative waters from the Brunswick shale are given in the following table.

TABLE 1. Chemical analyses of ground water from the Brunswick shale in the Lansdale area.

*Analyses by Geological Survey, United States Department of the Interior*
*(Parts per million)*

| | Mg-52 | †Mg-62 | Mg-76 |
|---|---|---|---|
| DATE OF COLLECTION | 9/25/25 | 9/28/25 | 2/21/52 |
| Silica ($SiO_2$) | 18 | 32 | 21 |
| Iron (Fe) | .06 | .05 | .01 |
| Calcium (Ca) | 47 | 36 | 24 |
| Magnesium (Mg) | 17 | 15 | 20 |
| Sodium (Na) | 9.4 | 11 | |
| Potassium (K) | 2.1 | 1.8 | 5.1 |
| Bicarbonate ($HCO_3$) | *194 | *173 | 150 |
| Sulfate ($SO_4$) | 23 | 15 | 22 |
| Chloride (Cl) | 13 | 8.0 | 5 |
| Fluoride (F) | | | |
| Nitrate ($NO_3$) | 7.5 | 2.5 | .4 |
| Dissolved solids | 232 | 201 | |
| Total hardness as $CaCO_3$ | 187 | 152 | 142 |
| Specific conductance (Kx$10^5$ at 25°C.) | | | 321 |
| pH | | | 6.4 |
| Temperature | 54°F. | | 55°F. |

* Includes equivalent of small amount of carbonate.
† Composite sample from 3 wells (Mg-62, 63, 64).

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## DEVELOPMENT OF ADDITIONAL GROUND-WATER SUPPLIES

In the development of additional ground-water supplies in the Lansdale area consideration should be given to the several factors described above. The most favorable localities for drilling new wells of high yield in the Lansdale area are near streams or springs remote from other heavily pumped wells. There are several such localities within a 5-mile radius of Lansdale. To the south and west from Lansdale the valleys of the north and south branches of Towamencin Creek offer possibilities. Another favorable locality, northeast of Lansdale, is the valley of the branch of Neshaminy Creek that parallels Line Road.

New wells should be spaced sufficiently far apart to reduce the effect of interference between wells. The proper spacing will vary from one locality to another, as it depends on the hydraulic characteristics of the formation. Wells less than 1,500 feet apart have shown appreciable mutual interference.

Heavy and prolonged pumping of individual wells in the Lansdale area results in considerable reduction of specific capacity. As water levels in a water-table aquifer are lowered appreciably, the effective thickness—and hence the transmissibility of the aquifer—are diminished, resulting in decreased yields from wells.

## SUMMARY

In summary, ground water occurs in the Brunswick shale near the surface in a water table aquifer and at greater depth in artesian aquifers. The water-table aquifer comprises a system of fracture openings that are usually larger and more numerous at shallow depths than at greater depths. The artesian aquifers consist of zones of solution openings that are controlled by the local structure and stratigraphy of the formation. They may occur at any depth that is accessible to circulating ground water. The formation of solution openings requires that rocks containing soluble material be intersected by open fractures. All fractures are closed by rock pressure at depth and artesian aquifers are rarely found in the Brunswick shale below a depth of about 600 feet.

The aquifers at depth, formed by solution, are erratic in their occurrence and limited in their areal extent, and their presence can be determined only by test drilling. The best wells usually obtain their supply from both vertical fracture openings in the upper water table zone, and one or more permeable artesian zones at depth. The most favorable areas for the development of additional supplies are near streams and remote from heavily pumped wells.

AR300476

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GEOLOGICAL SURVEY

*Fourth Series*

BULLETIN W14

# GEOLOGY AND HYDROLOGY OF THE STOCKTON FORMATION IN SOUTHEASTERN PENNSYLVANIA

## A STUDY OF THE EFFECT OF LITHOLOGY UPON THE YIELD OF WELLS

by
Donald R. Rima, Harold Meisler,
and Stanley Longwill
U. S. Geological Survey

Prepared by
The United States Geological Survey
Ground Water Branch
in cooperation with
The Pennsylvania Geological Survey

DEPARTMENT OF INTERNAL AFFAIRS
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300478

# GEOLOGY AND HYDROLOGY OF THE STOCKTON FORMATION IN SOUTHEASTERN PENNSYLVANIA

by

Donald R. Rima, Harold Meisler,
and
Stanley M. Longwill

## ABSTRACT

The Stockton formation underlies two separate, irregularly shaped elongate areas in Bucks, Chester, and Montgomery Counties in southeastern Pennsylvania. It is the oldest sedimentary formation in the Newark group of Triassic age. The formation consists of interbedded arkose, arkosic conglomerate, feldspathic sandstone, and red shale and siltstone.

During the investigation leading to this report, the Stockton formation was mapped in detail in an area extending from the Bucks County-Montgomery County line westward to Phoenixville. In this area the formation was subdivided into three members, as follows: (1) the lower arkose member, which is characterized by the abundance of coarse-grained arkosic sandstone and arkosic conglomerate; (2) the middle arkose member, which is characterized by the abundance of fine-and medium-grained arkosic sandstone; and (3) the upper shale member, which consists mostly of shale and siltstone.

Although locally the sediments become finer grained upward in the formation, sediments of different textures are interbedded irregularly. Beds commonly pinch out or grade laterally into beds of different texture and color. In the area mapped in detail, the thickness of the Stockton formation ranges from 6,000 feet near the Montgomery County-Bucks County line to 2,300 feet at Phoenixville. The beds of the formation dip homoclinally to the north and northwest at an average angle of 12°. The sediments were derived from crystalline highlands to the south and deposited as coalescing alluvial fans upon the piedmont slope at the base of the highlands.

The middle arkose member has the highest yield of the three members of the formation. It has an average specific capacity of 5.0 gpm (gallons per minute) per foot of drawdown and an average reported yield of about 130 gpm. The lower arkose member has an average specific capacity of 3.0 gpm per foot of drawdown and an average reported yield of about 110 gpm. The upper shale member, the poorest aquifer in the formation, has an average specific capacity of 0.5 gpm per foot of drawdown and an average reported yield of about 20 gpm.

Laboratory tests on 12 rock samples indicate that the medium-grained arkosic sandstone has the highest specific yield and porosity and that siltstone and very fine-grained sandstone have the lowest specific yield and porosity. The medium-grained arkosic sandstone is better sorted and consequently more porous than the coarse-grained arkosic sandstones. The siltstones and very fine-grained sandstones are the least porous because they contain much clay, which clogs the pores.

Analyses of pumping tests made at five localities indicated coefficients of transmissibility ranging from 1,000 gpd (gallons per day) per foot to 25,000 gpd per foot and coefficients of storage ranging from $1.9\times10^{-3}$ to $5.4\times10^{-4}$. Few of the drawdown-time curves used in the analyses matched the type curve beyond the first few hours. Some of the curves indicated recharge boundaries, and others indicated impermeable boundaries.

300479

Because of the complex hydraulic characteristics of the Stockton formation, as revealed by the pumping tests, results obtained from standard pumping-test procedures cannot be used satisfactorily for predicting long-term water-level trends caused by pumping wells.

Chemical analyses are available for water from 70 wells in the formation. The waters are largely of the calcium bicarbonate type and have a median dissolved-solid content of 202 ppm (parts per million). Concentrations of dissolved-solids greater than 245 ppm are due to the introduction of waters high in sulfate, and water having a dissolved-solids content greater than approximately 400 ppm is predominantly sulfate water. The occurrence of water with a high dissolved-solids content (and its attendant high sulfate content) may be related to industrial contamination associated with urbanization.

## INTRODUCTION

### Purpose and Scope

Throughout the area underlain by the Triassic rocks in southeastern Pennsylvania, most municipalities and industries depend on ground water for potable water supplies. The lack of information on the occurrence of ground water in these rocks has seriously handicapped development of new supplies to meet increased demands for water. In January 1956, recognizing the urgent need for information to insure the optimum use of available supplies, the U.S. Geological Survey, in cooperation with the Pennsylvania Geological Survey, began a study of the occurrence of ground water in the Triassic rocks of southeastern Pennsylvania.

This report contains the results of an investigation of the occurrence of ground water in the Stockton formation. It is one of several reports that will be prepared concerning ground water in the Triassic rocks of southeastern Pennsylvania.

The Stockton formation underlies two separate, irregularly shaped elongate areas in Bucks, Chester, and Montgomery Counties in southeastern Pennsylvania. (See Fig. 1.) Most of the field work for this investigation was concentrated in the part of the outcrop area in Montgomery County, because it constitutes the area of greatest present and potential use of the Stockton for ground-water supplies. In the remainder of the area of outcrop, the study was more generalized — consisting chiefly of the collection of basic hydrologic data, including records of wells and data on the chemical quality of ground water. Attention is focused on (1) the influence of topography, lithology, and structure upon the occurrence of ground water, (2) the hydraulic characteristics of the formation, and (3) the chemical character of the water being withdrawn from the formation.

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## Previous Investigations

One of the earliest written references to the occurrence of ground water in the Stockton formation in Southeastern Pennsylvania appeared in a report by Bascom (1904, P. 53). That report contains a brief discussion of ground-water conditions in the "Triassic belt" and a table of artesian wells in which the Stockton formation is called the "Norristown shale". The same table (with the Stockton formation identified) and an expanded discussion of ground-water conditions in the Triassic rocks was included in a report by Bascom and others (1909, p. 23).

In 1925 Hall began a reconnaissance of the occurrence of ground water in southeastern Pennsylvania. The report on that investigation (Hall, 1934) contains a brief description of the geologic and hydrologic character of each of the rock formations exposed in southeastern Pennsylvania and additional information on ground-water conditions in each county. Hall concluded that the coarse beds of the Stockton formation were generally more permeable than the rocks constituting the rest of the Triassic sequence and would, therefore, yield larger amounts of water.

A report on Middlesex County, N. J., by Barksdale and others (1943, p. 140-148) contains a description of the hydraulic character of the Triassic rocks in that area. Factors affecting yield are cited and estimates concerning the safe yield of these rocks are given.

A discussion of the hydrologic character of the Stockton formation in Bucks County, Pa., appears in a report by Greenman (1955, p. 26-30). Factors controlling the occurrence and movement of ground water are described and average values for the hydraulic properties of the rocks are given. The report also contains a description of the chemical character of water from the Stockton formation.

Reports by Parker and others (in press) and Barksdale and others (1958) describe some aspects of the hydrology of the Stockton formation, but these reports are based largely on the data contained in one or more of the reports previously cited.

## Methods of this Investigation

An inventory was made of nearly all large municipal and industrial wells and about 10 percent of the rural and domestic wells tapping the Stockton formation. The well records are presented in Table 6, and the well locations are shown in Plate 1. Geologic information was

AR300481

obtained from drillers' logs of wells and drilling samples from newly drilled wells. Abandoned wells that were accessible and some newly drilled wells were explored by means of geophysical-logging techniques such as electric, gamma-ray, and temperature logging. An attempt was made to measure the flow of water through the borehole in one well under non-pumping conditions by releasing salt (NaCl) at various depths in the borehole and tracing its movement with a borehole-resistivity probe. (See Bennett and Patten. 1960)

An areal geologic map of the Stockton formation in Montgomery County and part of Chester County was prepared from observations of rock exposures and float and by projecting lithologic contacts identified in well logs to the surface—using known angles of inclination of the rock strata. (see Plate 2.) Laboratory tests for porosity, specific yield, and permeability were made of 12 rock samples that were considered to be representative of the different beds in the Stockton formation.

Pumping-test data were collected and analyzed by means of the nonequilibrium formula of Theis (1935).

Chemical analyses of ground water were made to identify the characteristic chemical and physical properties of the ground water in the Stockton area.

## Well-numbering System

The well-numbering system used in this report includes an identification number and a location number. The well-identification number consists of a two-letter symbol for the name of the county followed by a serial number beginning with 1 in each county. The county symbols used in this report are Bk for Bucks County, Ch for Chester County, and Mg for Montgomery County. For example, Mg-83 identifies the 83rd well scheduled in Montgomery County.

The well-location number is composed of two parts separated by a hyphen—J22b-1205. The first part, "J22B," refers to the coordinate system used to identify the individual 7½-minute quadrangle maps. This system employs the use of the letters A through L (except I) along the west border of the State of Pennsylvania to designate from north to south each 15-minute interval of latitude. Similarly, the numbers 1 through 25 are used along the north border to designate from west to east each 15-minute interval of longitude. Each pair of coordinates designates a 15-minute quadrangle that is subdivided into four parts by using the letters a, b, c, and d to represent the northwest, northeast, southwest, and southeast quarters respectively.

300482

The second part of the well-location number consists of a four-digit number that identifies the northwest corner of a one-hundredth square-mile area within any 7½-minute quadrangle map. The first two figures refer to the number of tenths of a mile between the northern boundary of the 7½-minute quadrangle map and the northern boundary of the one-hundredth square-mile area containing the well site. The last two figures refer to the distance between the western boundary of the 7½-minute quadrangle map and the western boundary of the one-hundredth square-mile area containing the well site. Thus, a well having the location number J22b-1205 is situated between 1.2 and 1.3 miles south and between 0.5 and 0.6 mile east of the north and west boundaries, respectively, of the 7½ minute quadrangle designated "J22b."

## Acknowledgments

The authors are indebted to the numerous organizations, industries, and individual well owners who gave access to their lands, permitted measurements to be made in their wells, and furnished helpful information on the development of water supplies. Mr. Harry Borchers, Superintendent of the North Wales Municipal Authority, permitted the authors to use a municipal well for the purpose of making special tests. Mr. Thomas Mercaldo, President, Blue Bell Water Co.; Mr. Buckingham, President, Langhorne Spring Water Co.; Mr. Barkmeyer, Chief Engineer, Norristown State Hospital; Mr. C. M. Roberts, Chief Engineer, Phoenix Iron and Steel Co.; and Mr. J. G. Tearsall, Engineer, Borough of Doylestown; allowed the use of their well fields for systematic pumping tests.

Ridpath and Potter Drilling Co., F. S. Bollinger and Sons Drilling Co., and the Philadelphia Drilling Co., provided many well logs and drilling samples and gave much other useful information about wells in the Stockton formation.

## Climate

The area underlain by the Stockton formation in southeastern Pennsylvania is in a region where temperature extremes are moderate and rainfall is abundant.

The average annual precipitation for the years 1931 through 1952 is 43.23 inches at Doylestown and 46.07 inches at Phoenixville. Precipitation is fairly well distributed throughout the year, although it is greatest during the summer. In the period of 1931-52, approximately

AR300483

40 percent of the annual precipitation occurred from May through August. (Data from the U.S. Weather Bureau climatic summaries and monthly climatological data.)

The average yearly temperature at Phoenixville is 54.3°F. Mean monthly temperatures at Phoenixville range from 33.1°F in February to 76.7°F in July. Winters in southeastern Pennsylvania are comparatively mild as, on the average, less than 100 days per year have minimum temperatures below the freezing point. In the summer, temperatures above 100°F are rare. (Data from U.S. Weather Bureau climatic summaries and monthly climatological data.)

## GEOLOGY

### Newark Group

Sedimentary and associated igneous rocks of Triassic age occupy a series of disconnected, downfaulted basins that extend from Nova Scotia to North Carolina. These rocks are known as the Newark group. The sedimentary rocks are primarily red conglomerate, sandstone, arkose, siltstone, shale and argillite. They were deposited in a shallow-water continental environment and exhibit crossbedding, ripple marks, mud cracks, and raindrop impressions. The sedimentary rocks are interbedded with lava flows and are intruded by diabase dikes and sills.

The rocks of the Newark group have been correlated with Triassic rocks of Europe and are generally considered to be Late Triassic (McLaughlin, 1957, p. 1492-1493). Rocks of the group overlie Paleozoic rocks unconformably and were not involved in the folding near the end of the Paleozoic era. Further evidence of their age lies in the fact that Cretaceous sediments overlie the Newark group unconformably at several localities in New Jersey.

The Newark group in Pennsylvania occupies part of the largest Triassic basin in the eastern United States—a basin that extends for more than 300 miles from southeastern New York to Virginia. In Pennsylvania, the basin is 32 miles wide at the Delaware River and 14 miles wide at the Maryland boundary. Large normal faults along the northern boundary of the basin separate the Triassic sediments from the older rocks to the north. (See Fig 1.) Similar faults do not occur along the southern boundary of the basin, where Triassic sediments unconformably overlie the older Paleozoic and Precambrian rocks.

300484

In southeastern Pennsylvania and western New Jersey, the Triassic sediments have been divided, in ascending order, into the Stockton, Lockatong, and Brunswick formations. (See Fig. 1.) The Stockton, formation consists of interbedded arkose, subarkose, arkosic conglomerate, and red shale and siltstone. It is overlain to the north by the Lockatong formation, which consists of dark-gray, black, and red shale and argillite. The Lockatong formation is overlain to the north by the Brunswick formation, which consists chiefly of soft red shale and thin beds of sandstone. In some places, particularly near the northern border of the basin, the Brunswick formation is composed of sandstone and conglomerate.

## Origin of the sediments

The origin of the Triassic basin in Pennsylvania and New Jersey has been attributed variously to downfaulting, downwarping, and erosion. McLaughlin (1957, p. 1491) attributed the origin of the basin to deep erosion of the least resistant beds in the Paleozoic rocks while crystalline highlands remained to the south and an escarpment of Silurian quartzite developed to the north.

The first sediments deposited in the basin were derived from the erosion of igneous and metamorphic rocks in the highlands to the south. These sediments, which constitute the Stockton formation, were deposited as coalescing alluvial fans upon a piedmont slope from the highlands.

During the accumulation of the alluvial fans along the south side of the basin, lakes and swamps occupied the center of the basin. The Lockatong formation was deposited in these lakes and swamps.

Under the load of sediments in the basin, downfaulting along the northern border resulted in the deposition of sediments derived from the north (McLaughlin, 1945). These sediments form the Brunswick formation.

According to Krynine (1950), the climate of the Triassic was warm and humid, and the rainfall had a seasonal distribution. During heavy floods, much slightly weathered material was eroded from the canyon walls and deposited on the alluvial fans as arkosic sand. During weak floods, red soil was eroded from the gentler slopes of the interfluves and deposited on the alluvial fans. The result was an alternation of arkosic sandstone and red shale that is typical of most of the Stockton formation.

AR300485

Conglomerate and coarse arkosic sand were deposited nearest the source of the sediments. Decreases in stream gradients, farther away from the source, caused a diminishing of the transporting power of the streams and resulted in the deposition of fine material. As the regional relief was diminished, decrease in erosive activity in the highlands caused chemical decay to be more effective and the red muds that formed the thick red shales in the upper part of the Stockton formation were deposited. Red muds deposited in the reducing environment of lakes ad swamps were changed in color to gray and black; such deposits are typical of the Lockatong formation.

## Stockton Formation

### General features

The Stockton formation, in its type locality near Stockton, N.J., was described by Kummel (1897, p. 35-36) as interbedded coarse arkosic conglomerate; yellow, micaceous, feldspathic sandstone; quartzite conglomerate; brown-red sandstone; and soft red shale.

During this investigation, the Stockton was mapped in detail in an area extending from the Bucks County-Montgomery County line westward to Phoenixville. (See Plate 2.) This detailed mapping forms the basis for most of the geologic discussion that follows.

*Lithology.* The Stockton formation is composed chiefly of very fine to coarse-grained arkosic sandstone and arkosic conglomerates, interbedded red shale, and siltstone. Coarse arkosic sandstone and arkosic conglomerate are predominant in the lower beds; fine- and medium-grained arkosic sandstone is predominant in the middle beds; and red shale, siltstone, and very fine-grained arkosic sandstone are predominant in the upper beds. Locally, sediments of different texture are interbedded irregularly, and coarse-grained rocks commonly overlie fine-grained rocks. In addition, beds commonly pinch out or grade laterally into other beds of different texture and color.

The terms arkosic sandstone, arkose, and subarkose in this report follow the classification of Pettijohn (1957, p. 291) and will be used as follows: arkosic sandstone is the group name for sandstone containing feldspar and is subdivided into arkose, which contains 25 percent or more feldspar, and subarkose, which contains less than 25 percent feldspar.

300486

*Exposures and surface expressions.* The Stockton formation has few good exposures, as most of the formation is covered by soil, vegetation, and city and suburban developments. The best exposures are in the lower beds, where quarries and railroad cuts expose several excellent sections. The middle and upper beds are poorly exposed except north of Valley Forge — along the Schuylkill River and along the railroad cut west of the river.

Ridges and valleys are commonly parallel to the strike of the beds. In the southern part of the Stockton outcrop area, beds of coarse arkosic sandstone and conglomerate form conspicuous ridges. Very hard shale and argillite in the upper beds and in the overlying Lockatong formation form a prominent ridge along the northern boundary of the Stockton formation. Valleys are commonly underlain by shale. However, the complex stratigraphy of the formation and the scarcity of outcrops obscures the precise relations between topography and lithology.

*Thickness.* Estimates of the thickness of the Stockton formation differ widely depending upon the method used to determine the thickness. McLaughlin (1957, p. 1492) stated that the thickness calculated from the width of outcrop and average dip of the formation is nearly correct and that the repetition of beds by strike faults is insignificant. He estimated that the formation is 5,000 feet thick in the Delaware Valley. In the area mapped during this investigation, the thickness of the Stockton formation has been estimated from width of outcrop and from average dip of the strata. The formation thins westward from a thickness of more than 6,000 feet near the Montgomery County-Bucks County line to 2,300 feet at Phoenixville. Near Norristown, the formation is 4,000 feet thick. The total thickness of the formation, however, is not present in the subsurface at any one location because the upper beds do not completely cover the lower beds, and the lower beds become thinner to the north.

## Stratigraphy

The Stockton formation has been subdivided into three members as follows: (1) the lower arkose member, which is characterized by the abundance of coarse-grained arkosic sandstone and arkosic conglomerate; (2) the middle arkose member, which is characterized by the abundance of fine-and medium-grained arkosic sandstone, and (3) the upper shale member, which is characterized by the predominance of shale and siltstone. Table 1 indicates the distribution of rock types within each member, as determined from sample logs and sections

300487

measured in the field. The three members are readily traceable from the Montgomery County-Bucks County line to Phoenixville and are shown on the geologic map. (Plate 2).

Table 1. Distribution of rock types within the Stockton formation.

| Member | Percentage shale | Percentage fine-and medium-grained arkosic sandstone | Percentage coarse-grained arkosic sandstone and conglomerate |
|---|---|---|---|
| Upper shale | 76 | 24 | 0 |
| Middle arkose | 42 | 54 | 4 |
| Lower arkose | 24 | 17 | 59 |

## Lower Arkose Member

*Definition.* The lower arkose member of the Stockton formation consists principally of medium to coarse-, coarse-, and very coarse-grained arkosic sandstone and arkosic conglomerate of gray, reddish-brown, and pale-orange color. It contains lesser amounts of interbedded silty and sandy red shale. Fine- and medium-grained arkosic sandstone are common but less abundant than the coarser grained sediments.

*Relation to underlying and overlying material.* The lower arkose member unconformably overlies Precambrian and Paleozoic rocks. Throughout most of its extent the member overlies Chickies quartzite of Cambrian age and limestone of Cambrian and Ordovician age. However, in the extreme southeastern part of the area the member overlies Precambrian gneiss and gabbro.

The lower arkose member is overlain on the north by the middle arkose member. The contact between the two is transitional upward from coarse arkosic sandstone to fine-grained and medium-grained arkosic sandstone. East of Norristown, interfingering of these two textural types is common, the finer grained arkosic sandstones becoming more abundant upward in the section. West of Norristown, interfingering is less, and the transition from the lower member to the middle member is characterized by a gradual decrease in grain size.

*Thickness.* The lower arkose member reaches a maximum thickness of 2,700 feet immediately east of Ambler and constitutes 50 percent of the formation. Thinning eastward, the member is 1,500 feet thick near the Bucks County line and constitutes 20 percent of the formation.

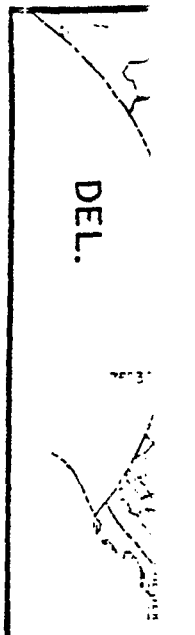


Figure 1. Geologic map of the Newark group in southeastern Pennsylvania.

Base modified from Geologic Map of Pennsylvania, Pennsylvania Geologic Survey, 1960.

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It thins westward from Ambler so that at Phoenixville it is 550 feet thick and makes up 23 percent of the formation. The member appears to take the form of an alluvial fan with the apex southeast of Ambler.

*Area east of Ambler.* East of Ambler, the member consists mainly of coarse-grained arkosic sandstone and lesser amounts of interbedded fine- and medium-grained arkosic sandstone and red shale. Fine- and medium-grained arkosic sandstone beds are especially numerous in the upper part. (See Plate 3, cross sections C-C' and D-D'.) The coarse arkosic sandstone beds in the upper part of the member pinch out eastward or grade laterally eastward into fine- and medium-grained arkosic sandstone. Conglomerate, which is abundant south of Ambler, diminishes rapidly in quantity eastward from Ambler.

Sample logs from five wells (Mg-285, Mg-465, Mg-499, Mg-500, and Mg-532) in this area are given in Table 7.

*Area from Ambler to Norristown.* South and north of Ambler, the lower arkose member is essentially coarse- and very coarse-grained arkosic sandstone that contains considerable conglomerate. A few miles west of Ambler, the coarse arkosic sandstone in the upper part pinches out, the conglomerate becomes much less abundant, and the member contains a large proportion of fine- and medium-grained arkosic sandstone. Farther west, near Norristown, the member consists chiefly of coarse- and very coarse-grained arkosic sandstone.

Shale lenses are numerous in some parts of the area, as shown by the following geologic section.

*Geologic section of the lower arkose member north of Main Street in Norristown*

| Top of exposure | Thickness (feet) |
|---|---|
| Shale, red | 2 |
| Arkose, coarse- to very coarse-grained | 3 |
| Shale, red | 4 |
| Arkose, medium-grained | 3 |
| Shale, red | 2 |
| Arkose, coarse-grained | 6 |
| Shale, red | 5 |
| Arkose, medium-grained | 2 |
| Shale, red | 1 |
| Arkose, coarse-grained | 1 |
| Shale, red | 1 |

300489

*Geologic section of the lower arkose member north of Main Street in Norristown—continued*

| | Thickness (feet) |
|---|---|
| Arkose, medium-grained | 4 |
| Shale red | 5 |
| Arkose, coarse- to very coarse-grained | 2 |
| Shale, red | 7 |
| Arkose, medium- to coarse-grained | 3 |
| Arkose, coarse-to very coarse-grained | 9 |
| Shale, red | 8 |
| Arkose, coarse- to very coarse-grained | 7 |
| Shale, red | 3 |
| Fault | .... |
| Arkose, medium- to coarse-grained | 6 |
| Shale, red | 10 |
| Arkose, coarse-grained | 4 |
| Shale, red | 6 |
| Arkose, coarse- to very coarse-grained | 4 |
| Bottom of exposure | |

A forty-foot section of the upper part of the member is exposed in a quarry east of Norristown; the section consists of pale orange and brownish gray coarse- to very coarse-grained arkose and arkosic conglomerate that contains minor amounts of medium- to coarse-grained arkose and a few thin clay lenses.

Sample logs from two wells in this area (Mg-290 and Mg-533) are given in Table 7.

*Area from Norristown to Phoenixville.* The lower arkose member, in the area from Norristown to Phoenixville, consists chiefly of coarse-and very coarse-grained arkosic sandstone and some conglomerate. Shale and beds of fine- and medium-grained arkosic sandstone are present but are not as abundant as in areas to the east. Differently textured arkoses interfinger near the top, but the transition from the lower arkose member to the overlying member is sharper here than in areas to the east. (See Plate 3, cross section A-A'.) South of Port Indian (2 miles west of Norristown), faulting has displaced the contact by a half a mile. (See Plate 3.)

Bedrock is well exposed in several places in this area. The bedrock is described in the following stratigraphic sections.

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*arkose member north*
*own—continued*

| | Thickness (feet) |
|---|---|
| ..... | 4 |
| ..... | 5 |
| ..... | 2 |
| ..... | 7 |
| ..... | 3 |
| ..... | 9 |
| ..... | 8 |
| ..... | 7 |
| ..... | 3 |
| ..... | .... |
| ..... | 6 |
| ..... | 10 |
| ..... | 4 |
| ..... | 6 |
| ..... | 4 |

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*Geologic section of the lower arkose member in Philadelphia and Western Railroad cut west of Bridgeport (1 mile southwest of Norristown)*

| | Thickness (feet) |
|---|---|
| Top of exposure | |
| Arkose, pale-orange to red, coarse- and very coarse-grained, conglomeratic in places | 56 |
| Shale, red | 14 |
| Arkose, pale-orange to red, coarse- and very coarse-grained, conglomeratic in places | 10 |
| Bottom of exposure | |

*Geologic section along the west side of the Schuylkill River north of Valley Forge*

| | Thickness (feet) |
|---|---|
| Middle arkose member: | |
| Sandstone, arkosic, red, fine-grained | Unknown |
| Arkose, pale reddish-brown, coarse-grained | 30 |
| Arkose, pale reddish-brown, fine-grained | 22 |
| Sandstone, arkosic, red, fine-grained | 6 |
| Sandstone, arkosic, red, very fine-grained | 8 |
| Arkose, red and reddish-brown, medium-grained | 65 |
| Arkose, pale reddish-brown, coarse-grained | 2 |
| Sandstone, arkosic, red, fine-grained | 13 |
| Arkose, pale reddish-brown, coarse-grained | 2 |
| Sandstone, arkosic, red, fine-grained | 4 |
| Lower arkose member: | |
| Arkose, pale reddish-brown, medium- to coarse-grained | 2 |
| Arkose, pale reddish-brown, coarse-grained | 4 |
| Arkose, pale reddish-brown, medium-grained | 2 |
| Arkose, red and pale-brown, coarse-grained | 108 |
| Arkose, gray, coarse-grained | 120 |
| Arkose, gray, medium-grained | 7 |
| Shale, red; coarse-grained arkose | 12 |
| Arkose, gray, coarse-grained | 5 |
| Sandstone, arkosic, greenish-gray, fine-grained | 5 |
| Arkose, gray, coarse-grained | 15 |

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*Geologic section along the west side of the Schuylkill River north of Valley Forge—continued*

| Lower arkose member—continued: | Thickness (feet) |
|---|---|
| Arkose, gray, coarse- to very coarse-grained | 18 |
| Arkose, gray, coarse-grained | 13 |
| Arkose, gray, medium- to coarse-grained | 10 |
| Arkose, pale reddish-brown, coarse- to very coarse-grained | 65 |
| Arkose, red and pale-brown, coarse-grained | 40 |
| Arkose, coarse-grained | 20 |
| Shale, red, and covered interval | 52 |
| Arkose, gray, coarse- to very coarse-grained, conglomeratic | 45 |

## Middle Arkose Member

*Definition.* The middle arkose member consists chiefly of beds of fine- and medium-grained arkosic sandstone and interbedded red shale. The arkosic sandstone is usually pale brown to pale red, gray, and pale orange. In many places, shale is more abundant than arkosic sandstone. A few thick masses of coarse-grained arkosic sandstone of small lateral extent grade into medium-grained arkosic sandstone. Thick beds of shale and siltstone are especially abundant in the upper part of the member.

*Thickness.* The middle arkose member attains its maximum thickness of 4,200 feet near the Bucks County line, where it constitutes 70 per cent of the Stockton formation. It thins westward to 1,500 feet at Wissahickon Creek, where it makes up 35 percent of the formation. It thickens westward from Wissahickon Creek and attains a thickness of 2,500 feet near Washington Square (2 miles northeast of Norristown), where it constitutes 50 per cent of the formation. Westward from Washington Square, the member thins (as does the entire Stockton formation), but it forms a progressively greater part of the formation. At Phoenixville it is 1,700 feet thick and constitutes about 75 percent of the formation.

*Area east of the Wissahickon Creek.* In the area east of Wissahickon Creek, the stratigraphy of the middle member is complex. Shale is abundant, particularly in the upper part, and in places is predominant over fine- and medium-grained arkosic sandstone. Interfingering of coarse- and medium-grained arkosic beds in the lower part of the member is common. Thick beds of coarse-grained arkosic sandstone are

300492

*... of the Schuylkill —continued*

| | Thickness (feet) |
|---|---|
| ned | 18 |
| | 13 |
| | 10 |
| ...y | |
| | 65 |
| ed | 40 |
| | 20 |
| | 52 |
| ...ned. | |
| | 45 |

...BER

... consists chiefly of beds of ... and interbedded red shale. ...n to pale red, gray, and ... dant than arkosic ... arkosic sandstone ...grained arkosic sandstone. ...ally abundant in the upper

... attains its maximum thick... ...ne, where it constitutes 70 ...ns westward to 1,500 feet ...5 percent of the formation. ...eek and attains a thickness ... miles northeast of Norris... formation. Westward from ...s does the entire Stockton ...ater part of the formation. ...stitutes about 75 percent of

...he area east of Wissahickon ...nber is complex. Shale is ...d in places is predominant ...ndstone. Interfingering of ... the lower part of the mem... ...ined arkosic sandstone are present also in the middle of the member. (See Plate 2.) Table 7 contains sample logs of wells Mg-216, 219, 275, 276, 489, and 490 in this area.

*Area from Wissahickon Creek to Jeffersonville.* The stratigraphy of the middle arkose member is less complex in the area from Wissahickon Creek west to Jeffersonville (1 mile northwest of Norristown) than it is east of Wissahickon Creek. Fine- and medium-grained arkosic sandstone is predominant through most of the area. Shale occurs as lenses and thin beds throughout the member, and coarse-grained arkosic sandstone occurs chiefly in the lower part of the unit. (See Plate 3, section B-B'.)

Sample logs from two wells in this area, Mg-230 and 270, (see Plate 1.) are given in Table 7.

*Area from Jeffersonville to Phoenixville.* In the area from Jeffersonville to Phoenixville, the stratigraphy of the midde arkose member is very similar to that of the area to the east, the member consisting of fine- and medium-grained arkosic sandstone, red shale, very fine red sandstone, and few beds of coarse-grained arkose. (See Plate 3, section A-A'.)

Geologic sections were measured at several extensive outcrops in this area. The geologic section along the Schuylkill River, north of Valley Forge, which contains both the middle and lower members, has been described in the discussion of the lower arkose member. The following geologic sections show the character of the middle arkose member in the area from Jeffersonville to Phoenixville.

*Geologic section of middle arkose member in the Reading Railroad cut north of Perkiomen Junction (1 mile north of Valley Forge)*

| Top of exposure | Thickness (feet) |
|---|---|
| Arkose, pale-orange, fine-grained | 25 |
| Shale, red, and covered interval | 120 |
| Arkose, reddish-brown, fine-grained | 5 |
| Shale, red | 25 |
| Arkose, red and reddish-gray, fine-grained | 16 |
| Sandstone, arkosic, dark-gray, fine-grained | 5 |
| Arkose, reddish-brown, fine-grained | 6 |
| Sandstone, arkosic, red, very fine- to fine-grained | 11 |
| Arkose, grayish-orange, fine-grained | 10 |
| Arkose, pale-orange, medium-grained | 13 |
| Arkose, pale-orange and light-gray, medium- to coarse-grained | 2 |

300493

*Geologic section of middle arkose member in the Reading Railroad cut north of Perkiomen Junction (1 mile north of Valley Forge)—continued*

| | |
|---|---|
| Arkose, gray, fine-grained | 10 |
| Sandstone, arkosic, red, fine-grained | 1 |
| Sandstone, arkosic, red and blackish-red, very fine-grained | 10 |
| Arkose, brownish-gray, fine-grained | 16 |
| Sandstone, arkosic, red, very fine to fine-grained | 7 |
| Sandstone, arkosic, red, very fine-grained | 38 |
| Arkose, pale-orange, fine- to medium-grained | 15 |
| Bottom of exposure | |

*Geologic section in Phoenixville, along the west side of Schuylkill River, north of French Creek*

| | Thickness (feet) |
|---|---|
| Lockatong formation: | |
| Shale and argillite, gray and black | 300 |
| Covered interval | 75 |
| Stockton formation: | |
| Upper shale member: | |
| Argillite, red and gray | 10 |
| Shale, reddish-gray, fissile | 1 |
| Argillite, reddish-gray | 2 |
| Shale, grayish-red, fissile | 3 |
| Argillite, red | 9 |
| Shale, red and black, fissile | 3 |
| Middle arkose member: | |
| Arkose, orange, very fine- to fine-grained | 6 |
| Arkose, orange, fine-grained | 5 |
| Arkose, orange, very fine-grained | 35 |

*Geologic section in the Pennsylvania Railroad cut, north of French Creek, in Phoenixville*

| | Thickness (feet) |
|---|---|
| Upper shale member: | |
| Shale, red | 40 |
| Sandstone, arkosic, red, very fine-grained | 16 |
| Siltstone, red | 12 |
| Middle arkose member: | |
| Arkose, orange, very fine- to fine-grained | 23 |
| Arkose, orange, very fine- to fine-grained | 13 |

300494

*n the Reading Railroad cut Valley Forge)—continued*

| | |
|---|---|
| ..... | 10 |
| ..... | 1 |
| ery fine-grained.... | 10 |
| ..... | 16 |
| grained ..... | 7 |
| ..... | 38 |
| ned ..... | 15 |

*west side of Schuylkill Creek*

| | Thickness (feet) |
|---|---|
| ..... | 300 |
| ..... | 75 |
| ..... | 10 |
| ..... | 1 |
| ..... | 2 |
| ..... | 3 |
| ..... | 9 |
| ..... | 3 |
| d ..... | 6 |
| ..... | 5 |
| ..... | 35 |

*ilroad cut, north of ville*

| | Thickness (feet) |
|---|---|
| ..... | 40 |
| ..... | 16 |
| ..... | 12 |
| ..... | 23 |
| d ..... | 13 |



*Geologic section in the Pennsylvania Railroad cut, north of French Creek, in Phoenixville—continued*

| | |
|---|---|
| Arkose, orange, fine-grained ..... | 10 |
| Shale, red ..... | 35 |
| Arkose, gray, fine-grained, and covered interval ..... | 75 |
| Shale, red ..... | 40 |
| Arkose, orange, fine-grained ..... | 40 |
| Shale, red, fissile ..... | 22 |
| Sandstone, arkosic, red, very fine-grained ..... | 67 |
| Arkose, orange, fine- to medium-grained ..... | 27 |

*Relation to overlying material.* The middle arkose member is overlain by the upper shale member. In general the contact between the two members is not sharp, and is defined as the horizon above which shale is predominant.

### Upper Shale Member

*Definition.* The upper shale member of the Stockton formation consists chiefly of red shale, siltstone, and very fine-grained arkosic sandstone. Beds of fine-grained arkosic sandstone are present throughout the member, but they are most abundant in the lower part. In the upper part, much of the shale is hard and is considered to be argillite. Although most of the shale and argillite are red, a few beds of gray shale and argillite are present.

*Thickness.* The upper shale member is 1,000 feet thick (20 percent of the formation) near Prospectville. From Prospectville (3½ miles northwest of Horsham) it thins eastward to 600 feet (10 percent of the formation) at the Bucks County line and thins westward to 60 feet (3 percent of the formation) at Phoenixville.

*Area east of Springhouse.* From Springhouse (2 miles north of Ambler) east to the Bucks County line, the upper shale member contains few beds of arkosic sandstone. (See Plate 3, section C-C' and D-D'.)

*Area from Springhouse to Perkiomen Creek.* From Springhouse west to Perkiomen Creek (3½ miles east of Phoenixville) beds of fine- and medium-grained arkosic sandstone are abundant only near Franklinville and Gwynedd Valley (2½ miles northwest of Ambler). (See Plate 3, section B-B). Well Mg-300 at Gwynedd Valley penetrated in the Lockatong formation, 60 feet of shale, and in the Stockton formation, 360 feet of shale, 115 feet of arkosic sandstone, 10 feet of siltstone, and 5 feet of limestone. (See Table 7 for complete log of this well.)

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*Area from Perkiomen Creek to Phoenixville.* In the area from Perkiomen Creek west to Phoenixville, the upper shale member contains abundant fine-grained arkosic sandstone, and it is difficult to separate this member from the underlying middle arkose member. (See Plate 3, section A-A'.)

*Relation to overlying material.* The upper shale member is overlain on the north by the Lockatong formation, which consists of gray fissile shale and black and red argillite. The red argillite in the upper part of the upper shale member is similar to the red argillite of the Lockatong formation. Interbedded arkosic sandstone in the Stockton formation distinguishes this formation from the Lockatong formation. Where the upper shale member does not appear to contain arkosic beds, the base of the lowermost black argillite bed is considered to be the contact between the two formations.

The authors consider the upper shale member to be a transition zone between typical Stockton sediments and typical Lockatong sediments.

## Petrography

Some sandstones of the Stockton formation contain as much as 50 percent feldspar. Although in field examination some sandstones appear to contain no feldspar, microscopic examination of thin sections of 12 samples (10 sandstone, 2 shale) taken at various stratigraphic levels show that feldspar constitutes 23 percent or more of each sandstone sample.

The mineral composition of the 12 thin sections is given in Table 2. The feldspar content of the 10 sandstone samples ranged from 23 to 44 percent, but much of the feldspar has weathered to sericite and clay. Untwinned plagioclase was present, and, consequently, it was difficult to evaluate plagioclase-potash feldspar proportions. Twinned plagioclase (albite and oligoclase) constitute 2.6 percent of the 10 sandstone thin sections. Mica constituted approximately 2 percent of the 10 sandstone samples, and opaque iron oxide minerals, commonly hematite and limonite, constituted approximately 2.5 percent of the samples. Small quantities of heavy minerals—particularly zircon, tourmaline, and apatite—were noted in all sandstone thin sections. Large quartz grains were present in the coarse-grained arkose.

Thin sections of shale revealed approximately half hematite-stained clay and half silt-sized particles of quartz and feldspar. It was not possible to determine the proportions of quartz and feldspar.

| Sample Number | Rock type | Stratigraphic position | Grain size | Characteristic color | Quartz | Feldspar | Iron minerals | Mica | Heavy minerals | Location of sample |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Arkose | Middle arkose member | Fine | Pale yellowish brown to orange | 66 | 30 | 3 | 1 | Trace | Quarry between Norristown and Jeffersonville |
| 2 | Shale | Middle arkose member | ..... | Grayish red | Half-silt - half clay | | | 4 | | |

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*to Phoenixville.* In the area from xville, the upper shale member con- sic sandstone, and it is difficult to erlying middle arkose member. (See

. The upper shale member is over- g formation, which consists of gray illite. The red argillite in the upper s similar to the red argillite of the l arkosic sandstone in the Stockton tion from the Lockatong formation. does not appear to contain arkosic ack argillite bed is considered to be ons.

er shale member to be a transition iments and typical Lockatong sedi-

gran

kton formation contain as much as field examination some sandstones oscopic examination of thin sections ale) taken at various stratigraphic s 23 percent or more of each sand-

12 thin sections is given in Table 2. idstone samples ranged from 23 to has weathered to sericite and clay. and, consequently, it was difficult ar proportions. Twinned plagioclase 6 percent of the 10 sandstone thin ately 2 percent of the 10 sandstone rals, commonly hematite and limon- ercent of the samples. Small quan- y zircon, tourmaline, and apatite— ections. Large quartz grains were e.

approximately half hematite-stained uartz and feldspar. It was not pos- f quartz and feldspar.

| Sample Number | Rock type | Stratigraphic position | Grain size | Characteristic color | Composition (percent of sample) | | | | | Location of sample |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Quartz | Feldspar | Iron minerals | Mica | Heavy minerals | |
| 1 | Arkose | Middle arkose member | Fine | Pale yellowish brown to orange | 66 | 30 | 3 | 1 | Trace | Quarry between Norristown and Jeffersonville |
| 2 | Shale | Middle arkose member | ..... | Grayish red | Half-silt - half clay | | | 4 | ..... | do |
| 3 | Sub-Arkose | Lower arkose member | Medium to coarse | Pale yellowish brown | 75 | 23 | 1 | 1 | Trace | East of Fort Washington |
| 4 | Arkose | Lower arkose member | Coarse to very coarse | Pale orange | 64 | 34 | 1 | 1 | Trace | Susquehanna Road, Ambler |
| 5 | Arkose | Lower arkose member | Fine | Pale red to pale brown | 51 | 44 | 3 | 2 | Trace | do |
| 6 | Arkose | Middle arkose member | Fine | Light olive gray | 57 | 39 | 1 | 3 | Trace | Johnson Highway east of Norristown |
| 7 | Argillite | Upper shale member | ..... | Grayish red | Half silt - half clay | | | 2 | ..... | Bethlehem Pike, north of Springhouse |
| 8 | Arkose | Middle arkose member | Fine | Pale orange | 63 | 32 | 3 | 2 | Trace | Norristown Road, southeast of Springhouse |
| 9 | Arkose | Middle arkose member | Fine | Pale red to Pale brown | 52 | 33 | 11 | 2 | Trace | Easton Road, west of Horsham |
| 10 | Arkose | Middle arkose member | Medium | Light gray | 70 | 29 | 1 | Trace | Trace | do |
| 11 | Arkose | Middle arkose member | Medium | Pale orange | 67 | 32 | Trace | 1 | Trace | Norristown Road, southeast of Springhouse |
| 12 | Arkose | Middle arkose member | Very fine | Grayish red to light brownish gray | 65 | 31 | 3 | 1 | Trace | Pennsylvania RR cut, north side Schuylkill River, east of Port Indian |

300497

Six thin sections of sandstone from the lower beds of the Stockton formation near Valley Forge were studied by R. C. Gerhard (1952). The feldspar content of these thin sections range from zero in quartzose sandstone to 32 percent in arkose. The average composition of the six samples is given below:

| Quartz | Feldspar | Rock fragments | Accessory minerals | Matrix | Cement |
|---|---|---|---|---|---|
| 58% | 18% | 4% | 5% | 11% | 4% |

According to Gerhard (1952), the feldspar minerals, in order of decreasing abundance, were orthoclase, microcline, albite, oligoclase, perthite, and microperthite. The rock fragments were schist and gneiss. The thin sections contained muscovite, biotite, chlorite, sericite, kaolinite-illite, chlorite-sericite paste, authigenic quartz, calcite and accessory heavy minerals. Matrixes were of three distinct types, as follows: (1) hematite and kaolinite-illite: (2) chlorite, sericite, and pulverized quartz grains; and (3) finely disseminate sericite. The cementing materials were authigenic quartz, authigenic feldspar and carbonates (chiefly calcite).

Results of the study of 52 thin sections of samples from near the base of the Stockton formation were supplied by J. D. Glaeser (1958). The thin sections were made from samples taken from the area east of Norristown. Glaeser identified end products of feldspar alteration, and, consequently, his study showed that the thin sections had a low feldspar content and a high sericite content. The feldspar content ranged from zero to 25.2 percent; the sericite content ranged from 1.0 to 50.6 percent; and the feldspar plus sericite content ranged from 9.5 to 50.6 percent. The average percentages of the various minerals in the 52 thin sections was as follows:

| Quartz | Feldspar plus sericite | Muscovite | Biotite | Iron minerals | Chert | Rock fragments |
|---|---|---|---|---|---|---|
| 68.0 | 25.2 | 2.7 | 0.5 | 1.1 | 1.8 | .4 |

Grain sizes in the Stockton formation range from clay particles to cobbles 3 to 4 inches across. Most pebbles and cobbles are composed of quartzite, but feldspar is common. One cobble of chlorite schist was noted.

The arkosic sandstones of the Stockton formation are generally well sorted, but the conglomeratic sandstones are poorly sorted. The sand grains are generally angular to subangular. The quartzite pebbles are generally well rounded, but the feldspar pebbles are angular. The shales of the formation contain abundant silt, and in many places they are probably siltstones, but near the base of the formation the shale is very sandy. The siltstones grade locally into very fine-grained red

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these are most
most commonly
reddish brown.
sandstones are
sandstone is pr
grained arkosic
dominantly pale
grained arkosic
red, and (less
invariably red
dark-gray beds

Red colorat
coloration is ca
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Beds in th
County and eas
Montgomery C
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range from 5
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Faults are
the southern bo
Fig. 1.) Small
visible at many

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2.) The gener

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: lower beds of the Stockton
by R. C. Gerhard (1952).
· range from zero in quartz-
The average composition of

| ·v minerals | Matrix | Cement |
|---|---|---|
| 5% | 11% | 4% |

ldspar minerals, in order of
nicrocline, albite, oligoclase,
nents were schist and gneiss.
:ite, chlorite, sericite, kaolin-
:uartz, calcite and accessory
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·icite, and pulverized quartz
:. The cementing materials
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:ent ranged from 1.0 to 50.6
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various minerals in the 52

| ·on minerals | Chert | Rock fragments |
|---|---|---|
| 1.1 | 1.8 | .4 |

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ular. The quartzite pebbles
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of the formation the shale is
into very fine-grained red

sandstones. The coarse clastic sediments range in degree of induration from weakly cemented sand to hard, well-cemented arkosic sandstone. The arkosic sandstone is commonly cross-bedded, but graded bedding has been observed in a few exposures of fine-grained arkosic sandstone.

In the Stockton formation, shale occurs predominantly in thick beds showing no fissility. Beds of fissile shale occur, but they are subordinate. In the upper part of the formation, much of the shale is extremely hard and may be considered to be an argillite.

Sediments of the Stockton formation occur in a variety of colors and hues. Gray, orange, red, brown, and shades and combinations of these are most common. The coarse-grained arkosic sandstones are most commonly light gray and pale orange but may be pale brown and reddish brown. The predominant colors of the medium-grained arkosic sandstones are pale orange, pale brown, and pale reddish brown; gray sandstone is present, but it is not as prominent as it is in the coarse-grained arkosic sandstone. The fine-grained arkosic sandstone is predominantly pale brown to pale red, and pale orange. The very fine-grained arkosic sandstone is usually pale red to pale brown, grayish red, and (less commonly) pale orange. Shale and siltstone is almost invariably red or grayish red, but there are a few reddish-gray and dark-gray beds of shale.

Red coloration is due to hematite staining, but much of the orange coloration is caused by orange-pink feldspar. Gray arkosic sandstone, on the other hand, contains white partly decomposed feldspar.

## Structure

Beds in the Stockton formation dip to the northwest in Bucks County and eastern Montgomery County and to the north in western Montgomery County and in Chester County. South and west of Phoenixville, the beds are tilted to the northeast. Dips of the beds range from 5° to 25° in southeastern Pennsylvania and from 5° to 18° in the area mapped in detail for this report. (See Plate 2.) The average dip, as computed from 73 measurements, is 12°, and 50 percent of the dips measured are between 10° and 14°.

Faults are common in the Stockton formation. A major fault forms the southern boundary of the northern belt in Bucks County. (See Fig. 1.) Small normal faults, having displacements of a few feet, are visible at many outcrops.

North of King of Prussia, the basal contact of the Stockton formation is displaced repeatedly by an intricate series of faults. (See Plate 2.) The general trends of these faults are northeast-southwest and

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east-west; the upthrown sides are to the northwest and north, respectively. Offsets of individual faults are as much as 0.5 mile. The total offset of the series is 1 mile.

West of Valley Forge and south of Phoenixville, along each of several north-south and northeast-southwest trending faults, the basal contact is offset from less than 0.05 to about 0.15 mile. (See Plate 2.) In all but one of these faults, the upthrown side is to the west, which displaces the contact northward on the west side of the faults.

Northwest of Oaks a northeast-trending fault has caused an offset of 0.25 mile in the contact between the Stockton and Lockatong formations. (See Plate 2.)

The extent of major faulting is difficult to evaluate because of the scarcity of outcrops and the complex lateral facies changes within the formation. However, continuity of the upper and lower contacts of the Stockton formation through most of the mapped area indicates that major faulting has not taken place except as described above.

Vertical joints are common in outcrops of the Stockton formation. The most frequently occurring set trends perpendicular to the strike of the bedding. Two other sets occur frequently: one is parallel or nearly parallel to the strike of the bedding, and the other trends northwestward at an angle of approximately 50° to the strike.

Diabase dikes intrude the Stockton in several places. Two dikes are present in the northern belt in Bucks County, and, in the eastern part of the area mapped for this report, one prominent dike extends from Camp Hill northeastward to near Warrington. (See Plate 2.) At the base of the formation, this dike is 90 feet thick, strikes N30 E, and dips 80°NW. Several dikes are present in Chester County, west of the area mapped for this report.

## HYDROLOGY

The zone in which all the interconnected openings or voids in the rocks of the earth's crust are filled with water under pressure greater than atmospheric is called the zone of saturation. Precipitation is the source of ground water in southeastern Pennsylvania. Although most of the water that reaches the land surface from the atmosphere either runs off as overland flow or is returned to the atmosphere by evaporation and transpiration, some infiltrates downward through the soil to the zone of saturation, where it becomes recharge to the main groundwater body. Upon reaching the zone of saturation, it begins to move downward and laterally toward lower elevations, and eventually it may return to the surface either naturally (through seeps and springs) or

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: northwest and north, respect-
is much as 0.5 mile. The total

of Phoenixville, along each of
west trending faults, the basal
out 0.15 mile. (See Plate 2.)
wn side is to the west, which
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nding fault has caused an off-
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ficult to evaluate because of
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cept as described above.

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d the other trends northwest-
the strike.

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s County, and, in the eastern
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Warrington. (See Plate 2.)
s 90 feet thick, strikes N30°E.
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saturation. Precipitation is the
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downward through the soil to
recharge to the main ground-
f saturation, it begins to move
evations, and eventually it may
thro h seeps and springs) or

artificially (through wells). Under natural conditions and over long periods of time, the amount of water that leaves the zone of saturation as discharge is balanced by the amount of water that enters it as recharge.

Ground water may be roughly divided into two classes: (1) that which occurs in the shallow formations, mostly under nonartesian conditions and (2) that which occurs in the deeper formations under artesian conditions. Nonartesian conditions are those in which ground water is unconfined, so that its upper surface (the water table) is free to rise and fall. Artesian conditions are those in which the ground water is confined in a permeable formation that is overlain by a relatively impermeable formation, so that the upper surface of the confined water is not free to rise and fall, and the water is under sufficient pressure to rise above the top of the formation that contains it where that formation is penetrated by wells. The imaginary surface to which water will rise in tightly cased wells tapping the artesian aquifer is called the piezometric surface.

In humid areas, such as southeastern Pennsylvania, the water table stands at or near the land surface in valleys and rises toward adjacent topographic highs, reaching a maximum height in the vicinity of surface-drainage divides. The slope of the water table is generally less than that of the land surface; hence, the depth to the water table below the land surface is usually greatest beneath topographic highs and least beneath topographic lows.

The water table does not remain in a fixed position but fluctuates in response to additions to and withdrawals from the zone of saturation. As the seasonal variation in precipitation in southeastern Pennsylvania is small, the dominant factor controlling the fluctuation of the water table in areas remote from pumped wells is the seasonal variation in the rate of evaporation and transpiration. Thus, the water table generally declines throughout the warm growing season (April to October) and rises throughout the remainder of the year.

Within the zone of saturation, the rocks of the earth's crust differ greatly in their capacity to store and transmit ground water. Rocks that are capable of yielding usable quantities of ground water to wells are called aquifers. An aquifer may consist of all or part of a geologic formation or group of formations.

Most ground water, like water in other phases of the hydrologic cycle, is continually in motion. It flows by gravity from intake or recharge areas, where hydraulic potentials are high, through permeable zones or aquifers to points of discharge, where hydraulic potentials are low.

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## Occurrence of Ground Water in the Stockton Formation

### Effect of lithology

Few wells drilled into the Stockton formation penetrate only one type of rock. The sequence of rocks penetrated consists generally of alternating beds of fine- and coarse-textured materials. Furthermore, the relative proportions of fine- and coarse-textured rocks change within rather uniform limits throughout the formation. For example, in the lower part of the formation, wells usually pass through more arkosic sandstone and conglomerate than shale and siltstone; whereas, in the upper part of the formation, the reverse is true. These features, together with the lateral changes in the lithology of the rocks, are responsible for much of the variation in well yields from place to place.

The Stockton formation has been subdivided into three members, as shown on the geologic map (Plate 2.) The relative capacities of these three members to yield ground water is indicated in Table 3, which contains a summary of the yields and specific capacities of wells more than 100 feet deep. The specific capacity of a well is the yield in gallons per minute per foot of drawdown and is generally a useful measure of the capacity of the rocks to yield water to wells.

Table 3.—*Average specific capacities and average reported yields of wells more than 100 feet deep in the Stockton formation*

| Member | Average specific capacity (gpm/ft drawdown) | No. of wells | Average reported yield (gpm) | No. of wells |
|---|---|---|---|---|
| Upper | 0.4 | 2 | 19 | 17 |
| Middle | 4.8 | 28 | 131 | 90 |
| Lower | 3.1 | 6 | 106 | 23 |

The highest yields and specific capacities reported are for wells tapping the middle arkose member. This member is characterized by alternating beds of arkosic sandstone and shale of nearly equal thickness and a lack or scarcity of conglomerate. The arkosic sandstones are fairly well sorted and weakly cemented, which probably accounts for the high yield of wells tapping this member.

Next in order of water-yielding capacity is the lower arkose member of the Stockton formation. The lower member consists chiefly of coarse-grained arkosic sandstone and conglomerate. The conglomerate and coarse-grained arkosic sandstones, which make up about 60 percent of the member, are, for the most part, poorly sorted and weakly cemented.

The lowest yields and specific capacities have been reported for wells tapping the upper shale member. The upper shale member con-

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The upper shale member contains very few beds of arkosic sandstone; hence, most of the wells tapping this member obtain water chiefly from fractures in beds of shale and siltstone. The few thin beds of arkosic sandstone in the upper shale member of the Stockton formation are among the most permeable zones in the formations, and wells that penetrate even one of them will yield considerably more water than those that do not.

The arkosic sandstones and conglomerates contain both primary and secondary openings through which ground water can circulate. Primary openings are most abundant in beds of well-sorted, loosely cemented materials and least abundant in materials that are well cemented or poorly sorted. Although the addition of cementing material tends to reduce the number of intergranular openings, it makes the rock hard and brittle and, thus, contributes to the development of secondary openings by fracturing and jointing. Most of the beds of arkosic sandstone and conglomerate in the Stockton formation are neither well sorted nor firmly cemented, and, as a result, their permeability is due to a combination of primary and secondary openings. The fine- and medium-grained arkosic sandstones are better sorted than coarse arkosic sandstone and arkosic conglomerate and, therefore, yield more water to wells.

In general the shales and siltstones are too fine grained to contain primary or intergranular openings of sufficient size to permit easy circulation of ground water. Hence, these rocks are relatively impermeable except where they are broken by joints and fractures. As a rule, these secondary openings are most abundant where the shales and siltstones are hard and brittle, but the volume of such openings, even in the brittle materials, constitutes only a small fraction of the total volume of the rock. Consequently, the shales and siltstones probably have a small capability to store and transmit ground water.

### Effect of structure

Because of the simple homoclinal dip of the rocks, the stratigraphic interval within economic reach of wells changes continuously along any traverse that crosses the outcrop area of the formation. The maximum change occurs perpendicular to the strike of the formation and is proportional to the inclination of the bedding. For example, at an average dip of 11½° the rate of increase in depth of a given bed is approximately 1 foot for each 5 feet of horizontal distance. This means that an exposed bed is 1,000 feet deep 5,000 feet downdip from the exposure. Obviously, then, wells drilled to a depth of 500 feet and spaced 2,500 feet apart along the dip of the formation will penetrate two entirely different sequences of beds. As a result, their yields will be correspondingly different.

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The hydrologic character of the Stockton formation is complicated further by lateral changes in lithology. These changes are fairly abrupt because the rocks were deposited on alluvial fans. For the most part, the coarse-textured rocks, which constitute the best water-bearing zones, were deposited in stream channels that radiated in a series of stringlike appendages from the apex of each fan. The intervening areas were filled contemporaneously with significantly finer grained materials. Thus, the character of the formation changes erratically along the strike from the coarse materials deposited in stream channels to the fine-textured materials deposited in the interfluves.

Such chaotic structure results in an intricate intermingling of pervious and impervious materials. For this reason, the depth at which water-bearing zones will be penetrated by a well and the quantity of water that will be obtained is uncertain. This is true even where several wells have been drilled in the same vicinity.

### Significance of topography

The topography developed upon the Stockton formation provides clues to the lithology and structure of the underlying rocks, and much valuable information concerning the occurrence of ground water can be obtained from a careful examination of topographic features. Elongated ridges and valleys that parallel or nearly parallel the strike of the Stockton formation mark the exposure of alternating beds of coarse- and fine-textured sediments, respectively. The height and width of the ridges are indicative of the lithology and thickness of the ridge-forming sediments. In general, the highest ridges are underlain by the coarsest sediments, and their width indicates the thickness of the coarse-grained sediments. Broad ridges are diagnostic of a thick sequence of arkosic sandstones and conglomerates, whereas narrow ridges imply thin beds of arkosic sandstone or conglomerate interbedded with thick beds of shale and siltstone.

The fact that ridges develop where beds of arkosic sandstone and conglomerate are exposed should not be taken as an indication that wells on the ridges will have higher yields than those in the adjacent valleys. The reverse is more often true, owing to the inclination of the rocks. Although the ridge-forming sediments are generally the most permeable, they do not necessarily extend to any great depth beneath the ridge. This is illustrated in Figure 2, which shows two wells drilled to the same depth. Well A is on a ridge and penetrates the permeable bed at relatively shallow depths. Moreover, a considerable part of the permeable bed lies above the water table and is not completely saturated. Well B, which is in a valley downdip from well A, pene-

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trates the full thickness of the permeable bed in a position well below the water table. Consequently, well A is not benefited by the full capability of the bed to store and transmit ground water. On the other hand, well B is more favorably situated because it penetrates the full saturated thickness of the water-bearing bed.

Although this example is over simplified, it clearly indicates the advantage of drilling wells in valleys rather than on ridges where the permeable beds crop out.

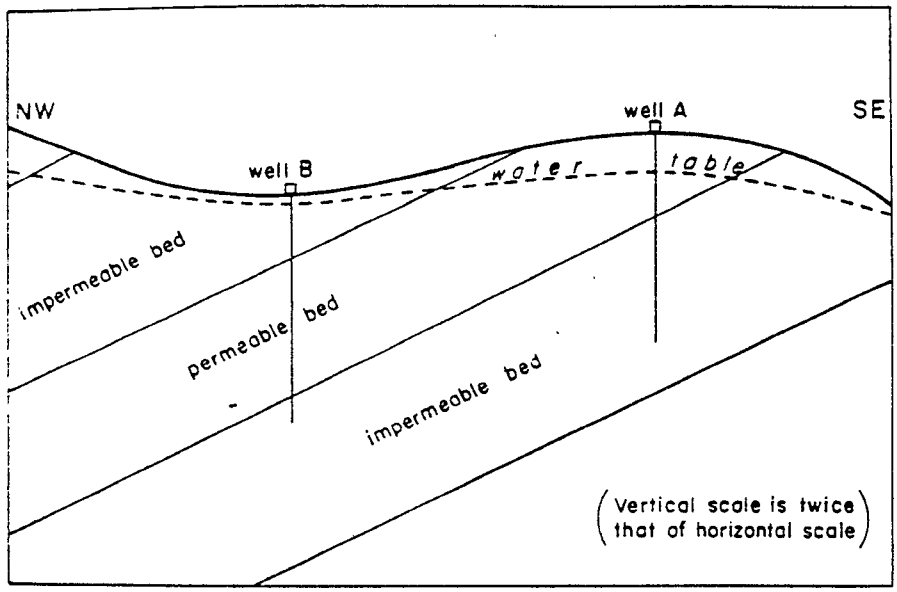


Figure 2. Diagrammatic section showing the relation between topography and the occurrence of permiable and impermiable beds.

## Hydraulic Properties of the Stockton Formation

### Principles and definitions.

Various terms are used by hydrologists to describe the properties of an aquifer. The terms used in this report are the terms defined in the following paragraphs, so that the succeeding discussion can be more easily understood.

Porosity is the ratio of the volume of interstices in a rock to its total volume and is usually expressed as a percentage. As thus defined, porosity includes both primary openings (such as intergranular pore space) formed contemporaneously with the rock and secondary openings (such as joints) formed by processes that modified the rock after it was formed.

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The specific yield of a rock is defined as the amount of water the rock will yield to gravitational forces and is expressed as a percentage of the total volume of the rock.

The capacity of an aquifer to transmit water under pressure is known as permeability. The coefficient of permeability, P, is usually expressed as the number of gallons of water per day that will pass through 1 square foot of water-bearing material under a unit hydraulic gradient at a water temperature of 60°F. At the prevailing temperature of the water, the value is called the field coefficient of permability.

The coefficient of transmissibility of an aquifer is defined as the quantity of water, in gallons per day, that will flow through a vertical section of the aquifer 1 foot wide and extending the full height of the aquifer under a unit hydraulic gradient at the prevailing temperature of the water.

The coefficient of storage of an aquifer is the volume of water it releases from or takes into storage per unit surface area of the aquifer per unit change in the component of head normal to that surface. Under water-table conditions, the water released from storage is obtained by dewatering a part of the aquifer. However, under artesian conditions, water is released from storage by compression of the aquifer skeleton in response to a decrease in head in the aquifer. Thus, the coefficient of storage of an artesian aquifer is considerably smaller than that of a water-table aquifer. The former generally ranges from 0.00001 to 0.001 and the latter from 0.05 to 0.30. The coefficients of transmissibility and storage can be calculated from the results of systematic pumping tests.

### Results of laboratory tests on rock samples

Laboratory tests for porosity, specific yield, and permeability were made on 12 rock samples from the Stockton formation. The coefficient of permeability was determined both perpendicular to and parallel to the plane of bedding. The results are given in Table 4.

Figure 3 shows the averages of the laboratory determinations for porosity and specific yield of each grain size plotted as a function of mean size of the samples. Although the two graphs are similar in form, the numerical values for porosity are consistently higher than those for specific yield. This demonstrates that, although the relationship between the porosity and specific yield of the samples is close, not all of the pore space yields water under gravitational force.

As shown by graphs in Figure 3, both porosity and specific yield increase as the grain size decreases through the range of rock textures

*Table 4 Laboratory determination of hydraulic properties of rock samples from the Stockton formation*

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Table 4. *Laboratory determination of hydraulic properties of rock samples from the Stockton formation*

| Sample no. | Location no. | Description | Porosity (n) (percent) | Specific yield (percent) | Coefficient of permeability (K) in gpd/ft² | |
|---|---|---|---|---|---|---|
| | | | | | Horizontal | Vertical |
| 57PA1 | J23a-7423 | Conglomerate, very coarse-grained | 17.3 | 11.0 | 0.009 | 0.007 |
| 57PA2 | J23a-7423 | Arkose, very coarse-grained | 10.9 | 6.2 | .01 | .007 |
| 57PA3 | J23a-7423 | do. | 19.4 | 12.8 | .01 | .009 |
| 57PA4 | J23a 5724 | Arkose, medium-grained | 30.6 | 19.1 | .3 | .2 |
| 57PA5 | J23a-5724 | Arkose, fine grained | 14.4 | 9.5 | .03 | .003 |
| 57PA6 | J23a-5724 | Arkose, coarse-grained | 19.2 | 16.2 | .03 | .04 |
| 57PA7 | J23a-1801 | Conglomerate, very coarse-grained,arkosic | 7.1 | 3.1 | .003 | .004 |
| 57PA8 | J23a-4113 | Sandstone, arkosic, very fine-grained, brick-red | 10.5 | 0 | 1/ .4 | ..... |
| 57PA9 | J23a-3823 | Siltstone, sandy grayish-red | 9.7 | 0 | .0022 | .003 |
| 57PA10 | J22b-5160 | Arkose, medium-grained, buff | 25.6 | 19.3 | .02 | .01 |
| 57PA11 | J22b-5061 | Arkose, medium-grained, tan | 16.1 | 4.0 | .001 | .001 |
| 57PA12 | J22b-5061 | Arkose, coarse-grained, tan | 7.9 | 1.0 | 2/ ..... | .0003 |

1/ Sample 57PA8 could not be cored without fracturing. Permeability is probably high. Porosity was determined on "undisturbed" chunk.

2/ Could not obtain two cores from sample 57PA12.

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from conglomerate to medium-grained sandstone. This is attributed to the fact that the sediments constituting the Stockton formation become better sorted as the grain size decreases. However, the porosity and specific yield decrease as the grain size decreases below the range of medium-grained sandstone. The decrease in porosity and specific yield of the finer grained sediments is attributed to the clogging of pore spaces by clay.

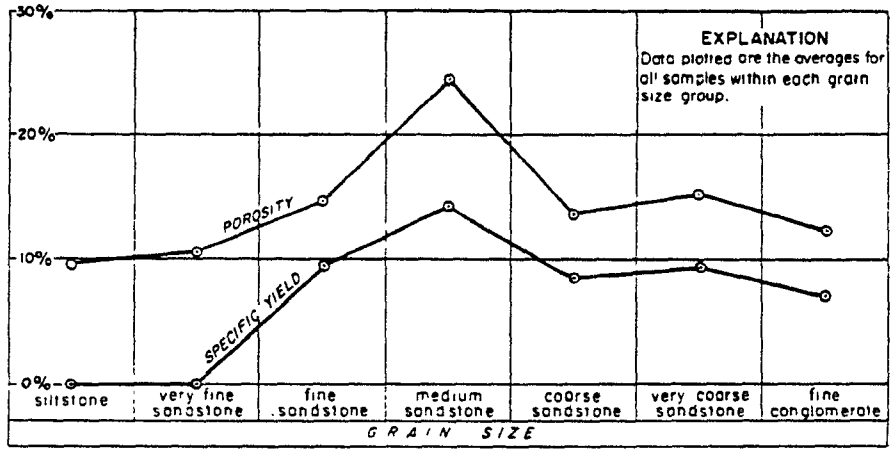


Figure 3. Graph showing the relation of porosity and specific yield to grain size of rock samples from the Stockton formation.

## Pumping tests

When a well is pumped, water levels in the area are lowered, and a cone of depression is formed in the piezometric surface or the water table. As pumping proceeds, the cone continues to deepen and broaden until one of the following conditions is realized: (1) recharge to the aquifer is increased in an amount equal to the pumping rate, (2) natural discharge from the aquifer is decreased in an amount equal to the pumping rate, or (3) the sum of the increased recharge and decreased natural discharge is equal to the pumping rate.

Line A-E on Figure 4 is a theoretical plot of drawdown against time in a well pumping from a homogeneous isotropic aquifer of infinite areal extent and uniform thickness. Other assumptions made in constructing the theoretical curve are: (1) the discharge well has an infinitesimal diameter and completely penetrates the aquifer, (2) no recharge occurs, (3) the water taken from storage in the aquifer is discharged instantaneously with the decline in head, and (4) the coefficient of transmissibility is constant at all places and all times. A plot of recovery against time would coincide with a plot of drawdown

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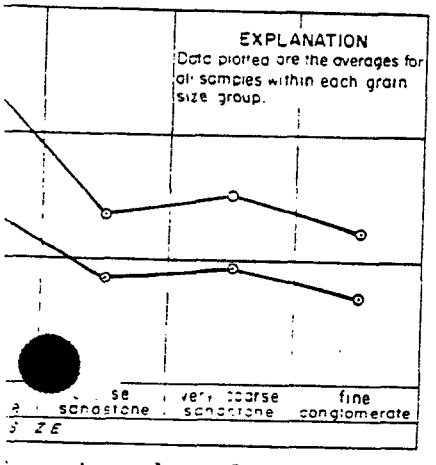


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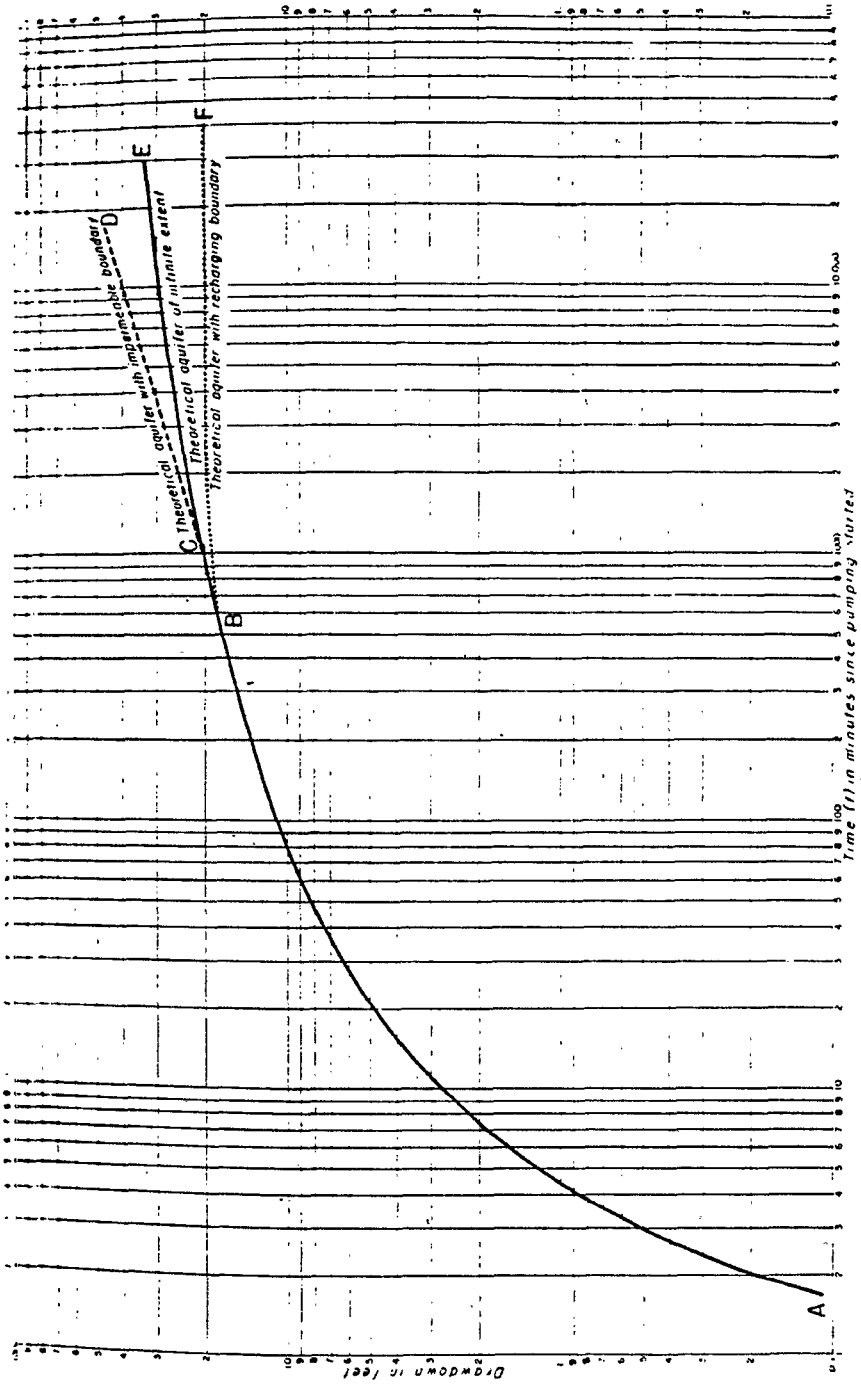


**Figure 4. Logarithmic graph of drawdown in a theoretical aquifer of infinite extent showing the effects of an impermiable boundary and a recharging boundary.**

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against time. Any deviation from the above assumptions will cause a plotted curve to differ from the theoretical curve. For example, line A-B-F on Figure 4 is a drawdown curve whose slope decreases abruptly from that of the theoretical curve at point B, indicating that expansion of the cone of depression has induced recharge to the aquifer from some outside source. Line A-C-D on Figure 6 is a drawdown curve whose slope increases abruptly from that of the theoretical curve at point C, indicating that the cone of depression has expanded to an impermeable boundary — that is, a boundary formed by a formation that yields less water than the major aquifer. An impermeable-boundary condition may appear, for example, when the cone of depression reaches the end of the aquifer and lateral expansion of the cone is stopped or retarded. An impermeable-boundary condition also may indicate a marked decrease in the permeability of the aquifer caused by a change in the lithology of the aquifer at some distance from the well.

Systematic pumping tests were made at the following five locations, to determine the hydraulic properties of the Stockton formation: Phoenixville, Norristown, Blue Bell, Doylestown, and Langhorne. The locations of pumping-test sites are shown on Figure 5. Results of the tests are given in Table 5.

Two pumping tests were made in Phoenixville. In September 1957, well Ch-152 was pumped for 72 hours at an average rate of 60 gpm, and water levels were observed in wells Ch-151,152, and 153. In October 1957, well Ch-152 was pumped for 72 hours at an average rate of 115 gpm, and water levels were again observed in wells Ch-151, 152, and 153.

Analysis of data from the observations wells indicated coefficients of transmissibility ranging from 13,000 to 18,000 gpd (gallons per day) per foot, and a coefficient of storage ranging from $2\times10^{-4}$ to $2\times10^{-5}$. Figure 6 shows the recovery in well Ch-151, during the October 1957 tests, plotted against time. The data yield a curve that follows the theoretical curve for the first 40 minutes and then shows the effect of an impermeable boundary that became effective 40 minutes after the pumping stopped. Plots of data from wells Ch-152 and 153 also show the effects of impermeable boundaries.

Two pumping tests were made at the Norristown State Hospital near Norristown. In August 1956, pumping was stopped for 23.5 hours in well Mg-20, which is pumped continuously at an average rate of 118 gpm. The resulting recovery of water level was observed in well Mg-21. Analysis of the data from Mg-21 indicated a transmissibility coefficient of 23,000 gpd per foot, and a storage coefficient

Table 5. *Summary of pumping tests made in the Stockton formation*

| Pumping | Duration of | Transmissibility |
|---|---|---|

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**Table 5.** *Summary of pumping tests made in the Stockton formation*

| Area | Observation Well | Date | Pumping rate (gpm) | Duration of pumping (hrs.) | Transmissibility T (gpd/ft) | Storage Coefficient S |
|---|---|---|---|---|---|---|
| Phoenixville | Ch-151 | Sept. 1957 | 60 | 72 | 15,000 | $2\times10^{-4}$ |
| | Ch-151 | Oct. 1957 | 115 | 72 | 21,000 | $2\times10^{-4}$ |
| | 1/ Ch-152 | Sept. 1957 | 60 | 72 | 13,000 | ..... |
| | 1/ Ch-152 | Oct. 1957 | 115 | 72 | 17,000 | ..... |
| | Ch-153 | Sept. 1957 | 60 | 72 | 17,000 | $2\times10^{-3}$ |
| | Ch-153 | Oct. 1957 | 115 | 72 | 14,000 | $2\times10^{-3}$ |
| Norristown | Mg-17 | Nov. 1957 | 110 | 71 | 23,000 | $7\times10^{-4}$ |
| | Mg-21 | Aug. 1956 | 118 | 2/ 23.5 | 23,000 | $14\times10^{-4}$ |
| | Mg-21 | Nov. 1957 | 110 | 71 | 24,000 | $12\times10^{-4}$ |
| Blue Bell | Mg-270 | Sept. 1957 | 23 | 64 | 1,000 | ..... |
| Doylestown | Bk-278 | Nov. 1958 | 100 | 44.5 | 8,000 | $2\times10^{-4}$ |
| | Bk-281 | Nov. 1958 | 100 | 44.5 | 16,000 | $1\times10^{-4}$ |
| | Bk-282 | Nov. 1958 | 100 | 44.5 | 14,000 | $2\times10^{-4}$ |
| Langhorne | Bk-723 | June 1957 | 50 | 69 | 23,000 | $5\times10^{-4}$ |

1/ Pumped well
2/ Duration of recovery

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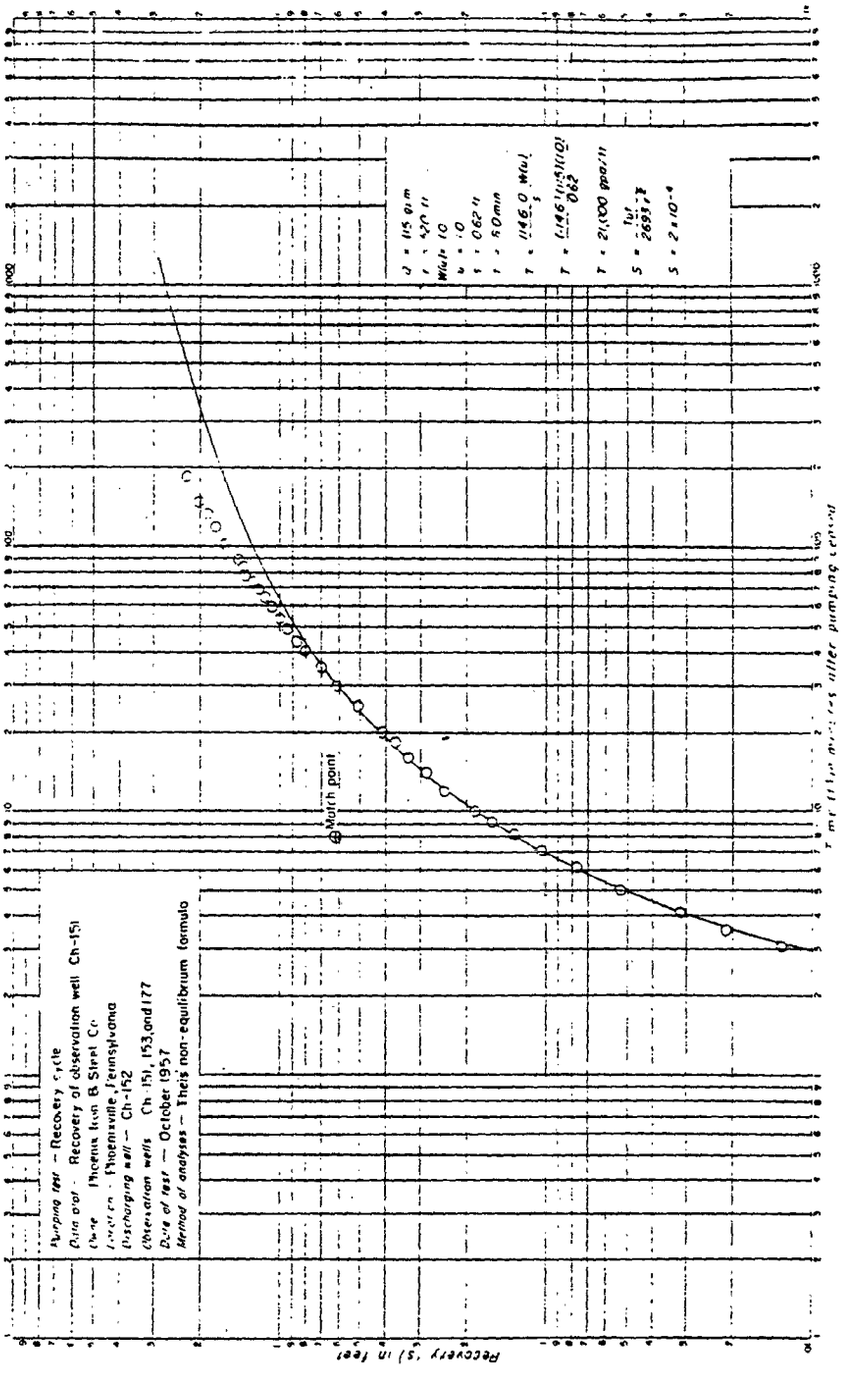


Figure 6. Logarithmic graph of recovery in well Ch-151.

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of $14\times10^{-4}$. Plots of recovery and drawdown show the effects of an impermeable boundary. In November 1957, well Mg-22 was pumped for 71 hours at 110 gpm, and water-level measurements were made in wells Mg-17, 18, 19, and 21. Results from wells Mg-18 and 19, however, were not considered to be reliable. Data from wells Mg-17 and 21 gave transmissibility coefficients of 23,000 and 24,000 gpd per foot and storage coefficients of $7\times10^{-4}$ and $12\times10^{-4}$. Figure 7 shows the drawdown in well Mg-17 plotted against time. The effects of an impermeable boundary appeared in Mg-17 approximately 270 minutes after pumping started.

In September 1957, well Mg-270, at Blue Bell, was pumped for 64 hours at 23 gpm. Analysis of the data indicated a transmissibility coefficient of 1,000 gpd per foot.

Well Bk-277, at Doylestown, was pumped for 44.5 hours in November 1958 at 100 gpm, and wells Bk-278, 281, and 282 were used for observation. Analysis of the data indicated transmissibility coefficients ranging from 8,000 to 16,000 gpd per foot and storage coefficients ranging from $1\times10^{-4}$ to $2\times10^{-4}$. Most of the plots of drawdown and recovery against time showed the effects of an impermeable boundary.

Well Bk-722, north of Langhorne, was pumped for 69 hours in June 1957 at an average rate of 50 gpm, and water-level observations were made in well Bk-723. Analysis of the data indicated a transmissibility coefficient of 23,000 gpd per foot and a storage coefficient of $5\times10^{-4}$.

A pumping test was made at well Ch-177 in November 1959 to determine coefficients of transmissibility and storage of each aquifer penetrated by the well. (See Bennett and Patten, manuscript in review.)

Electric logs indicate that two sandstone aquifers are penetrated by the well: one occupies the interval between depths of 68 and 124 feet, and the other occupies the interval between depths of 152 and 184 feet.

Internal flow in the well under nonpumping conditions was determined by introducing a slug of salt into the well and then tracing the movement of the salt slug by the use of a fluid-resistivity probe. Internal flow was calculated to be 8 gpm upward, indicating that the lower aquifer had the higher head under nonpumping conditions and that the upper aquifer acted as a thieving zone.

When pumping of the well commenced, the water level was drawn down quickly from a static level of 5.82 feet below the top of the casing to 13.90 feet below the top of the casing. This lower level was maintained throughout the remainder of the test. Discharge of

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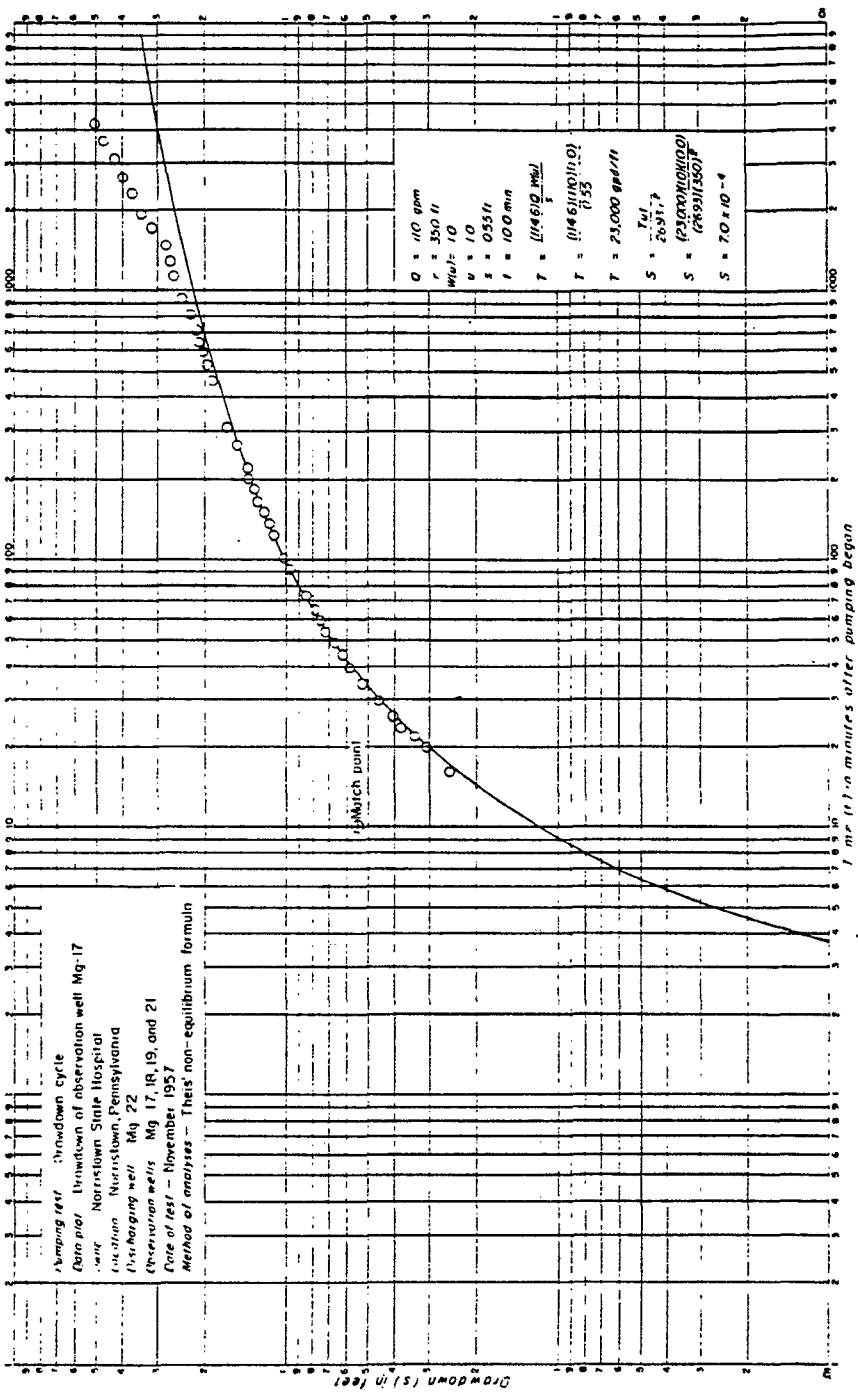


Figure 7. Logarithmic graph of drawdown in well Mg-17.

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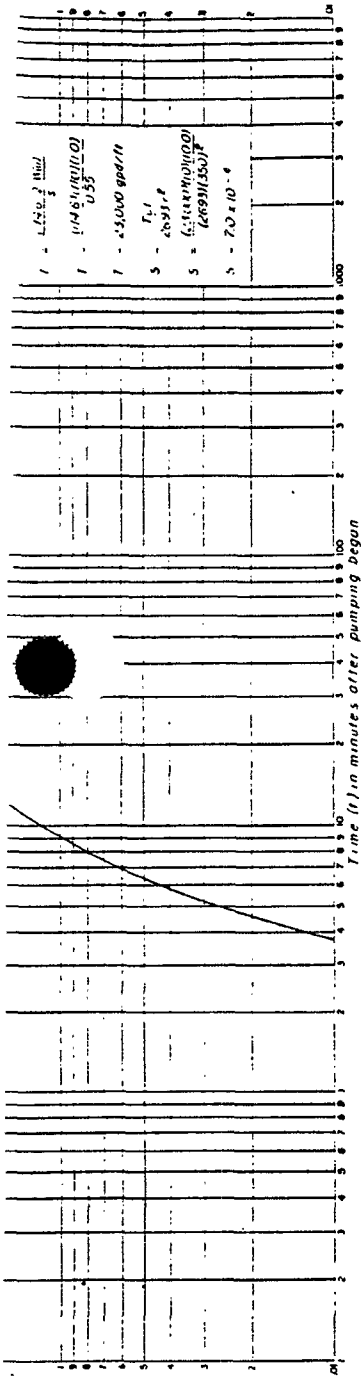


Figure 7. Logarithmic graph of drawdown in well Mg-17.

the lower aquifer during pumping was measured by using an Au flowmeter suspended in the well. The transmissibility and storage coefficients and the original hydrostatic head of each aquifer were calculated to be as follows:

| Aquifer | Transmissibility coefficient (gpd per foot) | Storage coefficient | Static head (In feet below top of casing) |
|---|---|---|---|
| Upper | 10,900 | $1.37 \times 10^{-4}$ | 8.0 |
| Lower | 1,955 | 0.367 | 1.8 |

Bennett and Patten (manuscript in review) noted that the calculated storage coefficient of the lower aquifer was too high and that the difference in transmissibility between the two aquifers was too great. They cite the following sources of error: (1) erroneous flowmeter measurements. (2) well-entrance losses, and (3) incorrect measurement of original internal flow. Nevertheless, they believe that the calculated transmissibilities and aquifer heads are of some value because they have approximate order- of- magnitude significance.

Bennett and Patten (1960) described a method for determining the discharge-drawdown characteristics of each aquifer penetrated by a multiaquifer well. The method makes use of conventional well-logging techniques combined with measurements of flow velocity in the borehole.

Information derived from such tests such as yields, specific capacities, hydrostatic heads, and the location of thieving zones, can be of great importance in the construction and operation of the well or in the development of a well field. For example, such tests can provide data to determine whether or not a thieving zone should be sealed off in a well. In many cases, thieving zones can become producing zones when the head in the well is decreased below that of the thieving zone.

*Discussion of pumping-test results.* The results of the pumping tests in predicting the amount and rate of declines in water levels caused by pumping from wells leave much to be desired. None of the plots of test data matches the type curve for more than a few hours during the initial period of the test. During the remainder of the test periods, the data plot above or below the type curve, indicating departures from the ideal conditions assumed in analyzing the tests by the Theis nonequilibrum method (Theis, 1935).

The tests prove that the Stockton formation does not respond to pumping as an ideal aquifer would. Two reasons for this are that the formation is not isotropic, and it is not infinite in areal extent. It contains an alternating sequence of materials of grossly different hydraulic properties that are intermingled in such a way as to defy simple

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definition by means of coefficients. Even those individual beds that appear to have a uniform permeability throughout their extent do not conform to the ideal-aquifer concept, owing to their lenticular shape and differences in thickness from place to place.

The unreliability of determinations of the coefficients of storage and transmissibility by conventional methods suggests that the hydraulic character of the Stockton formation is too complex to be defined adequately by these coefficients. Among procedures that might yield more satisfactory results are electrical model studies, wherein the hydraulic character of the aquifer is duplicated by electrical circuitry. Before this approach could be used, however, detailed studies would be necessary to establish the parameters of the hydraulic system as it is in nature. Owing to the heterogeneity of the Stockton formation, such an investigation would be extremely difficult, time consuming, and costly. Hence, this approach would not be warranted except in those circumstances where accurate predictions of the effects of pumping are needed to protect a large investment.

## QUALITY OF WATER

Dissolved-solids content in ground water is the result of the leaching of soluble material from the atmosphere, soil and rocks through which the water moves. Factors that control the chemical quality of ground water are: the composition of soil and bedrock, climate, temperature, pressure, length of time the water has been in contact with soil and rock, and human activities such as disposal of industrial waste and sewage.

The most common dissolved chemical constituents of ground water are: calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), iron (Fe), bicarbonate ($HCO_3$), carbonate ($CO_3$), sulfate ($SO_4$), chloride (Cl), fluoride (F), and nitrate ($NO_3$).

Chemical data are available for water from 70 wells in the Stockton formation. (See Table 8.) More than one analysis was available for some wells, but only one relatively recent analysis was used for each well.

The areal distribution of water quality from representative wells is depicted on the map in Plate 4. Figures 8 and 9 are trilinear diagrams showing the percentage composition of important constituents of water samples from the Stockton formation. Sulfate plus chloride is plotted against carbonate plus bicarbonate on one axis; and calcium plus magnesium is plotted against sodium plus potassium on another axis.

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF INTERNAL AFFAIRS

# GROUND WATER RESOURCES OF BUCKS COUNTY, PENNSYLVANIA

By
DAVID W. GREENMAN

TOPOGRAPHIC AND GEOLOGIC SURVEY
BULLETIN W11
1955

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Mangan, and White (1951). The field studies for this report were completed in 1953 by J. C. Kammerer, W. A. Mourant, and N. H. Klein, who made the well inventory and collected water samples for chemical analysis. The analyses were made in the laboratory of the Geological Survey at Philadelphia, Pa.

Much of the information on the geologic units is from a manuscript report on the geology of Bucks County by Bradford Willard, D. B. McLaughlin, E. H. Watson, and others. That report is to be published, when completed, and is now on file with the Director of the Pennsylvania Topographic and Geologic Survey at Harrisburg. The geologic map to accompany that report has been published. It is used as plate 1 in this report.

## PRINCIPLES OF GROUND-WATER HYDROLOGY

### OCCURRENCE AND MOVEMENT

Essentially all the rocks that form the crust of the earth have openings which contain and transmit water. The nature and distribution of the rock openings is determined by the character of the rocks, and by their geological experience. Unconsolidated rocks and weakly cemented granular rocks contain primary openings—that is, interstitial voids that are products of the original conditions of deposition. Consolidated rocks, including cemented sandstone, shale, limestone, and crystalline rocks, contain cavities comprising joints, openings along planes of bedding and schistosity, faults, etc., which commonly have been enlarged by solution. These openings are termed secondary because they are not inherent to the rock but occur as a result of crustal movements, solution, or the action of destructive weathering processes that modified the rock after it was deposited.

The flow of springs and the water obtained from wells is ground water. Ground water is defined as that part of the water beneath the surface of the earth that occurs in the zone of saturation. In the zone of saturation all the connected pores, crevices, and voids in the rock are filled with water under hydrostatic pressure. The number, size, and shape of the rock openings, and the degree of interconnection between them, determine the effectiveness of any saturated rock unit as a source of water. A body of rock that yields sufficient water to make it an economic source of supply is called an aquifer.

As a part of the earth's natural drainage system, ground water moves under the influence of gravity from intake areas toward lower levels, and ultimately to points of discharge. The direction and rate of movement are controlled by the "hydraulic gradient," which is defined as the difference in head between two points divided by the flow distance between them. Unlike flow on the land surface, where water moves freely in open channels, ground-water flow is through openings in the rocks. Because most of these openings are small, they offer considerable resistance to the flow of water. Consequently, the natural rate of ground-water movement is slight compared to that of surface water, and is commonly measured in terms of feet or fractions of a foot per day, or even per year.



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Precipitation is the source of essentially all ground water. Ground water may be derived either from local precipitation or (more commonly in arid regions than in Pennsylvania) from streams whose channels are cut into water-bearing beds. In general, ground-water supplies in the consolidated rocks of the Piedmont are replenished entirely by precipitation which falls within the outcrop area of the individual formations. Under natural conditions, local precipitation probably would be the principal source of recharge to the unconsolidated deposits also, but, since the time wells of large yield first tapped the valley-fill and Coastal Plain sediments in southeastern Bucks County, a part of the recharge has been furnished by infiltration of water from the Delaware River.

Ground water is obtained for use through wells and springs. Springs are natural ground-water outlets. They were in extensive use as a source of supply in the early days, but have been largely replaced by wells since the development of modern drilling and pumping methods.

Wells intercept ground water as it moves through the rocks toward points of natural discharge or induce infiltration of water from a surface source, such as a lake or stream. The long-term yield of a well is determined by the hydraulic characteristics of the aquifer—the ability of the aquifer to store and transmit water, the rate of replenishment of water to the aquifer, and the construction of the well. The hydraulic characteristics of an aquifer are expressed as its coefficients of storage and transmissibility. The coefficient of storage is defined as the volume of water released or taken into storage by the aquifer per unit surface area of the aquifer per unit change in the component of head normal to that surface. The storage coefficient controls the rate at which the cone of influence about a pumped well will expand into other parts of the aquifer. If a well that taps a homogeneous aquifer is pumped, the rate of expansion of the cone of depression—or the rate of transmission of the effect of withdrawal—varies inversely with the storage coefficient of the aquifer, and is independent of the quantity of water that is pumped from the well.

The coefficient of transmissibility is defined as the field coefficient of permeability times the thickness of the aquifer in feet. The field coefficient of permeability is defined as the rate of flow, in gallons per day, through a unit cross-sectional area of the aquifer under a unit hydraulic gradient at the prevailing temperature of the water. The coefficient of transmissibility is a principal factor determining the amount of drawdown in a pumped well because it controls the slope of the cone of depression.

The transmissibility of an aquifer is closely related to the specific capacity of wells that tap it. Specific capacity is defined as the yield of a well per unit decline of water level, and is commonly expressed as gallons per minute per foot of drawdown. The specific capacity of a well generally varies directly with the transmissibility of the aquifer through the range of discharge rates at which water entering the well obeys the laws of laminar flow, under which head loss is proportional to velocity. However, at higher discharge rates the velocity of entry exceeds the critical velocity for the aquifer, and at least a part of the

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water enters the well under conditions of turbulent flow, for which head loss varies as the square of the velocity.

Ground water may occur under either water-table or artesian conditions. Under water-table conditions the ground water is not confined and the water level in a well marks the upper surface of the zone of saturation, called the water table. Under artesian conditions there is no water table, as the ground water is confined under hydrostatic pressure between two relatively impermeable bodies of rock, and the water level in a tightly cased well is above the upper limit of the artesian aquifer. The imaginary surface defined by the levels to which the water will rise in artesian wells is called the piezometric surface.

True artesian conditions exist in nature on only a minute scale, because no rock is completely impervious over a large area. A confining bed need only be less permeable than the underlying strata to produce artesian head in those strata. Thus a rock formation may be sufficiently permeable to be an aquifer, but if it is less permeable than the underlying rock it may also act as a confining bed. If there is no sharp contrast in the permeabilities of the respective beds, or if the confining bed is discontinuous, the confined water may be said to occur under semiartesian conditions. Such conditions prevail for most occurrences of confined ground water in Bucks County.

There are significant differences in the behavior of ground water in water-table and artesian aquifers. Water-table aquifers function as natural reservoirs of ground water from which withdrawals can be made between periods of replenishment; water-table conditions occur in the catchment areas of aquifers where the rock is exposed to recharge directly from above. Widespread circulation of ground water does not occur in water-table aquifers even though they underlie most of the land area in a humid region such as eastern Pennsylvania. Because of the local origin of recharge, the water table is always a subdued replica of the surface topography; therefore the direction and slope of the natural hydraulic gradient in any locality is related to the local topography. The ground water drains from the uplands towards the valleys and is discharged through springs or seeps along the valley walls and in stream beds. Furthermore, the physical nature of water-table aquifers does not favor extensive movement.

The storage coefficient of water-table aquifers may range from 0.01 to 0.40 (and commonly is greater than 0.10). Withdrawal of water from a water-table aquifer is supplied from aquifer storage by draining the pore spaces of the saturated rock in the vicinity of the locus of withdrawal. The resulting decline in water level around the point of discharge occurs in the form of an inverted cone which expands until it intercepts sufficient recharge to balance the withdrawal without further dewatering of the aquifer. Because of the large storage capacity of water-table aquifers, the cone of influence expands slowly; and, because recharge is locally derived from downward-percolating waters, the area of influence does not extend any great distance from the point of discharge. Consequently, fluctuation of water level in one area will not appreciably influence water levels in other areas, and excessive local withdrawals during droughts may cause critical declines of water level in water-table aquifers even though nearby areas are not affected by the pumping.



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An artesian aquifer functions largely as a natural conduit that is recharged from the part of the aquifer that is under water-table conditions at the outcrop, and that transmits ground water under hydrostatic pressure to points of escape where the confining bed is absent or broken, or where water is withdrawn through wells. Artesian aquifers favor long-distance circulation of ground water. Their occurrence may be independent of the surface topography; points of recharge and discharge may be far from one another, and movement of the water is the result of unbalanced hydrostatic pressure on the confined water. As under water-table conditions, the ground water moves in the direction of the hydraulic gradient, but the hydraulic gradient in an artesian aquifer is commonly more persistent over wide areas than that in a water-table aquifer because it is not influenced by local topographic features.

The storage coefficient of artesian aquifers is commonly less than 0.001. Under artesian conditions this value is related to the elasticity of the aquifer and the contained water, not to the drainable pore space as under water-table conditions. Artesian aquifers may have as large a porosity as water-table aquifers, but the yield of an artesian well is not supplied by dewatering the aquifer—rather it is derived from compaction of the aquifer skeleton and expansion of the water as the hydrostatic pressure is decreased in response to the withdrawal of water. When an artesian well discharges, the resulting decline of pressure head is transmitted rapidly through the aquifer to outcrop areas or boundaries where the rates of discharge and recharge adjust to balance the withdrawal. Thus, fluctuations of water level at a given point in an artesian system may be reflected in a change in conditions of recharge or discharge at a considerable distance. By the same reasoning, local droughts have little effect on artesian water levels in the locality because artesian aquifers commonly have remote sources of recharge.

## QUALITY OF GROUND WATER

### *Chemical Quality*

The chemical and physical characteristics of ground water are important factors to consider in any description of the hydrology of an aquifer. The quality of ground water is intimately related to its source of recharge and to its geologic habitat; and in many instances it is the factor that determines the usability of the aquifer as a source of supply.

All natural ground waters contain dissolved mineral matter, the result of leaching of soluble material from the soil and rock with which the water has been in contact. The types and concentrations of the minerals in solution are primarily functions of the types of rock through which the water has moved, the length of time of the contact, and the physical conditions of the contact—that is, the temperature and pressure. Consequently, the natural chemical character of ground water commonly bears a distinct relation to that of the aquifer in which it occurs.

Human activities may cause significant changes in the chemical quality of ground water. Mineral and organic impurities are introduced directly into aquifers through wells used for disposal of sewage and industrial wastes. Even more widespread and appreciable changes in the chemical



300522

to the Hellam member is present at its base. Rather, thin beds of conglomerate occur throughout the Hardyston.

The structural and stratigraphic mode of occurrence of the Hardyston in the Reading Hills is almost identical with that of the Chickies in the Buckingham area. The base is in normal sedimentary contact with the underlying crystalline rocks of Precambrian age and the upper contact is generally thought to be transitional into the overlying limestone of Cambrian age. It is bounded on the south by a major normal fault which separates the beds of Cambrian age from beds of Triassic age.

In the Durham area the Hardyston quartzite ranges in thickness from less than 100 feet to about 300 feet. This conforms with the general belief that the quartzite beds of Early Cambrian age are contemporaneous, but that the aggregate thickness of the beds increases to the south as the result of the addition of the Hellam member to the sequence. It has been theorized that the quartzite rocks of Early Cambrian age were deposited during the first invasion of Paleozoic seas into the Appalachian geosyncline.

### *Ordovician System*

*Cocalico phyllite.* The Cocalico phyllite is exposed in a small triangular area west of Furlong in Buckingham Valley. It is a dark-colored platy to finely laminated rock that ranges in texture from phyllite to slate. In some exposures the phyllite exhibits a faint bedding that apparently dips gently to the north beneath the sedimentary rocks of Triassic age.

The Cocalico phyllite is in fault contact with limstone of Cambrian age on the east, and with shale of Triassic age on the south. To the north and west it unconformably underlies sandstone of the Stockton lithofacies of Triassic age. Beds of the Cocalico phyllite having a stratigraphic thickness of about 200 feet are exposed in the area, but the total thickness of the formation is unknown, as neither the upper nor the lower contact is exposed in the area.

### *Triassic System*

*Diabase.* Beds of Late Triassic age, particularly the Brunswick lithofacies, are extensively intruded by diabase, popularly known as traprock. Diabase occurs in nearly vertical dikes which cut across the bedding of the sedimentary strata, and in sills which commonly are conformable with the bedding. As the diabase has greater resistance to erosion than the sediments, it form conspicuous ridges where dikes are exposed and prominent uplands where sills are exposed.

The lithology of the diabase is remarkably uniform from place to place. It includes nearly equal amounts of plagioclase feldspar and augite, and ilmenite, quartz, and apatite as accessory minerals. Diabase rocks weather to boulders which, when exposed, are often covered with a rust-colored oxidized coat; fresh surfaces are greenish gray in color and have a conchoidal fracture. The texture of the diabase varies somewhat according to its mode of occurrence. In the thinner dikes the rock may be exceedingly fine grained, but the larger dikes and sills consist of medium- to coarse-grained rock that closely resembles granite.



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The diabase intrusions occurred late in the Triassic period, near the end of the Brunswick deposition. They cut rocks that range in age from Precambrian through Triassic, but they do not share in any of the crustal movements that occurred prior to the Triassic period.

The diabase intrusives are correlative at least in part with basaltic lava flows that are interbedded with beds in the upper part of the Brunswick lithofacies in central New Jersey. The diabase and balsalt probably had a common magmatic source. They are chemically identical and differ from one another only in texture, because the diabase solidified before reaching the land surface.

## WATER-BEARING CHARACTERISTICS OF THE CRYSTALLINE ROCKS

Although the crystalline rocks differ greatly in origin and in most of the chemical and physical characteristics which are used in describing rocks, their basic hydrologic properties are generally similar. All are dense, massive rocks which, in their original state, are relatively impervious to water. Essentially all ground water in the crystalline rocks occurs under water-table conditions in the weathered zone near the land surface, where openings resulting from faulting and jointing have been enlarged by frost action, the roots of vegetation, and solution of the rock-forming minerals by circulating ground water. These cavities constitute only a small part of the total volume of the rock, but they provide for the storage and movement of considerable quantities of ground water.

The forces of weathering are most effective at the rock outcrop. With depth the water-bearing cavities decrease in size and number, as the weathered material grades into unaltered rock. The weathered zone is thickest in areas of low to moderate relief; it is best developed in valleys because there is continuous circulation of ground water in the vicinity of streams, which are the principal localities of natural discharge of ground water. The weathered zone is least thick, and may be absent, in areas of high relief. Judging from records of drilled wells, the maximum thickness of the weathered material commonly does not exceed about 150 feet, and yields of wells are not appreciably increased by drilling below that depth. Most successful wells obtain their supplies from the zone of partly weathered rock that lies between the disintegrated rock at the land surface and the fresh rock at depth. A few wells are reported to obtain water from depths of 500 feet or more, probably from faults, exceptionally large joints, or shattered quartz veins. Successful deep wells are the exception, however, and their aggregate yield does not constitute an appreciable part of the ground-water supply.

The storage coefficient of the crystalline rocks is in the low range of water-table values. It probably ranges from about 0.005 to about 0.02. The specific capacity of wells that tap the crystalline rocks is also moderately low to very low, as shown in the following table of reported specific capacities of wells.

| *Formation* | *Number of wells* | *Average specific capacity* | *Range in specific capacity* |
|---|---|---|---|
| Wissahickon schist ..... | 8 | 1.70 | 0.17 - 5.0 |
| Gneiss ..... | 3 | 2.69 | 1.27 - 5.29 |
| Quartzite ..... | 2 | 1.50 | .23 - 1.67 |



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| | 0.17 - 5.0 |
| | 1.27 - 5.29 |
| | .23 - 1.17 |

## Crystalline Rocks

From an analysis of the hydraulic characteristics of the crystalline rocks it is apparent that a typical well that taps these beds will exhibit appreciable drawdown at any pumping rate, but the effect of the withdrawal will not be transmitted any great distance from the well, probably no more than a few hundred feet in most localities, unless the yield and rate of pumping are high.

In some areas the ground water may be semiconfined in the partly altered rock that occurs between the decomposed material at the surface and the fresh rock; or it may be confined in fault zones that occur at considerable depth in the fresh rock, or in the weathered rock that underlies the unconsolidated fill in the valley of the Delaware River. The upper part of the crystalline rock beneath the valley commonly consists of decomposed rock that serves as a confining bed on the underlying partly altered rock. Where the confining bed is continuous beneath the unconsolidated deposits, the water in the crystalline rock has a definite gradient riverward from the Fall Line. A few wells drilled through the valley fill into the crystalline rock have flowed at the surface. In most places, however, the confining bed is discontinuous and there is interchange of water between the crystalline and unconsolidated rocks. In these areas the water level in a well that taps crystalline rocks is about the same as the water level in a nearby well that taps unconsolidated beds. Occurrences of semiconfined conditions have little effect on the regional hydrology of the crystalline rocks, however, because their influence is local.

The crystalline rocks of Precambrian age, particularly the gneisses, schists, and quartzites, are reliable sources of small to moderate supplies of ground water. Little is known of the water-bearing characteristics of the Cocalico phyllite, but it appears to be a less favorable source of water supply than the other crystalline rocks. The reported yields of wells that tap gneiss, quartzite, and the Wissahickon schist are summarized in the following table.

| *Formation* | *Number of wells* | *Range in yield (gpm)* | *Average yield (gpm)* |
|---|---|---|---|
| Wissahickon schist | 12 | 2 - 200 | 45 |
| Gneiss | 16 | 2 - 200 | 42 |
| Quartzite | 31 | 1 - 125 | 38 |

As to chemical quality, the crystalline rocks of Precambrian age yield the most desirable ground water available in Bucks County. The water commonly is low in dissolved solids and hardness, and is free of objectionable mineral matter except iron, which may be present in concentrations that exceed the generally accepted limit of 0.3 part per million.

Analyses of representative samples of water from gneiss, quartzite, and the Wissahickon schist are given in table 2.

Special mention should be made of the water-bearing characteristics of diabase because it underlies a larger area of Bucks County than all other crystalline rocks combined. Diabase is the poorest aquifer in Bucks County—so poor, in fact, that many drillers will not accept contracts to make wells in this formation. The thickness of the weathered zone in diabase seldom exceeds about 75 feet and probably averages no more than 50 feet. Wells generally obtain their yields from depth of 50 feet



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## TABLE 2.—Analyses of Water From Crystalline Rocks

(Parts per million. Numbers correspond to numbers in tables of well data for the counties)

| Well No. | Location | Date | Silica ($SiO_2$) | Iron (Fe) | Total iron | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids | Total hardness as $CaCO_3$ | Non-carbonate | Specific conductance (at 25°, micromhos) | pH | Temperature (°F.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Wissahickon Formation** | | | | | | | | | | | | | | | | | | | | |
| Bk-462 | OKO Plush Co., Inc. | 4-28-53 | 24 | .03 | 3.4 | 4.1 | 1.7 | 8.3 | 2.4 | 26 | 9.1 | 5.4 | .1 | .3 | 72 | 17 | .0 | 76.3 | 5.9 | 57 |
| Bk-471 | Hi-Way Pool, well 1 | 9-8-53 | 13 | .05 | .27 | 11 | 9.9 | 10 | 2.4 | 16 | 18 | 40 | .0 | 25 | 171 | 76 | 63 | 265 | 5.5 | 55 |
| Bk-488 | Frank J. Lotz | 4-28-53 | 12 | .01 | .04 | 22 | 9.1 | 21 | 4.4 | 26 | 48 | 34 | .1 | 30 | 246 | 92 | 71 | 384 | 5.2 | 54 |
| Bk-585 | Hunter Manufacturing Corp., well 2 | 4-16-53 | 19 | .02 | .36 | 20 | 3.6 | 8.5 | 2.8 | 38 | 41 | 8.0 | .1 | 1.9 | 127 | 65 | 34 | 176 | 6.1 | 53 |
| Bk-598 | Publicker Industries, Inc. | 1-21-54 | 20 | .00 | .15 | 14 | 8.3 | 7.4 | 2.8 | 26 | 18 | 16 | .1 | 34 | 154 | 69 | 48 | 198 | 6.9 | 58 |
| Bk-610 | Fairless Hills, well 5 | 4-21-53 | 20 | .04 | .06 | 4.5 | 2.2 | 2.2 | 1.3 | 8 | 1.6 | 5.5 | .1 | 13 | 58 | 20 | 14 | 67.9 | 5.3 | 52 |
| Bk-612 | Fairless Hills, well 7 | 4-24-53 | 20 | .01 | 1.3 | 8.1 | 4.0 | 5.4 | 2.2 | 40 | 13 | 4.0 | .2 | .8 | 90 | 37 | 4 | 111 | 6.0 | 53 |
| **Gneiss** | | | | | | | | | | | | | | | | | | | | |
| Bk-436 | Yardley Water & Power Co., well 5 | 4 9 53 | 15 | .02 | 1.1 | 18 | 7.0 | 16 | 3.3 | 100 | 9.5 | 8.0 | .1 | 5.8 | 138 | 74 | .0 | 211 | 6.8 | 54 |
| Bk-451 | Parkland Water Co., well 2 | 4-8-53 | 13 | .02 | .41 | 10 | 2.4 | 6.0 | 1.3 | 38 | 2.8 | 9.0 | .0 | 3.8 | 78 | 35 | 4 | 100 | 5.3 | 53 |
| Bk-454 | Parkland Water Co., well 5 | 4 15-53 | 11 | | | | | 4.6 | | 20 | 14 | 14 | | 13 | | 48 | 35 | 156 | 5.7 | 53 |
| Bk-456 | Langhorne Spring Water Co., well 2 | 9-7-53 | 8.7 | .06 | .20 | 2.9 | 1.3 | 5.0 | 1.3 | 8 | .3 | 7.0 | .0 | 7.9 | 51 | 13 | 6 | 63.6 | 5.4 | 53 |
| Bk-621 | Bucks County Farms Dairies, well 1 | 4-30-53 | 17 | .05 | .10 | 7.4 | 5.0 | 4.7 | 2.0 | 23 | 11 | 11 | .1 | 7.4 | 92 | 39 | 20 | 120 | 7.2 | 54 |
| **Quartzite** | | | | | | | | | | | | | | | | | | | | |
| Bk-340 | Walter M. Reil | 4 14 53 | 8.9 | .04 | .18 | 4.3 | 2.0 | 5.6 | 2.2 | 16 | 2.3 | 8.2 | .0 | 10 | 55 | 19 | 7 | 81.5 | 5.2 | 53 |
| Bk-395 | Somerton Springs Swimming Club | 4-28-53 | 17 | .01 | .18 | 9 1 | 2.9 | 6.1 | 1.2 | 29 | 5.1 | 6.9 | .0 | 13 | 85 | 35 | 11 | 108 | 5.9 | 53 |
| Bk-453 | Parkland Water Company | 4 15-53 | 15 | .03 | .03 | 35 | 6 6 | | 1.4 | 100 | 26 | 14 | .0 | 13 | 191 | 114 | 33 | 280 | 6.4 | 53 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bk-451 | Parkland Water Co., well 5 | 4-15-53 | 11 | | | | | 4.6 | | 20 | 14 | 14 | | 13 | | 48 | 35 | 156 | 5.7 | 5 | |
| Bk-136 | Langhorne Spring Water Co., well 2 | 9-7-53 | 8.7 | .06 | .09 | 2.9 | | 5.0 | 1.3 | 8 | .3 | 7.0 | .0 | 7.9 | 51 | 13 | 6 | 63.6 | 5.4 | 53 | |
| Bk-161 | Bucks County Farms Dairies, well 1 | 4-30-53 | 17 | .05 | .10 | 7.4 | 5.0 | 4.7 | 2.0 | 23 | 11 | 11 | .1 | 7.4 | 92 | 39 | 20 | 120 | 7.2 | 54 | |

**Quartzite**

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bk-340 | Walter M. Reiff | 4-14-53 | 8.9 | .04 | .18 | 4.3 | 2.0 | 5.6 | 2.2 | 15 | 2.3 | 8.2 | .0 | 10 | 55 | 19 | 7 | 81.5 | 6.2 | 53 | |
| Bk-395 | Somerton Springs Swimming Club | 4-28-53 | 17 | .04 | .18 | 9.1 | 2.9 | 6.1 | 1.2 | 20 | 5.1 | 6.9 | .0 | 13 | 85 | 35 | 11 | 108 | 5.9 | 53 | |
| Bk-453 | Parkland Water Company | 4-15-53 | 15 | .03 | .03 | 35 | 6.0 | 8.8 | 4.4 | 100 | 26 | 14 | .0 | 13 | 191 | 114 | 83 | 290 | 6.4 | 53 | |
| Bk-458 | Langhorne Spring Water Company | 9-7-53 | 17 | .06 | 1.6 | 25 | 5.1 | 4.5 | 3.8 | 80 | 13 | 8.0 | .4 | .3 | 122 | 83 | 18 | 203 | 7.1 | 53 | |

**Diabase**

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bk-97 | Milford Square Pants Company | 4-20-53 | 18 | .04 | 1.4 | 48 | 15 | 11 | 2.3 | 190 | 34 | 8.5 | .1 | 3.7 | 247 | 181 | 21 | 884 | 7.3 | 52 | |
| Bk-136 | Sellersville Borough, well 1 | 4-8-53 | 25 | .01 | .4 | 94 | 9.1 | 4.4 | 1.0 | 120 | 109 | 2.2 | .1 | .3 | 398 | 272 | 169 | 536 | 7.5 | 55 | |



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or less, and the maximum depth from which a well in diabase in the county is reported to obtain water is 125 feet. The capacity of diabase to store and transmit water is extremely low, and many wells are failures. No specific-capacity tests are available for wells that tap diabase, but the average specific capacity is probably only a fraction of a gallon per minute per foot of drawdown of water level. The reported yields of five wells in diabase range from 2 gpm to 45 gpm and average 23 gpm. However, this accounting is based only on successful wells. If failures are included, the average yield of wells is probably less than 5 gpm.

The water from the diabase generally is moderately mineralized and hard, and sometimes has objectionable amounts of iron in solution. Some samples contain relatively high concentrations of sulfate and have corresponding high noncarbonate hardness. Analyses of two representative samples of water from diabase are given in table 2.

## GEOLOGY OF THE CARBONATE ROCKS

### *Cambrian System*

The nomenclature and correlation of the limestones of Cambrian age in Bucks County are subject to technical controversy. Bascom, Clark, Darton, and others (1909) mapped the entire sequence of limestone deposits, including those of Ordovician age, as a single unit which they called the Shenandoah limestone. In a later investigation Bascom, Wherry, Stose, and Jonas (1931) subdivided the Shenandoah limestone in the Buckingham area into three mappable units which they correlated with the Beekmantown limestone, of Ordovician age, and the Conococheague and Elbrook limestones, of Cambrian age. Other investigators used the names Tomstown or Leithsville in place of Elbrook, and Allentown in place of Conococheague. Howell, Roberts, and Willard (1950) took exception to previous interpretations of the stratigraphic sequence of the Cambrian limestones of Bucks County, chiefly because the beds had not been systematically traced from type areas into eastern Pennsylvania. They proposed the following local terminology, the formational names being given in descending order: Allentown (restricted), Limeport, and Leithsville. The Allentown and Limeport in this restricted definition are equivalent respectively to the upper and lower parts of the Conococheague limestone, and the Leithsville is equivalent to the Elbrook or Tomstown formations. This terminology was used in the text of the report on Bucks County by Willard, McLaughlin, Watson, and others (unpublished manuscript); but on their geologic map, which is also used for this report, they retain the nomenclature of Bascom, Wherry, Stose, and Jonas (1931) for the Buckingham area, and do not differentiate between the various beds in the Durham area except to show two narrow belts of the Tomstown formation (Leithsville) along the Triassic border fault.

In view of the obvious uncertainty regarding the identification and correlation of the Cambrian limestones, and to be consistent with both the accompanying geologic map and current terminology as defined by Willard, McLaughlin, Watson, and others, the formations are discussed below as shown on the geologic map.



300528

1 part per million of this undesirable constituent. Except for their hardness the limestone waters are as a rule excellent waters.

Wells deriving their water from solution channels are liable to serious contamination because of the rapidity with which the water moves along the channels. Care should therefore be taken in choosing a site for a well that is near sources of pollution."

## GEOLOGY AND HYDROLOGY OF THE TRIASSIC ROCKS

Rocks of Triassic age play an important part in the geology of the northeastern Atlantic seaboard from Nova Scotia to North Carolina. The character and occurrence of the deposits are remarkably similar throughout this area. All the Triassic rocks occur in structural basins elongated in a north-south or northeast-southwest direction. In general they consist of thick sequences of nonmarine sediments, predominantly red to brown in color. The sediments are intruded by diabase dikes and sills in many areas, and the upper strata are commonly interbedded with thick flows of basaltic lava. The beds frequently occur in large blocks that are tilted and separated from one another by normal faults. The underlying rocks range in age from Precambrian to Carboniferous, but they are always separated from the Triassic rocks by a profound unconformity.

The Triassic sedimentary rocks and interbedded lava flows constitute the Newark group, which was named for exposures in the vicinity of Newark. The igneous intrusives also are of Triassic age, but because they are not conformable with the stratified rocks, they are not included as part of the Newark group, and are at least in part of later origin.

### *Newark Group*

Owing to the similarity of the lithology, structure, stratigraphic relations, and fossil content of the Triassic rocks, the term Newark group is applied to all occurrences of these rocks in northeastern North America. However, it has not been possible to subdivide the group into formations or members that can be correlated from one basin to another, or even throughout any of the larger basins. Deposition was largely controlled by local environment, and similar conditions apparently occurred at different times in different areas.

The diabase does not have a name common to all areas of occurrence. It may carry a local name, but it is generally referred to simply as "traprock."

The Newark group is believed to be of Late Triassic age. This correlation is based in part on paleontologic data, and in part on structural and stratigraphic evidence. Fossil plants and animals correspond within general limits to European forms, but it has not been possible to correlate equivalent beds in the European and American strata. The Newark group rests unconformably on older rocks, and it shows no effects of the structural deformation that occurred at the end of the Paleozoic era. On the other hand, the Newark group is distinctly older than the Cretaceous deposits. Rocks of the Newark group were intruded by diabase, then faulted and tilted, and finally peneplaned before deposition of Lower Cretaceous sediments.

Triassic rocks are a dominant feature of the geology of Bucks County. The Newark group underlies nearly three-quarters of the total land



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area, and diabase dikes and sills underlie an additional tenth of the county. Except for the isolated areas of Cambrian rocks in the Buckingham and Durham valleys, the Triassic deposits form the land surface of all Bucks County north of the Precambrian border near Langhorne.

The Newark group and associated intrusives in Bucks County occur in part of the largest belt of Triassic rocks in northeastern North America. The deposits occur in a broad, downfaulted intermontane basin that extends from southeastern New York State across New Jersey, southeastern Pennsylvania, and central Maryland into northern Virginia. The belt is broadest in Bucks County, where it attains a width of 32 miles.

In Bucks County the Newark group consists chiefly of interbedded red shale and red sandstone, with subordinate amounts of conglomerate, arkose, and argillite. No lava flows have been identified in the county, but they are known to occur to the west in Berks County, and to the east in New Jersey.

The origin of sediments of the Newark group has been the subject of considerable debate. The latest studies (McLaughlin, unpublished manuscript) indicate that they are products of the erosion of uplands that lay to both the north and the south of the outcrop area of the Triassic rocks. Arkose and conglomerate on the south side of the belt were derived from the crystalline rocks of Precambrian and Cambrian age that bordered the basin on the south. Sandstone, shale, and fanglomerate on the north were derived from the sediments of Silurian, Devonian, and Mississippian age that bordered the basin on the north. The beds are thickest in the center of the basin, which probably subsided during the period of deposition. They thin toward their areas of origin. On the side of the basin opposite from their sources the older beds pinch out against the floor of the basin, and the younger beds overlap the older rocks.

In the basin that extends from Virginia to New Jersey the great normal-fault blocks are tilted toward the northwest, and in Bucks County most of the Triassic strata dip in that direction at angles ranging from 5° to 20°. Folding is not a prominent feature, but near the large faults drag folds occur and beds have dips as great as 50°. Beds that underlie the large intrusive bodies in the northern part of the county are warped into gentle synclinal folds which lie superimposed on the regional monocline.

Estimates of the total thickness of the Newark group in Bucks County range from about 2,000 feet to more than 12,000 feet. The higher figure is favored by most investigators, but others claim that repetition of strata due to faulting gives the illusion of great thickness to deposits that are no more than 2,000 feet thick. McLaughlin (unpublished manuscript) estimates the thickness to be about 12,000 feet, after taking into account duplication of beds caused by major faults. He acknowledges the possibility of some error due to undiscovered minor strike faults, but he believes possible errors to represent only a small percentage of the total thickness, because there has been no significant displacement of major beds.

Kummel (1897) subdivided the Newark group into three lithologic units. They are, in ascending order, the Stockton sandstone, the Lockatong black argillite, and the Brunswick red shale, named after type localities in western New Jersey. A fourth rock type, the border conglomer-



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ate, was identified as a facies of the other three units. The divisions established in New Jersey are applicable in Bucks County, but a short distance to the west they grade into a two-unit group. Each division of the Newark group was originally designated a series, but the three divisions have since been redefined as formations in reports of the United States Geological Survey. In describing the beds, Kummel recognized that they are interfingering sedimentary facies which represent rapidly changing conditions of local deposition, and have little significance as time markers. This interpretation was expanded considerably by McLaughlin (unpublished manuscrapt), who attributed the interfingering to derivation of the sediments from different sources, and he redefined the unit terms as lithofacies, as distinguished from formations, which commonly imply temporal limits. As geologic and hydrologic studies in Bucks County are closely related, the same nomenclature is used in this report. The individual lithofacies have been described as follows.

*Stockton lithofacies.* The Stockton lithofacies crops out in two areas in central and southeastern Bucks County. (See pl. 1.) The southern belt traverses the entire county in a general west-southwest direction. Its width is about 4 miles at the Delaware River, but it increases westward to about 6 miles at the Montgomery County line. The belt is bounded on the south by Precambrian rocks and on the north by the Lockatong lithofacies.

The central belt of the Stockton lithofacies trends southwestward across the county to Chalfont, where it is cut by a large normal fault. The belt narrows locally where the fault cuts diagonally across it. This central belt is bounded on the south by exposures of Paleozoic rock in the Buckingham area, on the west by the fault which separates the Stockton from younger Triassic rocks, and on the north by rocks of the Lockatong lithofacies.

The Stockton lithofacies consists of light-colored coarse-grained arkosic standstone and conglomerate, red to brown fine-grained siliceous sandstone, and red shale. In general, arkosic beds are more characteristic of the Stockton than is shale. The most conspicuous features of the beds are the dominant red color and the abundance of arkose throughout the section except in the uppermost beds. The different lithologies are interbedded in no regular order and are frequently repeated. Single beds rarely can be traced for any appreciable distance along an outcrop. They commonly pinch out, or grade into beds having different textures and/or compositions, but certain sequences of beds may persist for many miles. Some of the thick arkose and red sandstone beds can be identified at widely separated points.

The Stockton lithofacies weathers to an undulating topography of moderately low relief. Most of the valleys are eroded into the soft red sandstone beds, whereas the uplands are underlain by more resistant arkose. Owing to the irregular character of the bedding, topographic features are not commonly oriented in any systematic pattern, but locally, as in the central belt of the Stockton exposures, some of the ridges parallel the strike of the beds.

The rocks of the Stockton are cut by a well-developed system of joints and are extensively faulted. The beds commonly show ripple marks, mud



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cracks, and raindrop impressions. Crossbedding, lensing, and pinch-and-swell structures are characteristic features of the bedding, particularly in the arkose and conglomerate deposits.

At any exposure the Stockton may exhibit every gradation in texture from arkosic conglomerate through fine-grained sandstone to red shale. But if the lithofacies is considered in its stratigraphic entirety, the beds show a gradation in texture and composition from coarse-grained, arkosic materials at the base to fine-grained siliceous materials at the top. According to McLaughlin (unpublished manuscript) the local interbedding of arkose, fine sand, and shale reflects temporary changes in the sources of the sediments to the individual beds; and the upward gradation in texture reflects a progressive shift in the locus of the primary source of the sediments with respect to the basin as a whole. Thus the local development of relatively thin interbedded sediments in the Stockton is a replica, on a miniature scale, of the conditions of deposition that resulted in formation of the Newark group.

From exposures along the Delaware River, McLaughlin (unpublished manuscript) prepared a composite section of the Stockton lithofacies for the central belt of occurrence. Thicknesses were computed largely from dip measurements, but were verified wherever possible by vertical sections exposed in quarries, and along valley walls. Thus, the computed thickness of 5,000 feet is believed to approximate the true thickness of the lithofacies. It was not possible to prepare a detailed section for the southern belt because of the scarcity of good exposures. However, a sufficient number of dip measurements were made to serve as a basis for estimating the average dip to be 8°, from which the thickness was computed to be about 3,000 feet. The apparent thinning toward the south thus determined supports the hypothesis that the Stockton lithofacies thins toward a southern source.

In Bucks County the thickness of the Stockton lithofacies is relatively uniform within each of the belts, but toward the west, beyond the limits of the county, the Stockton overlaps older crystalline rocks and thins to a minimum of about 1,000 feet in northern Chester County.

The Stockton lithofacies rests unconformably upon older rocks. In the southern belt it overlies the Baltimore gneiss of Precambrian age. In the central belt it overlies Cambrian and Ordovician limestone and phyllite. In both belts the Stockton is overlain conformably by the Lockatong lithofacies, with only local interfingering of beds at the contact between them.

The Stockton lithofacies is the best bedrock source of ground water in Bucks County. Weakly cemented coarse-grained clastic sediments constitute a large part of the formation. Ground water is contained in intergranular openings in the clastic sediments where the cementing material has been removed by weathering. Thus, the occurrence and movement of ground water in the Stockton are functions of the degree of weathering of the rock. The effectiveness of weathering decreases with depth, and the porosity of the Stockton has a corresponding decrease with depth, becoming negligible in the virgin rock below the weathered zone. The thickness of the weathered rock varies from place to place according to the topography, but it probably seldom exceeds about 500 feet, and it is not generally worth while to exceed that depth in drilling for water.



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Ground water in the Stockton lithofacies commonly occurs under artesian conditions, chiefly in the sandstone and conglomerate beds that are interlayered with red shale throughout the formation. In some areas the artesian pressure is apparently a function of the bedding, the shale constituting the confining beds. These conditions are of only local significance, because the bedding is so lenticular and erratic that individual shale beds are not continuous for any appreciable distance, along either the dip or the strike of the formation. Furthermore, the dip of the bedding is so steep—averaging 10 degrees or more—that a selected bed is not water bearing for any appreciable distance down dip, as it grades into unaltered rock at shallow depth. The artesian pressure in the Stockton is more commonly related to vertical changes in permeability that occur in the formation. The cementing material is apparently less susceptible to solution in some zones than in others; furthermore, gradations in the texture of the sediments may account for significant vertical changes in permeability in the section. Thus the occurrence and movement of ground water in the Stockton lithofacies is largely controlled by the configuration of the base of the weathered zone and by vertical changes in the porosity and permeability of the sediments. Recharge to the ground-water reservoir percolates downward in localities where confining layers are absent, joins the body of ground water, and moves laterally, under hydrostatic pressure, toward points of discharge. The competency of the confining layer and the rigidity of the aquifer are reflected in the low values of the coefficient of storage of Stockton aquifers. Data are not abundant, but preliminary tests indicate that the average coefficient of storage probably is about 0.00001 or 0.00002, a value characteristic of artesian conditions. The coefficient of storage is undoubtably higher in some of the beds of the Stockton, but probably nowhere does it exceed about 0.001.

The Stockton lithofacies has a wide range in permeability, but, considered in its entirety, it probably has the highest average permeability of the consolidated-rock aquifers in Bucks County. Specific-capacity tests for 23 wells that tap the Stockton lithofacies show a range in values from 0.35 to 44 gallons per minute per foot of drawdown and an average specific capacity of 5.95 gallons per minute per foot.

In accord with these hydraulic characteristics of the aquifer, a typical well in the Stockton might have either a relatively large or a moderately small drawdown at a given rate of discharge; but the decline in water level in response to the withdrawal would be translated rapidly throughout the aquifer in the vicinity of the well. Therefore, the proper spacing of wells is especially important for efficient utilization of the ground-water supply, because wells that are too closely spaced may be expected to have appreciable mutual interference, resulting in loss of yield and increased operating and maintenance costs.

The Stockton is the most reliable source of water for industrial and public supply in the upland areas of Bucks County. Records are available for 91 wells that range in yield from 2 gallons per minute to 440 gallons per minute and have an average yield of 78 gallons per minute.

The chemical quality of the ground water from the Stockton cannot be characterized by a single typical analysis. It commonly contains low to



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moderate concentrations of dissolved solids and hardness-forming minerals, and is generally low in iron content. Locally the water may be relatively highly mineralized and hard, usually because of larger concentrations of calcium and magnesium associated with sulfate. The origin of the sulfate is not definitely known, but it is probably derived from the mineral glauberite. The Stockton rarely yields water containing objectionable amounts of iron, and in general the water is satisfactory for most uses without treatment.

The temperature of the water ranges from about 53°F to about 57°F, according to the depth of the well. A few higher temperatures have been reported, but these probably result from storage of the water in a standpipe before being sampled, and do not reflect conditions in the aquifer.

Data on the quality of water in the Stockton lithofacies are given in table 3.

*Lockatong lithofacies.* The Lockatong lithofacies crops out in two wide belts that trend approximately east-west across central and south-central Bucks County, and in a number of narrow bands north of each belt where it interfingers with red beds of the Brunswick lithofacies. (See pl. 1.) In the broad belts of occurrence the Lockatong is generally bounded by the Stockton on the south and the Brunswick on the north, but in some places faults have brought older beds into contact with it. The banded outcrops of the Lockatong are bounded on both north and south by beds of the Brunswick.

Argillite of the Lockatong is a prominent ridgemaker in Bucks County. The courses of the smaller streams are largely controlled by the bedding; hence the outcrop area of broad belts of the Lockatong are characterized by broad ridges that approximately parallel the strike of the argillite beds. Where interbedded with the less resistant shale of the Brunswick lithofacies, the Lockatong tends to form rather distinct ridges.

The boundary between the Lockatong and Stockton lithofacies is commonly marked by a sharp change in topographic slope, and in places by a steep escarpment, the upland level of the argillite of the Lockatong being as much as 200 feet above the terrane of the Stockton.

The Lockatong consists chiefly of dark-gray to black thick-bedded argillite (or mudstone) and occasional zones of thin-bedded black shale. Locally, thin layers of impure limestone or calcareous shale are present. The upper beds of gray argillite are extensively interbedded with dark red argillite. The rocks are evenly bedded and very fine grained; coarse-grained sediments are almost totally lacking except in the lower beds which are transitional with the underlying Stockton lithofacies. Small crystals of calcite and pyrite are numerous in some of the argillite beds and absent from others. Ripple marks are rare, but mud cracks occur almost everywhere throughout the lithofacies.

The Lockatong lithofacies does not exhibit the chaotic interbedding and intergrading of deposits of different textures that is so characteristic of the Stockton lithofacies. Many individual beds or sequences of beds can be traced for considerable distances along the strike. McLaughlin (unpublished manuscript) has used the more persistent strata in subdividing the Lockatong lithofacies into several distinct members which can be recognized to the west in Montgomery County and to the east in New Jersey.



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## Lockatong Lithofacies

According to McLaughlin (unpublished manuscript), by "Lockatong time" all the sediments deposited in the basin had a common provenance (source) to the north. The Lockatong lithofacies is believed to be contemporaneous with the lower and middle beds of the Brunswick lithofacies, the Lockatong having been deposited in the center of the basin and the Brunswick along the margins. The red beds which occur in the upper part of the Lockatong, and which compose almost all of the contemporaneous Brunswick beds, are the product of a different depositional environment from that which produced the dark-colored argillite of the Lockatong. The sediments of both the Lockatong and the Brunswick were derived from red muds. Most of the Lockatong was deposited under reducing conditions in a lacustrine or swampy habitat, and the red ferric iron was reduced to the black ferrous variety. Occasional beds in the upper part of the Lockatong lithofacies, and virtually all the Brunswick beds, were deposited under fluvial conditions and remained in the red, oxidized, state. Lockatong deposition came to a close when the increasing influx of red sediments engulfed the basin, but in Brunswick time there were brief recurrences of lacustrine conditions which are marked by the occurrence of gray shale with the red beds.

Thus, the history of Lockatong sedimentation paralleled that of Stockton sedimentation in that temporary changes in environment during Lockatong time presaged the permanent change in environment at the end of Lockatong deposition. The change in environment occurred at different times in different parts of the basin. In most places there was no sudden, complete change; instead there were oscillations, both locally and regionally and between lacustrine and fluvial conditions which resulted in the local interbedding of sediments of different color, and in the regional interfingering of the prominent lithofacies.

The thickness of the Lockatong lithofacies varies from place to place. McLaughlin (unpublished manuscript) shows four measured sections, two from each of the broad belts of the Lockatong. In the central belt the thickness along Tohickon Creek and along the Delaware River is over 3,800 feet. In the south-central belt the thickness of the Lockatong ranges from 2,150 feet along the Delaware River to 3,073 feet along Mill Creek. The Lockatong lithofacies apparently is thickest in the central belt.

The Lockatong lithofacies conformably overlies the Stockton lithofacies with only local interfingering of beds. The top of the Lockatong lithofacies is conformable with the overlying Brunswick lithofacies but the contact is transitional and marked by a thick sequence of interbedded red and gray shale. From the center of the basin, which approximately corresponds with the central belt of the Lockatong, the Lockatong lithofacies interfingers with and grades into the Brunswick lithofacies. Northeastward in New Jersey and westward in Berks County, where the Brunswick and Stockton lithofacies are in conformable contact with one another, the Lockatong is entirely absent from the section.

The hydrology of the Lockatong lithofacies is comparable to that of the crystalline rocks. The Lockatong contains both fracture and solution porosity where it has been faulted and jointed and exposed to the forces of weathering. Ground water occurs under water-table conditions in the secondary openings, as far down as the base of the weathered zone.



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In general, the Lockatong is inferior to the crystalline rocks as a source of water. The capacity of the Lockatong to store and transmit water is very low. The specific capacities of five wells for which records are available range from 0.10 to 1.88 gallons per minute per foot of drawdown of water level and average 0.90 gallon per foot. Reported yields of 43 wells that tap the Lockatong range from 2 gpm to 25 gpm and average 10 gpm.

The water in the Lockatong characteristically is moderately to highly mineralized and hard, but it is generally free of objectionable quantities of iron. The analyses of two samples given in table 4 are representative of water in the formation having better than average quality. Hall (1934) lists analyses of 7 samples from the Lockatong. The concentration of dissolved solids ranged from 199 ppm to 1,050 ppm and averaged 418 ppm; and hardness ranged from 162 ppm to 533 ppm and averaged 285 ppm. Despite the relatively high mineral content, the water from the Lockatong does not commonly contain objectionable concentrations of any constituents except the hardness-forming minerals. It is used for domestic and stock purposes without treatment, but it is generally softened when used for industrial or public supply.

TABLE 4. Analyses of Water From the Lockatong Lithofacies
(Parts per million. Numbers correspond to numbers in tables of well data for the counties)

| Date of collection | Bk-274 4-27-53 | Bk-314 4-22-53 |
|---|---|---|
| Silica ($SiO_2$) | 11 | 14 |
| Iron (Fe) | .04 | .04 |
| Total iron | .04 | .04 |
| Calcium (Ca) | 47 | 28 |
| Magnesium (Mg) | 17 | 15 |
| Sodium (Na) | 12 | 7.0 |
| Potassium (K) | .8 | .6 |
| Bicarbonate ($HCO_3$) | 164 | 120 |
| Sulfate ($SO_4$) | 61 | 58 |
| Chloride (Cl) | 11 | 7.0 |
| Fluoride (F) | .1 | .0 |
| Nitrate ($NO_3$) | 7.4 | 2.1 |
| Dissolved solids | 255 | 229 |
| Total hardness as $CaCO_3$ | 187 | 132 |
| Non-carbonate | 50 | 35 |
| Specific conductance (at 25° C, micromhos) | 397 | 370 |
| pH | 7.4 | 7.4 |
| Temperature | 55 | 53 |

Bk-274 Bucks County Neshaminy Manor Home
Bk-314 Boy Scouts of America, Camp Ockanickon

*Brunswick lithofacies.* The Brunswick lithofacies underlies a larger area of Bucks County than any other geologic unit. Its area of outcrop comprises about 200 square miles, or about 36 percent of the total land area of the county, and is about equal to the combined outcrop area of the Stockton and Lockatong lithofacies.

The Brunswick does not crop out in wide belts that cross the county in the manner of the Lockatong and Stockton. Owing to the effects of faulting, intrusion by igneous rocks, and interfingering with the Lockatong, the Brunswick lithofacies has a heterogeneous outcrop pattern. The lower beds of the Brunswick occur in sinuous bands which alternate with



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bands of the Lockatong; the upper beds of the Brunswick occur in a patchwork of irregularly shaped exposures commonly surrounded by diabase.

The Brunswick is less resistant to weathering and erosion than either the interbedded Lockatong or the adjacent diabase. It weathers to a gently undulating topography characterized by broad, shallow valleys that trend parallel to the strike of the beds. The continuity of the rolling terrane formed by the Brunswick is interrupted by low ridges formed by shale of the Lockatong and by prominent uplands underlain by diabase.

The Brunswick lithofacies is the most uniform lithologic unit in the Newark group. It is a sequence of monotonously similar, irregularly bedded soft red argillaceous shales locally interbedded with fine-grained red sandstone. The lower beds of the Brunswick in the zone of transition with the Lockatong lithofacies include a considerable thickness of thick-bedded hard red argillite and occasional beds of tough gray shale. The argillite grades upward into typical soft red shale, and near the top of the formation there are rare recurrences of the more resistant Lockatong-type rocks.

The shale of the Brunswick lithofacies does not display a prominent cleavage, but it contains numerous cracks or joints which are commonly inclined at high angles to the plane of the bedding. Ripple marks, mud cracks, and raindrop impressions are abundant through the lithofacies.

Near the northern border of the Triassic basin the Brunswick lithofacies commonly contains beds of fanglomerate interbedded with the red shale. These occur from the bottom to the top of the formation in this area, but they are more numerous and thicker, and contain coarser-grained sediments, in the upper part. A typical occurrence of the fanglomerate is described by McLaughlin (unpublished manuscript) as follows:

> "The transition from red shale and sandstone to fanglomerate is gradual. As a sandstone bed is traced north towards the border, at first a few scattered pebbles appear in it. Farther north the pebbles are more numerous; the bed thickens, and additional banks of conglomerate appear."

The conglomerate consists chiefly of well-rounded quartzite pebbles, but pebbles of limestone and calcareous sandstone are common. In some places calcareous material is so abundant that the rock resembles a limestone breccia.

The Brunswick lithofacies has been extensively intruded by diabase dikes and sills. Near the intrusive bodies the shale has been altered to a hard, dark-colored hornfels that often closely resembles the argillite of the Lockatong. The apparent width of the altered zone, as evidenced in the outcrop, ranges from a few feet to a mile or more, but the true width of the altered rock probably never exceeds a few hundred feet. The Brunswick lithofacies is subdivided (McLaughlin, unpublished manuscript) into several members on the basis of differences in the color and lithology of the sediments. Some of the members can be traced for considerable distances, but others vary irregularly in thickness and are not persistent over an appreciable area. None of the members can be correlated between different areas of occurrence of the Brunswick rocks.

The Brunswick is the thickest of the Triassic lithofacies in Bucks County. Its stratigraphic thickness is about 9,000 feet (McLaughlin, unpublished manuscript), but, as the floor of the basin probably shelves



300537

toward the north, in no one place should the total thickness be present. However, the true vertical thickness probably equals or exceeds 6,000 feet at some places in the county.

The relationship between the Brunswick and the underlying Lockatong is described above in the discussion of the Lockatong lithofacies. In general, the Brunswick lithofacies conformably overlies the Lockatong lithofacies, but the lower beds of the Brunswick extensively interfinger with an appreciable thickness of beds of the Lockatong. The youngest beds of the Brunswick lithofacies have all been eroded away in Bucks County. In the valley of the Delaware River, deposits of Pleistocene and Recent age unconformably overlie the shale.

Eastward into New Jersey and westward into Berks County the Brunswick lithofacies grades along the strike into sandstone and conglomerate. Northward, toward the source of its sediments, the Brunswick thins along the bedding and grades into the border-conglomerate facies. In many places the northern limit of the Newark group is determined by faults, but in some areas the Brunswick overlaps Paleozoic rocks. The marginal faults probably represent local post-depositional movements, not regional movement along the entire northern border of the basin.

The Brunswick lithofacies contains water under both water-table and semiartesian conditions in the weathered zone of the formation, which may extend to depths of 600 feet or more. A water-table aquifer of low permeability, comprising the highly weathered zone of the formation, occurs to depths of about 250 feet; and one or more rather permeable artesian aquifers, consisting of beds of partly altered rock rarely more than 20 feet thick, occur to depths of about 600 feet. In both types of aquifers the saturated voids are believed to be vertical joint fractures enlarged by solution. The water-table aquifer contains many more fractures than the semiartesian aquifers but the near-surface rocks have been so thoroughly decomposed that many of the cracks are filled with clay residual from the weathering of the shale.

The water-table aquifer is recharged from precipitation, a part of which seeps through the soil mantle to the water table. The underlying semiconfined aquifers are, in turn, recharged by drainage from the water-table zone; thus the total supply of water in storage is essentially that in water-table storage.

Most wells in the Brunswick lithofacies tap both water-table and artesian aquifers, and their yields are derived in part from both sources. Consequently, coefficients of transmissibility and storage determined by analysis of field pumping tests are meaningless, as they represent combined effects of withdrawals from aquifers of different types. Because the semiartesian aquifers are more permeable than the water-table aquifer and yield much less water from storage, the artesian pressure tends to decline rapidly with pumping and there results a hydraulic gradient downward from the water-table to the artesian zone. A typical well may have a relatively high yield when drilled, but the yield declines as the water-table aquifer in the immediate vicinity is unwatered. The ultimate yield of a well is related to the saturated thickness of water-table aquifer it penetrates, and the rate at which the semiartesian aquifers



TABLE 5. Analyses of Water from the Brunswick Lithofacies
(Parts per million. Numbers correspond to numbers in table of well data for the counties)

300538

it taps are recharged from above. The history of drilled wells shows that the long-term yield of a well is commonly no more than about one-third of the initial yield.

The Brunswick is an important source of water for domestic, industrial, and public supply in Bucks County. It underlies more than one-third of the total land area of the county, and is everywhere a reliable source of moderate supply. The reported yields of 52 wells for which records are available range from 2 gpm to 260 gpm and average 40 gpm.

The water from the Brunswick is moderately mineralized and moderately hard to hard, but it does not contain objectionable amounts of any constituents. Its iron content is negligible; some samples contain relatively large amounts of sulfate, perhaps from local solution of the mineral glauberite, which has been noted in the rock, but the concentration is not excessive.

The water is of satisfactory quality for most uses without treatment. It is acceptable for public supply according to the suggested standards of the United States Public Health Service. Except for the silica content, which is too high for use of the raw water in high-pressure steam boilers, it is satisfactory for most industrial purposes. The temperature is nearly constant and ranges, in individual wells, from about 50°F in shallow wells (50-150 feet deep) to about 55°F in deep wells (more than 400 feet deep).

Chemical analyses of representative samples of water from the Brunswick lithofacies are given in table 5.

## GEOLOGY OF THE UNCONSOLIDATED ROCKS

Unconsolidated rocks of Late Cretaceous, Pleistocene, and Recent age occur in Bucks County. The Pleistocene and Recent sediments occur as terrace remnants and valley-fill deposits in the major stream valleys. Cretaceous beds do not crop out in Bucks County, but they underlie Quaternary deposits in the broad valley of the Delaware River between Morrisville and Andalusia.

In this report the discussion of the unconsolidated rocks is confined to the Coastal Plain sediments of southeastern Bucks County. In the Piedmont region unconsolidated rocks occur only as a thin veneer on the bedrock floor. Their only function in the regimen of ground water occurrence is to trap precipitation and thus to facilitate recharge to the underlying rocks. A detailed description of these deposits and of the Pleistocene history of Bucks County is given by Peltier (unpublished manuscript).

Coastal Plain sediments underlie an area of about 34 square miles in southeastern Bucks County in the valley of the Delaware River southeast of the Fall Line. The deposits range in thickness from a featheredge at the Fall Line to about 200 feet or more at the extreme southeastern boundary of the county. The unconsolidated rock formations that compose the Coastal Plain sediments in Bucks County include, in ascending order, the Raritan formation of Late Cretaceous age, glacial outwash of Pleistocene (probably late Wisconsin) age, and alluvium of Recent age. Following are descriptions of the individual rock units.



*Raritan form*
alternating b
County. In
grounds into
trace the inc
River valley.
differentiated
overlying Ma
two formatio
are commonly
Raritan form
in the area ar

The Rarita
sand, or grav
light gray to
and lignitic
even-textured
of the Rarit
gray, but ye
presence of s
sediments ra
sand and gr
coarse mater
many are mi

The indivi
tinuity. The
it is difficult
the holes ar
consists of r
least one cla
laid down in
abrupt chan
sea level.

The Rarit
rock floor ar
the southeas
about equal
Bucks Coun
surface—rat
it does not e
points on th
the area.

The Rarit
crystalline b
southeast co
bend to the
from place
may be attr

300539

REFERENCE NO. 23

300540

# GROUND-WATER RESOURCES OF BUCKS COUNTY PENNSYLVANIA

BY
J. C. KAMMERER, U.S. GEOLOGICAL SURVEY

1953

EXPLANATION

Trb Brunswick Formation

Trl Lockatong Formation

Trs Stockton Formation

Site Location

PLATE I. GEOLOGIC MAP OF THE BRUNSWICK AND LOCKATONG FORMATIONS IN BERKS AND MONTGOMERY COUNTIES, PENNSYLVANIA, SHOWING WELL LOCATIONS.

SCALE 1:62500

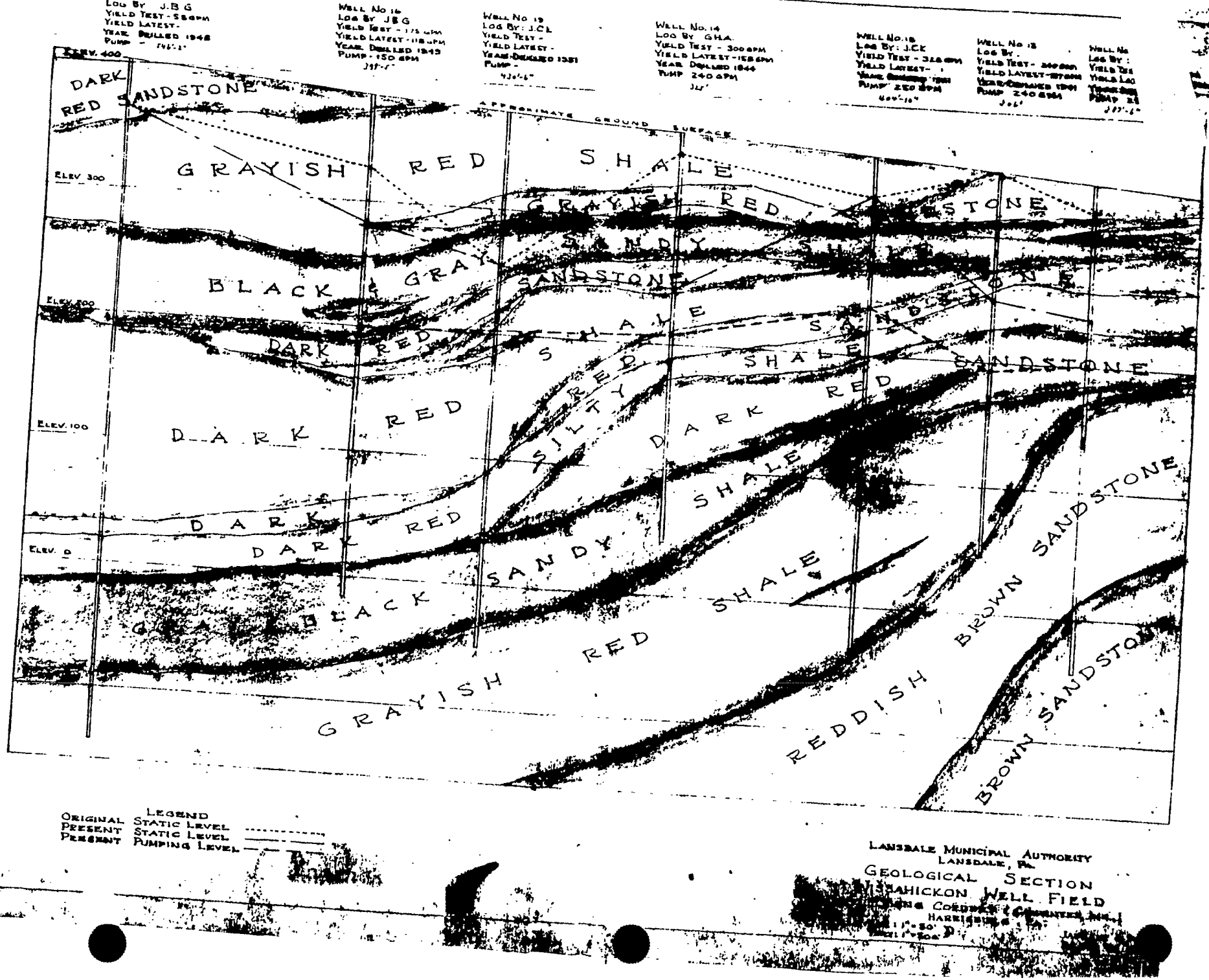
1 0 1 2 3 4 MILES

3000 0 3000 6000 9000 12000 15000 18000 21000 FEET

1 0 1 2 3 4 5 KILOMETERS

AR300541

REFERENCE NO. 24


WELL No. 15
LOG BY J.B.G.
YIELD TEST - 55 GPM
YIELD LATEST -
YEAR DRILLED 1948
PUMP -
WELL No. 16
LOG BY J.B.G.
YIELD TEST - 175 GPM
YIELD LATEST - 118 GPM
YEAR DRILLED 1949
PUMP - 150 GPM
WELL No. 17
LOG BY: J.C.L.
YIELD TEST -
YIELD LATEST -
YEAR DRILLED 1951
PUMP -
WELL No. 14
LOG BY G.H.A.
YIELD TEST - 300 GPM
YIELD LATEST - 158 GPM
YEAR DRILLED 1944
PUMP 240 GPM
WELL No. 18
LOG BY: J.C.K.
YIELD TEST - 326 GPM
YIELD LATEST -
PUMP 250 GPM
WELL No. 13
LOG BY -
YIELD TEST - 240 GPM
YIELD LATEST - 157 GPM
YEAR DRILLED 1941
PUMP 240 GPM
WELL No.
LOG BY:
YIELD TES
YIELD LAS
YEAR DRI
PUMP 25
ELEV. 400
ELEV. 300
ELEV. 200
ELEV. 100
ELEV. 0
APPROXIMATE GROUND SURFACE
DARK RED SANDSTONE
GRAYISH RED SHALE
GRAYISH RED SANDY SHALE
BLACK & GRAY SANDSTONE
DARK RED SHALE
DARK RED SANDSTONE
DARK RED SILTY SHALE
DARK RED SHALE
DARK RED SANDY SHALE
BLACK SHALE
GRAYISH RED SHALE
REDDISH BROWN SANDSTONE
BROWN SANDSTONE
LEGEND
ORIGINAL STATIC LEVEL
PRESENT STATIC LEVEL
PRESENT PUMPING LEVEL
LANSDALE MUNICIPAL AUTHORITY
LANSDALE, PA.
GEOLOGICAL SECTION
SAHICKON WELL FIELD
HARRISBURG, PA.
1"=50'
1"=200'

AR300543

REFERENCE NO. 25

300544

NORTH PENN WATER AUTHORITY
200 NORTH CHESTNUT STREET
P.O. BOX 591, LANSDALE, PA 19446
TEL: 215-855-3617

DAVID R. LANDREY, *Chairman*
Lansdale Borough
JOHN P. BARKER, *Vice-Chairman*
Franconia Township
ERNEST D. YOCUM, JR., *Secretary*
Worcester Township
MARVIN A. ANDERS, *Treasurer*
Souderton Borough
JOSEPH B. BECKER, *Ass't Secretary*
Towamencin Township
RICHARD A. THOMAS, *Ass't Treasurer*
Hatfield Township
JOHN W. CLEMENS, JR.
Lower Salford Township

October 7, 1986

Tim Silar
NUS Corporation
992 Old Eagle School Road
Suite 916
Wayne, PA 19087

Dear Tim:

This is to provide further information in reference to my letter to you of September 3, 1986, in which I reported results of sampling in the Souderton Area. The samples were collected by you on August 28, 1986.

All of the samples were analyzed for volatile organic chemicals in the NPWA laboratory. EPA Method 502.1 for gas chromatography was used. All EPA protocols were followed and the results of our quality control exercises were well within established guidelines. Detailed explanations of the quality control procedures used for these samples were included in our QA Plan, which I submitted with my letter of 9/3/86.

I have attached another copy of the results. Please don't hesitate to let me know if you need any further information.

Sincerely,

NORTH PENN WATER AUTHORITY

Judith A. Coyle
Water Quality Manager

encl

300545

REFERENCE NO. 26

300546

**NUS CORPORATION AND SUBSIDIARIES** — **TELECON NOTE**

| CONTROL NO: | DATE: | TIME: |
|---|---|---|
| | 10/8/82 | 1415 |

**DISTRIBUTION:** North Penn Water Authority Package

| BETWEEN: | OF: | PHONE: |
|---|---|---|
| Judith A. Coyle (JAC) | North Penn Water Authority | (215) 855-3617 |

**AND:** Bill Hose

**DISCUSSION:**

JAC informed me that the sampling information for all the packages followed the same EPA methods and protocols outlined in the October 7 letter from JAC. to Tim Silar of NUS FIT III. In addition, JAC stated that all the sample results / quality control exercises fell well within established guidelines

**ACTION ITEMS:**

Bill Hose 10/8/82

NUS 067 REVISED 0885

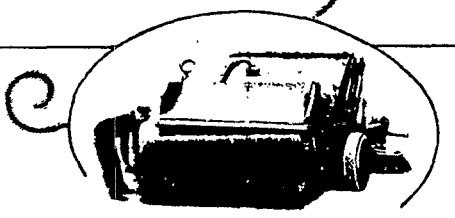
AR300547

REFERENCE NO. 27

300548

AREA CODE-215
822-0567

# A. Steiert & Son
INCORPORATED



P. O. BOX 100
HATFIELD, PA.
19440

JULY 1, 1986

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 CHESTNUT BUILDING
PHILA., PA 19107

REFERENCE: 3HW23

DEAR SIRS,

ENCLOSED ARE PHOTO-COPIES OF ALL CORRESPONDENCE REGARDING ANY SUBSTANCES DEEMED HAZARDOUS. WE HAVE INCLUDED THE ENVIRONMENTAL HAZARD SURVEY FORM FROM THE DEPARTMENT OF LABOR AND INDUSTRY WHICH IS AN OVERVIEW OF ALL SUBSTANCES THAT WE HANDLE AND THEIR DISPOSITION.

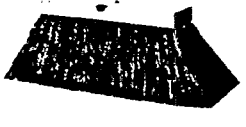
WE HAVE TRIED TO TAKE A POSITIVE STANCE WITH REGARD TO POLLUTION. WE HAVE TAKEN CORRECTIVE ACTION IN THE PAST TO COMPLY AND WE HAVE INSTRUCTED EMPLOYEES ON THE PROPER HANDLING OF ANY CONTAMINATES.

WE FEEL THE ENCLOSURES WILL GIVE YOU ALL THE PERTINENT DATA REQUESTED. IF THERE IS ANY FURTHER INFORMATION NEEDED PLEASE FEEL FREE TO CONTACT US.

SINCERELY,
A. STEIERT & SON, INC.

W P Steiert

WILLIAM P. STEIERT
VICE-PRESIDENT



300549

# ENVIRONMENTAL HAZARD SURVEY FORM

Worker and Community Right to Know Program

PART I

1. NAME OF COMPANY: A. STEIERT & SON, INC.

2. FEDERAL EMPLOYER IDENTIFICATION NUMBER: 23-1322360

3. PLANT NAME: AS ABOVE

4. WORKPLACE COVERED BY THIS FORM

5. STREET ADDRESS OF WORKPLACE: P.O. BOX 100 BERGEY RD.

CITY: HATFIELD, STATE: PA ZIP CODE: 19440

(MAILING ADDRESS IF DIFFERENT)

6. TELEPHONE NUMBER: (215) 822-0567

7. STANDARD INDUSTRIAL CODE: 3991

9. COUNTY NAME: MONTGOMERY COUNTY CODE: 46

8. NAME OF EMPLOYER OR EMPLOYER REPRESENTATIVE: LILLIAN E. STEIERT TITLE: VICE-PRESIDENT DATE: 4/22/86

BUSINESS ADDRESS OF SIGNATOR

Does this plant emit, discharge or dispose of any of the Environmental Hazards as indicated on the Hazardous Substance Lists published by the Department of Labor and Industry?

YES [X] NO [ ]

If answer to number 12 is yes, complete the entire Environmental Hazard Survey for your workplace and return. Keep a copy of the completed forms for your files.

If answer to number 12 is no, return only this portion of the Survey. Keep a copy for your files.

13. ENVIRONMENTAL HAZARDS PRESENT AT WORKPLACE DURING REPORT YEAR: FROM / / THRU / /

SIGNATURE OF EMPLOYER OR EMPLOYER REPRESENTATIVE

Lillian E. Steiert

| CHEMICAL ABSTRACTS SERVICE NUMBER (A) | CHEMICAL NAME OF ENVIRONMENTAL HAZARD (B) | TYPE OF DISCHARGE, EMISSION OR DISPOSAL (C) |
|---|---|---|
| | GRAPHITE (SYNTHETIC) | |
| 1310-73-2 | SODIUM HYDROXIDE (NA(OH)) | NEUTRALIZATION. |
| -92-1 | LEAD | SENT BACK TO SUPPLIER FOR RECLAIMATION |
| 7647-01-0 | HYDROCHLORIC ACID | NEUTRALIZATION |
| 7782-42-5 | GRAPHITE | BURNS TO ASH |
| 74-98-6 | PROPANE | BURNT AS FUEL |
| 91-20-3 | NAPHTHALENE | SHIPPED IN SELECTED PRODUCT AS PESTACIDE |
| 1317-65-3 | LIMESTONE (LIME WITH CALCIUM) | NEUTRALIZATION AND COATING OF WIRE |



AR300550

ENVIRONMENTAL HAZARD SURVEY FORM

Worker and Community Right to Know Program

PART II

## Discharge/Emission of Environmental Hazards

A. Company Name A. STEIERT & SON, INC.

B. Federal Employer Identification Number [2][3]—[1][3][2][2][3][6][0]

C. Chemical Abstracts Service Number 1310-73-2

D. Environmental Hazard Substance Name SODIUM HYDROXIDE (NA(OH))

E. Description of Treatment PH IS MONITORED AND IS NEUTRALIZED TO APPROXIMATELY PH 7 WITH HYDROCHLORIC ACID. IS THEN FILTERED THROUGH SAWDUST TO REMOVE IMPURITIES AND DISPOSED OF BY DUMPING.

F. Emission/Discharge Loading or Concentration:

(complete 1 or 2)

1. a. volume 3 GAL DILUTED W/WATER PER WEEK

   b. concentration NEUTRALIZED

2. loading



AR300551

ENVIRONMENTAL HAZARD SURVEY FORM

Worker and Community Right to Know Program

PART II

## Discharge/Emission of Environmental Hazards

A. Company Name A. STEIERT & SON, INC.

B. Federal Employer Identification Number [2] [3] — [1] [3] [2] [2] [.3] [6] [0]

C. Chemical Abstracts Service Number 7439-92-1

D. Environmental Hazard Substance Name LEAD

E. Description of Treatment SENT BACK TO SUPPLIER FOR RECLAIMING BY A SMELTER

F. Emission/Discharge Loading or Concentration:

(complete 1 or 2)

1. a. volume _____

   b. concentration _____

2. loading DRUMS



AR300552

# ENVIRONMENTAL HAZARD SURVEY FORM

Worker and Community Right to Know Program

PART II

## Discharge/Emission of Environmental Hazards

A. Company Name A. STEIERT & SON, INC.

B. Federal Employer Identification Number 23-1322360

C. Chemical Abstracts Service Number 7647-01-0

D. Environmental Hazard Substance Name HYDROCHLORIC ACID

E. Description of Treatment ACID IS DILUTED AND WIRE BEING PROCESSED IS RUN THROUGH ACID BATH ON A CONTINUOUS LINE AFTER HEAT TREATING TO REMOVE OXIDES FORMED ON WIRE FROM AIR COOLING. DUE TO THE HEAT BEING DISSIPATED SOME IS EVAPORATED AND MORE IS DRAGGED INTO NEXT TANK WHICH IS A NEUTRALIZING TANK OF SODIUM HYDROXIDE AND THESE TWO PROCESSES ACCOUNT FOR THE ACID LOSSES.

F. Emission/Discharge Loading or Concentration:

(complete 1 or 2)

1. a. volume 70 GAL 20 BAUMA/WEEK

   b. concentration 20 BAUMA DILUTED WITH WATER TO APPROXIMATELY 20% BY VOLUME

2. loading



AR300553

ENVIRONMENTAL HAZARD SURVEY FORM

Worker and Community Right to Know Program

PART II

## Discharge/Emission of Environmental Hazards

A. Company Name A. STEIERT & SON, INC.

B. Federal Employer Identification Number 23-1322.360

C. Chemical Abstracts Service Number 7782-42-5

D. Environmental Hazard Substance Name GRAPHITE

E. Description of Treatment USED AS BLANKET TO CONTAIN LEAD FUMES MOST TURNS TO ASH AND IS SENT WITH RECLAIMABLE LEAD TO SMELTER.

F. Emission/Discharge Loading or Concentration:

(complete 1 or 2)

1. a. volume _____

   b. concentration _____

2. loading DRUMS



AR300554

ENVIRONMENTAL HAZARD SURVEY FORM

Worker and Community Right to Know Program

PART II

## Discharge/Emission of Environmental Hazards

A. Company Name A. STEIERT & SON, INC.

B. Federal Employer Identification Number [2] [3] — [1] [3] [2] [2] [3] [6] [0]

C. Chemical Abstracts Service Number 74-98-6

D. Environmental Hazard Substance Name PROPANE

E. Description of Treatment BURNT AS FUEL

F. Emission/Discharge Loading or Concentration:

(complete 1 or 2)

1. a. volume _____

   b. concentration _____

2. loading INTO FURNACE AS FUEL



AR300555

# ENVIRONMENTAL HAZARD SURVEY FORM

Worker and Community Right to Know Program

PART II

## Discharge/Emission of Environmental Hazards

A. Company Name A. STEIERT & SON, INC.

B. Federal Employer Identification Number [2][3]—[1][3][2][2][3][6][0]

C. Chemical Abstracts Service Number 91-20-3

D. Environmental Hazard Substance Name NAPHTHALENE

E. Description of Treatment PLACED AS BALLS IN INDIVIDUAL CARTONS OF FLOOR SWEEPS CONTAINING HORSEHAIR AS A PESTICIDE FOR GRUBS.

F. Emission/Discharge Loading or Concentration:

(complete 1 or 2)

1. a. volume _____

   b. concentration _____

2. loading CARTONS

300556

# ENVIRONMENTAL HAZARD SURVEY FORM

Worker and Community Right to Know Program

PART II

## Discharge/Emission of Environmental Hazards

A. Company Name A. STEIERT & SON, INC.

B. Federal Employer Identification Number 23-1322360

C. Chemical Abstracts Service Number 1317-65-3

D. Environmental Hazard Substance Name LIMESTONE (LIME WITH CALCIUM)

E. Description of Treatment USED IN SOLUTION WITH WATER TO COAT STEEL WIRE TO INSURE NEUTRALIZATION OF ACID AND AS A VEHICLE FOR CARRYING DRAWING SOAP THROUGH DIES TO LUBRICATE WIRE IN DRAWING OPERATION.

F. Emission/Discharge Loading or Concentration:

(complete 1 or 2)

1. a. volume 700 LBS/MONTH

   b. concentration _____

2. loading _____



AR300557

# PURITY - STANDARD

## LABORATORIES - WATER IMPROVEMENT

127 S. Limekiln Pike
Chalfont, Pa. 18914

DI 3-2222
822-3337

-Laboratory Report-

FOR:

A. Steiert & Sons Inc.
Box #100
Bergey Rd.,
Hatfield, Pa.

Montgomery County

The following results are observed in the examination of the sample of water collected by this laboratory:-

Sample No 7047-4 Type of Sample well Picked up by W.H.

Date 3/24/77 Point of Sampling Office Sink Faucet Time 2:15 PM.

BACTERIOLOGICAL WATER ANALYSIS

| | Period of Incubation 24 Hours | 48 Hours |
|---|---|---|
| Total bacteria per ml. on Nutrient Agar at 35°C. | 7 | 9 |
| Presumptive Tests ( Coliform Group ) | NEGATIVE | NEGATIVE |

CHEMICAL WATER ANALYSIS

| | | |
|---|---|---|
| Hardness as $CaCO_3$ | 14.0 | g.p.g. |
| Iron (Total as Fe) | 0.1 | p.p.m. |
| pH | 7.2 | |

Chlorine = 0.0 ppm.

V. HARD RECOMMEND WATER FOR TESTS
BILL HANEY

The bacteriological quality of this sample of water at the time of examination conforms with the U.S. Public Health Service Drinking Water Standards and the results indicate the water is in:-

| | |
|---|---|
| Excellent Sanitary Condition | (XXX) |
| Good Sanitary Condition | ( ) |
| Fair Sanitary Condition | ( ) |

PURITY-STANDARD LABORATORIES is approved by the DEPARTMENT OF HEALTH, Commonwealth of Penna. to perform bacteriological examinations of water under Laboratory # VII - 10

Harry C

Very truly yours,

George R. Geiz
Laboratory

AR300558

# PURITY - STANDARD

## LABORATORIES - WATER IMPROVEMENT

127 S. Limekiln Pike
Chalfont, Pa. 18914

DI 3-2222
822-3337

-Laboratory Report-

FOR:

A. Steiert & Sons Inc.
Box #100
Bergey Rd.,
Hatfield, Pa. 19440

Montgomery County

The following results are observed in the examination of the sample of water collected by this laboratory:-

Sample No 7047-3 Type of Sample Pond Picked up by W.H.

Date 3/24/77 Point of Sampling Pond Time 2:30 PM.

BACTERIOLOGICAL WATER ANALYSIS

| | Period of Incubation 24 Hours | 48 Hours |
|---|---|---|
| Total bacteria per ml. on Nutrient Agar at 35°C. | 120 | 190 |

Presumptive Tests ( Coliform Group ) POSITIVE = (7 tubes out of 7 tubes = Contamination)
MPN = 240+/100 mls. Confirmed = +++

CHEMICAL WATER ANALYSIS

Hardness as $CaCO_3$ 8.0 g.p.g.
Iron (Total as Fe) _____ p.p.m.
pH _____

The bacteriological quality of this sample of water at the time of examination conforms to results indicate the water is in:-

Pollution -
Excellent Sanitary Condition ( )
Good Sanitary Condition ( )
Fair Sanitary Condition ( )

PURITY-STANDARD LABORATORIES is approved by the DEPARTMENT OF HEALTH, Commonwealth of Penna. to perform bacteriological examinations of water under Laboratory # VII - 10

Very truly yours,

George
Laboratory Director

AR300559

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
1875 New Hope Street
Norristown, Pennsylvania 19401
215 631-2409

December 31, 1980

A. Steirert and Sons, Inc.
Box 100
Hatfield, Pa. 19440

Re: Industrial Waste
A. Steirert and Sons, Inc.
Hatfield Township
Montgomery County

Gentlemen:

This is to confirm the results of my inspection conducted on September 12, 1980 which revealed that rinse water from the heat treating operation was being discharged to the ground's surface.

Such discharge of industrial waste to Waters of the Commonwealth without a permit is a violation of the Clean Streams Law, the Act of June 22, 1937, P.L. 1987, as amended and subject to the penalties provided therein.

Notify this office in writing no later than January 14, 1981 of the action you have taken to comply, the date compliance was accomplished and the steps you have taken to prevent a recurrence of the violation.

If you have any questions, please feel free to contact me.

Very truly yours,

James LaRegina

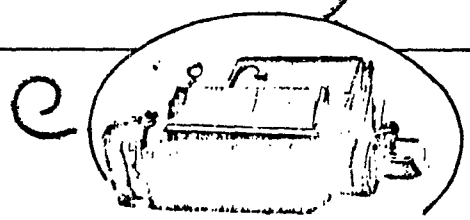
James LaRegina,
Water Quality Specialist

cc: W.P. Stender
Ce Re 30 MS118

AR300560

822-0567

# A. Steiert & Son
INCORPORATED



HATFIELD, PA.
19440

JANUARY 9, 1981

COMMONWEALTH OF PENNA.
DEPT OF ENVIRONMENTAL RESOURCES
1875 NEW HOPE ST.
NORRISTOWN, PA. 19401

ATTN: JAMES LAREGINA
WATER QUALITY SPECIALIST

DEAR MR. LAREGINA,

IN REFERENCE TO YOUR LETTER OF DECEMBER 31, 1980 REGARDING THE DISCHARGE OF RINSE WATER FROM THE HEAT TREATING OPERATION.

WE ARE IN THE PROCESS OF CONSTRUCTING A HOLDING TANK FROM WHICH WE WILL RECIRCULATE THE WATER USED FOR RINSING AND NEUTRALIZE AS NEEDED. THIS WILL ELIMINATE THE NEED FOR THE RUN OFF AS PREVIOUSLY OBSERVED BY YOU.

WE FEEL THAT THIS TANK AND SUBSEQUENT OPERATIONS WILL BE IN LINE READY FOR YOUR INSPECTION BY JANUARY 26TH, 1981.

WE ARE CONFIDENT THAT THIS WILL REMOVE ANY POSSIBILITY OF A VIOLATION OF THE CLEAN STREAMS LAW.

SINCERELY,

A. STEIERT & SON, INC.

W. P. STEIERT
VICE-PRESIDENT

WPS/gs

MANUFACTURERS OF STAPLE SET BRUSHES, METAL HEAD FIBRE BROOMS AND GUTTER BROOM WIRE. SUPPLIERS OF STREET SWEEPER FIBRES.

AR300561

-R BWQ-32 REV. 4-77

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT
**WASTE DISCHARGE INSPECTION REPORT**

1 of 2.

DATE 4-1-81

TIME 11:00

AR 300562

| ESTABLISHMENT | CASE | LOCATION (STREET/STATE ROUTE) | COUNTY | MUNICIPALITY | PROGRAM |
|---|---|---|---|---|---|
| A Stewert & Sons Inc | | Box 100 Hatfield 19440 | Monty | Hatfield | IW |

| OPERATOR NAME | VALID CERTIFICATE POSTED YES ☐ NO ☐ | TELEPHONE NO. | POP SERVED | ACRES UNDER PERMIT | ACRES ALREADY MINED |
|---|---|---|---|---|---|
| | | | | | |

| RESPONSIBLE OFFICIAL | ADDRESS | TELEPHONE NO. | INDUSTRIAL |
|---|---|---|---|
| Will Stewert V.P. | | 822-0567 | CTS |

| PERSON INTERVIEWED | ADDRESS | TELEPHONE NO. | 1. Industrial Prooms | 2 |
|---|---|---|---|---|
| Will Stewert | | | | |

| TREATMENT PROCESS | NUMBER OF UNITS TOT | NUMBER OF UNITS IN OP | REMARKS |
|---|---|---|---|
| Cloudy ~ Warm. Follow up inspection in regard to previous Industrial Waste discharges. Steel wire drawn - two non-contact cooled and smaller spools then treated with acid baths to remove scale. Acid rinse has been changed to closed loop tank neutralized and dumped on ground. Sediment to dumpster. Lime - lubricant coat on wire which is then drawn thru spools. Spools run thru mill to clean rod. Contact water to clean pond. Then heat treated. Oil quench & low heat heat treat water cooled (non-contact closed loop) Oil to prevent rust then cut. All acid water used for mill is discharged to ground. Contact water used for oil quench is discharged to pond. Intake & discharge line in stream. Both Entries at approximately same temperature. Oil from quench is used for several months then discharged to ground. Still storing old oil in pond. Clear NPDES | | | |

| VIOLATIONS |
|---|
| Discharge of IW cooling water & contact waters & Cummins without permit |

| LAWS, REGULATIONS OR PERMIT NO. & COND. |
|---|
| Clean Streams Law Rules & Regs. Clear NPDES |

**RECEIVING STREAM APPEARANCE**

| NAME | ABOVE DIS APP | BELOW DIS APP |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

THIS DOCUMENT IS OFFICIAL NOTIFICATION THAT A REPRESENTATIVE OF THE DEPARTMENT OF ENVIRONMENTAL RESOURCES, BUREAU OF WATER QUALITY MANAGEMENT, INSPECTED THE ABOVE FACILITY. THE FINDINGS OF THIS INSPECTION ARE SHOWN ABOVE.

ANY VIOLATIONS WHICH WERE UNCOVERED DURING THE INSPECTION ARE INDICATED. VIOLATIONS MAY ALSO BE DISCOVERED UPON EXAMINATION OF THE RESULTS OF LABORATORY ANALYSES OF THE DISCHARGE AND REVIEW OF DEPARTMENT RECORDS. NOTIFICATION WILL BE FORTHCOMING, CONFIRMING ANY VIOLATIONS INDICATED HEREIN AND LISTING ANY ADDITIONAL VIOLATIONS.

PERSON INTERVIEWED (SIGNATURE)

TITLE AND DATE
V.P. 4-1-81

INVESTIGATOR (SIGNATURE)

TITLE AND DATE
WQS 4-1-81

52 REV. 4-77

DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT
**WASTE DISCHARGE INSPECTION REPORT**

2 of 2

DATE

TIME 11:00

AR300563

| ESTABLISHMENT | CASE | LOCATION (STREET/STATE ROUTE) | COUNTY | MUNICIPALITY | PROGRAM |
|---|---|---|---|---|---|
| A Steinert & Sons Inc | | | Monty | Hatfield | W |

| OPERATOR NAME | VALID CERTIFICATE POSTED YES ☐ NO ☐ | TELEPHONE NO. | POP SERVED | ACRES UNDER PERMIT | ACRES ALLOWED |
|---|---|---|---|---|---|
| RESPONSIBLE OFFICIAL | ADDRESS | TELEPHONE NO. | INDUSTRIAL PROCESS | | |
| PERSON INTERVIEWED: Will Steinert | ADDRESS | TELEPHONE NO. 822-0567 | 1. | 2. | |

| TREATMENT PROCESS | NUMBER OF UNITS TOT | IN OP | REMARKS | VIOLATIONS |
|---|---|---|---|---|
| | | | Oil saturated ground must be removed filled + seeded. Rinse area will also be cleaned graded and seeded. Drawing compound must be kept from the pond. All contact and non contact cooling water discharges must be permitted. | |
| Area landfills - not complete list | | | | |
| Moyers | | | | |
| Monty County | | | | |
| GROWES | | | | LAWS, REGULATIONS OR PERMIT NO. & COND. |
| Pottstown | | | | |
| Boyertown | | | | |

THIS DOCUMENT IS OFFICIAL NOTIFICATION THAT A REPRESENTATIVE OF THE DEPARTMENT OF ENVIRONMENTAL RESOURCES, BUREAU OF WATER QUALITY MANAGEMENT, INSPECTED THE ABOVE FACILITY. THE FINDINGS OF THIS INSPECTION ARE SHOWN ABOVE.

ANY VIOLATIONS WHICH WERE UNCOVERED DURING THE INSPECTION ARE INDICATED. VIOLATIONS MAY ALSO BE DISCOVERED UPON EXAMINATION OF THE RESULTS OF LABORATORY ANALYSES OF THE DISCHARGE AND REVIEW OF DEPARTMENT RECORDS. NOTIFICATION WILL BE FORTHCOMING, CONFIRMING ANY VIOLATIONS INDICATED HEREIN AND LISTING ANY ADDITIONAL VIOLATIONS.

RECEIVING STREAM APPEARANCE

| NAME | ABOVE DIS APP | BELOW DIS APP |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

PERSON INTERVIEWED (SIGNATURE)
X W J Steinert

TITLE AND DATE
X V P. 2-1-81

INVESTIGATOR (SIGNATURE)
[signature]

TITLE AND DATE
WQS 4 81

RESPONSIBLE OFFICIAL

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
1875 New Hope Street
Norristown, Pennsylvania 19401
215 631-2409

April 20, 1981

Mr. W.P. Steirert
A. Steirert and Sons Inc.
Box 100
Hatfield, PA 19440

Re: Industrial Waste
A. Steirert and Sons Inc.
Hatfield Township
Montgomery County

Dear Mr. Steirert:

This is to confirm the results of my inspection conducted on April 1, 1981 which revealed that the previous discharge of waste acid rinse water had been eliminated through recirculation. However, there were several other conditions that need to be corrected. These conditions include the discharge of quench oil to the grounds surface, the discharge of contact cooling water to the pond and contaminated soil below the acid rinse discharge.

Such conditions are in violation of Title 25, Chapter 101, Section 101.3 of the Rules and Regulations of the Department of Environmental Resources regarding activities utilizing polluting substances.

In order to resolve these violations the following steps must be taken. With respect to the quench oil cooler, this unit must be repaired to prevent further contamination by oil, as well as removal, grading and seeding of the affected area. All contaminated materials must be properly disposed of.

This clean up procedure also applies to the contaminated soil below the former acid rinse discharge. The use of the pond as the receiving water for contact cooling water from the mill requires a Water Quality Management Permit. Enclosed are the necessary modules for the permit. Should this discharge be eliminated, however, the permit is not required.

Notify this office in writing no later than May 18, 1981 of the action you have taken to comply, the date compliance was accomplished and the steps you have taken to prevent a recurrence of the violation. Should the discharge of contact cooling water be continued the completed modules will also be required by this date.

If you have any questions, please feel free to contact me.

Very truly yours,

James LaRegina

JAMES LAREGINA
Water Quality Specialist

cc: Ce Re 30 4Z467

ENCLOSURES

AR300564

May 4, 1981

Mr. James LaRegina,
Water Quality Specialist
Commonwealth of Pennsylvania
Dept. of Environmental Resources
1875 New Hope Street
Norristown, Penna. 19401

Dear Mr. LaRegina:

The following is in answer to your letter of April 29, 1981 concerning Industrial Waste.

1) The unit which vacuums the wire to reduce residue [illegible] in the process of heat-treating has been dismantled, cleaned, repaired and replaced; and seems to be functioning properly.

2) The two rolling mills which flatten the wire were once cooled by our main water supply and discharged. This has now been eliminated and is being recirculated, thus eliminating any discharge.

3) The use of the pond as a supply and [illegible] heat exchanger for the cooling of quenching oil does not contaminate the water or environment. So, if it is permissable to apply for a permit, this will be our course of action. The amount of heat which is extracted from the heat exchanger [illegible]

4) In reference to the clean-up operation, it is almost impossible to bring in any kind of equipment to grade and seed until weather conditions are more favorable.

Very truly yours,

A. STEIERT & SONS, INC.

W. P. Steiert
Vice President

WPS:mj

[redacted]

AR300565

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
1875 New Hope Street
Norristown, PA 19401
215 631-2411

May 26, 1981

A. Steiert & Sons, Inc.
P.O. Box 100
Bergey Road
Hatfield, PA 19440

Attention: Mr. W.P. Steiert
Vice President

Re: Industrial Waste
A. Steiert and Sons
Hatfield Township, Montgomery County

Gentlemen:

This is in reply to your May 4, 1981 letter and application form sent to James LaRegina.

It is our understanding that you have eliminated all process water discharges to the pond and now discharge only noncontact cooling water. Because of this we will not require you to obtain an Industrial Waste permit at this time. However, we may require you to obtain a permit if any of the following conditions are violated:

1. Discharge to the pond(s) shall consist solely of noncontact cooling water.

2. No chemical additives (i.e. algicides, biocides, inhibitors, etc.) may be added to the noncontact cooling water.

3. Clean up of past pollution must be completed to the Department's satisfaction (see Mr. LaRegina's April 20, 1981 letter).

Your compliance with the above will be verified by future Department inspections.

If you have any questions, please feel free to call me at 631-2411.

Very truly yours,

James P. Ridolfi

JAMES P. RIDOLFI
Sanitary Engineer

cc: James LaRegina
Ce Re 30 BY201

AR300566

REFERENCE 3
Soil and Ground Water Contamination Assessment
for Ametek/Hunter Spring Division of
Hatfield, Pennsylvania Phase I
August 15, 1986

AR300567

# SOIL AND GROUND WATER CONTAMINATION ASSESSMENT FOR AMETEK/HUNTER SPRING DIVISION OF HATFIELD, PENNSYLVANIA

PHASE I

Issued: 8/15/86

Prepared by:

Environmental Resources Management
999 West Chester Pike
West Chester, Pennsylvania 19382

300568

TABLE OF CONTENTS


| | | Page |
|---|---|---|
| Section 1 - | Introduction | 1-1 |
| 1.1 | Background | 1-1 |
| 1.2 | Objectives of the Phase I Investigation | 1-7 |
| Section 2 - | Regional Geology and Hydrogeology | 2-1 |
| 2.1 | Physical Setting | 2-1 |
| 2.2 | Regional Geology | 2-3 |
| Section 3 - | Field Investigation | 3-1 |
| 3.1 | Evaluation of Existing Site Data | 3-1 |
| 3.2 | Site Reconnaissance | 3-1 |
| 3.3 | Evaluation of Records and Site Reconnaissance Data | 3-2 |
| 3.4 | Soil Gas Survey | 3-2 |
| 3.5 | Soil Sampling for Laboratory Analysis | 3-3 |
| 3.6 | Well and Surface Water Sampling Survey | 3-3 |
| 3.7 | Laboratory Analysis | 3-3 |
| Section 4 - | Results and Discussion | 4-1 |
| 4.1 | Site Physical Setting | 4-1 |
| 4.2 | Site Reconnaissance | 4-1 |
| 4.3 | Evaluation of Existing Data | 4-3 |
| 4.4 | Site Geology | 4-3 |
| 4.5 | Site Hydrogeology | 4-5 |
| 4.6 | Soil Gas and Sampling Survey | 4-7 |


300569

TABLE OF CONTENTS
(Continued)


| | | Page |
|---|---|---|
| Section 5 - | Conceptual Remedial Action Alternatives | 5-1 |
| 5.1 | Alternative 1: No Action | 5-1 |
| 5.2 | Alternative 2: Soil Drying/ Volatilization Beds (Composting) | 5-2 |
| 5.3 | Alternative 3: Soil Flushing and Purging of Ground Water | 5-3 |
| 5.4 | Alternative 4: In-vessel Air Stripping of Soil | 5-4 |
| 5.5 | Alternative 5: Soil Vacuuming | 5-6 |
| 5.6 | Alternative 6: In-Vessel Microbial Degradation | 5-7 |
| 5.7 | Alternative 7: In-Situ Microbial Degradation | 5-8 |
| 5.8 | Alternative 8: Off-Site Disposal of Contaminate Soil | 5-9 |
| 5.9 | Ranking of Alternatives | 5-10 |
| 5.10 | Summary of the Evaluation of Remedial Action Alternatives | 5-12 |
| Section 6 - | Conclusions | 6-1 |
| 6.1 | Extent of Contamination | 6-1 |
| 6.2 | Site Conditions | 6-2 |
| 6.3 | Preliminary Evaluation of Remediation Alternatives | 6-2 |
| Section 7 - | Recommendations | 7-1 |
| Appendix A | Laboratory Analyses | |

## LIST OF FIGURES


| Figure | | Page |
|---|---|---|
| 1-1 | General Location Map | 1-2 |
| 1-2 | Ametek Site Map | 1-3 |
| 1-3 | Area site Map | 1-6 |
| 2-1 | Montgomery County | 2-2 |
| 2-2 | Soil Map of Ametek Study Area | 2-5 |
| 4-1 | Ametek Reconnaissance Map | 4-2 |
| 4-2 | Lineament Map | 4-4 |
| 4-3 | Bedrock Lithology in Study Area | 4-6 |
| 4-4 | Sampling Location Map | 4-9 |
| 4-5 | TCE Tank Sampling Locations | 4-10 |
| 4-6 | Neutralizing Lagoons Sampling Locations | 4-11 |

# LIST OF TABLES


| Table | | Page |
|---|---|---|
| 1-1 | Plant Well Water Sample Analysis | 1-5 |
| 4-1 | Soil Gas Sampling Data | 4-12 |
| 4-2 | Sampling Location Data | 4-14 |
| 4-3 | Sampling Results | 4-16 |
| 5-1 | Numerical Evaluation and Ranking of Alternative for TCE Cleanup | 5-11 |

# SECTION 1

# INTRODUCTION

## 1.1 Background

The Ametek/Hunter Spring Division Plant in Hatfield, Pennsylvania was built and began operations in 1962 (Figure 1-1). Since that time, TCE has been used at the plant as a cleaning solvent except for the period of 1975 to 1976 when 1,1,1-trichloroethane was used instead. Prior to 1975, TCE was stored in drums. The exact location of the TCE drum storage is uncertain, however, during an inspection of the plant property in April 1986, some half-buried empty drums were observed in an area behind the plant. After 1975, TCE was stored in a 1500-gallon above ground tank. This tank was in use until June 1986 at which time it was removed from the site. Figure 1-2 shows the Ametek site.

A settling basin in the back of the plant received rinse water from plating operations at one time in the past. Lagoons in the same area were used to receive metal sludges (Figure 1-2). These lagoons were closed in place with DER approval in 1974. The waste discharge license was canceled at that time.

The plant has two production water wells (wells 1 and 2). Well 1 is located in the gatehouse to the northwest of the plant (all directions are in respect of true north). Well 2 is located to the southeast of the plant. A third well (well 3) is shown on plant drawings just east of the abandoned farm and drive. No well was found at this location. It is assumed that it has been filled in since no other record of the well exists.

In 1979, North Penn Water Authority discovered traces of volatile organic chemicals in 18 of its wells. These wells were shut down and replacement water has been purchased from Keystone Water Company. It was projected that the water demand would most likely exceed the capacity of the system by the summer of 1986.



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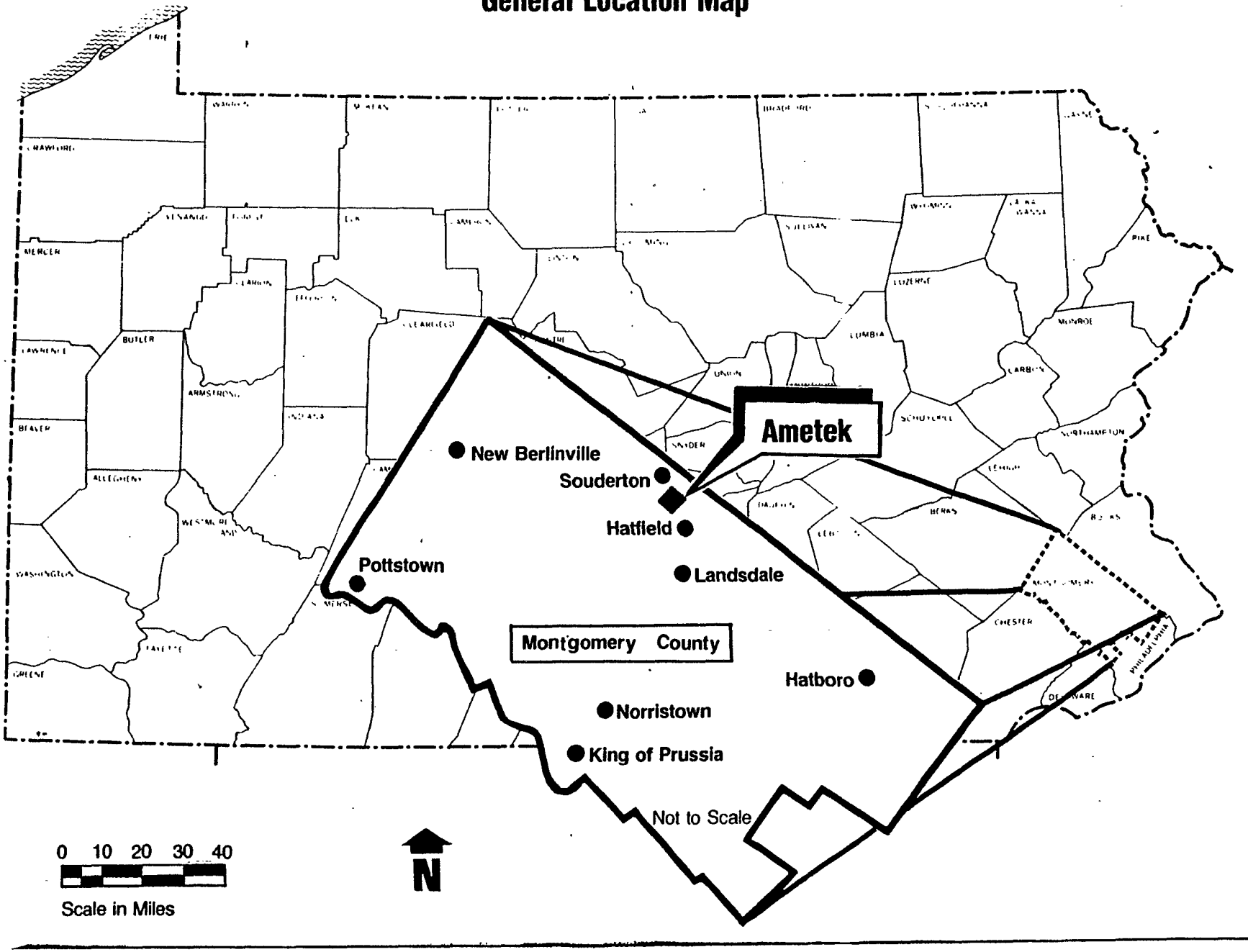
# Figure 1-1
# General Location Map




The ERM Group

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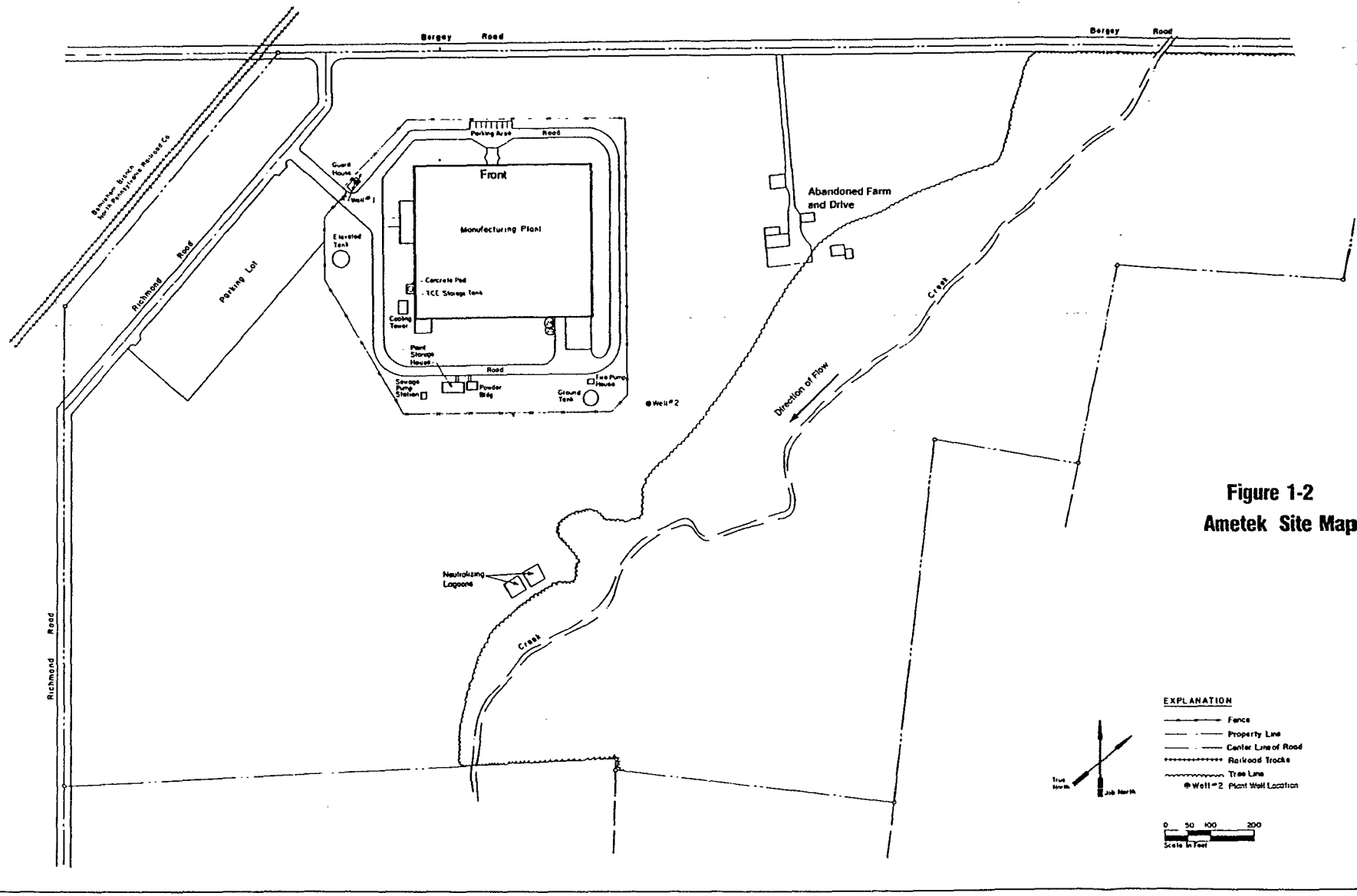



**Figure 1-2**
**Ametek Site Map**

AR300575

In a cooperative testing program, the two plant site wells (well 1 and well 2) were sampled in 1980 with the following results:

| | WELL 1 | WELL 2 |
|---|---|---|
| 1,1,1-Trichloroethane | 671 ppb | 601 ppb |
| Trichloroethene (TCE) | 15.7 ppb | 281 ppb |
| Tetrachloroethene (PCE) | <0.5 ppb | 8.9 ppb |

Subsequent samplings of the wells since that time have indicated varying concentrations with the highest reading being 1076 ppb of 1,1,1- Trichloroethane (Table 1-1). The latest samples (May, 1986) produced the following concentrations:

| | WELL 1 | WELL 2 |
|---|---|---|
| 1,1,1-Trichloroethane | 440 ppb | 640 ppb |
| Trichloroethene (TCE) | 210 ppb | 160 ppb |
| Tetrachloroethene (PCE) | <10.0 ppb | 20 ppb |

A survey done by a North Penn Water Resources Association (NPWRA) representative with an Organic Vapor Meter (OVM) over 12 of the plant's 87 acres indicated significant soil contamination in the area of the TCE storage tank.

As a result of the contamination of its wells, North Penn Water Authority has named Ametek/Hunter Spring Division, along with 31 other companies, in a pending litigation. The water company is currently asking for voluntary participation in a cleanup program of 18 of its 56 wells.

The closest North Penn well is approximately one-half mile from the Ametek plant in an industrial park off of Unionville Pike (Figure 1-3).



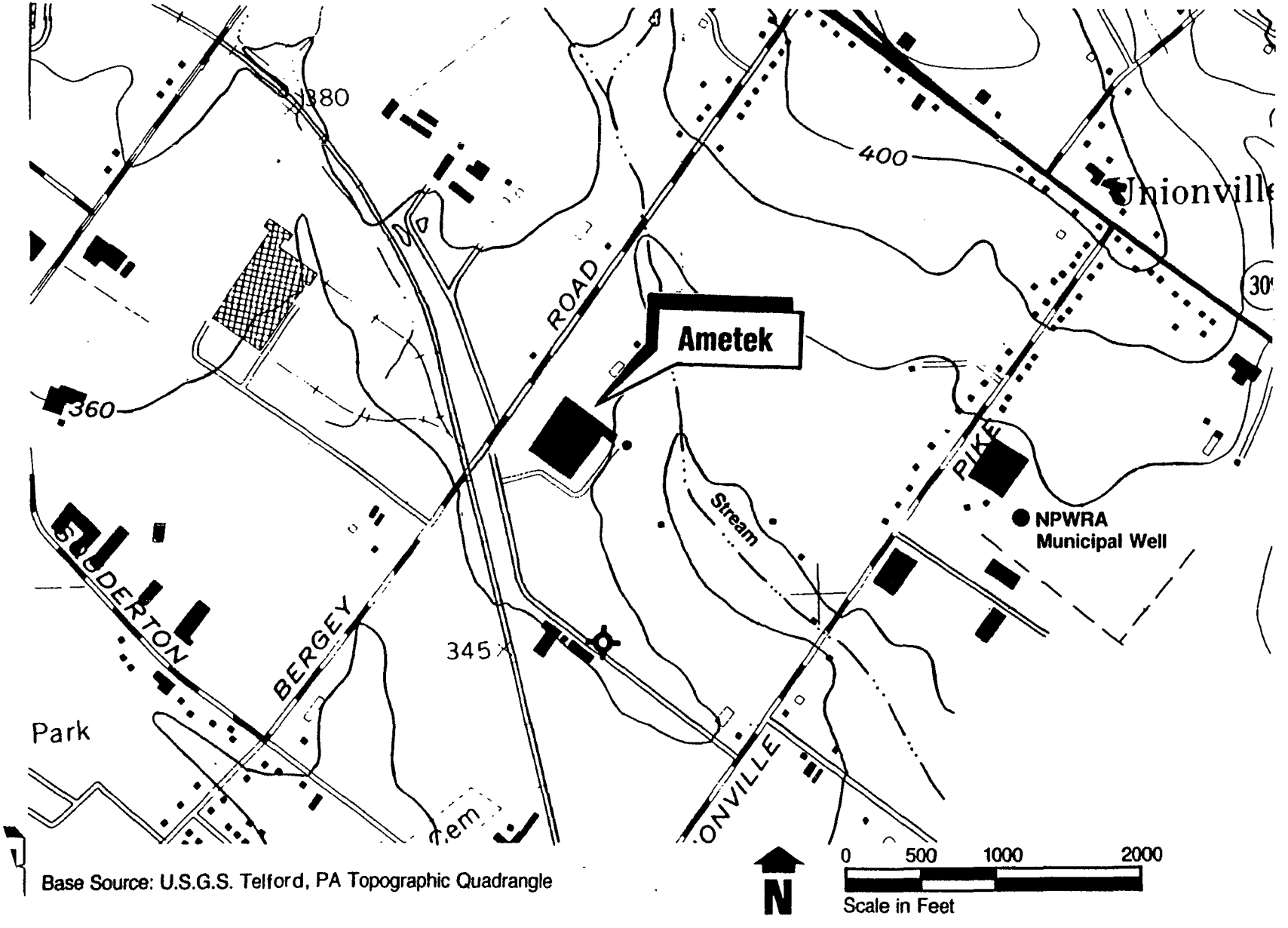
AR300576

TABLE 1-1
PLANT WELL
WATER SAMPLE ANALYSIS

| Date | WELL #1 1,1,1-TRI | TCE | PCE | WELL #2 1,1,1-TRI | TCE | PCE |
|---|---|---|---|---|---|---|
| 10/15/80 | 671. | 15.7 | <0.5 | 601. | 281. | 8.9 |
| 2/23/81 | 648. | 294. | 8.5 | 143.0 | 117. | 8.7 |
| 6/17/81 | 251. | 116. | 3.3 | 311. | 220. | 19.1 |
| 10/14/81 | 472. | 259. | 7.4 | 75.2 | 370. | 13.3 |
| 8/05/82 | 207. | 144. | 4.9 | 210. | 245. | 42.7 |
| 12/01/82 | 525. | 265.5 | 12.0 | 136.0 | 187.0 | 25.9 |
| 2/11/83 | 522. | 436. | 11.8 | 468. | 207. | 6.1 |
| 6/02/83 | 818. | 492. | 13.4 | 477. | 248. | 16.3 |
| 10/06/83 | 137.0 | 3.1 | <0.5 | ---- | ---- | ---- |
| 1/05/84 | 538.0 | 369. | 10.3 | 769.0 | 478.0 | 29.4 |
| 3/08/84 | 632.0 | 325.0 | 8.0 | 529.0 | 201.0 | 19.9 |
| 5/03/84 | 379.0 | 289.0 | 13.3 | 314.0 | 183.0 | 30.0 |
| 6/25/85 | 61.9 | 22.3 | <0.5 | 1076. | 384.0 | 28.5 |
| 8/16/85 | 198. | 183. | 5.3 | ---- | ---- | ---- |
| 10/02/85 | 59.7 | 26.9 | <0.5 | ---- | ---- | ---- |
| 12/04/85 | 377. | 297. | 9.2 | 546. | 329. | 11.1 |
| 2/20/86 | 433.0 | 419.0 | 9.3 | ---- | ---- | ---- |
| 5/09/86 | 440. | 210. | <10.0 | 640. | 160. | 20.0 |

All values are reported in ppb.

# Figure 1-3
# Area Site Map




Base Source: U.S.G.S. Telford, PA Topographic Quadrangle

The ERM Group

AR300578

## 1.2 Objectives of the Phase I ERM Investigation

The objectives of Phase I soil and ground water investigation were as follows:

- A confirmation of previous measurements of organic solvents in both the soil and ground water at specific locations on the site.
- A survey of the remaining plant site to determine other possible areas of soil and ground water contamination.
- An assessment of the water quality of the stream running through the site, especially at property entry and exit points.
- An assessment of soil contamination in the TCE storage tank area.
- A determination of the feasibility of on-site soil treatment to remediate contamination by volatile organic compounds.



AR300579

# SECTION 2

# REGIONAL GEOLOGY AND HYDROGEOLOGY

This section provides background information on the regional geology and hydrogeology for Ametek/Hunter Spring Division and for Montgomery County. The specific site conditions are described in Section 3. The following references were used in the preparation of this section.

- Hall, G.M., 1973 "Ground Water in Southeastern Pennsylvania", Topographic and Geologic Survey, Water Resource Report 2, Commonwealth of Pennsylvania, Department of Environmental Resources.

- Longwill, S.M., Wood, C.R., 1965, "Ground Water Resources of the Brunswick Formation in Montgomery and Berks Counties, Pennsylvania", Topographic and Geologic Survey, Ground Water Report W 22, Commonwealth of Pennsylvania, Department of Internal Affairs.

- Newport, T.G., 1973, "Ground Water Resources of Montgomery County, Pennsylvania", Topographic and Geologic Survey, Water Resource Report 29, Commonwealth of Pennsylvania, Department of Environmental Resources.

- Smith, R.V., 1967, "Soil Survey of Montgomery County, Pennsylvania", Pennsylvania Department of Agriculture, State Soil and Water Conservation Commission.

- Willard, B., Freedman, J., McLaughlin, D.B., Ryan, D.J., Wherry, E.T., Peltier, L.C., Gault, H.R., 1959, "Geology and Mineral Resources of Bucks County Pennsylvania", Topographic and Geologic Survey, Bulletin C 9, Commonwealth of Pennsylvania, Department of Internal Affairs.

## 2.1 Physical Setting

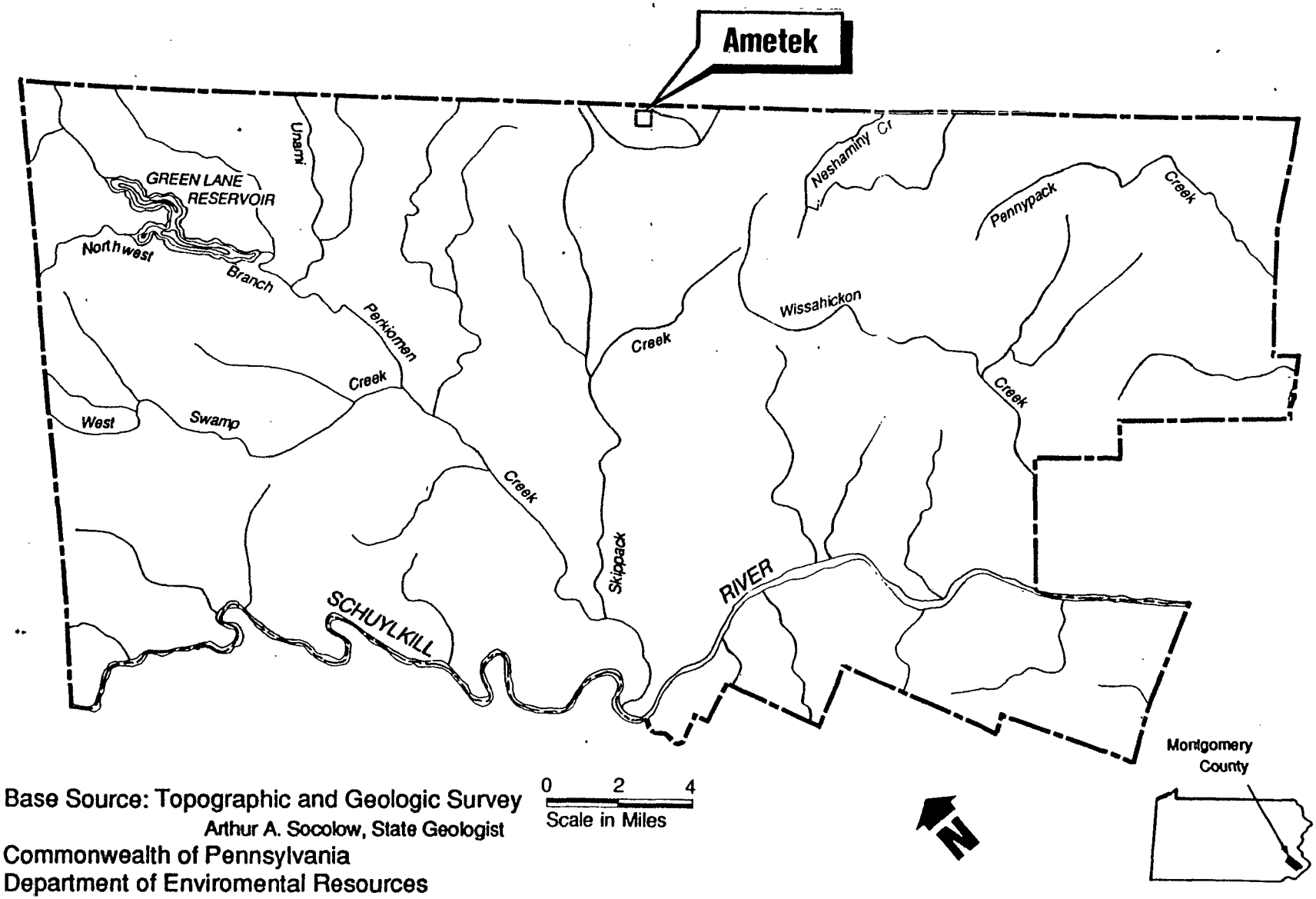
The Ametek Site is located in the Northeastern portion of Montgomery County, Pennsylvania (Figure 2-1). The county occupies an area of approximately 491 square miles of undulating plain consisting of low hills and ridges belonging to the Piedmont province of the Appalachian Highlands physiographic division. The general drainage and slope of the land is to the



AR300580

# Figure 2-1

## Montgomery County




Base Source: Topographic and Geologic Survey
Arthur A. Socolow, State Geologist
Commonwealth of Pennsylvania
Department of Enviromental Resources

The ERM Group

AR300581

southeast into the Delaware River. The Schuykill River and it's tributaries drain most of the western part of the county. The eastern part of the county is drained by the Neshaminy, Pennypack, and Tacony Creeks which flow directly into the Delaware River (Newport, 1973).

## 2.2 Regional Geology

### 2.2.1 Bedrock

The bedrock formations within Montgomery County and more specifically within the vicinity of of the Ametek site are composed of rocks of the Triassic age. The rocks belong to the Newark Group which have been divided, proceeding from oldest sediments to youngest, into the Stockton, Lockatong, and Brunswick formations. However, for the purpose of this discussion, only the two youngest formations, the Lockatong and the Brunswick, will be discussed as the Stockton Formation is not present in the study area (Longwill, 1965).

In Montgomery County, the Lockatong Formation is generally a continuous belt of medium to dark gray argillite interbedded with thin beds of gray to black shale, siltstone, and marlstone. For the most part, bedding in the formation is massive. The Lockatong Formation contains a large percentage of analcime along with dolomite, feldspar, and clay. Quartz is a very minor constituent in the formation. Pyrite is scattered throughout the formation and calcite is common, especially in joints and fractures (Longwill, 1965).

The Brunswick Formation consists typically of reddish-brown shale, mudstone, and siltstone. A few very thin beds of green and brown shale are present. The formation consists mainly of feldspar, illite, chlorite, quartz, and calcite. Some beds are finely micaceous. Joints in the Brunswick formation are generally filled with calcite and quartz, less commonly they are filled with barite and pyrite. Most of the Brunswick formation is a tough thick-bedded red argillite interbedded with dark-grey argillite of the Lockatong formation (Longwill, 1965).

The average dip of the beds in the Brunswick and Lockatong formations is north-northwest at approximately 20°. Several broad anticlines and synclines whose axes trend about N. 60° W, are superimposed on this regional structural pattern (Longwill, 1965).

Both the Brunswick and Lockatong formations have been displaced by many relatively small faults. The largest fault in the study



AR300582

area passes between Hatfield and Souderton in an east-west direction and can be traced in both Bucks and Montgomery Counties. It has an offset of about 3000 feet (Longwill, 1965).

Joint systems are well developed in many of the beds in the Brunswick Formation. All the joints are nearly vertical and have an average distance between joints of about 6 inches. The strike of the joint sets appears to be independent of the dip and strike of the beds (Longwill, 1965).

### 2.2.2 Soil Description

In the majority of Montgomery County, especially in the vicinity of the Ametek site, the soils are moderately deep or deep and are gently sloping. They are generally acidic and have moderately slow internal drainage. The following soil series make up the majority of the soils in the vicinity of the Ametek site (Smith, 1967) (Figure 2-2).

- Bowmansville Series: Deep, poorly drained, gray or grayish-brown silt loams or silty clay loams. These soils formed in material washed from uplands underlain by shale, sandstone, and diabase. They are nearly level or gently sloping and occur along streams and waterways.

- Chalfont Series: Deep, somewhat poorly drained, nearly level and gently sloping soils that are very silty throughout. These soils are dark yellowish brown mottled with gray. A thick layer of low permeability in the subsoil impedes the downward movement of water.

- Doylestown Series: Deep, poorly drained, gray soils that are nearly level or gently sloping and are silty. These soils formed in windblown silt on low-lying flats, in depressions and on smooth, broad uplands. Like the Chalfont soils, they have a thick layer of low permeability in the subsoil that impedes the downward movement of water.

- Readington Series: Deep, moderately well drained silt loams that are nearly level to moderately sloping. These soils formed in materials weathered from shale, siltstone, and sandstone. They are located on smooth to rolling uplands. Their profile contains a firm subsoil that has grayish mottles in the lower part.

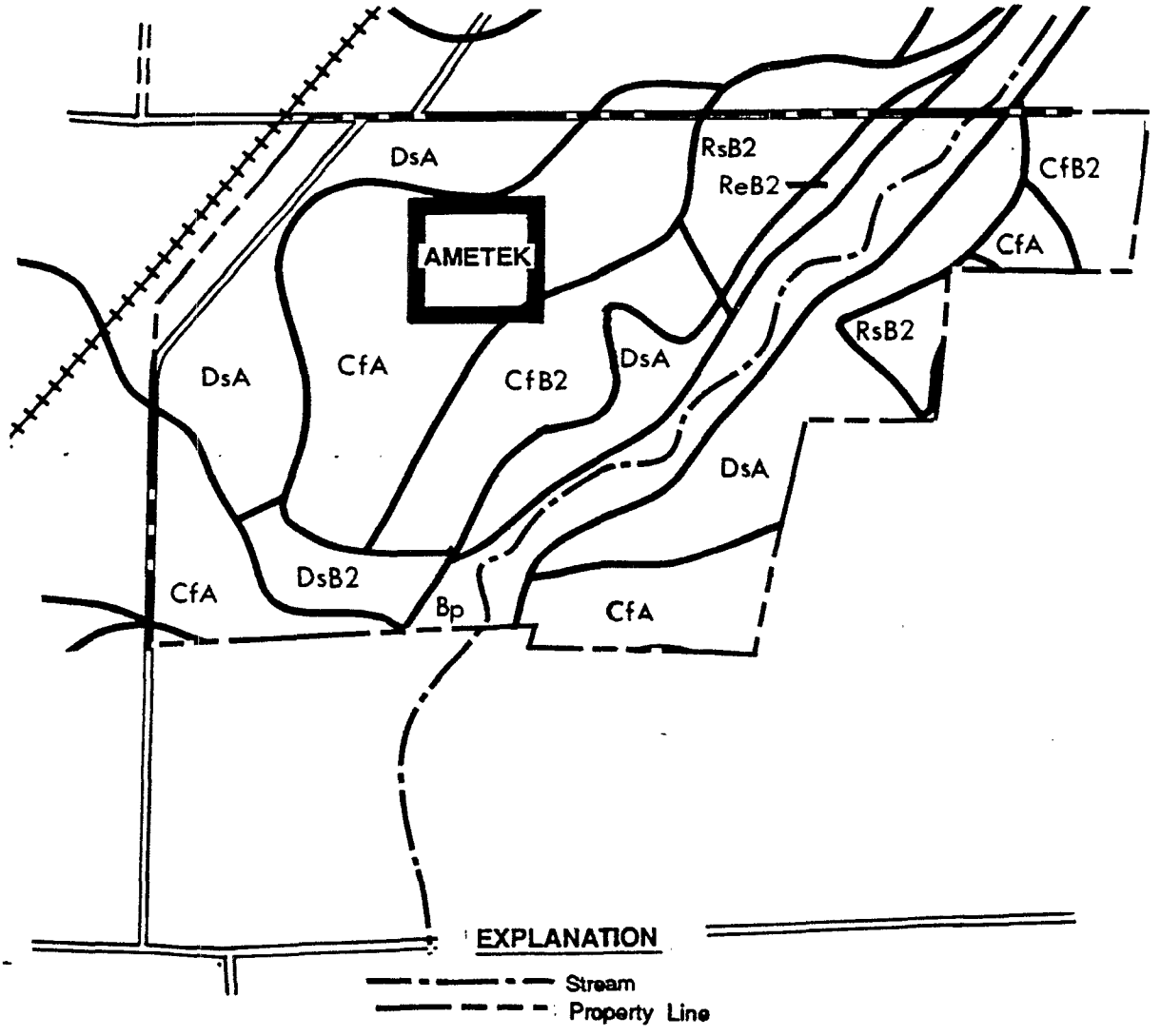
- Reaville Series: Deep moderately well drained to somewhat poorly drained, reddish shaly silt loam. These soils have a thin subsoil of low permeability that restricts the downward movement of water. They formed in materials weathered from shale and siltstone on level to rolling uplands.



AR300583

# Figure 2-2

## Soil Map of Ametek Study Area



## 2.3 Regional Hydrogeology

The Brunswick Formation is the main producer of ground water in Montgomery County. Althouth the primary permeability (interconnected intergranular pore space) in the Brunswick Formation is very low, the secondary permeability is relatively high with ground water moving through a network of vertical joints that intersect at various angles throughout the formation. Since some beds in the formation contain more joints than others, well yields may be different for wells screened in different beds. Surface water can percolate down through these joints to recharge the aquifer. The Brunswick formation is generally a reliable source of small to moderate supplies of ground water, producing more than 100 gpm in many places (Newport, 1973).

The structure of the Lockatong Formation is very similar to that of the Brunswick, differing only in the amount and spacing of the joints. The Lockatong has fewer and more widely spaced joints than does the Brunswick causing smaller amounts of water yield. The maximum recorded amount of water pumped from a well in the Lockatong formation is 40 gpm (Newport, 1973).

The water quality of ground water derived from the Brunswick Formation can be expected to contain a moderate to large amount of dissolved solids. The water has a medium hardness and meets most of the U.S. Public Health Service Standards for mineral content (Newport, 1973).

The water quality from the Lockatong formation is very similar to the Brunswick differing only in a slightly lower hardness and dissolved-solids content (Newport, 1973).



AR300585

# SECTION 3

# FIELD INVESTIGATION

## 3.1 Evaluation of Existing Site Data

The ERM site evaluation included the review of the following previous report:

- "Report of Activities and Recommendations for the North Pennsylvania Water Resources Association Water Quality Committee, March 1984 - March 1986" March 1986 by Gerald T. Coyle.

This report was reviewed with respect to the types of contamination found in the NPWA water wells and the types and locations of contamination found on the Ametek Site.

ERM collected pertinent qualitative and quantitative water data records for the existing on site wells. Data on the plant well performance such as specific capacity, pump rating and production rates were collected. Selected plant and USDA aerial photographs were obtained for selected periods of time during the plant's history. Data were acquired from state and federal agencies including numerous publications, maps, regional well records and climatological reports. Detailed plant topography maps and plant layout drawings were obtained and used to generate a base map.

## 3.2 Site Reconnaissance

ERM conducted a site walkover inspection of the site's 87 acres during the week of 28 April 1986 to check for signs of past storage and waste handling activity involving organic and other chemicals. A 100 feet by 100 feet grid pattern was laid on top of a constructed Ametek base map. The intervals were traversed in the field and checked for items such as tanks, basins, soil staining, areas of dead or stressed vegetation, partially exposed drums, slicks or scum on streams, ponds and other surface water bodies, large areas of disturbed ground, any vertical pipes or casings that could indicate wells or underground tanks, and any discernable chemical odors. The items that were found were marked accordingly on the base map for reference.



AR300586

## 3.3 Evaluation of Records and Site Reconnaissance Data

The existing data and data obtained in the site reconnaissance were carefully examined. All areas of known or suspected potential surface contamination were plotted on a base map for further investigation with a soil gas probe.

Existing plant water quality data were tabulated chronologically (Table 1-1), as well as plotted on graphs with climatological data, for a time trend evaluation. This permitted an evaluation of any trends of increasing or decreasing degrees of contamination or fluctuation tied to seasonal or major recharge events.

Aerial photographs were examined for indications of areas where waste disposal might have taken place on the plant property. In addition, aerial photographs and topographic maps were used to conduct a fracture trace analysis to determine zones of concentrated fracturing in the underlying bedrock, providing a pathway of increased permeability for ground water flow and contaminant migration.

## 3.4 Soil Gas Survey

Areas on the site that were previously reported to have high levels of volatile organics were measured using a soil gas sampler. Additional site areas suspected of potential surface contamination were also sampled. A total of 70 soil gas samples were taken (for locations and results see Section 4.6). The procedure for the soil gas sampling consisted of drilling an inch and a quarter diameter hole 18 inches deep at each sampling location using a stainless steel auger. A 3 foot piece of PVC pipe of the same diameter was then inserted into the hole. Small holes in the lower six inches of the pipe allowed the soil gas to be withdrawn through the pipe and into an organic vapor analyzer (OVA) with a flame ionization detector (FID) which was connected to the top of the PVC pipe with neoprene tubing.

The OVA measured a range of 1-1000 ppm (part per million) of the volatile organic compounds (VOC) present in the soil. Each sampling location was plotted on a map and had its total VOC concentration recorded appropriately. Between each sampling location the PVC pipe was decontaminated washing with Alconox® detergent and then triple rinsing with deionized water. Any gas remaining in the OVA was evacuated between each hole.

In areas where significantly high readings were obtained, additional readings were taken at varying distances from the center of the area to determine the approximate extent of soil contamination.



AR300587

## 3.5 Soil Sampling for Laboratory Analysis

At the completion of the soil gas survey, soil samples were obtained from the areas that reflected the highest volatile organic concentrations in terms of soil gas. Several samples were also taken in areas that were suspected of high concentrations. A total of nine soil samples were taken ranging from 1.5 to 4.0 feet deep (for locations and results see Section 4.6). The sampling procedure consisted of drilling a hole with a hand auger and taking samples at selected depths. The soil samples from each depth were then placed in separate jars and sealed. Each jar was marked accordingly. After a short period of time (approximately 15 minutes) the lid of each jar was opened just enough to permit the FID probe to sample the headspace of the jar for volatile organic vapors. For each soil sampling location the sample depths and concentrations were recorded so that profiles could be developed. To avoid cross-contamination, the hand auger was decontaminated between each sample and each hole by washing the auger with Alconox®, then triple rinsing with deionized water.

## 3.6 Well and Surface Water Sampling Survey

Plant wells 1 and 2 along with the stream flowing through the plant site were sampled for laboratory analysis. This sampling program was designed to characterize the present quality of the surface and ground water. The stream was sampled in three locations; at the property line entry and exit points and at the point just downstream from the former sludge lagoons. The plant wells were sampled after 3 volumes of water were removed from each well (for locations and results see Section 4.6).

## 3.7 Laboratory Analysis

All samples were sent to Lancaster Laboratories in Lancaster, Pennsylvania for analysis. U.S. EPA accepted methods for the collection preparation, preservation, storage, shipping, and chain-of-custody were used to guarantee the representativeness of the samples.

The soil samples were analyzed for priority pollutant volatile organics to determine both the types of volatile organic compounds and the quantities of each present. Water samples were analyzed as follows:

- Well 1 - Priority pollutant volatile organics plus indicator parameters including chemical oxygen demand (COD), specific conductance, and pH.



AR300588

- Well 2 - Selected constituents from the priority pollutant list plus 40 additional identifiable GC/MS peaks including the volatile fraction (plus ten peaks), the base-neutral extractable fraction (plus fifteen peaks), and the acid-extractable fraction (plus fifteen peaks). The same indicator parameters as well 1 were also run.

- Stream Samples - Priority pollutant volatile organics plus the same indicator parameters run on Wells 1 and 2.



AR300589

# SECTION 4

# RESULTS AND DISCUSSION

## 4.1 Site Physical Setting

The Ametek site is located on the lower side of an undulating plain. Topographic relief ranges from 340 to 400 feet above mean sea level with the lowest part of the site to the south and the highest to the northeast. About one third of the site's 87 acres are wooded to the south and to the east. Most of the remaining land is active farm land except for the land that is occupied by the plant itself. A small stream runs through the site to the east of the plant. The stream flows in a southerly direction with flow volume gradually increasing across the site from inflow of a network of small rills that run throughout the wooded area.

All of the Ametek on site manufacturing, storage, and testing facilities were active at the time of the Phase I investigation. The most notable of the site's structures is the main manufacturing plant which lies in the northwest portion of the site. Other structures on site include storage sheds, well houses and the foundations and rubble of an abandoned farm located to the northeast of the plant. An abandoned neutralizing lagoon also lies to the south of the plant.

It should be noted that the NPWA well (number 15) is located in an industrial park approximately one half mile southeast of the plant. The location of this well appears on Figure 1-3 in Section 1-1.

## 4.2 Site Reconnaissance

During ERM's site reconnaissance of the study area, the following items were noted (for locations of these items see Figure 4-1):

- Several areas with dead vegetation were found. They included: areas around the TCE tank; areas in front and in back of the paint storage house; areas between the lagoons and the plant; areas north of the former sludge lagoons.



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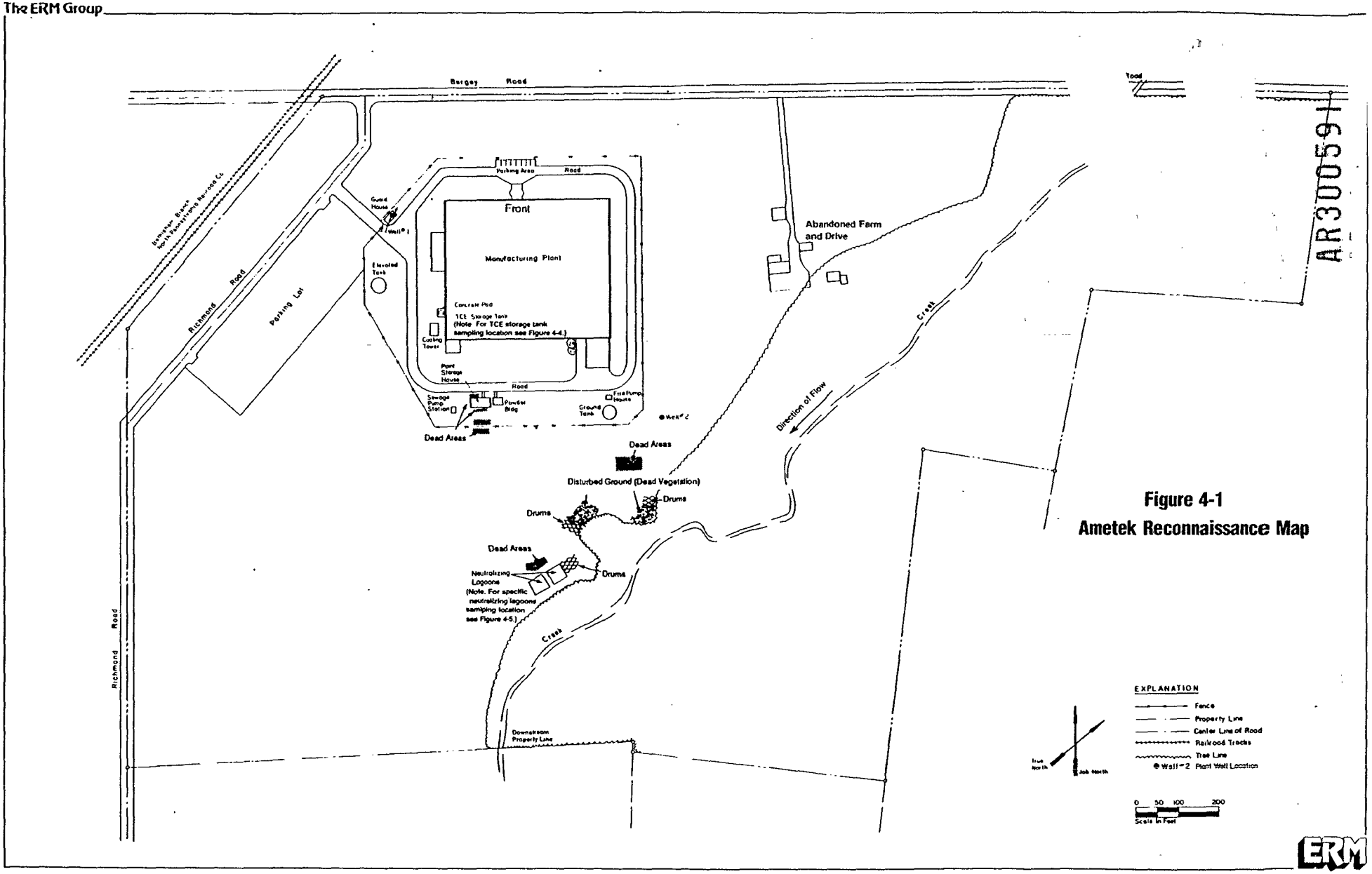


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**Figure 4-1**
**Ametek Reconnaissance Map**

- Large disturbed areas of ground were found in an area bordering the tree line, southeast of the plant. Vegetation was absent from these areas.

- About a dozen empty drums were found scattered on site in the area bordering the tree line, southeast of the plant. Several of these drums were partially buried in the soil

- Three wells are plotted on the Ametek site plan: two plant production wells and a third well believed to be a domestic well. The production wells were found in their plotted locations. Despite a thorough search, the third well was not found. However, close to the mapped location for the third well a circular depression was found which may be a remnant of an abandoned and backfilled well. Examination of the two plant production wells revealed that airline water level indicators installed in each well were inoperative. Further, Well 2 had no port or other means of gaining access to take a water level reading.

## 4.3 Evaluation of Existing Data

The careful evaluation of DER regional well records, climatalogical records, USGS aerial photos and topographic maps resulted in the following:

- No trends of increasing or decreasing degrees of contamination or fluctuation tied to seasonal or major recharge events were identified, indicating that the fluctuating levels of contaminants found in the site wells (Wells 1 and 2) are independent of precipitation.

- Fracture trace analysis from aerial photographs and topographic maps revealed the presence of three major sets of lineaments in the site vicinity (see Figure 4-2). These lineament sets had the following orientations: northwest/southeast (N46°W to N52°/W), north-northwest/south-southeast (N7°W to N11°W), and northeast/southwest (N38°E to N 44°W). The Chalfont Fault, which passes through the Ametek site, can be clearly identified to the west of the site where Skippack Creek follows the fault trace for over a mile. This fault is discussed further in Section 4.4.

## 4.4 Site Geology

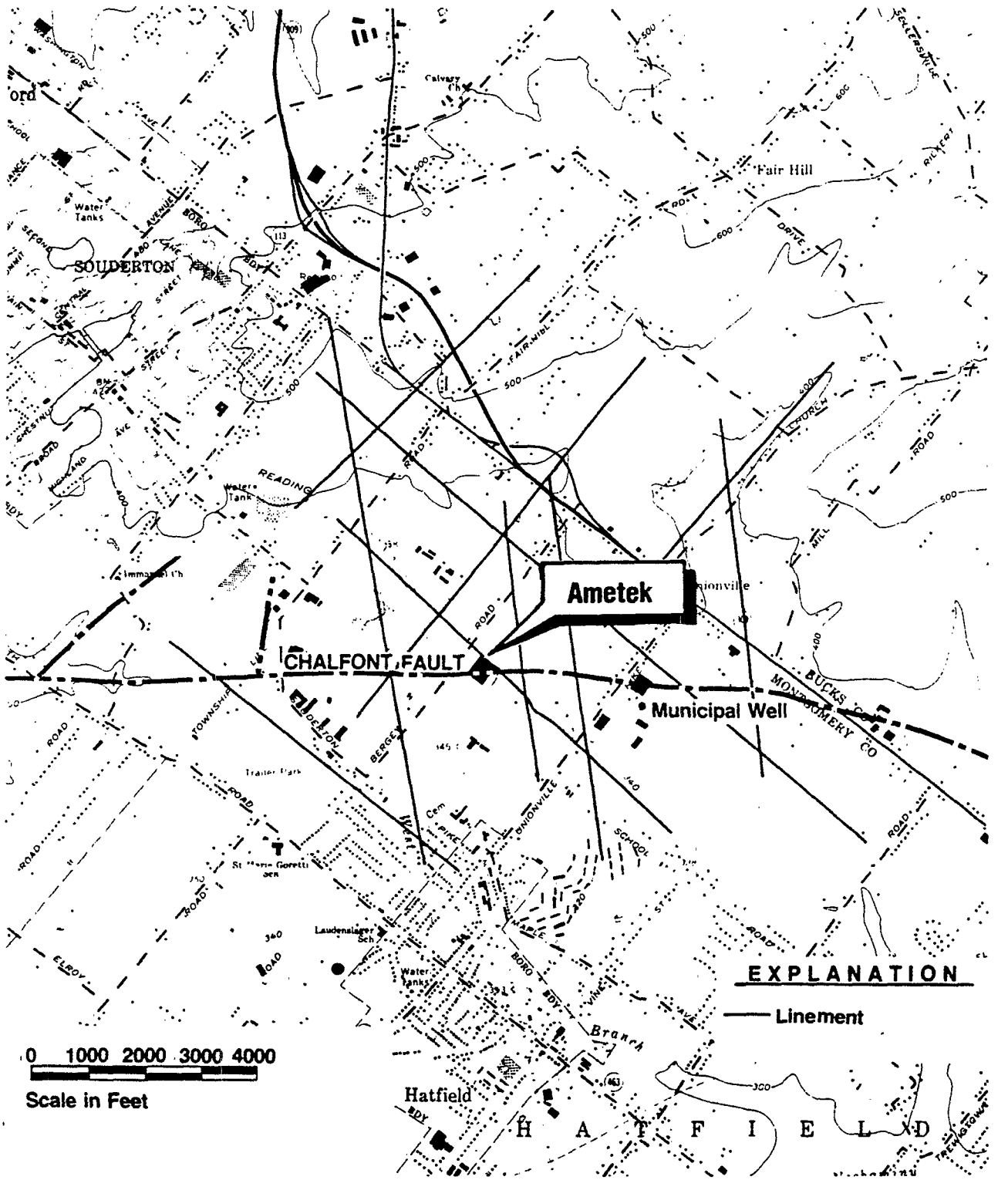
The structure of the bedrock beneath the Ametek site consists of thick to thinly bedded shales and siltstones dipping about 20° in a north - northwesterly direction. The bedrock is exposed in the



AR300592

# Figure 4-2

## Lineament Map




Base Source: U.S.G.S. Telford, PA Topographic Quadrangle

small stream to the east of the plant. The outcrops in the stream reveal that the rock is highly fractured with all fractures nearly vertical and intersecting at various orientations.

The bedrock underlying the site consists of the Brunswick and Lockatong Formations. Most of the site is underlain by the Brunswick Formation with the exception of the northeast corner of the site where the Lockatong formation has been faulted to the surface (Figure 4-3). At the site, the Brunswick Formation consists of a reddish brown shale with occasional lenses of siltstones of the same color. The Lockatong Formation found on the site consists of a thick-bedded, very dense, dark grey shale and mudstone. Both these formations are evident as weathered rock in the soil throughout the site. Logs from both plant wells indicate that depth to bedrock in the area of the plant building is about 12 feet.

The Chalfont fault passes through the site, traversing a course that is nearly east - west with the upthrown side to the north (Figure 4-3). The vertical displacement of the fault is estimated to be about 3000 feet (Willard, 1959). Drag folding on the upthrown (north) side of the fault indicate that some horizontal displacement has occurred. The Ametek plant building and site appear to be centered over the fault. Heavy fracturing in rocks observed in the stream bed is probably a direct result of this fault.

## 4.5 Site Hydrogeology

The two types of bedrock on the Ametek site are very similar in their water bearing characteristics. Although the Brunswick Formation has a very small amount of interconnected pore space within the rock itself, a significant amount of ground water occurs in secondary openings such as joints and fractures. This is also generally true for the Lockatong Formation. This formation differs from the Brunswick in that the joints and fractures are narrower and more widely spaced, restricting the amount of ground water that can flow and be contained in the formation.

The stream east of the plant drains most of the site. Two 24 inch storm conduits were built to drain the immediate area around the plant. The conduits empty into the stream southeast of the plant. The wooded area to the east of the plant is drained by small rills which network the entire area. The ground is very wet in this areas suggesting that a perched water table is



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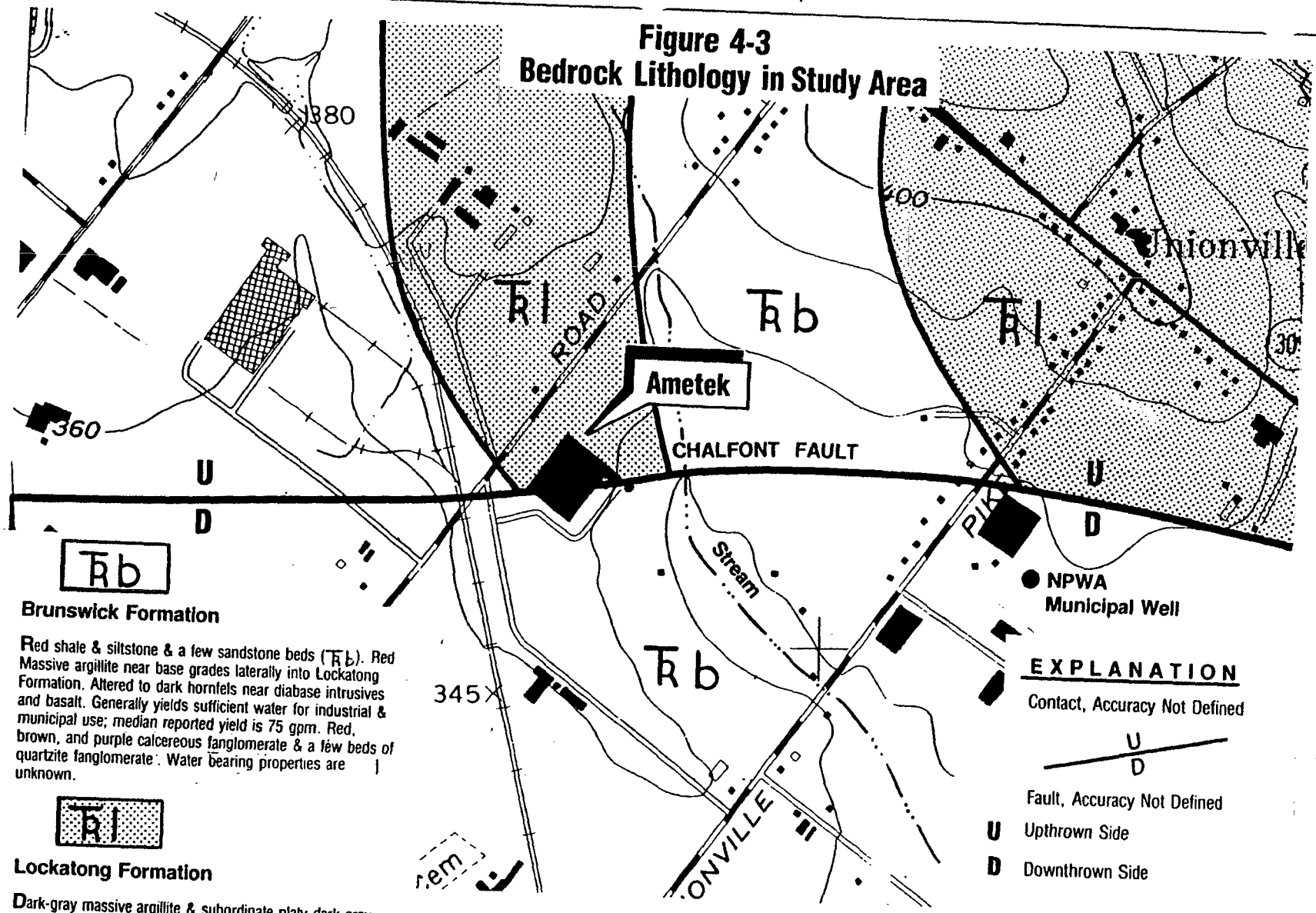
# Figure 4-3
# Bedrock Lithology in Study Area




Base Source: U.S.G.S. Telford, PA Topographic Quadrangle
Ground-Water Resources of Montgomery County, Pennsylvania, 1953

AR300595

present. A possible cause for this would be a shallow layer of very dense soil. Soil series descriptions (Section 2.2.2) indicate that such a layer (fragipan) is probably present over much of the site.

The plant has two active pumping wells which are designated as Well 1 and Well 2. Well one is located in the gate house in the northwest corner of the site. This well is 400 feet deep and has the pump intake set at 105 feet. The well produces about 105 gpm. Static water level measurements taken in May, 1986 showed a water table depth of 15 feet. Well 2 is located in a small pump house to the east of the manufacturing plant. This well was drilled to a depth of 395 feet and has the pump intake set at 226 feet. The well produces about 190 G.P.M. Both these wells were finished in the Brunswick Formation and produce a greater volume of water then the expected average yield (Brunswick formation - average yield 100 G.P.M.). Both these wells appear to have been purposely drilled along the trace of the Chalfont Fault which, along with the depth of the wells, may explain the higher water yields.

The fault traversing the site along with the bordering zone of highly fractured rock may provide a very permeable zone for ground water flow.

## 4.6 Soil Gas and Sampling Survey

The results of the soil gas survey detected the presence of organic vapor in the immediate area of the TCE tank, in and around the paint storage area, at isolated points in the abandoned neutralizing lagoons, and at isolated points along the tree line southeast of the plant. Soil gas readings ranged from 2 to >1000 ppm depending on the concentration of contamination in the soil (see Figures 4-4, 4-5, and 4-6 and Table 4-1).

The soil samples analyzed by the laboratory revealed a substantial amount of TCE and, to a lesser extent, PCE and toluene contamination in the soils around the TCE tank. TCE and toluene were also present in the soils near the paint storage house and along the tree line southeast of the plant. No PCE was detected in these areas. Toluene was present in low concentrations at one point in the abandoned neutralizing lagoon. TCE and PCE were not detected in this area. For locations and concentrations of these sampling points see Figures 4-4, 4-5, and 4-6 in conjunction with Tables 4-2 and 4-3.



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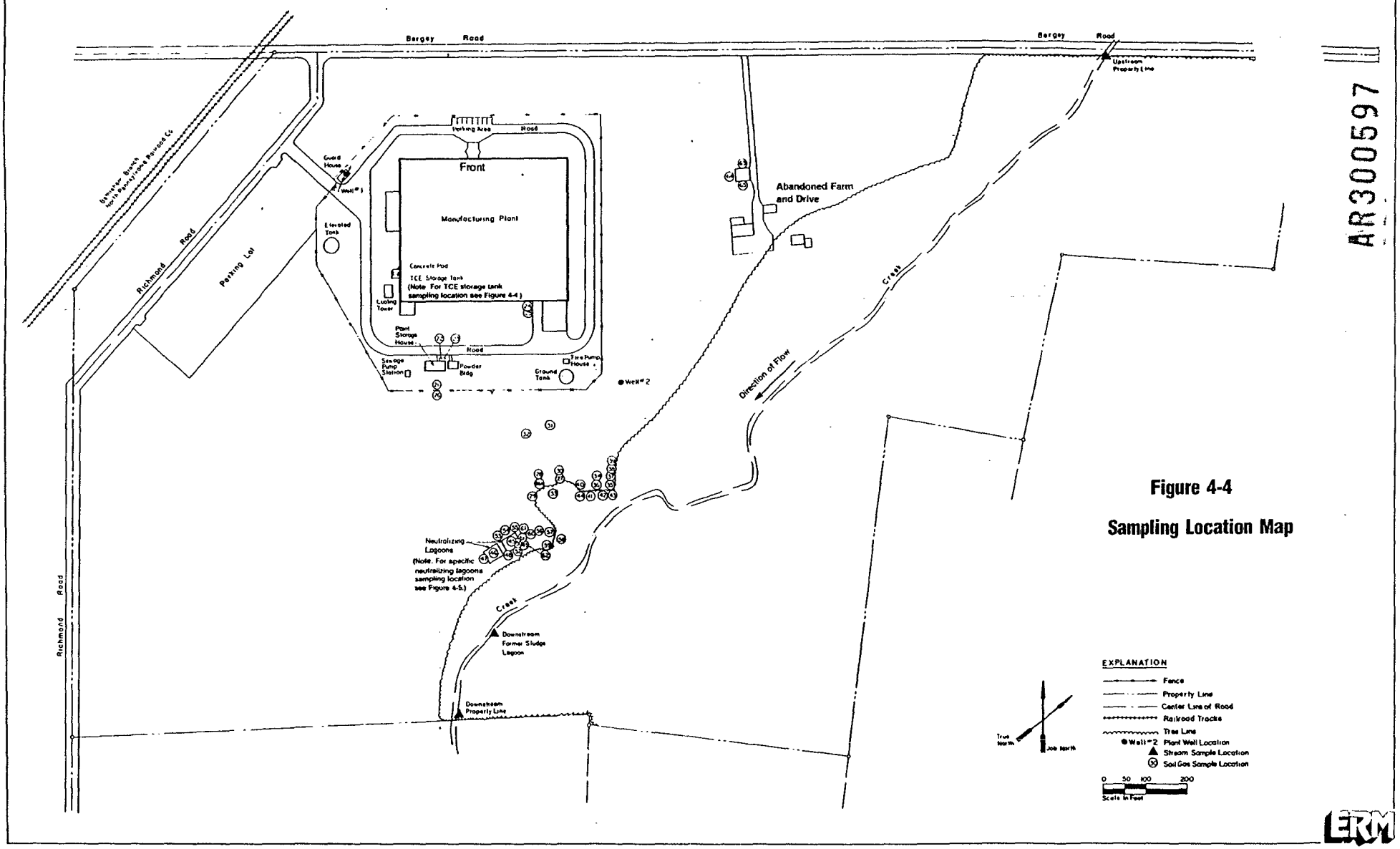


**Figure 4-4**

**Sampling Location Map**

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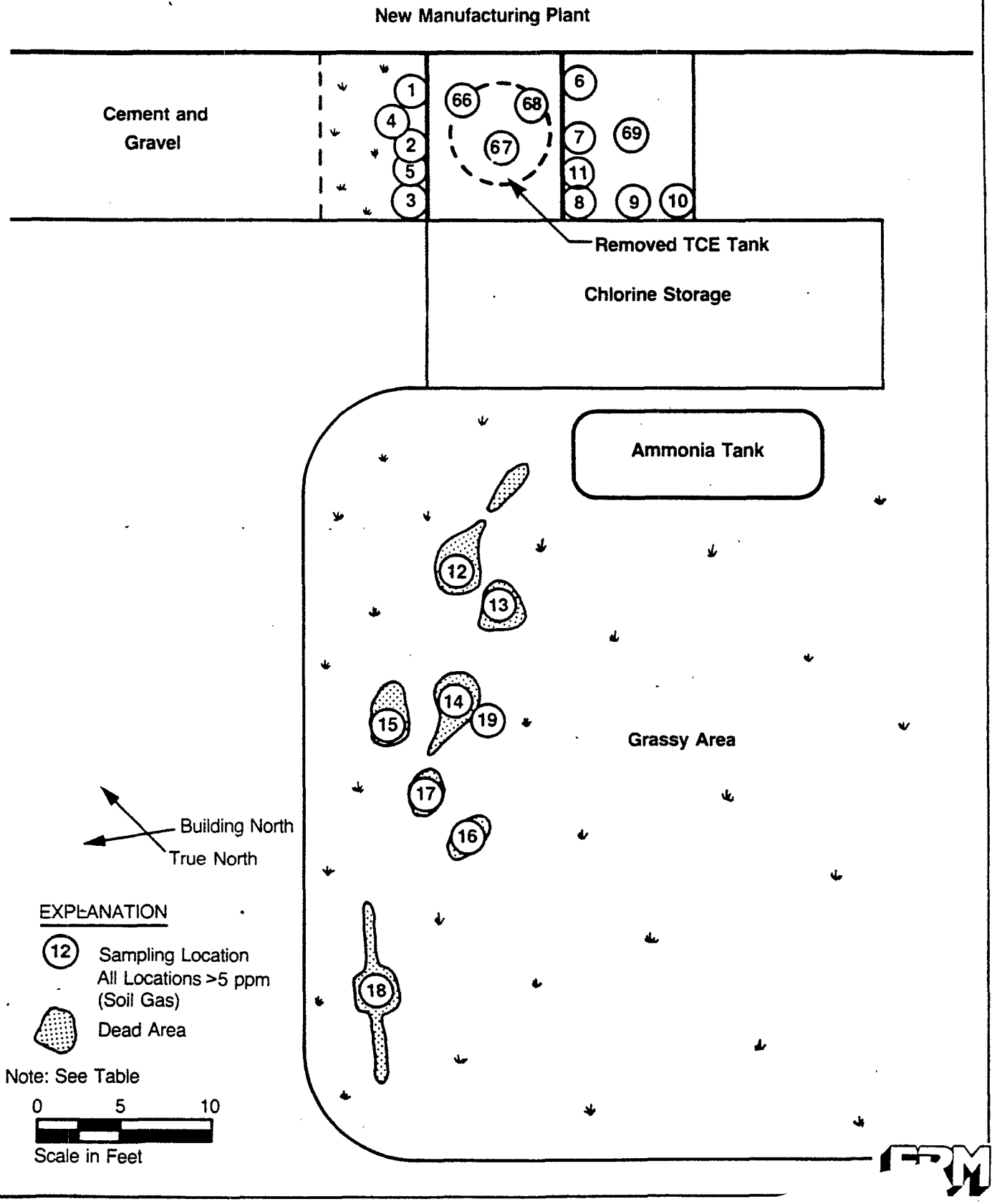
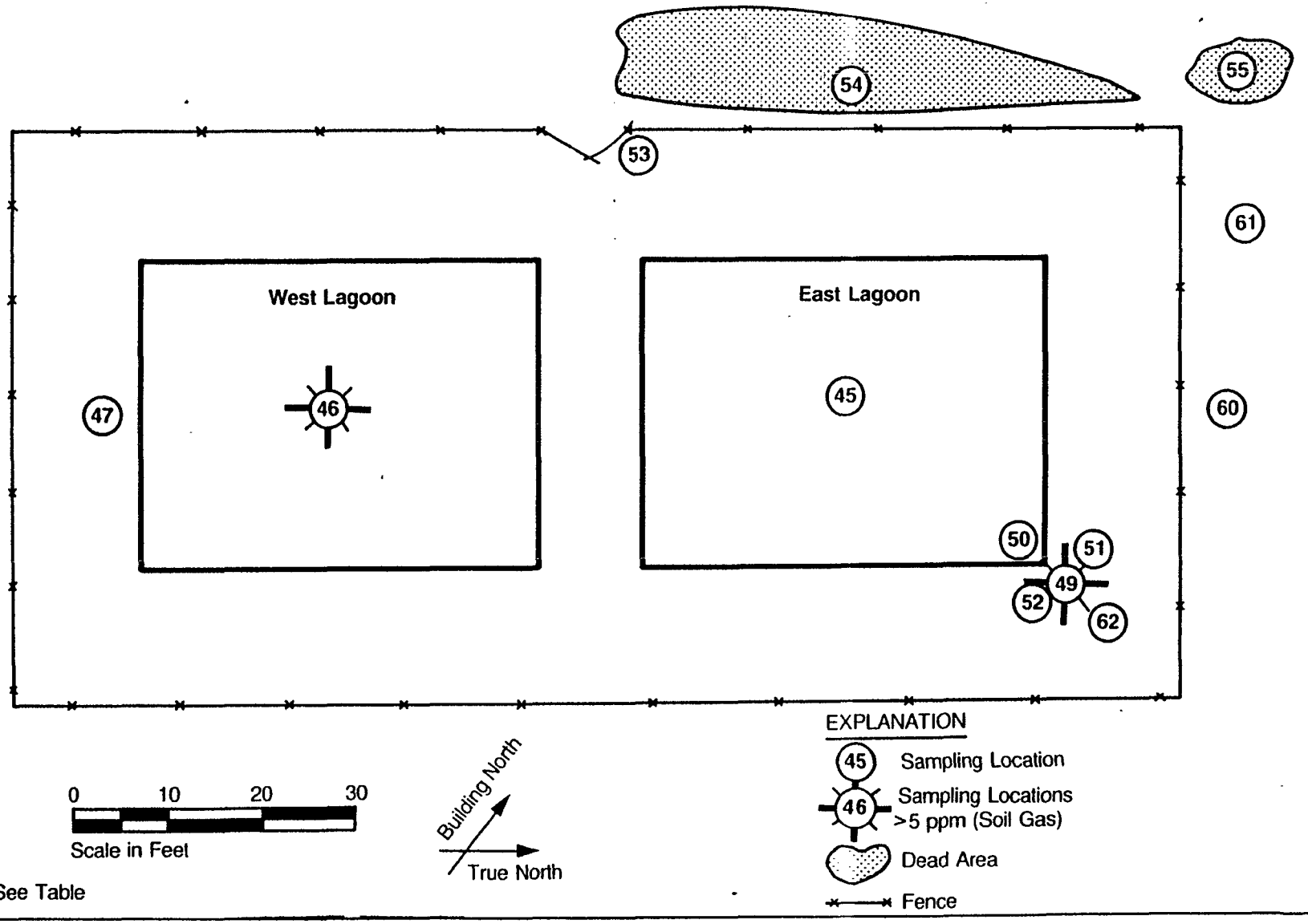
# Figure 4-5
# TCE Tank Sampling Locations



# Figure 4-6
# Neutralizing Lagoons Sampling Locations




The ERM Group

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TABLE 4-1
SOIL GAS SAMPLING DATA

| Sampling Location | Depth (Feet) | OVM (ppm) | Note |
|---|---|---|---|
| 1 | 1.0 | 490 | Odor |
| 2 | 1.0 | >1000 | Odor |
| 3 | 1.0 | 340 | Odor |
| 4 | 0.5 | 20 | No Odor |
| *5 | 3.0 | >1000 | Odor |
| 6 | 1.5 | 90 | Odor |
| 7 | 1.5 | >1000 | Odor |
| 8 | 1.5 | >1000 | Odor |
| 9 | 1.0 | 75 | Odor |
| 10 | 0.5 | 105 | Odor |
| *11 | 1.5 | >1000 | Odor |
| 12 | 1.5 | >1000 | Odor |
| 13 | 1.0 | 30 | No Odor |
| *14 | 1.0 | >1000 | Odor |
| 15 | 1.5 | >1000 | Odor |
| 16 | 0.5 | 30 | No Odor |
| 17 | 0.5 | 10 | No Odor |
| 18 | 0.5 | >1000 | Odor |
| 19 | 1.0 | 50 | No Odor |
| 20 | 0.5 | 0 | No Odor |
| *21 | 2.0 | 90 | Odor |
| *22 | 1.5 | 790 | Odor |
| 23 | 0.5 | 0 | No Odor |
| 24 | 0.5 | 0 | No Odor |
| 25 | 0.5 | 5 | No Odor |
| 26 | 0.5 | 5 | No Odor |
| 27 | 0.5 | 5 | No Odor |
| 28 | 2.0 | 28 | No Odor |
| 29 | 1.0 | 0 | No Odor |
| 30 | 1.0 | 2 | No Odor |
| 31 | 1.0 | 3 | No Odor |
| 32 | 1.0 | 0 | No Odor |
| 33 | 1.5 | 2 | No Odor |
| 34 | 1.0 | 0 | No Odor |
| 35 | 1.5 | 0 | No Odor |
| 36 | 1.5 | 0 | No Odor |
| 37 | 1.0 | 0 | No Odor |
| 38 | 1.4 | 0 | No Odor |
| 39 | 1.0 | 0 | No Odor |
| *40 | 1.5 | 30 | No Odor |
| 41 | 1.5 | 0 | No Odor |
| 42 | 1.5 | 0 | No Odor |
| 43 | 1.5 | 0 | No Odor |

TABLE 4-1 (continued)
SOIL GAS SAMPLING DATA

| Sampling Location | Depth (Feet) | OVM (ppm) | Note |
|---|---|---|---|
| 44 | 1.5 | 0 | No Odor |
| 45 | 1.5 | 0 | No Odor |
| 46 | 1.5 | 25 | No Odor |
| 47 | 1.5 | 0 | No Odor |
| 48 | 1.5 | 0 | No Odor |
| *49 | 1.5 | 900 | Odor |
| 50 | 1.5 | 10 | No Odor |
| 51 | 1.5 | 4 | No Odor |
| 52 | 1.5 | 9 | No Odor |
| 53 | 1.5 | 0 | No Odor |
| 54 | 1.5 | 0 | No Odor |
| 55 | 1.5 | 0 | No Odor |
| 56 | 1.5 | 0 | No Odor |
| 57 | 1.5 | 0 | No Odor |
| 58 | 1.5 | 0 | No Odor |
| 59 | 1.5 | 0 | No Odor |
| 60 | 1.5 | 0 | No Odor |
| 61 | 1.5 | 0 | No Odor |
| 62 | 1.5 | 0 | No Odor |
| 63 | 1.5 | 0 | No Odor |
| 64 | 1.5 | 0 | No Odor |
| 65 | 1.5 | 0 | No Odor |
| 66 | 3.5 | 13 | No Odor |
| *67 | 3.5 | 250 | Odor |
| 68 | 3.5 | 75 | No Odor |
| 69 | 3.5 | 7 | No Odor |

* Soil Samples Taken at These Locations (See Table 4-2).

Note: For Locations of Sampling Points See Figure 4-3.

TABLE 4-2
SAMPLING LOCATION DATA

| Sample ID | Sample Description | Location | Sample Type/Method | Sample Depth |
|---|---|---|---|---|
| (5) TCE tank North Slab | Soil | Along North Edge of Slab, Location 5 | Grab | 0.5-1.0' |
| (11) TCE Tank South Slab | Soil | Along South Edge of Slab, Location 11 | Grab | 0.5-1.2' |
| (14) Dead Grass Area | Soil | Dead Grass, Location 14 | Grab | 0.5-1.0' |
| (22) Paint Storage | Soil | North of Paint Storage, Location 22 | Grab | 1.0-4.0' |
| (21) Paint Storage | Soil | South of Paint Storage, Location 21 | Grab | 2.0-3.5' |
| (40) Location 40 | Soil | Wooded Area Location 40 | Grab | 2.0-4.0' |
| (49) Location 49 | Soil | West Neutralizing Lagoon, Location 49 | Grab | 2.0-4.0' |
| (67) Location 67 | Soil | Center of TCE Slab, Location 67 | Grab | 2.0-3.5' |
| (69) Location 69 | Soil | Center of Cement Slab South of TCE Storage | Grab | 2.0-3.5' |
| Upstream Property Line | Stream Water | Upstream at Property Line | Grab | 2" Below Surface |
| Downstream Property Line | Stream Water | Downstream at Property Line | Grab | 2" Below Surface |
| Downstream Former Sludge Lagoon | Stream Water | Downstream of Former Sludge Lagoon | Grab | 2" Below Surface |

Note: For Locations of Sampling Points See Figure 4-3.

wrong fig 4-4

TABLE 4-2
SAMPLING LOCATION DATA
(Continued)

| | | | | |
|---|---|---|---|---|
| Well 1 | Ground Water | Brunswick Formation (Aquifer) | Grab | 400' (Well Depth) |
| Well 2 | Ground Water | Brunswick Formation (Aquifer) | Grab | 395' (Well Depth) |

Note: For Locations of Sampling Points See Figure 4-3.

E 4-
ING RESULTS
June, 1986

| | Water Analysis | | | | | Soil Analysis | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Upstream Property Line | Downstream Property Line | Downstream Former Sludge Lagoon | Well No. 1 | Well No. 2 | TCE Tank North Slab (5)* | TCE Tank South Slab (11) | Dead Grass Area (14) | Paint Storage (21) | Paint Storage (22) | Location 40 (40) |
| pH | 7.42 | 7.78 | 8.0 | 7.88 | 7.65 | -- | -- | -- | -- | -- | -- |
| COD | 27 | ND | 15 | <12 | <12 | -- | -- | -- | -- | -- | -- |
| Specific Conductance | 530[2] | 469[2] | 469[2] | 629[2] | 477[2] | -- | -- | -- | -- | -- | -- |
| 1,1-Dichloroethene | ND | ND | ND | 60[1] | 90[1] | ND | ND | ND | ND | ND | ND |
| 1,1-Dichloroethane | ND | ND | ND | 60[1] | ND | ND | ND | ND | ND | ND | ND |
| Trans-1,2 Dichloroethene | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 3.6 |
| 1,1,1-Trichloroethane | ND | ND | ND | 440[1] | 640[1] | ND | ND | ND | ND | ND | ND |
| Trichloroethene | ND | ND | ND | 210[1] | 160[1] | 1.5 | 9.5 | 580 | ND | 3.1 | 0.5 |
| Benzene | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Tetrachloroehtene | ND | ND | ND | ND | 20[1] | ND | ND | 0.3 | ND | ND | ND |
| Toluene | ND | ND | ND | ND | ND | ND | 0.3 | 0.4 | ND | 15.7 | 0.6 |
| Fluoro Trichloromethane | ND | ND | ND | 40[1] | 180[1] | ND | ND | ND | ND | ND | ND |

Sampling point locations

l values in ppm unless otherwise specified.
[1]value in ppb

AR300604

The three stream samples obtained on the upstream property line, downstream property line, and downstream of the former sludge lagoons revealed that no detectable amounts of volatile organics were present in the stream. For locations and concentrations of these sampling points see Figures 4-4, 4-5, and 4-6 in conjunction with Tables 4-2 and 4-3.

Both ground water samples taken from Wells 1 and 2 revealed the presence of both TCE and 1,1,1-trichloroethane. PCE was detected in Well 2 only. In addition, 1,1-dichloroethane and 1,1-dichloroethene were also detected in the well samples although it should be noted that these constituents are TCE breakdown products formed through various processes of microbial degradation. Fluoro trichloromethane was also present in both well samples. This compound is a constituent of most cooling agents found in air conditioning systems (i.e., Freon®). For locations and concentrations of these sampling points see Figures 4-4, 4-5, and 4-6 and Tables 4-2, and 4-3.



AR300605

# SECTION 5

# CONCEPTUAL REMEDIAL ACTION ALTERNATIVES

This section of the report identifies and evaluates alternatives for on-site cleanup of soils contaminated with TCE.

Because the soil contamination is localized, in-situ remedial action measures were emphasized. These methods eliminate the possibility of off-site contamination which can occur during excavation and reburial, and other off-site remedial action alternatives. Costly pretreatment such as sealing of soil materials in double lined drums is also eliminated through in-situ alternatives. Seven on-site alternatives have been identified based on preliminary investigations. The final alternative is off-site disposal.

1. No Action Alternative
2. Soil Drying/Volatilization beds (composting)
3. Soil Washing - flushing TCE off of soil particles
4. In-Vessel Air Stripping of Soil
5. Soil Vacuuming
6. In-Vessel Microbial Degradation
7. In-Situ Microbial Degradation
8. Excavation and Off-Site Disposal

The technical feasibility, basic engineering and monitoring requirements, environmental constraints, and cost effectiveness of each of these eight alternatives will be discussed in this report.

## 5.1 Alternative 1: No Action

- Technical Feasibility - This alternative is technically feasible.

- Engineering and Monitoring Requirements - This alternative would require no engineering or monitoring effort.

- Environmental Limitations/Constraints - This alternative does not enhance environmental protection and allows a large source of contamination to remain a potential threat to human health and environment.

- Cost Effectiveness - This alternative imposes no costs in the short term. However, this alternative may not be



AR300606

cost-effective in the long term due to the potential impact of CERCLA regulations or RCRA Continuing Release legislation.

## 5.2 Alternative 2: Soil Drying/Volatilization Beds (Composting)

This alternative depends on natural chemical volatilization processes. It involves the excavation and spreading of contaminated soil (two-to four-inch depth) on an asphalt or concrete pad. The soil is periodically disked to expose new surface area to accelerate volatilization.

- Technical Feasibility - This alternative is technically feasible for the removal of volatile chemicals adsorbed on soil particles. However, both the extent and time required for removal will depend on the strength of the soil adsorption, the moisture content of the soil, and the quantity of more volatile chemicals present. There is little data to document percent removals or residual chemical concentrations following soil drying. Therefore, small-scale testing would be necessary prior to large scale drying bed operations.

- Engineering Requirements - The drying bed alternative would require the use of sizable land areas. Such areas may exist after proposed plant shut down. The land area required will be proportional to the areal extent and depth of the soil contamination. The operation of small-scale test plots are recommended in order to gather data for determining the optimum depth of the drying bed, the rate of volatilization, and the potential need for soil cultivation to accelerate volatilization.

- Monitoring Requirements - To control air emissions, a system may be necessary to sweep the volatilized chemicals into an adsorption unit (probably carbon) prior to release into the atmosphere. One method of providing emission control would be to place a cover over the entire area of the bed, and to supply over the bed an air flow which would, in turn, be purified by passing through a carbon adsorption column. The need for air emission controls will be determined by testing the air of the bed with an organic vapor meter (OVM). To provide ground water protection, it would be necessary to place a clay layer or synthetic lining under the drying bed. It is also necessary to protect of the drying beds from surface run-off from rainfall.



AR300607

- Environmental Limitations/Constraints - If the bed is left uncovered or unlined, it may pose a risk to air quality and ground water quality, as mentioned above. The rate of volatilization is likely to decrease due to increases in soil moisture following rainfall, and due to decreases in air temperature during colder months.

- Cost Effectiveness - If the soil must be decontaminated to approximately 10 ppb of volatile chemicals, and if air emission control is not required, then open-air drying with intermittent cultivation may be cost-effective. However, this alternative would not be cost-effective if decontamination standards are found to be more stringent than that achievable in preliminary drying bed tests. Requirements for air emission control and ground water protection systems would significantly decrease the cost-effectiveness of this alternative.

## 5.3 Alternative 3: Soil Flushing and Purging of Ground Water

This alternative involves the periodic flushing of the contaminated area with water to mobilize the contaminants out of the soil. Water percolates through the soil and down to the ground water, which is pumped out of the ground for subsequent treatment.

- Technical Feasibility - This alternative is technically feasible. Literature suggests that large volumes of soil (100 to 100,000 cubic meters) with less than 10,000 ppm trichloroethene contamination can be successfully decontaminated in-situ. However, the rate of contaminant removal by soil flushing depends on the strength of its adsorption on soil particles, the permeability of the soil, and the rate at which the water is applied. If the trichloroethene is readily removed, the time required for decontamination may be relatively short compared to other treatment alternatives. Flushing is only feasible when operated in conjunction with an aggressive ground water purge and treatment system.

- Engineering Requirements - Prior to designing a full-scale flushing operation, a series of field tests are necessary to determine the efficiency of water-extraction of trichloroethene in soil. Samples of the soil should be taken prior to and following testing in order to determine extraction efficiency. The quantity of water required per unit volume of soil necessary for acceptable decontamination must be determined.



AR300608

Land requirements for soil washing would consist of the contamination area, a collection trench surrounding the area, and an area for tank storage of fresh and contaminated water. Approval of soil flushing will depend on how effectively the flushing water can be recovered for treatment.

Contaminated flush water could either be sent to an off-site treatment facility or treated via air stripping, controlled trickling filters, or carbon adsorption. Such systems would pose a significant additional expense and additional land allocation. In the case of the latter two system, disposal of some treatment system residuals would be required. While no air emissions controls are necessary for soil washing, such controls may be necessary for air stripping or biological filtration of the flush water.

- Monitoring Requirements - Monitoring wells may need to be installed below the treatment area to detect any migration of contaminated flush water.

- Environmental Limitations/Constraints - This alternative creates a potential environmental liability in relation to disposal of soil flushing solvent, especially if off-site disposal is selected. There is also the potential for widespread contamination of ground water, if flush water is not completely collected.

- Cost Effectiveness - The cost-effectiveness of this alternative is expected to be less than that of the soil drying bed. Operating expenses would increase if pilot tests show that surfactants need to be added to the flush water for adequate removal of the TCE. Surface and ground water control systems also would significantly increase costs. On-site or off-site treatment of the flush water also reduces the relative cost-effectiveness of this alternative.

## 5.4 Alternative 4: In-vessel Air Stripping of Soil

This alternative involves the excavation and packing of contaminated soil into a stripping tower or chamber where air is forced through the soil to accelerate TCE volatilization. The air is passed through emission control devices and discharged.

- Technical Feasibility - The literature suggests that this alternative is feasible for 100 percent removal of up to



AR300609

429 ppm TCE in soil. Performance and required reaction time would most likely be dependent on the content of moisture and other volatiles in the soil, which are also effectively removed by air stripping, as well as on the strength of the TCE adsorption in the soil. It may be possible to use the tower for pre-dried lagoon sludge or to adapt the tower for the treatment of ground water, should the need arise.

- Engineering Requirements - Pilot-scale testing would be necessary to determine optimum design data, including the degree to which the soil must be broken up to allow efficient air stripping, the optimum feed rate, the optimum air temperature and flow rate, the required size of the air compressor, and the degree to which the soil can be decontaminated. System design should include mechanisms to automatically feed the soil into the tower, to move the soil up through the tower, to provide heated air (if necessary), and to store treated soil prior to final replacement on site. If pilot tests support this alternative, the major engineering challenges would probably be preventing clogging in the air feed system and maintaining adequate separation between soil masses as they move up through the tower.

  Approval for the application of this alternative would depend on the performance of pilot-scale systems and on the inclusion of adequate air emission control devices in the system design. Two possible air emission control technologies are carbon adsorption and thermal oxidation.

- Monitoring Requirements - Samples from treated soils and from the area of soil removal would have to be analyzed to confirm adequate decontamination of the affected area. The air emission control system would have to be monitored for performance.

- Environmental Limitations/Constraints - There is potential environmental liability if adequate air emission control devices are not installed on the stripping tower. It may be necessary to obtain storage containers for the contaminated soil and a hazardous waste storage permit if a tower of practical size cannot treat all of the soil within ninety days.

- Cost Effectiveness - The cost-effectiveness of this alternative is expected to be greater than that of either Alternatives 2, 3, 5, 6, and 7. However, its relative cost-effectiveness may be reduced somewhat by the cost of preliminary pilot testing. Use of carbon adsorption would



AR300610

add carbon purchase and disposal costs to the total cost of the stripping system; thermal oxidation would add to the energy and equipment costs.

## 5.5 Alternative 5: Soil Vacuuming

This alternative involves the installation of air wells into areas of local contamination. A vacuum is placed on each of the installed wells; ambient air is drawn through the soil, recovered through the vacuum wells, and passed through emission control devices. Volatilization of organics is accelerated through this process.

- Technical Feasibility - This alternative is technically feasible. However, if the soil contamination has spread into the water-saturated, or vadose zone, contaminated ground water must be purged from the soil prior to soil vacuuming. Soil vacuuming is only feasible if operated in conjunction with a ground water treatment system. If lagoon sludge is also to be treated in this manner, its water content must also be sufficiently reduced prior to treatment. The effectiveness of TCE removal would probably not be significantly affected by the strength of TCE adsorption on the soil particles nor the presence of other volatile contaminants due to the force of the vacuum.

- Engineering Requirements - Land requirements for this alternative would include the area of soil contamination, plus an area occupied by a system to treat the air exiting the vacuum system. The optimum depth of the vacuum wells would depend on the practical capacity of the vacuum system. Small-scale test plots should be operated to determine the achievable rate of soil decontamination and the ability of the system to treat the greatest depth of decontamination. A separate treatment system, such as air stripping, would be required for the treatment of any contaminated ground water. Vacuum wells could also potentially be installed in the lagoon for sludge treatment, if the sludge were first adequately dried.

- Monitoring Requirements - Approval for this alternative would require the inclusion of some form of air emission control, as well as ground water monitoring wells to detect any downward migration of soil contaminants.

- Environmental Limitations/Constraints - There is a potential environmental liability in relation to air quality if proper emission controls are not installed. Air and ground water



AR300611

protection systems discussed for Alternative 2 should also be considered for Alternative 5. In addition, surface run-off should be controlled to eliminate the potential for the spread of decontamination.

- Cost-Effectiveness - The cost of implementing this alternative is dependent on the extent of contamination. For large areas of contamination, this alternative is not cost-effective due to the large number of air wells needed for adequate decontamination. Air emission, and surface and ground water controls may reduce the cost-effectiveness of this alternative.

## 5.6 Alternative 6: In-Vessel Microbial Degradation

This alternative involves the excavation and anaerobic digestion of contaminated soils following placement in a bio-reactor.

- Technical Feasibility - This method is reported to be technically feasible. However, the rate of TCE degradation would depend on the natural rate of microbial reaction, the stability of the microbial population, and whether the reaction vessel can be kept anaerobic and insulated from cold temperatures. Treatment performance will depend on the residual TCE concentration determined to be acceptable, the ability of the microbes to adapt to particular soil conditions, and the amount of toxic degradation intermediates left in the soil following a reasonable treatment period.

- Engineering Requirements - This alternative requires the use of a steel or concrete reaction vessel. A pilot anaerobic system should be installed on site and operated for the collection of performance and full-scale design data. Operation of the reactor would require water for soil mixing, nutrients for biological growth, an oxygen sensor for detecting aerobic conditions, and a sludge removal mechanism.

  Sufficient land would be required for the installation of the reactor, a soil-slurrying tank, a sludge dewatering system, a filtered effluent holding tank, and an area for either sludge drying or sludge storage prior to shipment off site. Return of the treatment sludge to the decontaminated site would depend on whether the sludge could be classified as a non-hazardous waste. Approval for this treatment alternative would depend on its demonstrated performance in



AR300612

the pilot test, and on plans to equip the tank with an air emission control system.

- Monitoring Requirements - The system should be monitored for maintenance of anaerobic conditions, biological activity, and hazardous constituents in the filtered sludge and wastewater. The air emission control system should be checked for performance.

- Environmental Limitations/Constraints - A potential environmental liability exists in relation to disposal of microbial digestion sludge, whether on-site or off-site disposal is chosen. Emission control measures may also need to be installed on the reactor to improve the quality of air discharged from the tank.

- Cost Effectiveness - This process has been reported to be cost effective for greater than 5,000 cubic yards of contaminated soil.

## 5.7 Alternative 7: In-Situ Microbial Degradation

This alternative involves microbial degradation occurring within the soil column, without removing the soil from its area of contamination.

- Technical Feasibility - This alternative is technically feasible. It has been used successfully in degradation of numerous petroleum constituents in soils. The performance of In-Situ Degradation would depend on factors similar to those discussed for In-Vessel Microbial Degradation (Alternative 6). In addition, In-Situ Degradation would be more susceptible to adverse weather conditions, such as freezing temperatures and wind evaporation.

- Engineering Requirements - Due to the requirement to flood the soil, the treatment site would have to be designed and constructed with adequate controls on water movement. System design would include grading to prevent rainfall run-on and run-off, installing a clay or synthetic barrier under the treatment area to prevent contamination of ground water, and providing a collection system to recover excess water under the area. A secondary barrier may or may not be required. As with In-Vessel Degradation, a small scale pilot system should be operated to confirm performance and provide design data for the full-scale system.



AR300613

Water should be reused by collection and reapplication on the treatment area. Distribution of water would require the use of pumps, spray equipment, and a tank for storage of excess water. To enhance the rate of degradation, nutrient solutions could be mixed in a slurry tank and applied with the flood water.

Following treatment, it would be desirable to air-dry the soil by turning it over with cultivation equipment.

The land area required for this alternative would include the area of contamination, plus the area required to install the water storage and slurry tanks. Approval for this alternative would depend on the performance of the pilot system and the proper design of flood water containment and ground water monitoring systems.

- Environmental Limitations/Constraints - Since this alternative requires flooding the soil to provide moisture and anaerobic conditions, a potential environmental liability exists in relation to ground water contamination. Disposal of microbial sludge following degradation may also create an environmental liability. Toxic intermediate microbial products may create a greater environmental health risk than the original TCE concentrations.

- Cost Effectiveness - This alternative is thought to be less cost-effective than Alternatives 1, 2, 4 and 6 due to the extensive engineering design and construction necessary to create reducing conditions. However, it may prove to be more cost-effective than Alternatives 3, 5, and 8. Significant costs will be incurred for site restoration following TCE degradation, and for off-site disposal of microbial sludge (if required).

## 5.8 Alternative 8: Off-Site Disposal of Contaminated Soil

- Technical Feasibility - This is a feasible alternative since there are secure landfills approved for the disposal of contaminated soil, and for dewatered lagoon sludge (if necessary).

- Engineering Requirements - A minimal amount of engineering effort would be required for this alternative. Earth-moving equipment would be required to excavate the soil to below the depth of contamination. If the contamination has reached the ground water, pumping wells would be necessary to remove the contaminated ground water from the soil prior



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to excavation. Either an on-site or off-site ground water treatment system would be required. If necessary, lagoon sludge could also be removed for disposal.

- Monitoring Requirements - The surface of the soil remaining after excavation would have to be sampled and tested to confirm adequate decontamination.

- Environmental Limitations/Constraints - This alternative would not pose a risk to the local environment. However, it does pose a potential environmental risk at the ultimate disposal site if the operator of the off-site disposal site is not ultimately able to properly contain or dispose of the generator's waste. Therefore, this alternative carries potential cleanup liabilities for the waste generator.

- Cost Effectiveness - In the short term, this alternative may be more cost-effective than alternative 3, 4, 5, 6, and 7, depending on distance to the nearest off-site disposal facility and their disposal fees. However, in the long term, there is potential for significant costs in the cleanup of an inadequately maintained off-site disposal site.

## 5.9 Ranking of Alternatives

A ranking of the alternatives discussed is presented on Table 5-1. This ranking uses the following scoring system for evaluating the alternatives based on the three criteria of technical feasibility, environmental limitations and constraints, and cost-effectiveness:

1. Preferred alternative
2. Acceptable alternative
3. Acceptable alternative, with limitations
4. Unacceptable alternative

The lowest total scores reflect the tentatively favored options. It should be stressed that the ranking is the result of a technical evaluation of qualitative information on the site, literature review, and previous ERM experience in waste treatment and management. Without the collection of additional site-specific data and the performance of on-site pilot tests (where applicable), a final determination of the best alternative cannot be made. These additional investigations will also be necessary to design the optimum treatment and/or disposal system for the site.



AR300615

TABLE 5-1

NUMERICAL EVALUATION AND RANKING
OF ALTERNATIVES FOR TCE CLEANUP

| Alternatives | Evaluation Criteria: Technical Feasibility | Environmental Limitations/Constraints | Cost Effectiveness | Total |
|---|---|---|---|---|
| 1 | 2 | 4 | 1 | 7 |
| 2 | 3 | 3 | 2-3 | 8-9 |
| 3 | 3 | 3 | 3-4 | 9-10 |
| 4 | 1 | 3 | 2-3 | 6-7 |
| 5 | 3 | 3 | 2-3 | 8-9 |
| 6 | 2 | 3 | 2-3 | 7-8 |
| 7 | 3 | 3 | 4 | 10 |
| 8 | 2 | 3 | 2-3 | 7-8 |

1 Preferred

2 Acceptable

3 Acceptable with limitations

4 Not acceptable

Many questions remain which could affect this preliminary ranking. One question is "What level of remedial action will be required by regulatory agencies before they will proclaim that site cleanup is complete and the environmental liability is removed?" For instance, what standards (if any) will the agencies set for the maximum allowable contaminant concentrations in the soil and ground water following cleanup? What air emission standards will they set and what emission control systems will they require during treatment? Similarly, what ground water protection systems will they require?

In addition, more data collection will be necessary to determine the depth and area of contaminated soil and ground water, and to determine the relative contaminant concentrations within the contaminated area. The total quantities of soil and ground water involved are very likely to change the preliminary ranking of the remedial action alternatives suggested in Table 5-1. However, this initial assessment will help direct data collection and subsequent evaluations.

## 5.10 Summary of the Evaluation of Conceptual Remedial Action Alternatives

Within the limitations described above, the tentative ranking of alternatives indicates that the most favorable ones are likely to be Alternatives 2, 3, 4, 5, 6, and 8. Alternative 2 offers advantages of potential cost-effectiveness due to relatively minimal engineering, following pilot tests, and a low potential threat to ground water. However, this alternative would not be applicable to the treatment of any contaminated ground water or lagoon sludge. An advantage of Alternative 4 is that air emission control systems have already been developed for a similar application -- air stripping of wastewater. In addition, Alternative 4 would not pose a threat to ground water and could be useful for the stripping of contaminated waters. A disadvantage may be a more complex engineering design to allow continuous soil processing.

While the feasibility of Alternative 5 may not be limited by the chemical condition of the contaminated soil, it does require initial removal of water from the area, would require a modified air collection and treatment system, and would not be cost-effective for a large area of contamination. Alternative 6 offers the advantages of applicability to three types of wastes (contaminated soil, lagoon sludge, and ground water), low threat to ground water, and cost-effectiveness for larger contamination volumes. However, it may involve additional biological sludge disposal costs if the dewatered sludge cannot be directly returned to the land. Alternative 8 is the most direct,



AR300617

short-term solution; but may be undesirable due to disposal costs and future environmental liabilities. At this time, Alternatives 1, 3 and 7 do not appear viable for this site, although further investigation of Alternative 7 is recommended.



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# SECTION 6

# CONCLUSIONS

ERM has conducted a Geologic, Hydrogeologic and Remedial Engineering Assessment to determine the extent of the soil and ground water contamination by organic solvents at the Ametek Hunter Spring Division plant in Hatfield, Pennsylvania. Based upon the data obtained during this investigation, the following conclusions can be drawn relative to the extent of contamination and site conditions.

## 6.1 Extent of Contamination

Soil contamination is known to exist to a depth of 3 to 4 feet in four isolated areas on the Ametek site. The four known areas of soil contamination are as follows:

- The TCE tank area to the southwest of the plant is known to have TCE, PCE and toluene contamination to a depth of 3.5 feet.

- The paint storage area (Location 22) to the south of the plant is known to have TCE and Toluene contamination to a depth of 4.0 feet.

- The disturbed ground bordering the tree line to the southeast of the plant (Location 40) is known to have trans-1,2 Dichloroethene, TCE, and Toluene contamination to a depth of 4.0 feet.

- The east neutralizing lagoon (Location 49) located to the southeast of the plant is known to have Toluene contamination to a depth of 4.0 feet.

Water samples taken on 9 May 1986 from Wells 1 and 2 confirm previous measurements of organic solvents in the ground water. Well 1 is known to have 1,1 DCE, 1,1 DCA, 1,1,1-TCE, and TCE contamination. Well 2 is known to have 1,1 DCE, 1,1,1-TCE, and TCE contamination.

No detectable limits of volatile organic solvents exist at any point in the stream running east of the plant.



AR300619

## 6.2 Site Conditions

The following conclusions can be drawn from the Phase I investigation:

- The bedrock underlying the Ametek site is highly fractured allowing ground water to be transmitted through the rock relatively easily. Because of high specific gravities, TCE and other halogenated hydrocarbons reaching the ground water would tend to migrate downward into the aquifer through these fractures.

- The fault which traverses the Ametek site and continues to the vicinity of the NPWA municipal well may provide a possible pathway for ground water flow and contaminant migration.

- The soils present on the Ametek site are reported to contain a very dense interval from about three to five feet below the ground surface (fragipan). Where present, this fragipan layer could possibly act as a confining layer, restricting any soil contamination from moving down into the ground water present in the bedrock.

- Bedrock is relatively shallow across the site with depths of 12 feet encountered in plant wells and exposed bedrock near the stream. Clays and other weathering products may fill the joints and fractures near the bedrock surface and possibly provide a semi-confining layer of low permeability which could further restrict ground water and contaminant movement vertically.

## 6.3 Preliminary Evaluation of Remediation Alternatives

A screening of treatment technologies has indicated the potential viability of six alternatives for the remediation of soil and other contamination on this site. These alternatives include drying beds, soil vacuuming, soil washing, in-vessel air stripping, in-situ microbial degradation, and in-vessel microbial degradation. With the addition of a no action alternative, these constitute seven on-site alternatives. An eighth alternative, excavation and off-site disposal of soil at a permitted TSD facility, was also considered.



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The no action and soil washing alternatives are not considered viable for this site. However, the other five alternatives warrant further investigation due to their advantages in cost, demonstrated success in similar applications, low threat to ground water, or potential application to other contaminated media (e.g., lagoon sludge, ground water) on the site. Additional data collection and evaluation are expected to indicate which of these five alternatives is best suited for site remediation.



AR300621

# SECTION 7

# RECOMMENDATIONS

In order to resolve soil contamination data deficiencies and to further define site ground water conditions, ERM recommends the following Phase II workscope be undertaken:

- Conduct a soil boring investigation to (1) define the full vertical distribution of soil contaminants, (2) provide further horizontal definition of the extent of contamination, (3) establish the presence of the fragipan (low premeability layer) in site subsoils that is reported in the county soil survey, and (4) determine the levels of heavy metals present (if any) in the lagoon area.

- Install several monitoring well nests and obtain water level measurements and samples to (1) determine horizontal and vertical directions on site (2) define the degree of hydrologic interconnection between shallow and deep ground water-bearing zones, (3) qualitatively and quantitatively define the ground water contamination on site, (4) define ground water quality flowing both onto the site (upgradient/ background) and off of the site (downgradient), (5) define permeabilities above and below the fragipan layer in site soils and establish whether a perched water condition exists above the fragipan which could affect contaminate migration.



AR300622

# APPENDIX A

## Laboratory Analyses

# Environmental Resources Management, Inc.

## Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. 44901 AMETEK Sheet No. 1 OF 1

Sampler(s) VAL F. BRITTON Bottles Supplied By LANC. LABS.

Date Sampled 6/9/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| LOCATION 69 2.0-3.5 | SOIL | GRAB | HAND AUGER | 1030 | 1-400 ml JAR | EPA 624 VOLATILES | |
| LOCATION 69 2.0-3.5 | " | " | " | 1100 | " | " | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| | Val F. Britton | 6/6/86 1400 | SAMPLING |
| Val F. Britton | [illegible] | 6/6/86 1530 | [illegible] |
| | | | |
| | | | |
| | | | |

Copies: White - Sampler; Yellow - Lab; Pink - Client; Gold - File

AR300624

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Location 67 2.0-3.5 Grab Soil Sample
Collected 06/09/86 (1030) by VFB

Date Reported 6/26/86
Date Submitted 6/10/86
Discard Date 7/27/86
Collected by C
P.O. 44901
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000N |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000N |
| Chloromethane | N.D. | ppm | 0.2 | 082700000N |
| Bromomethane | N.D. | ppm | 0.2 | 082800000N |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000N |
| Chloroethane | N.D. | ppm | 0.2 | 083000000N |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000N |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000N |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000N |
| Chloroform | N.D. | ppm | 0.2 | 083500000N |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000N |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000N |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000N |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000N |
| Trichloroethene | 10. | ppm | 0.2 | 084200000N |
| Benzene | N.D. | ppm | 0.2 | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000N |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000N |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000N |
| Bromoform | N.D. | ppm | 0.2 | 084700000N |
| Tetrachloroethene | 0.7 | ppm | 0.2 | 084800000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000N |
| Toluene | N.D. | ppm | 0.2 | 085000000N |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000N |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000N |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300625

ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Location 69 2.0-3.5 Grab Soil Sample
Collected 06/09/86 (1100) by VFB

Date Reported 6/26/86
Date Submitted 6/10/86
Discard Date 7/27/86
Collected by C
P.O. 44901
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000N |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000N |
| Chloromethane | N.D. | ppm | 0.2 | 082700000N |
| Bromomethane | N.D. | ppm | 0.2 | 082800000N |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000N |
| Chloroethane | N.D. | ppm | 0.2 | 083000000N |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000N |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000N |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000N |
| Chloroform | N.D. | ppm | 0.2 | 083500000N |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000N |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000N |
| ichlorobromomethane | N.D. | ppm | 0.2 | 083900000N |
| ,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000N |
| Trichloroethene | 5.3 | ppm | 0.2 | 084200000N |
| Benzene | N.D. | ppm | 0.2 | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000N |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000N |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000N |
| Bromoform | N.D. | ppm | 0.2 | 084700000N |
| Tetrachloroethene | 1.6 | ppm | 0.2 | 084800000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000N |
| Toluene | N.D. | ppm | 0.2 | 085000000N |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000N |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000N |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300626

# Chain Of Custody Record

## Environmental Resources Management, inc.

999 West Chester Pike • P.O. Box 357 • West Chester, Pennsylvania 19381 ☎ (215) 696-9110

Project No. / I.D. 44901 AMETEK Sheet No. 1 OF 1

Sampler(s) VAL F. BRITTON Bottles Supplied By LANC. LABS

Date Sampled 5/30/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| PAINT STORAGE (Z2) (0.0-4.0') | SOIL | GRAB | HAND AUGER | 0920 | 1-150ml JAR | EPA 624 VOA | |
| PAINT STORAGE (Z1) (2.0-3.5) | " | " | " | 0950 | " | " | |
| LOCATION 40 (2.0-4.0) | " | " | " | 1030 | " | " | |
| LOCATION 49 (2.0-4.0) | " | " | " | 1115 | " | " | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| | V. F. Britton | 5/29/86 1600 | SAMPLING |
| V. F. Britton | [signature] | 6/2/86 1300 | Trans to Lab |
| | | | |
| | | | |
| | | | |

Copies: White - Sampler; Yellow - Lab; Pink - Client; Gold - File

AR300627

ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Paint Storage (22) 1.0'-4.0' Soil Sample
Collected 05/30/86 (0920) by VFB

Date Reported 6/10/86
Date Submitted 6/ 2/86
Discard Date 7/11/86
Collected by C
P.O. 44901
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 5. | 082400000 |
| Acrylonitrile | N.D. | ppm | 5. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.5 | 082600000 |
| Chloromethane | N.D. | ppm | 0.5 | 082700000 |
| Bromomethane | N.D. | ppm | 0.5 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.5 | 082900000 |
| Chloroethane | N.D. | ppm | 0.5 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.5 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.5 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.5 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.5 | 083400000 |
| Chloroform | N.D. | ppm | 0.5 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.5 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.5 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.5 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.5 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.5 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.5 | 084100000 |
| Trichloroethene | 3.1 | ppm | 0.5 | 084200000 |
| Benzene | N.D. | ppm | 0.5 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.5 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.5 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.5 | 084600000 |
| Bromoform | N.D. | ppm | 0.5 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.5 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.5 | 084900000 |
| Toluene | 15.7 | ppm | 0.5 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.5 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.5 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.5 | 079000000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Ri-
Group Leac

AR300628

ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Paint Storage (21) 2.0'-3.5' Soil Sample
Collected 05/30/86 (0950) by VFB

Date Reported 6/10/86
Date Submitted 6/ 2/86
Discard Date 7/11/86
Collected by C
P.O. 44901
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000 |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories, Inc

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully
Lancaster La
Reviewed and ..oved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Location 40 2.0'-4.0' Soil Sample
Collected 05/30/86 (1030) by VFB

Date Reported 6/10/86
Date Submitted 6/ 2/86
Discard Date 7/11/86
Collected by C
P.O. 44901
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 08240000( |
| Acrylonitrile | N.D. | ppm | 2. | 08250000( |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 08260000( |
| Chloromethane | N.D. | ppm | 0.2 | 08270000( |
| Bromomethane | N.D. | ppm | 0.2 | 08280000( |
| Vinyl chloride | N.D. | ppm | 0.2 | 08290000( |
| Chloroethane | N.D. | ppm | 0.2 | 08300000( |
| Methylene chloride | N.D. | ppm | 0.2 | 08310000( |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 08320000( |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 08330000( |
| trans-1,2-Dichloroethene | 3.6 | ppm | 0.2 | 08340000( |
| Chloroform | N.D. | ppm | 0.2 | 08350000( |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 08360000( |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 08370000( |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 08380000( |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 08390000( |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 08400000( |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 08410000( |
| Trichloroethene | 0.5 | ppm | 0.2 | 08420000( |
| Benzene | N.D. | ppm | 0.2 | 08430000( |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 08440000( |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 08450000( |
| Dibromochloromethane | N.D. | ppm | 0.2 | 08460000( |
| Bromoform | N.D. | ppm | 0.2 | 08470000( |
| Tetrachloroethene | N.D. | ppm | 0.2 | 08480000( |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 08490000( |
| Toluene | 0.6 | ppm | 0.2 | 08500000( |
| Chlorobenzene | N.D. | ppm | 0.2 | 08510000( |
| Ethylbenzene | N.D. | ppm | 0.2 | 08520000( |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 07900000( |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

Lancaster Laboratories
INCORPORATED
NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Location 49 2.0'-4.0' Soil Sample
Collected 05/30/86 (1115) by VFB

Date Reported 6/10/86
Date Submitted 6/ 2/86
Discard Date 7/11/86
Collected by C
P.O. 44901
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 08240000( |
| Acrylonitrile | N.D. | ppm | 2. | 08250000( |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 08260000( |
| Chloromethane | N.D. | ppm | 0.2 | 08270000( |
| Bromomethane | N.D. | ppm | 0.2 | 08280000( |
| Vinyl chloride | N.D. | ppm | 0.2 | 08290000( |
| Chloroethane | N.D. | ppm | 0.2 | 08300000( |
| Methylene chloride | N.D. | ppm | 0.2 | 08310000( |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 08320000( |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 08330000( |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 08340000( |
| Chloroform | N.D. | ppm | 0.2 | 08350000( |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 08360000( |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 08370000( |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 08380000( |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 08390000( |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 08400000( |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 08410000( |
| Trichloroethene | N.D. | ppm | 0.2 | 08420000( |
| Benzene | N.D. | ppm | 0.2 | 08430000( |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 08440000( |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 08450000( |
| Dibromochloromethane | N.D. | ppm | 0.2 | 08460000( |
| Bromoform | N.D. | ppm | 0.2 | 08470000( |
| Tetrachloroethene | N.D. | ppm | 0.2 | 08480000( |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 08490000( |
| Toluene | 0.3 | ppm | 0.2 | 08500000( |
| Chlorobenzene | N.D. | ppm | 0.2 | 08510000( |
| Ethylbenzene | N.D. | ppm | 0.2 | 08520000( |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 07900000( |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

**Environmental Resources Management, Inc.**

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. 4490 1 AMETEK Sheet No. 1 OF 1

Sampler(s) V BRITTON A. FUNK Bottles Supplied By L.L.

Date Sampled 5/14/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| TCE TANK NORTH SLAB 6"-12" | GRAB | SOIL | HAND AUGER | 1030 | 1-4OZ JAR | VOA EPA 624 | |
| TCE TANK SOUTH SLAB 6"-14" | " | " | " | 1125 | " | " | |
| DEAD GRASS AREA 6"-12" | " | " | " | 1240 | " | " | |
| | | | | | | | |
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| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| | V.F. Britton | 5/13/86 | SAMPLING |
| V.F. Britton | [signature] | 5/15/86 1300 | sample trans. |
| | | | |
| | | | |
| | | | |

Copies: White - Sampler; Yellow - Lab; Pink - Client; Gold - File

AR300632

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek TCE Tank North Slab 6"-12" Grab Soil Sample
Collected 05/14/86 (1030) by VB & AF

Date Reported 5/30/86
Date Submitted 5/15/86
Discard Date 6/30/86
Collected by C
P.O. 44901
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000N |
| Chloromethane | N.D. | ppm | 0.2 | 082700000N |
| Bromomethane | N.D. | ppm | 0.2 | 082800000N |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000N |
| Chloroethane | N.D. | ppm | 0.2 | 083000000N |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000N |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000N |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000N |
| Chloroform | N.D. | ppm | 0.2 | 083500000N |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000N |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000N |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000N |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000N |
| rans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000N |
| richloroethene | 1.5 | ppm | 0.2 | 084200000N |
| Benzene | N.D. | ppm | 0.2 | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000N |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000N |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000N |
| Bromoform | N.D. | ppm | 0.2 | 084700000N |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000N |
| Toluene | N.D. | ppm | 0.2 | 085000000N |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000N |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000N |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

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# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Date Reported 5/30/86
Date Submitted 5/15/86
Discard Date 6/30/86
Collected by C
P.O. 44901
Rel.

Ametek TCE Tank South Slab 6"-14" Grab Soil Sample
Collected 05/14/86 (1125) by VB & AF

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000N |
| Chloromethane | N.D. | ppm | 0.2 | 082700000N |
| Bromomethane | N.D. | ppm | 0.2 | 082800000N |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000N |
| Chloroethane | N.D. | ppm | 0.2 | 083000000N |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000N |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000N |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000N |
| Chloroform | N.D. | ppm | 0.2 | 083500000N |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000N |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000N |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000N |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000N |
| Trichloroethene | 9.5 | ppm | 0.2 | 084200000N |
| Benzene | N.D. | ppm | 0.2 | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000N |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000N |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000N |
| Bromoform | N.D. | ppm | 0.2 | 084700000N |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000N |
| Toluene | 0.3 | ppm | 0.2 | 085000000N |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000N |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000N |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

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AR300634

Lancaster Laboratories
INCORPORATED
NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Dead Grass Area 6"-12" Grab Soil Sample
Collected 05/14/86 (1240) by VB & AF

Date Reported 5/30/86
Date Submitted 5/15/86
Discard Date 6/30/86
Collected by C
P.O. 44901
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000N |
| Chloromethane | N.D. | ppm | 0.2 | 082700000N |
| Bromomethane | N.D. | ppm | 0.2 | 082800000N |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000N |
| Chloroethane | N.D. | ppm | 0.2 | 083000000N |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000N |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000N |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000N |
| Chloroform | N.D. | ppm | 0.2 | 083500000N |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000N |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000N |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000N |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000N |
| rans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000N |
| richloroethene | 580. | ppm | 0.2 | 084200000N |
| Benzene | N.D. | ppm | 0.2 | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000N |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000N |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000N |
| Bromoform | N.D. | ppm | 0.2 | 084700000N |
| Tetrachloroethene | 0.3 | ppm | 0.2 | 084800000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000N |
| Toluene | 0.4 | ppm | 0.2 | 085000000N |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000N |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000N |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

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AR300635

**ERM** Environmental Resources Management, Inc.

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. Ametek 44901 Sheet No. 1 of 1

Sampler(s) VAL F. BRITTON Bottles Supplied By LANC. LABS.

Date Sampled 5/9/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| UPSTREAM PROPERTY LINE | SURFACE WATER | GRAB | BEAKER | 0915 | 2/40ml 125ml 500ml | EPA 624 VOLATILES COD SPECIFIC CONDUCTANCE pH | |
| DOWNSTREAM PROPERTY LINE | " | " | " | 1000 | " | " | |
| DOWNSTREAM FORMER SLUDGE LAGOONS | " | " | " | 1030 | " | " | |
| TRIP BLANK | TAP | GRAB | TAP | — | 1-40ml VIAL | " | |
| WELL 1 | GROUND ~~TAP~~ WATER | GRAB | TAP | 1100 | ~~[illegible]~~ 2/40ml 125ml 500ml | " | |
| WELL 2 | " | " | " | 1215 | 3 l 2/40ml 125ml 500ml | SEE ATTACHED SHEET | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| [signature] | [signature] | 5-8-86 7:30 | Bottle drop |
| [signature] | S. Barry | 5/8/86 1330 | Bottle ~~Trans~~ drop off |
| S. Barry | Val F. Britton | 5/8/86 1700 | Bottle transfer |
| Val F. Britton | [signature] | 5/12/86 0900 | Bottle Trans. |
| | | | |

Copies: White - Sampler; Yellow - Lab; Pink - Client; Gold - File

AR300636

# ANALYSIS REPORT

## Lancaster Laboratories

INCORPORATED
NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Upstream Property Line Grab Surface Water
Collected 5/9/86 (0915) by VFB

Date Reported 6/24/86
Date Submitted 5/12/86
Discard Date 7/ 2/86
Collected by C
P.O. 44-901
Rel.

| ANALYSIS | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| pH | 7.42 | | | 020000500 * |
| Chemical Oxygen Demand | 27. | mg/l | 12. | 023402200 * |
| Specific Conductance | 530. | umhos/cm | 1. | 028000700 * |
| Purgables Method # 624 | | attached | | 052022000 * |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:
REE
Richard C. Entz, P
Group Leader

AR300637

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Upstream Property Line Grab Surface Water
Collected 5/9/86 (0915) by VFB

Date Reported 6/24/86
Date Submitted 5/12/86
Discard Date 7/ 2/86
Collected by C
P.O. 44-901
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | N.D. | ppb | 10. | 084200000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

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Chemical & Biological fields of Testing

Member American Council of Independent Laboratories, Inc

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser
Group Leader

AR300638

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Downstream Property Line Grab Surface Water
Collected 5/9/86 (1000) by VFB

Date Reported 6/24/86
Date Submitted 5/12/86
Discard Date 7/ 2/86
Collected by C
P.O. 44-901
Rel.

| ANALYSIS | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| pH | 7.78 | | | 020000500 |
| Chemical Oxygen Demand | N.D. | mg/l | 12. | 023402200 |
| Specific Conductance | 469. | umhos/cm | 1. | 028000700 |
| Purgables Method # 624 | | attached | | 052022000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:
RCE
Richard C. Entz, B.A.
Group Leader, Organic Analysis

AR300639

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Downstream Property Line Grab Surface Water
Collected 5/9/86 (1000) by VFB

Date Reported 6/24/86
Date Submitted 5/12/86
Discard Date 7/ 2/86
Collected by C
P.O. 44-901
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | N.D. | ppb | 10. | 084200000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000N |

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Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

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Respectfully Submitted
Lancaster Laboratori
Reviewed and

Nelson H.
Group Lea - GC/MS

AR300640

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Date Reported 6/24/86
Date Submitted 5/12/86
Discard Date 7/ 2/86
Collected by C
P.O. 44-901
Rel.

Ametek Downstream Former Sludge Lagoon Surface
Collected 5/9/86 (1030) by VFB
Water Sample

| ANALYSIS | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| pH | 8.00 | | | 020000500 |
| Chemical Oxygen Demand | 15. | mg/l | 12. | 023402200 |
| Specific Conductance | 469. | umhos/cm | 1. | 028000700 |
| Purgables Method # 624 | | attached | | 052022000 |

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Chemical & Biological fields of testing

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Respectfully submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Entz, B.A.
Group Leader, Organic Analysis

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Date Reported 6/24/86
Date Submitted 5/12/86
Discard Date 7/ 2/86
Collected by C
P.O. 44-901
Rel.

Ametek Downstream Former Sludge Lagoon Surface
Collected 5/9/86 (1030) by VFB
Water Sample

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | N.D. | ppb | 10. | 084200000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

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Chemical & Biological fields of testing

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Trip Blank Water Sample

Date Reported 6/24/86
Date Submitted 5/12/86
Discard Date 7/ 2/86
Collected by C
P.O. 44-901
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | N.D. | ppb | 10. | 084200000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000N |

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Chemical & Biological fields of testing

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Well 1 Surface Water Sample
Collected 5/9/86 (1100) by VFB

Date Reported 6/24/86
Date Submitted 5/12/86
Discard Date 7/ 2/86
Collected by C
P.O. 44-901
Rel.

| ANALYSIS | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| pH | 7.88 | | | 020000500 |
| Chemical Oxygen Demand | N.D. | mg/l | 12. | 023402200 |
| Specific Conductance | 629. | umhos/cm | 1. | 028000700 |
| Purgables Method # 624 | | attached | | 052022000 |

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The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Entz, B.A.
Group Leader, Organic Analysis

AR300644

ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Well 1 Surface Water Sample
Collected 5/9/86 (1100) by VFB

Date Reported 6/24/86
Date Submitted 5/12/86
Discard Date 7/ 2/86
Collected by C
P.O. 44-901
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000 |
| Vinyl chloride | N.D. | ppb | 10. | 082900000 |
| Chloroethane | N.D. | ppb | 10. | 083000000 |
| Methylene chloride | N.D. | ppb | 10. | 083100000 |
| 1,1-Dichloroethene | 60. | ppb | 10. | 083200000 |
| 1,1-Dichloroethane | 60. | ppb | 10. | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000 |
| Chloroform | N.D. | ppb | 10. | 083500000 |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000 |
| 1,1,1-Trichloroethane | 440. | ppb | 10. | 083700000 |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000 |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000 |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000 |
| Trichloroethene | 210. | ppb | 10. | 084200000 |
| Benzene | N.D. | ppb | 10. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000 |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000 |
| Bromoform | N.D. | ppb | 10. | 084700000 |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000 |
| Toluene | N.D. | ppb | 10. | 085000000 |
| Chlorobenzene | N.D. | ppb | 10. | 085100000 |
| Ethylbenzene | N.D. | ppb | 10. | 085200000 |
| Fluorotrichloromethane | 40. | ppb | 10. | 079000000 |

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The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Well 2 Surface Water Sample
Collected 5/9/86 (1215) by VFB

Date Reported 6/24/86
Date Submitted 5/12/86
Discard Date 7/ 2/86
Collected by C
P.O. 44-901
Rel.

| ANALYSIS | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| pH | 7.65 | | | 020000500 * |
| Chemical Oxygen Demand | N.D. | mg/l | 12. | 023402200 * |
| Specific Conductance | 477. | umhos/cm | 1. | 028000700 * |
| Purgables Method # 624 | | attached | | 052022000 * |
| Acid Extractables | | attached | | 055214000 |
| Base Neutrals | | attached | | 055326000 |
| Base Neutrals (cont) | | attached | | 055400000 |
| VOA GC/MS 15 Peak Lib. Search | | attached | | 089000000 |
| BNA GC/MS 25 Peak Lib. Search | | attached | | 089300000 |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Entz, B.A.
Group Leader, Organic Analysis

AR300646

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Well 2 Surface Water Sample
Collected 5/9/86 (1215) by VFB

Date Reported 6/24/86
Date Submitted 5/12/86
Discard Date 7/ 2/86
Collected by C
P.O. 44-901
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| 1,1-Dichloroethene | 90. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | 640. | ppb | 10. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | 160. | ppb | 10. | 084200000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | 20. | ppb | 10. | 084800000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |
| Fluorotrichloromethane | 180. | ppb | 10. | 079000000N |

The data indicated that no significant extraneous peaks were observed.

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Resp submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

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Rel.

| Acid Extractables | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| 2-chlorophenol | N.D. | ppb | 10. | 064600000N |
| phenol | N.D. | ppb | 10. | 065500000N |
| 2-nitrophenol | N.D. | ppb | 10. | 065100000N |
| 2,4-dimethylphenol | N.D. | ppb | 10. | 064800000N |
| 2,4-dichlorophenol | N.D. | ppb | 10. | 064700000N |
| 4-chloro-3-methylphenol | N.D. | ppb | 10. | 065300000N |
| 2,4,6-trichlorophenol | N.D. | ppb | 10. | 065600000N |
| 2,4-dinitrophenol | N.D. | ppb | 25. | 065000000N |
| 4-nitrophenol | N.D. | ppb | 25. | 065200000N |
| 2-methyl-4,6-dinitrophenol | N.D. | ppb | 10. | 064900000N |
| pentachlorophenol | N.D. | ppb | 10. | 065400000N |

The data indicated that no significant extraneous peaks were observed.

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P.O. 44-901
Rel.

| Base Neutrals | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| N-nitrosodimethylamine | N.D. | ppb | 10. | 069700000N |
| bis (2-chloroethyl) ether | N.D. | ppb | 10. | 066700000N |
| 1,3-dichlorobenzene | N.D. | ppb | 10. | 067700000N |
| 1,4-dichlorobenzene | N.D. | ppb | 10. | 067800000N |
| 1,2-dichlorobenzene | N.D. | ppb | 10. | 067600000N |
| bis (2-chloroisopropyl) ether | N.D. | ppb | 10. | 066800000N |
| hexachloroethane | N.D. | ppb | 10. | 069200000N |
| N-nitrosodi-n-propylamine | N.D. | ppb | 10. | 069800000N |
| nitrobenzene | N.D. | ppb | 10. | 069600000N |
| isophorone | N.D. | ppb | 10. | 069400000N |
| bis (2-chloroethoxy) methane | N.D. | ppb | 10. | 066600000N |
| 1,2,4-trichlorobenzene | N.D. | ppb | 10. | 070200000N |
| naphthalene | N.D. | ppb | 10. | 069500000N |
| hexachlorobutadiene | N.D. | ppb | 10. | 069000000N |
| hexachlorocyclopentadiene | N.D. | ppb | 10. | 069100000N |
| 2-chloronaphthalene | N.D. | ppb | 10. | 067200000N |
| acenaphthylene | N.D. | ppb | 10. | 065800000N |
| dimethyl phthalate | N.D. | ppb | 10. | 068100000N |
| 2,6-dinitrotoluene | N.D. | ppb | 10. | 068400000N |
| acenaphthene | N.D. | ppb | 10. | 065700000N |
| 2,4-dinitrotoluene | N.D. | ppb | 10. | 068300000N |
| fluorene | N.D. | ppb | 10. | 068800000N |
| 4-chlorophenyl phenyl ether | N.D. | ppb | 10. | 067300000N |
| diethyl phthalate | N.D. | ppb | 10. | 068000000N |
| 1,2-diphenylhydrazine | N.D. | ppb | 10. | 068600000N |
| N-nitrosodiphenylamine | N.D. | ppb | 10. | 069900000N |
| 4-bromophenyl phenyl ether | N.D. | ppb | 10. | 067000000N |
| hexachlorobenzene | N.D. | ppb | 10. | 068900000N |
| phenanthrene | N.D. | ppb | 10. | 070000000N |

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Rel.

| Base Neutrals (cont) | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| anthracene | N.D. | ppb | 10. | 065900000N |
| di-n-butyl phthalate | N.D. | ppb | 10. | 068200000N |
| fluoranthene | N.D. | ppb | 10. | 068700000N |
| pyrene | N.D. | ppb | 10. | 070100000N |
| benzidine | N.D. | ppb | 10. | 066000000N |
| butyl benzyl phthalate | N.D. | ppb | 10. | 067100000N |
| benzo (a) anthracene | N.D. | ppb | 10. | 066100000N |
| chrysene | N.D. | ppb | 10. | 067400000N |
| 3,3'-dichlorobenzidine | N.D. | ppb | 10. | 067900000N |
| bis (2-ethylhexyl) phthalate | N.D. | ppb | 10. | 066900000N |
| di-n-octyl phthalate | N.D. | ppb | 10. | 068500000N |
| benzo (b) fluoranthene | N.D. | ppb | 10. | 066300000N |
| benzo (K) fluoranthene | N.D. | ppb | 10. | 066500000N |
| benzo (a) pyrene | N.D. | ppb | 10. | 066200000N |
| indeno (1,2,3-cd) pyrene | N.D. | ppb | 10. | 069300000N |
| dibenzo (a,h) anthracene | N.D. | ppb | 10. | 067500000N |
| benzo (ghi) perylene | N.D. | ppb | 10. | 066400000N |

The data indicated that no significant extraneous peaks were observed.

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Nelson H. Risser B.A.
Group Leader - GC/MS

REFERENCE 4
Soil and Ground Water Contamination Assessment
for Ametek/Hunter Spring Division of
Hatfield, Pennsylvania Phase II
September 19, 1986

AR300651

# DATA SUMMARY FOR SOIL AND GROUND WATER CONTAMINATION ASSESSMENT FOR AMETEK/HUNTER SPRING DIVISION OF HATFIELD, PENNSYLVANIA

## PHASE III

Issued: 1/5/87

Prepared By:

Environmental Resources Management
999 West Chester Pike
West Chester, Pennsylvania 19382

AR300652

REFERENCE 5
Data Summary for Soil and Ground Water
Contamination Assessment for
Ametek/Hunter Spring Division of
Hatfield, Pennsylvania Phase III
January 5, 1987

AR300653

TABLE OF CONTENTS

I. INTRODUCTION

II. FIELD INVESTIGATION

- Magentic Anomaly Mapping
- Soil Sampling
- Confirmation of Water Quality Data
- Ground Water Flow Pattern Confirmation
- Shallow Monitoring Well Installation
- Co-Sampling Program

III. RESULTS AND DISCUSSION

- Magentic Anomaly Mapping
- Soil Sampling
- Confirmation of Water Quality Data
- Ground Water Flow Pattern Confirmation
- Shallow Monitoring Well Installation
- Co-Sampling Program

IV. REVISED FEASIBILITY PLAN FOR GROUND WATER AND SOIL REMEDIATION

- Refinements of Volume Estimates for Treatment
- Engineering Evaluation

## LIST OF TABLES

Page#

1 - Static Water Levels for Deep Bedrock Aquifer Wells

2 - Soil Sampling Results

3 - Ground Water Sampling Results October 1986

4 - Ground Water Sampling Results August 1986

5 - Ground Water Sampling Results Shallow Perched Water

## LIST OF FIGURES

Page#

1 - Ametek Site Map
2 - Soil Borings and Monitoring Well Locations
3 - Percolation Test Well Locations
4 - Magnetic Anomaly Map
5 - Water Table Configuration
6 - TCE Tank Area
7 - Paint Storage Area - Total VOA Results
8 - Wooded Area Behind Plant - Total VOA Results
9 - Plant Building Wall in Vicinity of TCE Tank Pad

## ATTACHMENTS

A - Drilling Logs
B - Soil Sampling Results
C - Ground Water Quality Results
D - Chain of Custody Forms

## I. INTRODUCTION

ENVIRONMENTAL RESOURCES MANAGEMENT, INC. (ERM) performed a Phase III soils and ground water investigation at the AMETEK/HUNTER SPRING DIVISION site near Hatfield, Pennsylvania. The following were the goals of this investigation:

- Exploration of possible buried drums in the wooded area behind the plant.
- Further definition of the extent of contaminated soils in the wooded area behind the plant.
- Confirmation of water quality data collected in Phase II.
- Confirmation of ground water flow patterns defined in Phase II.
- Definition of the quality of the perched ground water.
- Co-sampling program with North Penn Water Association for a possible transaction of Ametek production wells to NPWA.
- Development of a single economically feasible plan of ground water and soil remediation.

## II. FIELD INVESTIGATION

### Magnetic Anomaly Mapping

During the Phase I study, several half buried drums were observed in the wooded area behind the plant (Figure 1). The ground in this area is disturbed, suggesting the possibility of fully buried drums in the sub-surface. To avoid the possibility of

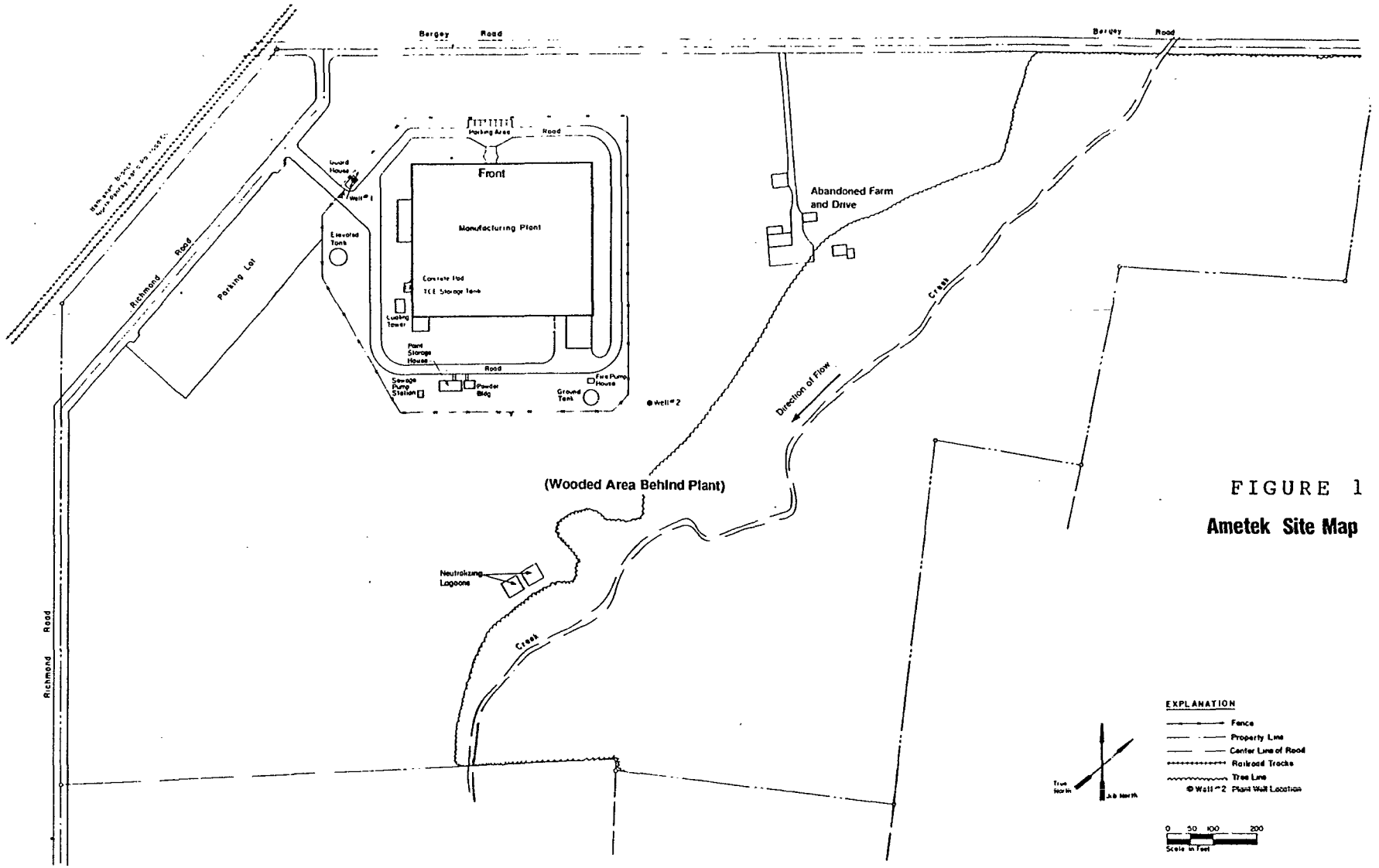



FIGURE 1

**Ametek Site Map**

AR300657

TABLE 1

STATIC WATER LEVELS FOR DEEP BEDROCK AQUIFER WELLS

| WELL ID | 10/1/86 DEPTH TO WATER (Top of Casing) (Feet) | 10/1/86 WATER LEVEL ELEVATION (Feet MSL) |
|---|---|---|
| AMETEK WELL 1 | 17.34 | 335.76 |
| AMETEK WELL 2 | --- | --- |
| MW-1 | 16.75 | 337.63 |
| MW-2 | 21.93 | 333.41 |
| MW-3 | 19.75 | 333.37 |
| MW-4 | 13.92 | 340.45 |
| MW-4D | 13.35 | 340.42 |
| MW-5 | 14.94 | 333.27 |
| MW-6 | 17.93 | 331.70 |
| MW-7 | 33.39 | 317.89 |
| MW-8 | 9.90 | 352.87 |
| MW-8D | 10.29 | 352.83 |
| MW-9 | 20.88 | 326.71 |
| MW-9D | 21.15 | 326.76 |

auger. At the completion of each hole, the auger was pulled out and the well was installed. Each well consisted of a two inch diameter piece of PVC casing in which slots were cut in the bottom two feet to act as a screen. An end cap was placed on the bottom of the well to avoid the possibility of silting. A gravel pack was added to a height of one foot above the screened interval. This was followed by a one foot bentonite seal and then a bentonite/cement grout mix to the surface. A cap was placed on the top of each well for completion. Drilling logs are presented in Appendix A.

The new wells were left for approximately four days before development and sampling; however, upon the sampling date only two wells had enough water in them to sample. These wells were sampled for volatile organic compounds.

Co-Sampling Program

On 18 November 1986 the Ametek production wells one and two were co-sampled with the North Penn Water Association. The samples were analyzed for volatile organics and primary and secondary drinking water parameters. The NPWA did an in-house analysis of their samples. ERM sent their samples to Lancaster Laboratories in Lancaster, Pennsylvania. The purpose of this sampling program was to determine ground water quality for the possible transfer of the Ametek production wells to the NPWA. Both production wells were to be sampled twice, however, due to a malfunction, production well 2 was sampled only once. Well 1 was sampled twice.

## III. RESULTS AND DISCUSSION

### Magnetic Anomaly Occurrence

Several areas of high metallic content (magnetic anomalies) were detected in the wooded area behind the plant (Figure 4). Several half-buried drums were found close to these areas, suggesting that the high readings could be buried drums in the subsurface. If this is the case, extreme care should be taken during the excavation of this area to avoid rupturing a drum containing contaminants.

### Soil Quality Results

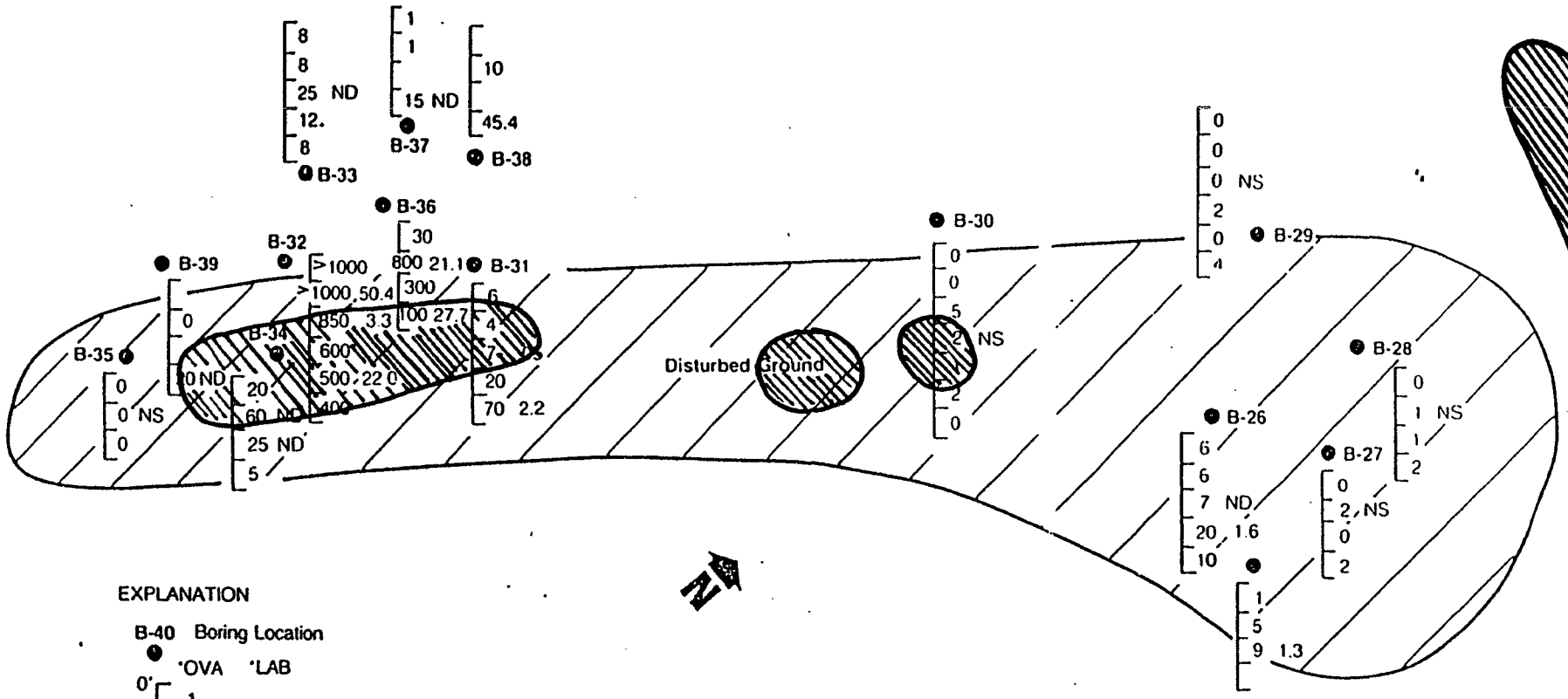
The results of the additional soil borings in the wooded area revealed that the soil contamination does not extend south to the creek which traverses the Ametek property (Figure 2). Volatile organics were detected in only one soil sample (S-71), as shown on Table 2. This sample had methylene chloride present at 35 ppb. Since no other traces of methylene chloride have been found at the site and since this compound is a commonly used laboratory solvent, ERM believes that the presence of this constituent in the sample may be due to common laboratory contamination. Analytical results can be found in Attachment B.

### Confirmation of Water Quality Data

The results of the ground water sampling analysis confirm that no contaminates appear to be migrating off the Ametek property. The results of this second analysis are presented in Table 3. These results can be compared to the results of the first sampling analysis presented in Table 4. The volatile organic results are relatively similar between the first and second round of ground water sampling. Zinc was detected at 0.08 ppb (well below the drinking water standard of 5 mg/l). Bis(2-ethylhexyl)phthalate was alos detected at 40 ppb. Due to the low amount of this

# FIGURE 4

## WOODED AREA BEHIND PLANT
## MAGNETIC ANOMALY MAP




The ERM Group

AR300661

TABLE 2

Soil Sampling Results
(Results given in ppb, dry weight basis)

September 25, 1986

| Boring I.D. | Sample | Methylene Chloride | Total VOCs* |
|---|---|---|---|
| B-70 | S-70 (2.0') | ND | 0 |
| B-71 | S-71 (2.5') | 35 | 35 |
| B-72 | S-72 (3.0') | ND | 0 |
| B-73 | S-73 (1.5') | ND | 0 |
| B-74 | S-74 (1.5') | ND | 0 |
| B-75 | S-75 (1.5') | ND | 0 |

TABLE 3
Ground Water Sampling Results (Deep Bedrock Aquifer)

October 1-2, 1986

| | methylene chloride | 1,1-di-chloro-ethene | 1,1-di-chloro-ethane | trans-1,2 dichloro-ethene | 1,1,1-trichloro-ethane | tri-chloro-ethene | tetra-chloro-ethene | toluene | ethyl-benzene | fluoro-trichloro-methane | zinc | bis (2-ethylhexyl phthalate | total VOC* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 360 | X | X | 360 |
| MW-2 | ND | 570 | 20 | 150 | 2300 | 740 | ND | ND | ND | ND | X | X | 3780 |
| MW-3 | ND | 20 | ND | 280 | 40 | 2300 | 20 | ND | ND | ND | X | X | 2660 |
| MW-4 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | X | X | 0 |
| MW-4D | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | X | X | 0 |
| MW-5 | 40 | ND | ND | 20 | ND | 50 | 20 | ND | ND | ND | X | X | 130 |
| MW-6 | ND | 10 | ND | 10 | 1300 | 410 | ND | ND | ND | 100 | X | X | 1830 |
| MW-7 | ND | 100 | ND | ND | 630 | 400 | 10 | ND | ND | 170 | X | X | 1310 |
| MW-8 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | X | X | 0 |
| MW-8D | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | X | X | 0 |
| MW-9 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | X | X | 0 |
| MW-9D | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | .08 | 40 | 0 |
| Well 1 | ND | 200 | 40 | ND | 1400 | 580 | 30 | ND | ND | 400 | X | X | 2650 |
| Well 2 | ND | 230 | 20 | ND | 1800 | 600 | 30 | ND | ND | 340 | X | X | 3020 |
| Trip Blank | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | X | X | 0 |

X - Priority Pollutant Analysis was not run on this sample.
Water analysis results in (ppb)
ND - None Detected
*Volatile Organic Compounds

AR300663

TABLE 4
GROUND WATER SAMPLING RESULTS
(Deep Bedrock Aquifer)

August 13-14, 1986

| | 1,1-di-chloro-ethene | 1,1-di-chloro-ethane | trans-1,2 dichloro-ethene | 1,1,1-trichloro-ethane | tri-chloro-ethene | tetra-chloro-ethene | toluene | ethyl-benzene | fluoro-trichloro-methane | Total VOCs* |
|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | ND | ND | ND | ND | ND | ND | ND | ND | 70 | 70 |
| MW-2 | 170 | ND | ND | 280 | 160 | ND | ND | ND | ND | 610 |
| MW-3 | 40 | 20 | 310 | 80 | 5300 | 40 | ND | ND | ND | 5790 |
| MW-4 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0 |
| MW-4D | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0 |
| MW-5 | ND | ND | ND | ND | 20 | 90 | ND | ND | ND | 110 |
| MW-6 | 80 | ND | 20 | 2300 | 1700 | ND | ND | ND | 190 | 4290 |
| MW-7 | 100 | ND | ND | 800 | 300 | ND | ND | ND | 700 | 1900 |
| MW-8 | ND | ND | ND | ND | ND | ND | 10 | ND | ND | 10 |
| MW-8D | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0 |
| MW-9 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0 |
| MW-9D | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0 |
| Well 1 | 210 | 20 | ND | 1900 | 540 | 30 | ND | ND | 410 | 3110 |
| Well 2 | 230 | 20 | ND | 1900 | 570 | 30 | ND | ND | 510 | 3260 |
| Trip blank | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0 |

Water analysis results in (ppb)
ND - None Detected
*Volatile Organic Compounds

AR300664

compound detected, ERM believes the presence of this compound may be the result of laboratory contamination. Analytical results can be found in Attachment C.

## Ground Water Flow Pattern Confirmation

An effective cone of depression is still being maintained by the plant production wells. The results of the water level data taken on 1 October 1986 have been plotted on Figure 5 to confirm this. The rate at which the wells are presently being pumped is maintaining the cone of depression which is necessary to keep the contaminates from migrating off-site.

## Perched Ground Water Quality

Several different sampling points were analyzed to develop an accurate picture of the perched ground water quality. Unfortunately, only two of the newly installed shallow wells (S-1 and S-9) had enough water in them to sample. To get a more complete lateral distribution of sampling points the deep percolation test wells were sampled (PT-1D, PT-2D, and PT-3D). It should be noted that the deep percolation test wells are less than ten feet deep, however, in comparison to the shallow percolation test wells, they are referred to as deep. The results from a water sample previously taken from B-18 was also examined (see Figures 2 and 3 for locations). The results of these samples reveal that the shallow perched water is also contaminated in the areas of the removed TCE tank, the paint storage house and the wooded area behind the plant. Results are presented in Table 5. It should be noted that Well S-9 has 20 ppb of TCE present in the water which could quite possibly migrate into the creek immediately southwest of this location. Vinyl chlodide was detected on the site for the first time at 20 ppb in PT-2D. It is a breakdown of TCE. Analytical results can be found in Attachment C.

FIGURE 5
WATER TABLE CONFIGURA
(DEEP BEDROCK AQUIFE
10/1/86

AR300666

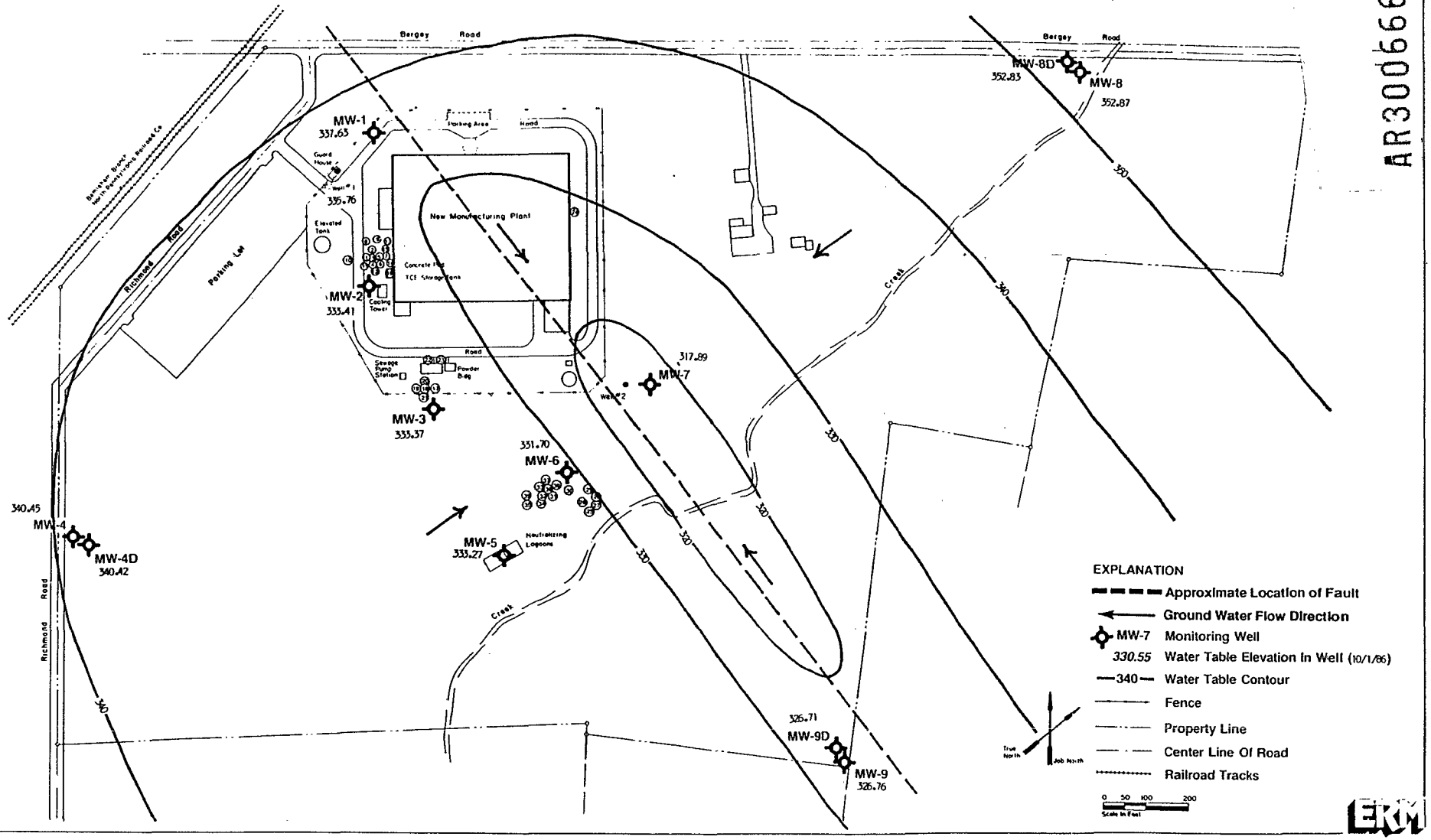


TABLE 5

Ground Water Sampling Results (shallow perched water)

| | sampling date | carbon tetra-chloride | vinyl chloride | 1,1-di-chloro-ethene | 1,1-di-chloro-ethane | trans-1,2 dichloro-ethene | 1,1,1-trichloro-ethane | tri-chloro-ethene | tetra-chloro-ethene | toluene | ethyl-benzene | fluoro-trichloro-methane | Total VOCs* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 10/15/86 | ND | ND | 20 | ND | ND | 200 | 20 | ND | ND | ND | ND | 240 |
| S-9 | 10/15/86 | ND | ND | ND | ND | ND | ND | 20 | ND | ND | ND | ND | 20 |
| PT-1D | 10/1/86 | ND | ND | 1700 | 110 | 450 | 22000 | 19000 | 20 | ND | ND | ND | 43280 |
| PT-2D | 10/1/86 | 10 | 20 | 40 | ND | ND | 80 | 10 | ND | ND | ND | ND | 160 |
| PT-3D | 10/1/86 | ND | ND | ND | ND | 880 | 30 | 4400 | 70 | ND | ND | 80 | 5460 |
| B-18 | 7/30/86 | ND | ND | ND | ND | 2100 | ND | ND | ND | ND | ND | ND | 2100 |

Water analysis results in (ppb)
ND - None Detected
*Volatile Organic Compounds

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Co-Sampling Program

The results of the ERM co-sampling program with NPWA are presented in Attachment C. Well 1 was sampled twice, first at 9:30 A.M. and then seventeen minutes later at 9:55 A.M. Well 2 was sampled only once at 10:35 A.M. The NPWA determiend the smapling times. Analytical results can be found in Attachment C.

## IV. REVISED FEASIBILITY PLAN FOR GROUND WATER AND SOIL REMEDIATION

### Refinements of Volume Estimates for Treatment

The amount of soil to be excavated was recalculated on the basis of removal to 2 ppm and on the average depth to bedrock. Figures 6, 7, and 8 present the three areas of excavation. The following are the refinement of volume estimates for soil treatment:

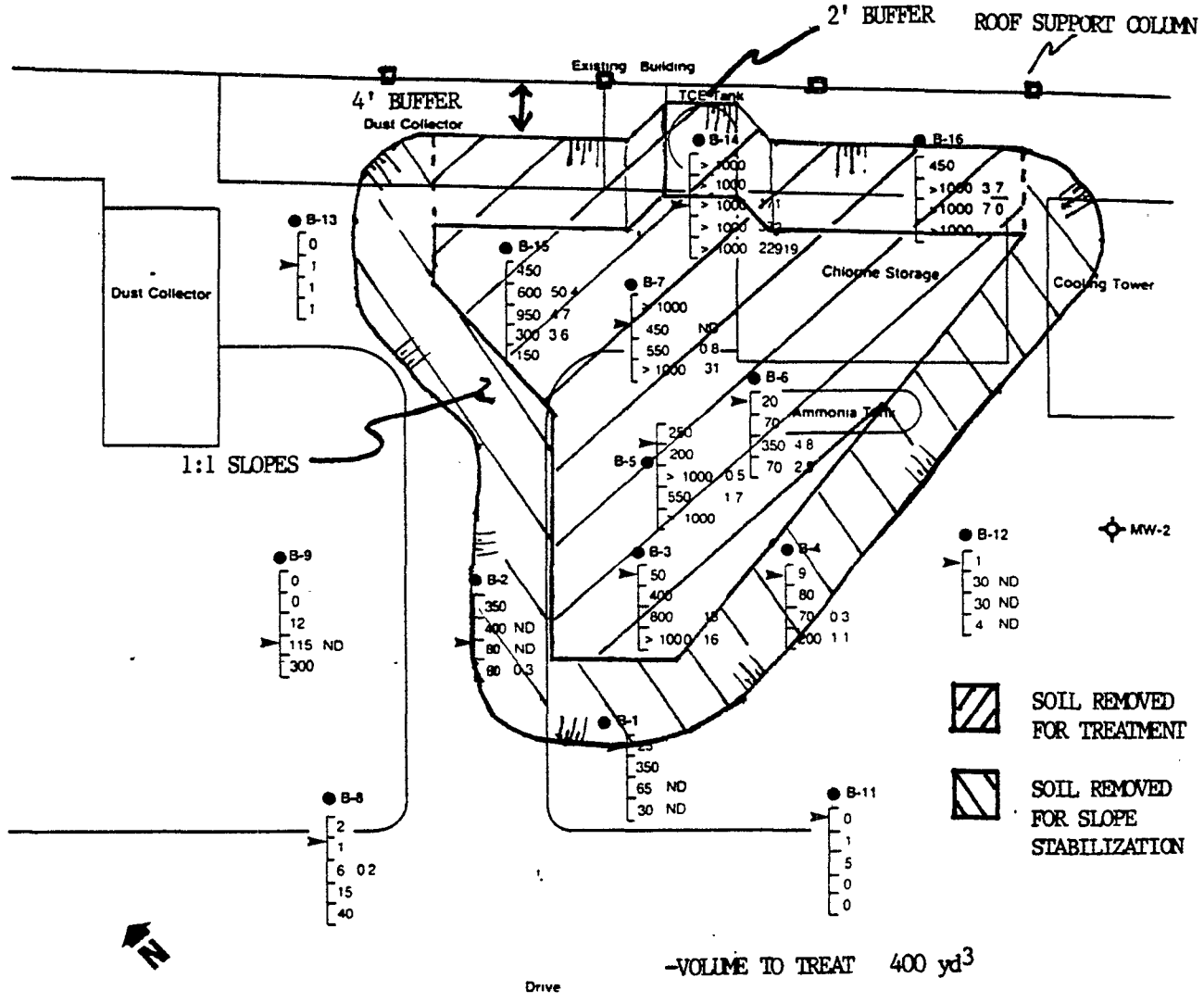
| Location | Average Depth To Bedrock (feet) | Volume To Treat ($yd^3$) |
|---|---|---|
| TCE Tank Area | 8.0 | 400 |
| Paint Storage Area | 5.5 | 50 |
| Wooded Area Behind Plant | 8.7 | 190 |

The total amount of soil to be treated is 640 cubic yards.

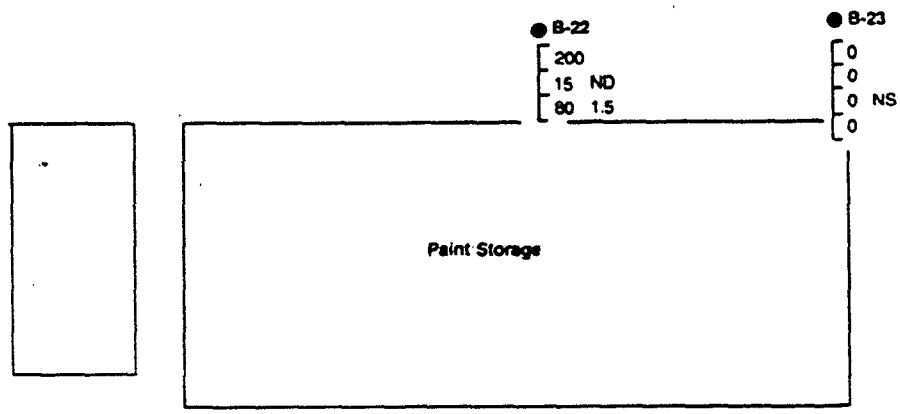
In the area of the TCE tank, soil contamination near and beneath the building will not be excavated because of the possibility of potential damage to the building. A buffer zone of 2 to 4 fe-

# FIGURE 6

## TCE Tank Area

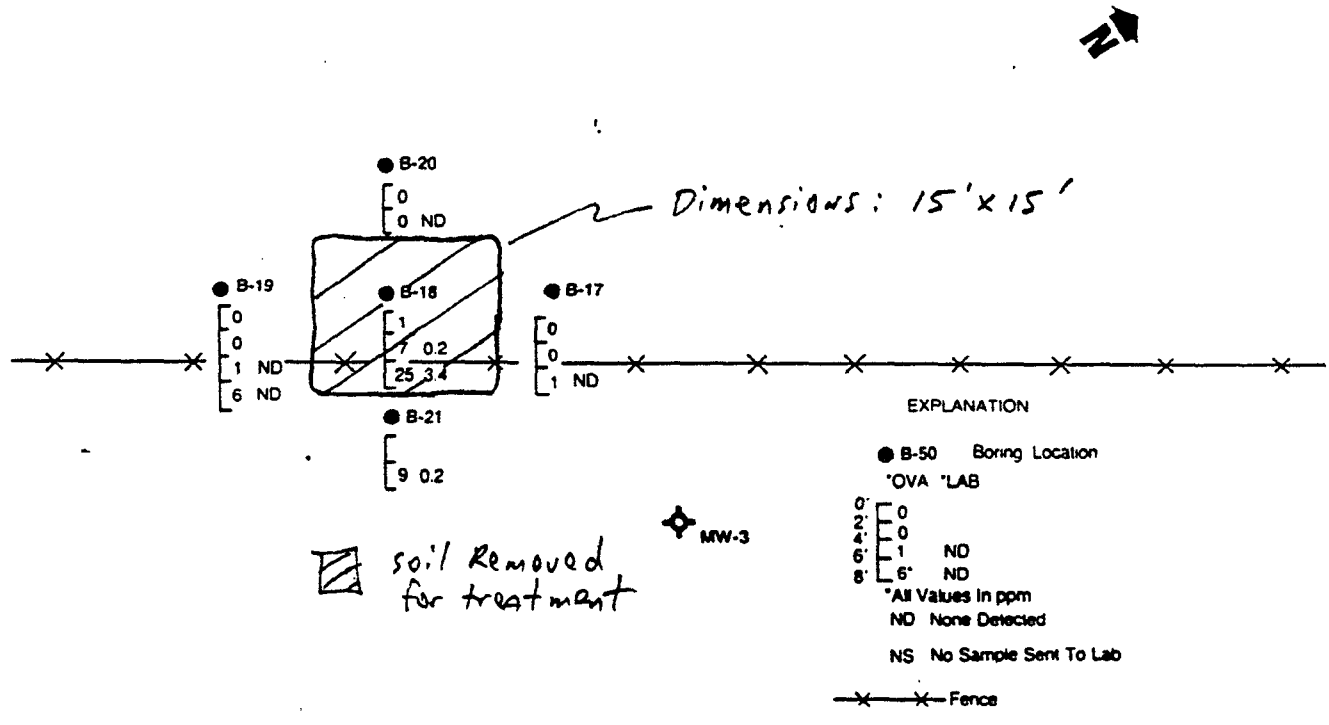


# FIGURE 7
## Paint Storage Area
## Total VOA Results

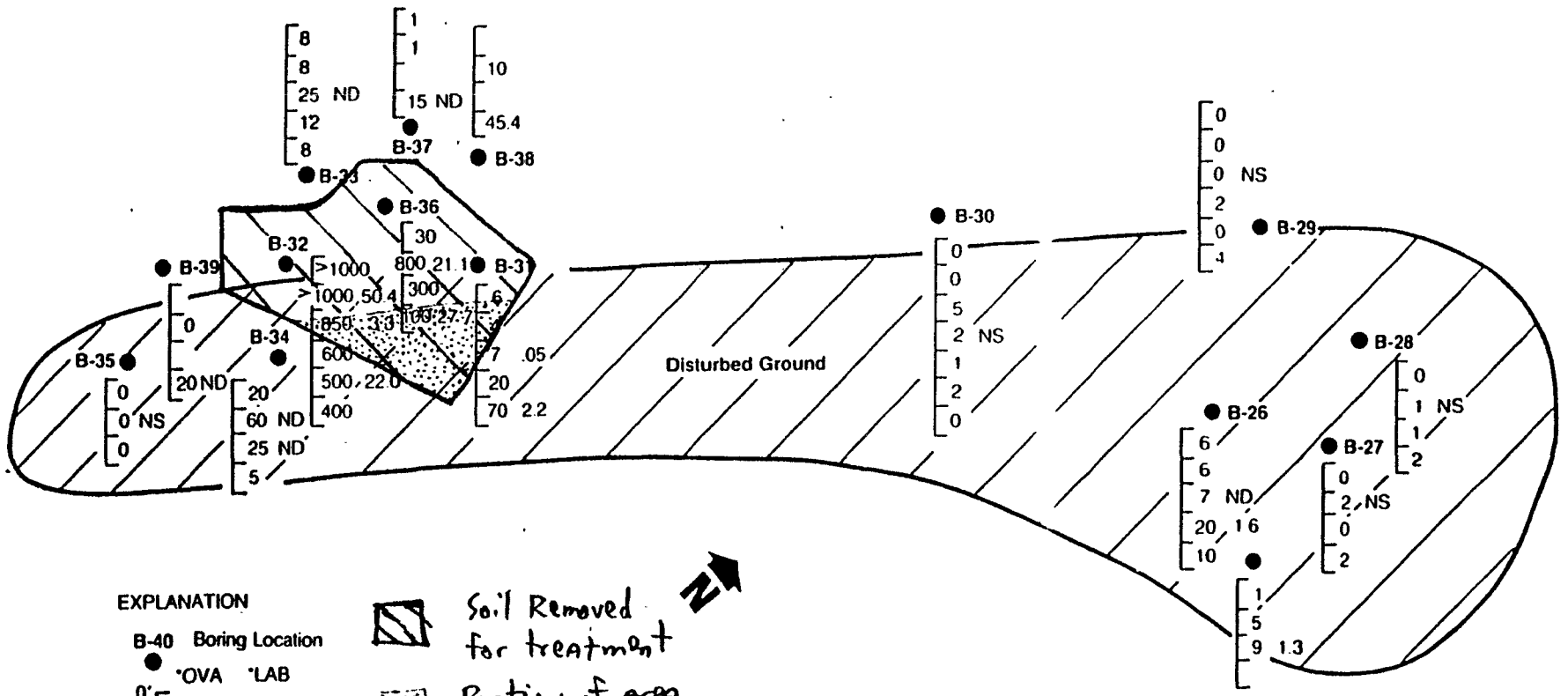



- Volume to treat ≈ 50 yd³

1) Removal to 2 ppm.
2) Avg. depth to rock = 5.5'.



# FIGURE 8
## Wooded Area Behind Plant
## Total VOA Results




- Volume to treat ≈ 190 yd³
1) Removal to 2ppm.
2) Avg. depth to rock = 8.7'.

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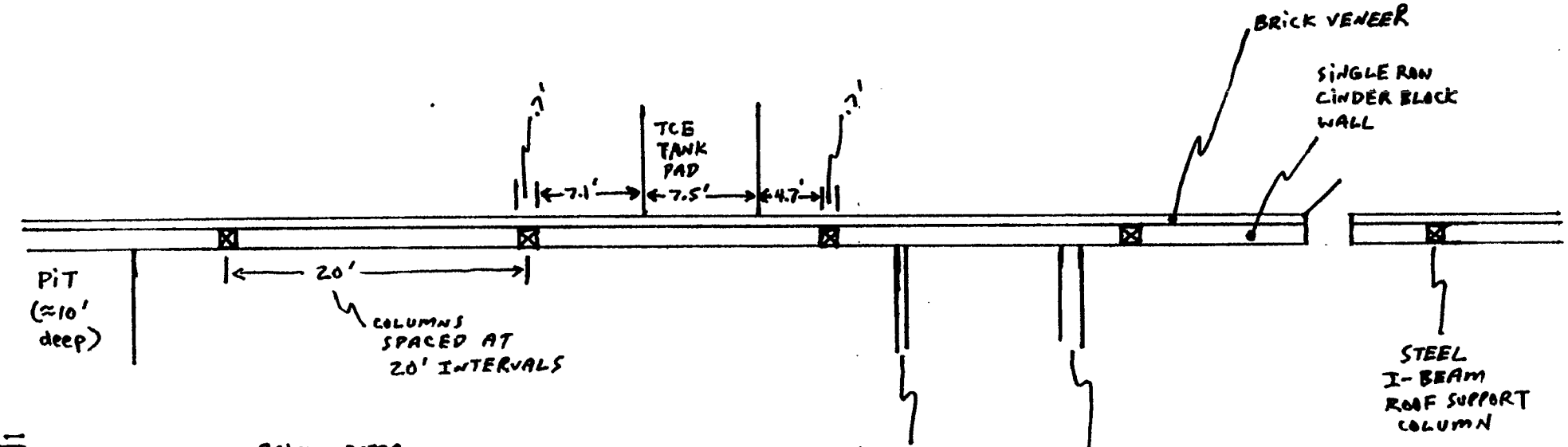
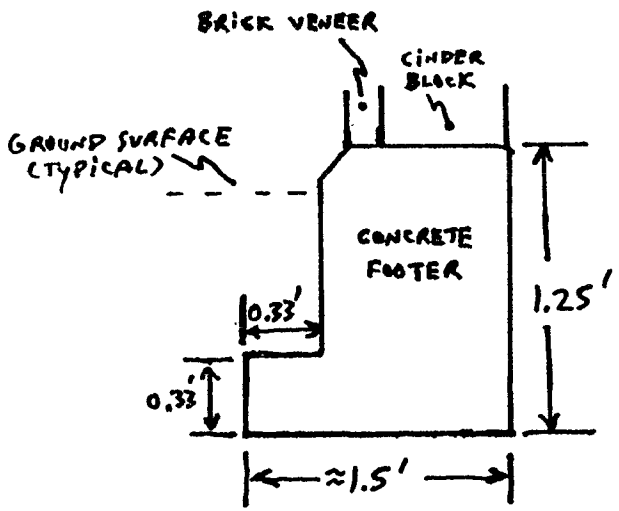
will be left along the west wall of the building. A detailed drawing of this wall as observed by ERM is presented in Figure 9 for future reference. There are no structural hazards in the two remaining excavation areas.

# FIGURE 9

## PLANT BUILDING WALL IN VICINITY OF TCE TANK PAD




FOOTER DETAIL
SCALE: 1" = 10"

11

AR300673

## Engineering Evaluation

ERM began an engineering analysis of several on-site volatile stripping technologies as they would best be applied to soil remediation at the Ametek site. These technologies included forced-air stripping of excavated soils in shallow piles (or windrows), soil vacuuming in non-disturbed soil columns, and passing excavated soils through a highway construction dirt screen (oil screening). The purpose of the engineering analyses were to develop the design of pilot-scale soil remediation systems to predict the total length of time required to complete remediation, to predict system performance, and to select a soil cleanup goal based on a brief risk assessment at the site.

The engineering effort was subsequently replaced in favor of focusing on the basic mechanics of soil drying in shallow beds as it could be applied at the site as requested by Ametek. Proceeding on Ametek's decision that time would not be a limiting factor to a soil drying project, it was assumed that contaminated soils could be dried in batches and in drying beds constructed on existing paved areas at the site. Saturated soils would be drained prior to drying bed construction. Berms and underdrain systems would be constructed to control runon/runoff and collect runoff water for treatment. This water could either be treated on-site or sent to the sanitary sewer for treatment at the local POTW.

Upon discussing the relative time requirements, economics and liabilities associated with soil drying beds and off-site disposal of contaminated soils, Ametek and ERM agreed that neither technology was acceptable. Further, it was agreed that the soil screening technology appeared the most attractive in terms of providing a more rapid, more complete, and lower risk

soil remediation. ERM had recently completed a very successful remediation of soils at another site having similar organic volatiles contamination. ERM has consequently begun to assess the actual economics and mechanics of setting up a soil screening operation on site. Pre-drying saturated soils to a manageable moisture content by forced hot air and the operation of the highway screen in roofed unloading areas are being considered. Hot air drying of soils could be accomplished in a temporary enclosure or in a section of the unused plant on site.

AR300675

rupturing any of these drums during remediation, ERM conducted a magnetic anomaly survey to identify any locations that had a high metal content. This survey was carried out by constructing a grid pattern across the wooded area and then passing a metal detector over the pattern, plotting the areas of high metal concentration on a map. The survey was conducted by an ERM Geophysicist.

## Soil Sampling

During the Phase II soil sampling program, many soil samples were taken in the wooded area behind the plant, however, the area just south of this was inaccessible to the drilling rig. Consequently, no samples were obtained in this area, leaving the southern boundary of the contaminated soils undefined.

To further define the extent of this soil contamination, ERM drilled six soil borings in the area utilizing a hand held power auger during the Phase III Investigation (Figure 2). A small pilot hole was first drilled to determine the depth to bedrock. This was followed at the same location by a second hole which stopped short of bedrock by about one foot. A shovel auger was then placed down the hole to sample this one foot of soil. One soil sample was retrieved from each hole. All samples were collected in accordance with EPA guidelines and were sent to Lancaster Laboratories in Lancaster, Pennsylvania for a volatile organic analysis.

## Confirmation of Water Quality Data

The Phase II water quality results revealed that no contamination appeared to be migrating off-site due to the absence of contamination in all of the perimeter wells. ERM and AMETEK jointly agreed that these results should be confirmed by a second round of ground water samples. Ground water samples were collected out of the twelve monitoring wells, the deep

FIGURE 2

**Soil Borings And Monitoring Well Locations**

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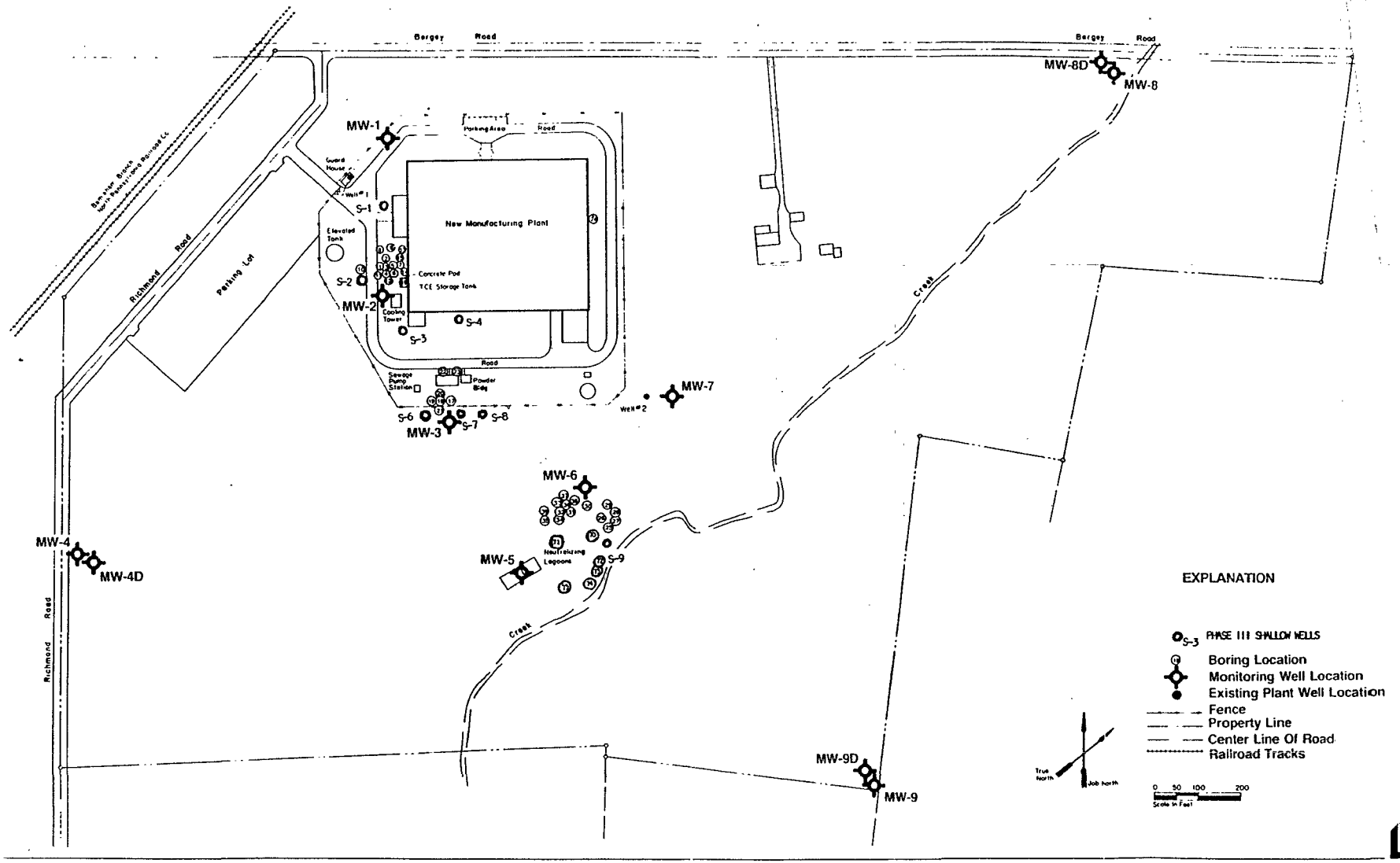

percolation test wells, and the two existing plant wells. These well locations are shown on Figures 2 and 3. Prior to sample collection, a minimum of three volumes of water were purged from each of the wells with exception of the two active plant production wells. The deep wells were purged with a 3-3/4 inch diameter submersible pump. The shallow wells were bailed by hand with bottom loading PVC bailers. The plant production wells were run for one-half hour to clear the tap lines. Samples were then collected directly from the tap of each well. Since the two plant wells are active on a daily basis, there was no need to purge a full three volumes from each well. After purging each monitoring well, the ground water samples were obtained by using a bottom loading PVC bailer dedicated to each well and decontaminated prior to and after use. All the samples were analyzed for volatile organics. Well MW-9D was analyzed for priority pollutant, excluding pesticides and PCB's).

## Ground Water Flow Pattern Confirmation

Since the complete plant shutdown in late September, 1986, the plant production wells have been pumped continuously at normal production rates to maintain the cone of depression and contain the contaminate plume on site. A second round of water levels were taken on 1 October, 1986, to confirm that this cone of depression was being maintained (Table 1).

## Shallow Monitoring Well Installation

The Phase II investigation defined the ground water quality in the deep bedrock aquifer, but left the upper perched zone undefined. To fill this data gap, ERM installed eight shallow monitoring wells, designated as S-1 through S-9 (Figure 2) during the Phase III Investigation. It should be noted that S-5 was not installed because bedrock was encountered at 1.7 feet below the ground surface. The wells were installed by drilling down to the top of bedrock utilizing a six inch O.D. diameter hollow stem

FIGURE 3
Percolation Test
Well Locations

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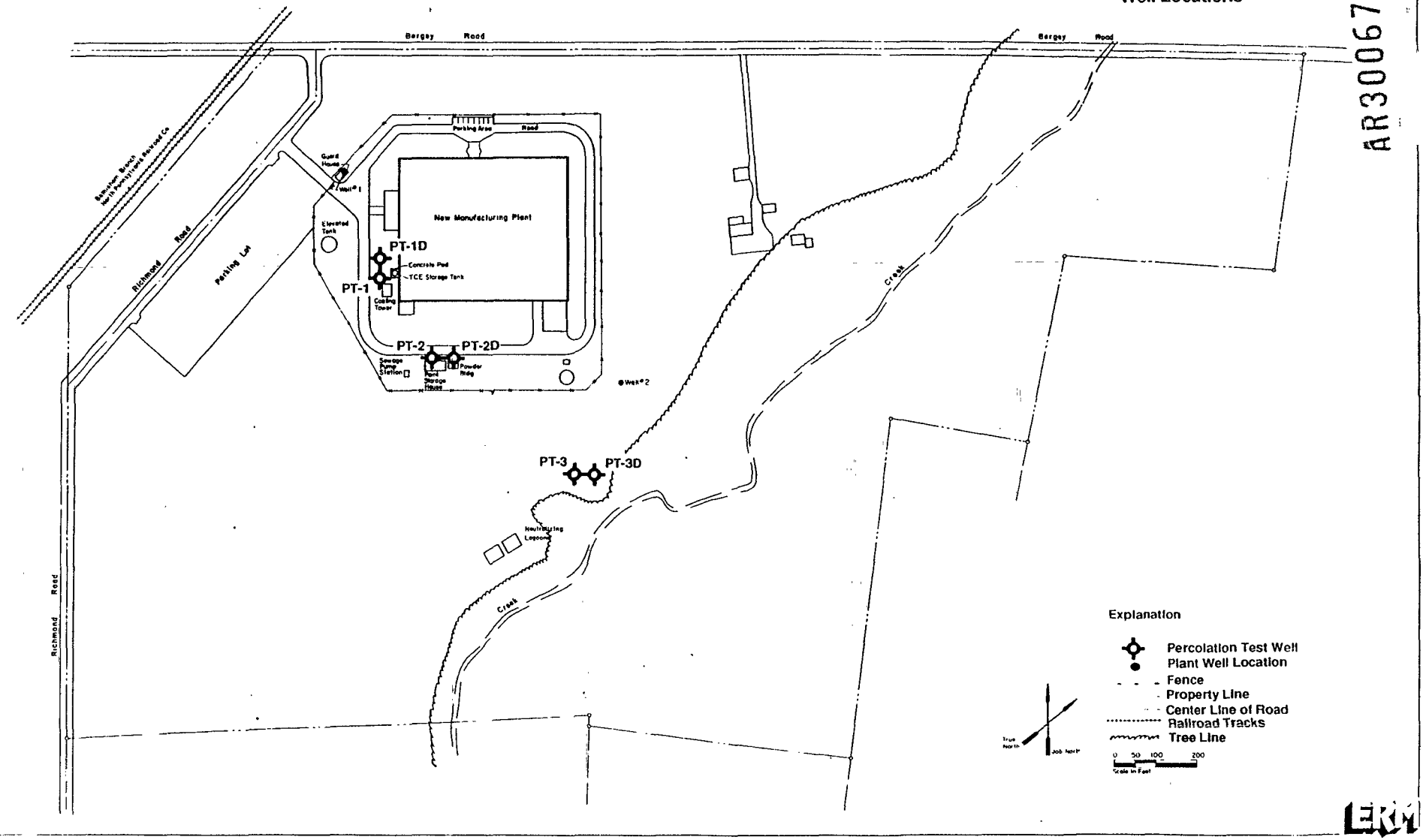


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# SOIL AND GROUND WATER CONTAMINATION ASSESSMENT FOR AMETEK/HUNTER SPRING DIVISION OF HATFIELD, PENNSYLVANIA

## PHASE II

Issued: 9/19/86

Prepared by:

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AR300680

TABLE OF CONTENTS


| | | | Page |
|---|---|---|---|
| Section 1 - | | Introduction | 1-1 |
| | 1.1 | Background | 1-1 |
| | 1.2 | Objectives of the Phase II ERM Investigation | 1-8 |
| Section 2 - | | Regional Geology and Hydrogeology | 2-1 |
| | 2.1 | Physical Setting | 2-1 |
| | 2.2 | Regional Geology | 2-2 |
| | 2.3 | Regional Hydrogeology | 2-6 |
| Section 3 - | | Field Investigation | 3-1 |
| | 3.1 | Evaluation of Phase I Investigation | 3-1 |
| | 3.2 | Soil Borings | 3-1 |
| | 3.3 | Monitoring Well Installation | 3-4 |
| | 3.4 | Laboratory Analysis | 3-10 |
| | 3.5 | Percolation Tests | 3-10 |
| | 3.6 | Water Level Measurements | 3-12 |
| | 3.7 | Elevation Survey | 3-12 |
| Section 4 - | | Results and Discussion | 4-1 |
| | 4.1 | Site Physical Setting | 4-1 |
| | 4.2 | Site Soil Characterisitics | 4-1 |
| | 4.3 | Site Geology | 4-2 |
| | 4.4 | Site Hydrogeology | 4-7 |
| | 4.5 | Soil Sampling Survey | 4-9 |
| | 4.6 | Ground Water Sampling Survey | 4-40 |
| Section 5 - | | Conclusions | 5-1 |
| | 5.1 | Extent of Contamination | 5-1 |
| | 5.2 | Site Conditions | 5-2 |


AR300681

# LIST OF FIGURES


| FIGURE | | PAGE |
|---|---|---|
| 1-1 | General Location Map | 1-2 |
| 1-2 | Ametek Site Map | 1-3 |
| 1-3 | Area Site Map | 1-6 |
| 2-1 | Montgomery County | 2-2 |
| 2-2 | Soil Map of Ametek Study Area | 2-5 |
| 3-1 | Soil Boring and Monitoring Well Locations | 3-7 |
| 3-2 | Deep Bedrock Monitoring Well Construction Schematic | 3-8 |
| 3-3 | Shallow Monitoring Well Construction Schematic | 3-9 |
| 3-4 | Percolation Test Well Locations | 3-11 |
| 4-1 | Bedrock Lithology in Study Area | 4-3 |
| 4-2 | Lines of Hydrogeologic Cross Section | 4-4 |
| 4-3 | Hydrogeologic Cross Sections | 4-5 |
| 4-4 | Hydrogeologic Cross Section | 4-6 |
| 4-5 | Perched Water Table Configuration (Upper Aquifer) | 4-8 |
| 4-6 | Water Table Configuration for 8/21/86 (Plant Wells Pumping) | 4-10 |
| 4-7 | Water Table Configuration for 9/2/86 (Plant Wells Not Pumping) | 4-11 |
| 4-8A | TCE Tank Area Total VOA Results | 4-24 |
| 4-8B | TCE Tank Area Trichlorethene Results | 4-25 |
| 4-8C | TCE Tank Area 1,1,1- Trichloroethane Results | 4-26 |

LIST OF FIGURES (continued)


| FIGURE | | PAGE |
|---|---|---|
| 4-8D | TCE Tank Area 1,1- Dichloroethene Results | 4-27 |
| 4-8E | TCE Tank Area Trans-1,2- Dichloroethene Results | 4-28 |
| 4-8F | TCE Tank Area Toluene Results | 4-29 |
| 4-9A | Paint Storage Area Total VOA Results | 4-30 |
| 4-9B | Paint Storage Area Trichloroethene Results | 4-31 |
| 4-9C | Paint Storage Area Tetrachloroethene Results | 4-32 |
| 4-9D | Paint Storage Area Trans-1,2- Dichloroethene Results | 4-33 |
| 4-10A | Wooded Area Behind Plant Total VOA Results | 4-34 |
| 4-10B | Wooded Area Behind Plant Trichloroethene Results | 4-35 |
| 4-10C | Wooded Area Behind Plant 1,1,1- Trichloroethane | 4-36 |
| 4-10D | Wooded Area Behind Plant Tetrachloroethene | 4-37 |
| 4-10E | Wooded Area Behind Plant Toluene | 4-38 |
| 4-10F | Wooded Area Behind Plant Ethylbenzene | 4-39 |
| 4-11 | Contaminant Concentrations | 4-42 |


AR300683

# LIST OF TABLES


| TABLE | | PAGE |
|---|---|---|
| 1-1 | Plant Well Water Sample Analysis | 1-5 |
| 3-1 | Boring Inventory Data | 3-2 |
| 3-2 | Well Inventory Data | 3-5 |
| 3-3 | Percolation Test Well Data | 3-13 |
| 3-4 | Static Water Level Data | 3-14 |
| 4-1 | OVA/Split Spoon Sampling Data | 4-13 |
| 4-2 | Soil Sampling Results July-August, 1986 | 4-18 |
| 4-3 | Ground Water Sampling Results August 13-14, 1986 | 4-41 |

# LIST OF APPENDICES


| APPENDIX | TITLE |
|---|---|
| A | SOIL BORING LOGS |
| B | MONITORING WELL DRILLING LOGS |
| C | LABORATORY ANALYTICAL DATA |

## EXECUTIVE SUMMARY

Environmental Resources Management, Inc. (ERM) performed a Phase II Soils and Ground Water Investigation of contamination from volatile organic compounds (VOCs) at the AMETEK/Hunter Spring Division site near Hatfield, Pennsylvania. The goals of the investigation were to determine the extent, both horizontally and vertically, of areas of soil contamination that were identified from the Phase I investigation by utilizing the data gathered during Phase II.

To achieve these goals, ERM conducted 39 soil borings and selected pre-screened soil samples for laboratory analysis; installed 12 monitoring wells from which water level measurements were made and samples were obtained for laboratory analysis; and installed six additional shallow wells which were tested for water percolation rates to determine the hydraulic conductivity in the soil.

### Conclusions

The conclusions from the Phase II investigation are:

- Significant soil contamination is known to exist down to the top of the bedrock in three separate areas on the Ametek site. The three known areas have been more accurately defined, both vertically and horizontally, in terms of extent of soil contamination. The three areas are as follows, listed in decreasing order in terms of magnitude of contamination:
  - TCE Tank Area to the southwest of the plant
  - The disturbed ground bordering the tree line of the wooded area.
  - The Paint Storage Area to the southeast of the plant
- The soils are contaminated with 1,1-dichloroethene, trans-1,2 dichloroethene, 1,1,1-trichloroethane, trichloroethene, tetrachloroethene, toluene, and ethlylbenzene. The highest total volatile organic compound level was 22,919 ppm in Boring B-14 (TCE Tank Pad).
- A fourth area of minor contamination (both in terms of contaminant concentration and soil volume) from toluene exists in the northeast corner of the former sludge lagoons southeast of the plant.



AR300686

- Ground water contamination by organic solvents has been found in samples from the plant production wells and the monitoring wells in the central portion of the Ametek site. Due to the active pumping of the Ametek site production wells, this contamination is not currently migrating off site. The ground water on site is contaminated with 1,1-dichloroethene, 1,1-dichloro-ethane, trans-1,2 dichloroethene, 1,1,1-trichloroethane, trichloroethene, tetrachloroethene, toluene, and fluorotrichloromethane. The highest total volatile organic compound level was 5790 ppb in Well MW-3 located southeast of the Paint Storage Building. No contaminants were detected in any of the site permiter wells.

- Minor toluene contamination present in Well MW-8 at the north edge of the site is questionable. It is possible that this minor contamination, if present, is originating from off-site.

- While a dense fragipan layer does exist in the soils under the site, the layer does not significantly restrict the flow of water vertically through the soils.

- The water table is formed by a perched layer of water that is present within the soils on the top of the bedrock throughout the site. The presence of this perched water suggests that water is somewhat restricted as it moves down into the deeper aquifer present in the bedrock.

- The upper and lower portions of the bedrock are hydraulically interconnected and form one deeper aquifer. Due to the active pumping of the Ametek Plant site wells, the ground water flow is inward in a radial pattern towards the center of the site. This is currently preventing the contaminated ground water from flowing off site.

- The fault traversing the site is a conduit of high permeability and significant ground water flow which will also act as a major pathway for off-site migration of contaminants, if not controlled by continuous on-site pumping.



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# SECTION 1

# INTRODUCTION

## 1.1 Background

The Ametek/Hunter Spring Division Plant in Hatfield, Pennsylvania was built and began operations in 1962 (Figure 1-1). Since that time, TCE has been used at the plant as a cleaning solvent except for the period of 1975 to 1976 when 1,1,1-trichloroethane was used instead. Prior to 1975, TCE was stored in drums. The exact location of the TCE drum storage is uncertain, however, during a recent inspection of the plant property some half-buried empty drums were observed in an area behind the plant. After 1975, TCE was stored in a 1500-gallon above ground tank. This tank was in use up until June 1986 at which time it was removed from the site. Figure 1-2 shows the Ametek site.

A settling basin in the back of the plant received rinse water from plating operations at one time in the past. Lagoons in the same area were used to receive sludges (Figure 1-2). These lagoons were closed in place with DER approval in 1974. The waste discharge license was canceled at that time.

The plant has two production water wells (Wells 1 and 2). Well 1 is located in the gatehouse to the west of the plant (all directions are in respect of true north). Well 2 is located to the east of the plant. A third well (Well 3) is shown on plant drawings just east of the abandoned farm and drive. No well was found at this location. It is assumed that it has been filled in since no other record of the well exists.

In 1979, North Penn Water Authority (NPWA) discovered traces of volatile organic chemicals in 18 of its wells. These wells were shut down and replacement water has been purchased from Keystone Water Company. It was projected that the water demand would most likely exceed the capacity of the system by the summer of 1986.



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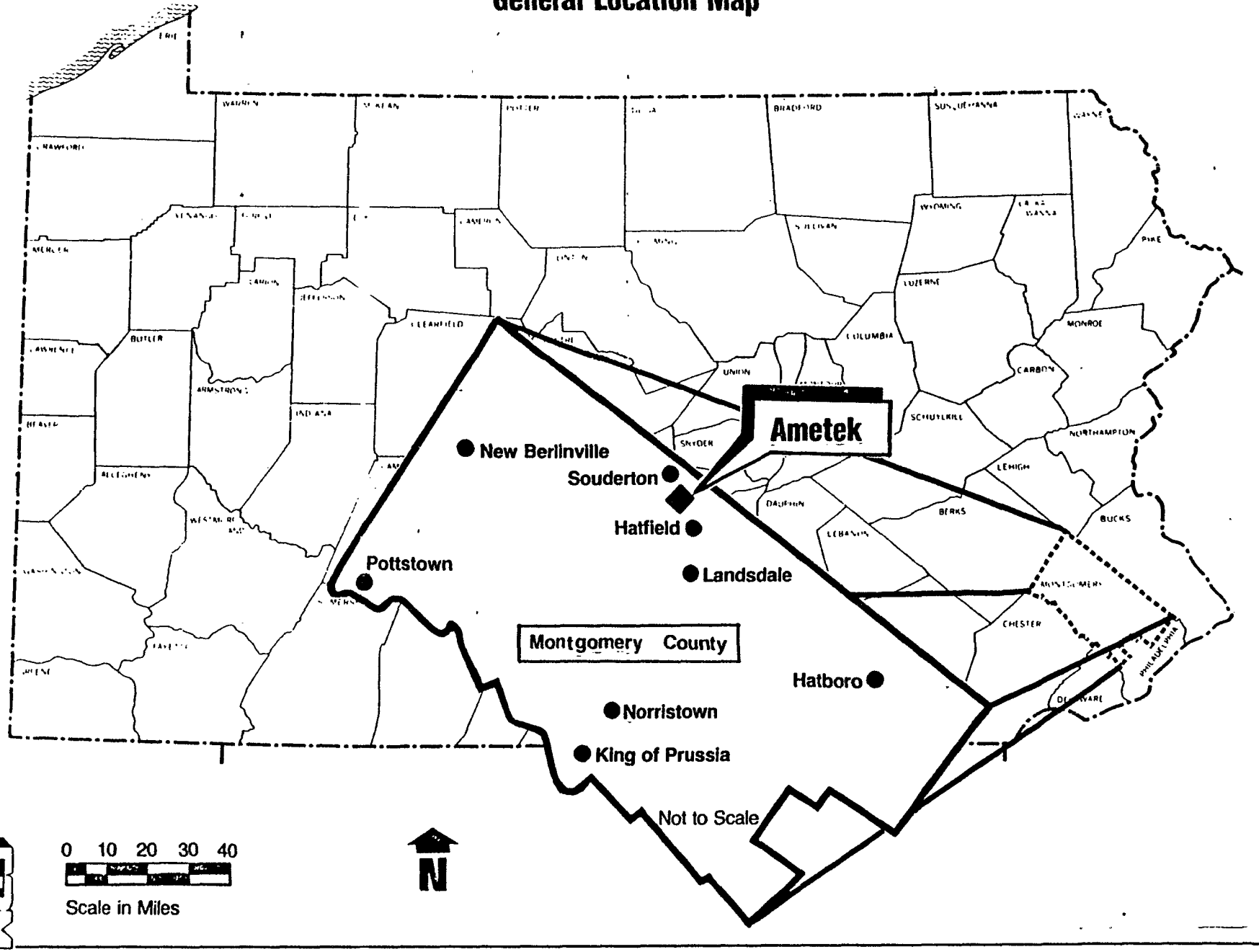
# Figure 1-1
# General Location Map





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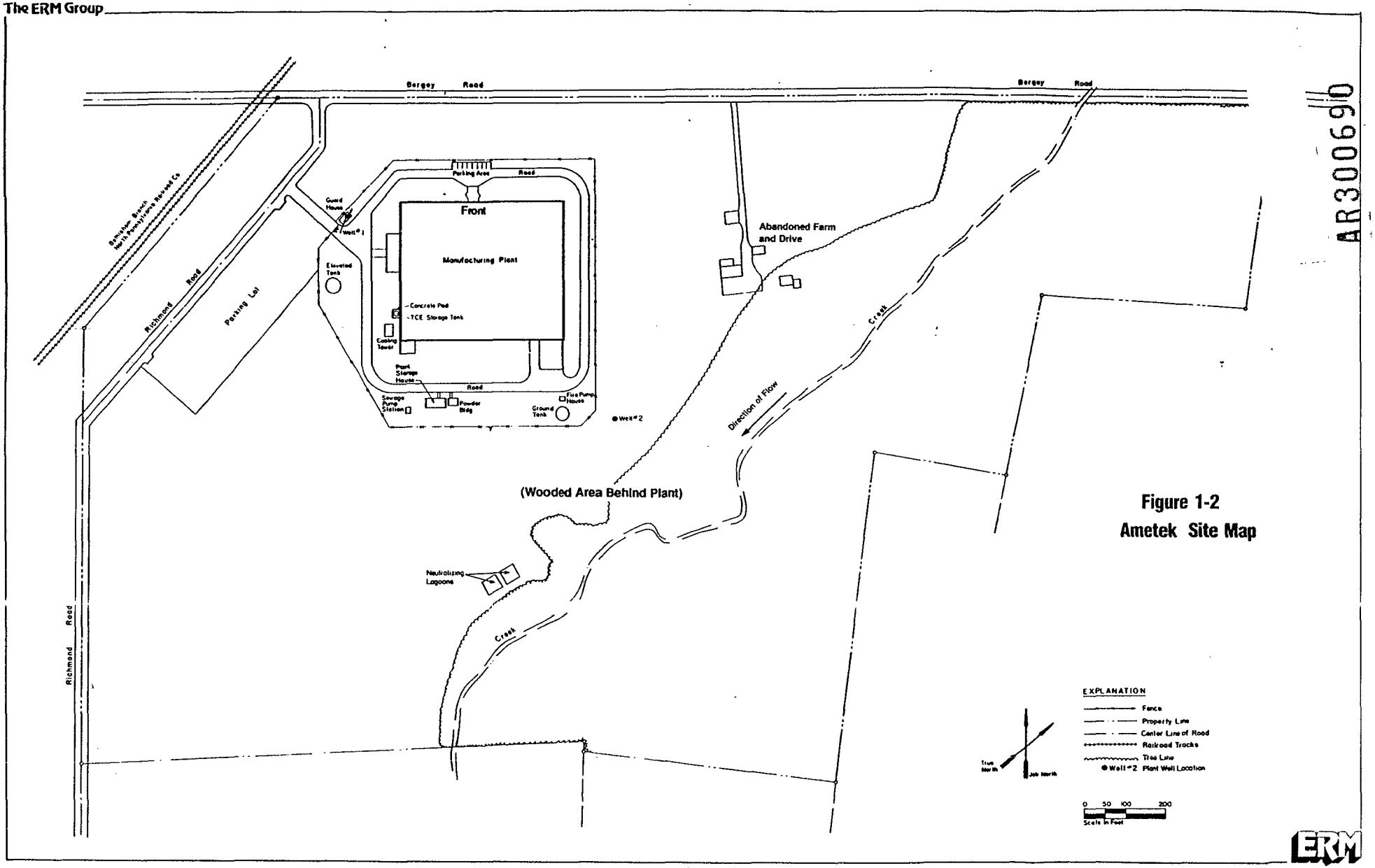


**Figure 1-2**
**Ametek Site Map**

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In a cooperative testing program, the two plant site wells (well 1 and well 2) were sampled in 1980 with the following results:

| | WELL 1 | WELL 2 |
|---|---|---|
| 1,1,1-Trichloroethane | 671 ppb | 601 ppb |
| Trichloroethene (TCE) | 15.7 ppb | 281 ppb |
| Tetrachloroethene (PCE) | <0.5 ppb | 8.9 ppb |

Subsequent samplings of the wells since that time have indicated varying concentrations with the highest reading being 1900 ppb of 1,1,1- Trichloroethane (1,1,1-TCA) (Table 1-1).

A survey done by a N.P.W.R.A. (North Penn Water Resources Association) representative with an Organic Vapor Meter (OVM) over 12 of the plant's 87 acres indicated significant soil contamination in the area of the TCE storage tank.

As a result of the contamination of its wells, North Penn Water Authority has named Ametek/Hunter Spring Division, along with 31 other companies, in a pending litigation. The water company is currently asking for voluntary participation in a cleanup program of 18 of its 56 wells.

The closest North Penn well is approximately a half-mile away in an industrial park off Unionville Pike (Figure 1-3).

During May and June of 1986, ERM conducted a Geologic, Hydrogeologic and Remedial Engineering Assessment (Phase I) to determine the extent of the soil and ground water contamination by organic solvents at the Ametek Hunter Spring Division plant in Hatfield, Pennsylvania. Based upon the data obtained during the Phase I investigation, the following conclusions were drawn relative to the extent of contamination and site conditions.

Soil contamination existed to a depth of 3 to 4 feet in four isolated areas on the site. The four known areas of soil contamination were as follows:

- The TCE Tank Area to the southwest of the plant has TCE, PCE, and toluene contamination to a depth of at least 3.5 feet.

- The Paint Storage Area to the southeast of the plant has TCE and toluene contamination to a depth of at least 4.0 feet.



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TABLE 1-1
PLANT WELL
WATER SAMPLE ANALYSIS

| Date | WELL #1 1,1,1-TCA | TCE | PCE | WELL #2 1,1,1-TCA | TCE | PCE |
|---|---|---|---|---|---|---|
| 10/15/80 | 671. | 15.7 | <0.5 | 601. | 281. | 8.9 |
| 2/23/81 | 648. | 294. | 8.5 | 143.0 | 117. | 8.7 |
| 6/17/81 | 251. | 116. | 3.3 | 311. | 220. | 19.1 |
| 10/14/81 | 472. | 259. | 7.4 | 75.2 | 370. | 13.3 |
| 8/05/82 | 207. | 144. | 4.9 | 210. | 245. | 42.7 |
| 12/01/82 | 525. | 265.5 | 12.0 | 136.0 | 187.0 | 25.9 |
| 2/11/83 | 522. | 436. | 11.8 | 468. | 207. | 6.1 |
| 6/02/83 | 818. | 492. | 13.4 | 477. | 248. | 16.3 |
| 10/06/83 | 137.0 | 3.1 | <0.5 | ---- | ---- | ---- |
| 1/05/84 | 538.0 | 369. | 10.3 | 769.0 | 478.0 | 29.4 |
| 3/08/84 | 632.0 | 325.0 | 8.0 | 529.0 | 201.0 | 19.9 |
| 5/03/84 | 379.0 | 289.0 | 13.3 | 314.0 | 183.0 | 30.0 |
| 6/25/85 | 61.9 | 22.3 | <0.5 | 1076. | 384.0 | 28.5 |
| 8/16/85 | 198. | 183. | 5.3 | ---- | ---- | ---- |
| 10/02/85 | 59.7 | 26.9 | <0.5 | ---- | ---- | ---- |
| 12/04/85 | 377. | 297. | 9.2 | 546. | 329. | 11.1 |
| 2/20/86 | 433.0 | 419.0 | 9.3 | ---- | ---- | ---- |
| 5/09/86 | 440. | 210. | <10.0 | 640. | 160. | 20.0 |
| 8/14/86 | 1900. | 540. | 30.0 | 1900. | 570. | 30.0 |

All values are reported in ppb.



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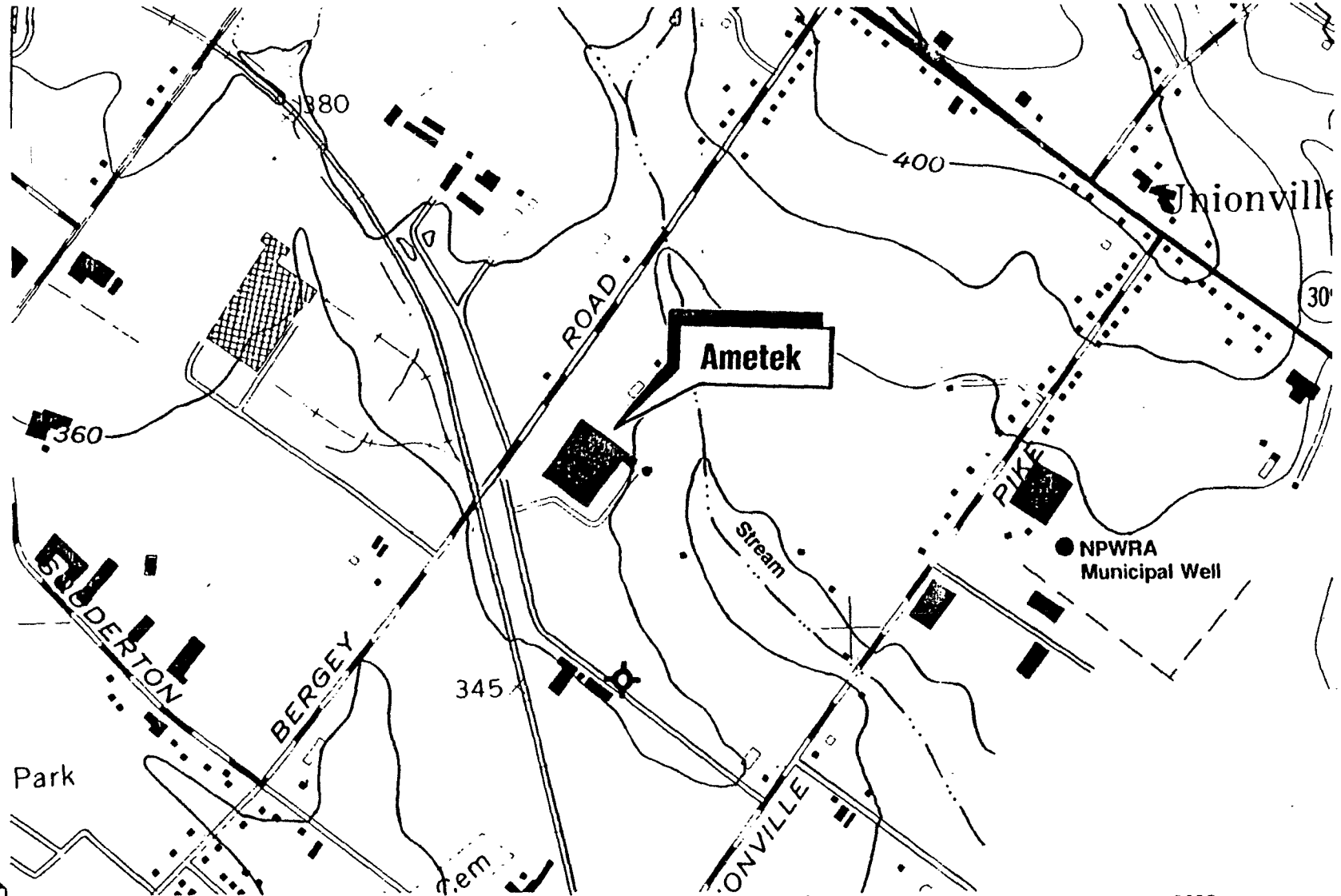
# Figure 1-3
## Area Site Map




Base Source: U.S.G.S. Telford, PA Topographic Quadrangle



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- The disturbed ground bordering the tree line to the southeast of the plant has trans-1,2 dichloroethene, TCE, and toluene contamination to a depth of at least 4.0 feet.

- The north neutralizing lagoon located to the southeast of the plant has toluene contamination to a depth of at least 4.0 feet.

Water samples taken on 9 May 1986 from Wells 1 and 2 confirmed previous measurements of organic solvents in the ground water. Well 1 has 1,1-dichloroethane (1,1 DCE), 1,1-dichloroethane (1,1 DCA), 1,1,1-TCA, and TCE contamination. Well 2 has 1,1 DCE, 1,1,1-TCE, and TCA contamination.

No detectable limits of volatile organic solvents exist at any point in the stream running east of the plant.

The following conclusions were drawn from the Phase I investigation:

- The bedrock underlying the Ametek site is highly fractured allowing ground water to be transmitted through the rock relatively easily. Because of high specific gravities, TCE and other contaminants reaching the ground water would tend to migrate downward into the aguifer through these fractures.

- The fault which traverses the Ametek site and continues to the vicinity of the N.P.W.A. municipal well may provide a possible pathway for ground water flow and contaminant migration.

- The soils present on the Ametek site are reported to contain a very dense interval from about three to five feet below the ground surface (fragipan). Where present, this fragipan layer could possibly act as a confining layer, restricting any soil contamination from moving down into the ground water present in the bedrock.

- Bedrock is relatively shallow across the site with depths of 12 feet encountered in plant wells. Clays and other weathering products may fill the joints and fractures near the bedrock surface and possibly provide a semi-confining layer of low permeability which could further restrict ground water and contaminant movement vertically.

A screening of treatment technologies indicated the potential viability of six alternatives for the remediation of soil and other contamination on this site. These alternatives included drying beds, soil vacuuming, soil washing, in-vessel air



AR300694

stripping, in-situ microbial degradation, and in-vessel microbial degradation. With the addition of a no action alternative, these constitute seven on-site alternatives. An eighth alternative, excavation and off-site disposal of soil at a permitted TSD facility, was also considered.

The no action and soil washing alternatives were not viable for this site. However, the other five alternatives warranted further investigation due to their advantages in cost, demonstrated success in similar applications, low threat to ground water, or potential application to other contaminated media (e.g., lagoon sludge, ground water) on the site. Additional data collection and evaluation were expected to indicate which of these five alternatives would be best suited for site remediation.

## 1.2 Objectives of the Phase II ERM Investigation

In order to resolve soil contamination data deficiencies and to define site ground water conditions, ERM set forth the following objectives to be undertaken in the Phase II soil and ground water investigation:

- Conduct a soil boring investigation to (1) define the vertical distribution of soil contaminants, (2) provide further horizontal definition of the extent of contamination, (3) establish the presence of the fragipan (low permeability layer) in site subsoils that is reported in the county soil survey.

- Install several monitoring well nests and conduct a ground water investigation to (1) define shallow and deep flow directions on site (2) define the degree of hydrologic interconnection between shallow and deep ground water-bearing zones, (3) qualitatively and quantitatively define the ground water contamination on site, (4) define ground water quality flowing both onto the site (upgradient background) and off of the site (downgradient), (5) define permeabilities above and below the fragipan layer in site soils and establish whether a perched water condition exists above the fragipan which could affect contamination migration.



AR300695

# SECTION 2

# REGIONAL GEOLOGY AND HYDROGEOLOGY

This section provides background information on the regional geology and hydrogeology for Ametek/Hunter Spring Division and for Montgomery County. The specific site conditions are described in Section 4. The following references were used in the preparation of this section.

- Hall, G.M., 1973 "Ground Water in Southeastern Pennsylvania", Topographic and Geologic Survey, Water Resource Report 2, Commonwealth of Pennsylvania, Department of Environmental Resources.

- Longwill, S.M., Wood, C.R., 1965, "Ground Water Resources of the Brunswick Formation in Montgomery and Berks Counties, Pennsylvania", Topographic and Geologic Survey, Ground Water Report W 22, Commonwealth of Pennsylvania, Department of Internal Affairs.

- Newport, T.G., 1973, "Ground Water Resources of Montgomery County, Pennsylvania", Topographic and Geologic Survey, Water Resource Report 29, Commonwealth of Pennsylvania, Department of Environmental Resources.

- Smith, R.V., 1967, "Soil Survey of Montgomery County, Pennsylvania", Pennsylvania Department of Agriculture, State Soil and Water Conservation Commission.

- Willard, B., Freedman, J., McLaughlin, D.B., Ryan, D.J., Wherry, E.T., Peltier, L.C., Gault, H.R., 19 , "Geology and Mineral Resources of Bucks County Pennsylvania", Topographic and Geologic Survey, Bulletin C 9, Commonwealth of Pennsylvania, Department of Internal Affairs.

## 2.1 Physical Setting

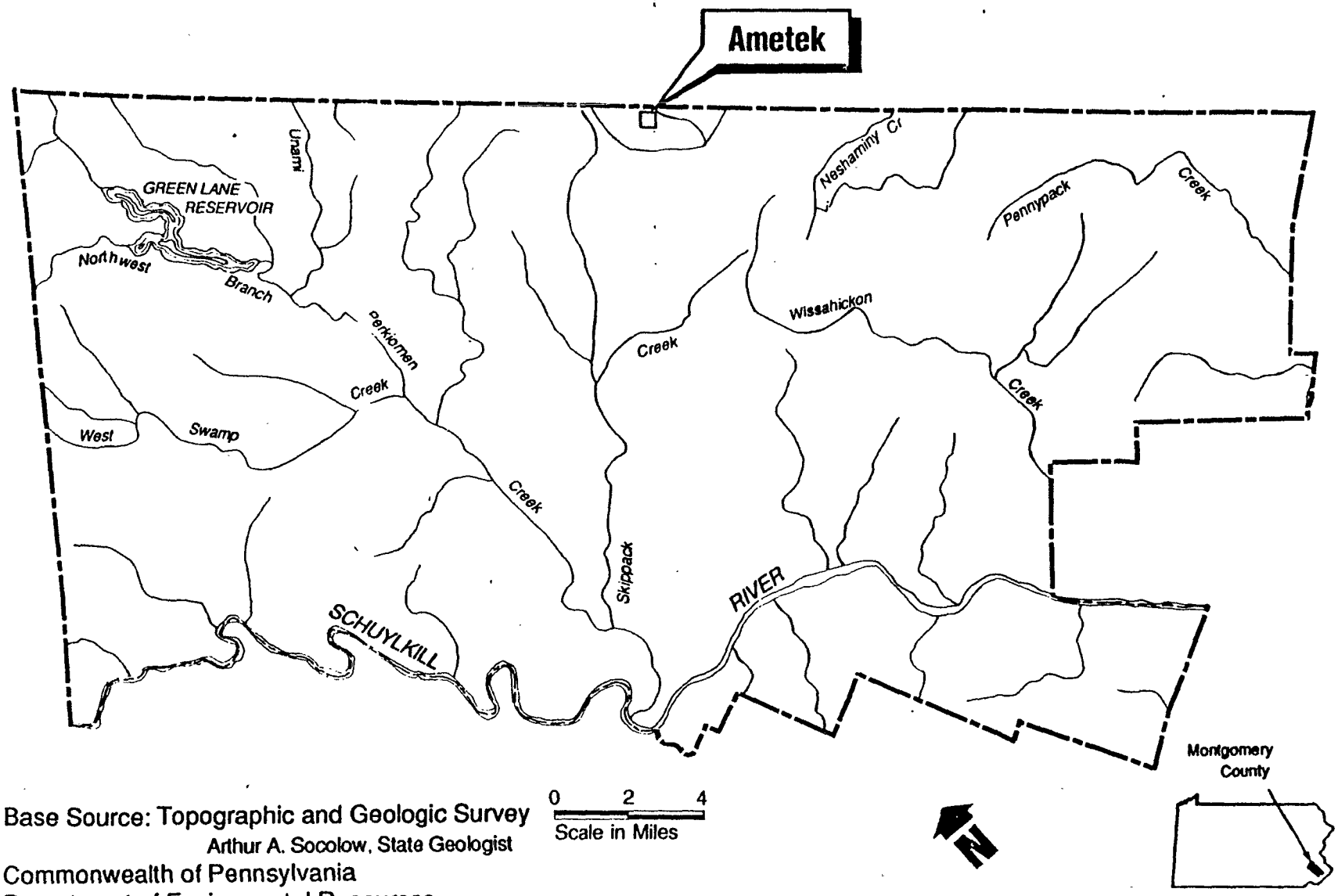
The Ametek Site is located in the Northeastern portion of Montgomery County, Pennsylvania (Figure 2-1). The county occupies an area of approximately 491 square miles of undulating plain consisting of low hills and ridges belonging to the Piedmont province of the Appalachian Highlands physiographic



AR300696

# Figure 2-1

## Montgomery County




Base Source: Topographic and Geologic Survey
Arthur A. Socolow, State Geologist
Commonwealth of Pennsylvania
Department of Enviromental Resources



AR300697

division. The general drainage and slope of the land is to the southeast into the Delaware River. The Schuykill River and it's tributaries drain most of the western part of the county. The eastern part of the county is drained by the Neshaminy, Pennypack, and Tacony Creeks which flow directly into the Delaware River (Newport, 1973).

## 2.2 Regional Geology

### 2.2.1 Bedrock

The bedrock formations within Montgomery County and more specifically within the vicinity of of the Ametek site are composed of rocks of the Triassic age. The rocks belong to the Newark Group which have been divided, proceeding from oldest sediments to youngest, into the Stockton, Lockatong, and Brunswick formations. However, for the purpose of this discussion, only the two youngest formations, the Lockatong and the Brunswick, will be discussed as the Stockton Formation is not present in the study area (Longwill, 1965).

In Montgomery County the Lockatong Formation is generally a continuous belt of medium to dark gray argillite interbedded with thin beds of gray to black shale, siltstone, and marlstone. For the most part, bedding in the formation is massive. The Lockatong Formation contains a large percentage of analcime along with dolomite, feldspar, and clay. Quartz is a very minor constituent in the formation. Pyrite is scattered throughout the formation and calcite is common, especially in joints and fractures (Longwill, 1965).

The Brunswick Formation consists typically of reddish-brown shale, mudstone, and siltstone. A few very thin beds of green and brown shale are present. The formation consists mainly of feldspar, illite, chlorite, quartz, and calcite. Some beds are finely micaceous. Joints in the Brunswick formation are generally tilled with calcite and quartz, less commonly they are filled with barite and pyrite. Most of the Brunswick formation is a tough thick-bedded red argillite interbedded with dark-grey argillite of the Lockatong formation (Longwill, 1965).

The average dip of the beds in the Brunswick and Lockatong formations is north-northwest at approximately 20°. Several broad anticlines and synclines whose axes trend about N. 60° W, are superimposed on this regional structural pattern (Longwill, 1965).



AR300698

Both the Brunswick and Lockatong formations have been displaced by many relatively small faults. The largest fault in the study area passes between Hatfield and Souderton in an east-west direction and can be traced in both Bucks and Montgomery Counties. It has an offset of about 3000 feet (Longwill, 1965).

Joint systems are well developed in many of the beds in the Brunswick Formation. All the joints are nearly vertical and have an average distance between joints of about 6 inches. The strike of the joint sets appears to be independent of the dip and strike of the beds (Longwill, 1965).

### 2.2.2 Soil Description

In the majority of Montgomery County, especially in the vicinity of the Ametek site, the soils are moderately deep or deep and are gently sloping. They are generally acidic and have moderately slow internal drainage. The following soil series make up the majority of the soils in the vicinity of the Ametek site (Smith, 1967) (Figure 2-2).

- Bowmansville Series: Deep, poorly drained, gray or grayish-brown silt loams or silty clay loams. These soils formed in material washed from uplands underlain by shale, sandstone, and diabase. They are nearly level or gently sloping and occur along streams and waterways.

- Chalfont Series: Deep, somewhat poorly drained, nearly level and gently sloping soils that are very silty throughout. These soils are dark yellowish brown mottled with gray. A thick layer of low permeability in the subsoil impedes the downward movement of water.

- Doylestown Series: Deep, poorly drained, gray soils that are nearly level or gently sloping and are silty. These soils formed in windblown silt on low-lying flats, in depressions and on smooth, broad uplands. Like the Chalfont soils, they have a thick layer of low permeability in the subsoil that impedes the downward movement of water.

- Readington Series: Deep, moderately well drained silt loams that are nearly level to moderately sloping. These soils formed in materials weathered from shale, siltstone, and sandstone. They are located on smooth to rolling uplands. Their profile contains a firm subsoil that has grayish mottles in the lower part.

- Reaville Series: Deep moderately well drained to somewhat poorly drained, reddish shaly silt loam. These soils have a



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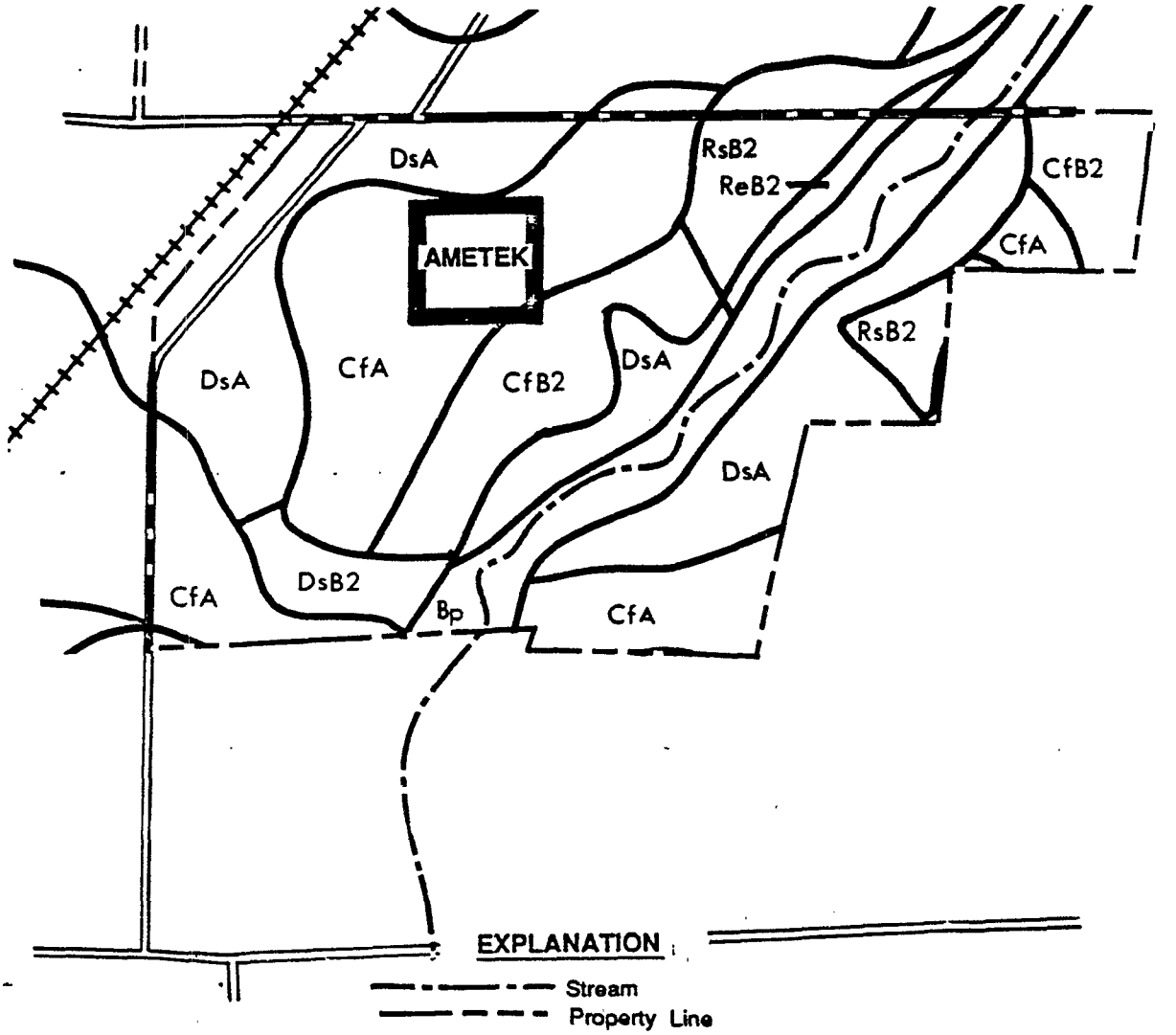
# Figure 2-2

## Soil Map of Ametek Study Area



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poorly drained, reddish shaly silt loam. These soils have a thin subsoil of low permeability that restricts the downward movement of water. They formed in materials weathered from shale and siltstone on level to rolling uplands.

## 2.3 Regional Hydrogeology

The Brunswick Formation is the main producer of groundwater in Montgomery County. Although the primary permeability (interconnected intergranular porespaces) in the Brunswick Formation is very low, the secondary permeability is relatively high with ground water moving through a network of vertical joints that intersect at various angles throughout the formation. Since some beds in the formation contain more joints than others, well yields may be different for wells screened in different beds. Surface water can percolate down through these joints to recharge the aquifer. The Brunswick formation is generally a reliable source of small to moderate supplies of ground water, producing more than 100 gpm in many places (Newport, 1973).

The structure of the Lockatong Formation is very similar to that of the Brunswick, differing only in the amount and spacing of the joints. The Lockatong has fewer and more widely spaced joints than does the Brunswick causing smaller amounts of water yield. The maximum recorded amount of water pumped from a well in the Lockatong formation is 40 gpm (Newport, 1973).

The water quality of ground water derived from the Brunswick Formation can be expected to contain a moderate to large amount of dissolved solids. The water has a medium hardness and meets most of the U.S. Public Health Service Standards for mineral content (Newport, 1973).

The water quality from the Lockatong formation is very similar to the Brunswick differing only in a slightly lower hardness and dissolved-solids content (Newport, 1973).



AR300701

# SECTION 3

# FIELD INVESTIGATION

## 3.1 Evaluation of Phase I Investigation

ERM reviewed the results of the Phase I investigative report in relation to the apparent extent of soil contamination, ground water flow direction and other factors which may influence the extent of contamination on the site. After careful review of the report, ERM objectively chose locations for the Phase II soil borings, monitoring wells and percolation wells to resolve data deficiencies pertaining to the extent of soil contamination and site ground water conditions.

## 3.2 Soil Borings

### 3.2.1 Drilling

A total of 39 soil borings were drilled to further define the horizontal and vertical extent of soil contamination (Figure 3-1). A mobile ASTM auger rig, utilizing six-inch hollow stem augers (6.0 inch outside diameter, 3.0 inch inside diameter), was used to drill the soil borings. Before drilling, all boring locations were checked by an Ametek Representative to verify that no underground structures or utilities existed below the boring locations. The soil borings varied in depth from 3.90 to 13.00 feet, depending on the depth to bedrock (Table 3-1). At the completion of each boring, the open hole was covered with a steel plate. This allowed a complete round of water levels to be obtained at a later date. After a complete round of water levels were taken, the borings were filled to the top with a cement and bentonite grout mix. All boring locations were flagged and numbered for later reference. The entire boring program was observed and logged by an ERM Field Geologist. Boring logs are presented in Appendix A.

### 3.2.2 Sampling

A total of 158 soil samples were obtained from the soil borings by means of a split spoon sampling device. The spoon is driven into undisturbed soil and retrieved with a soil sample inside.



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TABLE 3-1

BORING INVENTORY DATA

| BORING ID | *DEPTH FROM GROUND SURFACE (FEET) | ELEVATION GROUND SURFACE (FEET MSL) | ELEVATION TOP OF BEDROCK (FEET MSL) | NOTE |
|---|---|---|---|---|
| B-1 | 8.50 | 353.38 | 344.88 | ----- |
| B-2 | 8.80 | 354.01 | 345.21 | ----- |
| B-3 | 7.50 | 353.80 | 346.30 | ----- |
| B-4 | 7.00 | 353.94 | 346.94 | PT-1- INSTALLED IN BORING |
| B-5 | 8.05 | 354.13 | 346.08 | ----- |
| B-6 | 6.50 | 354.68 | 348.18 | ----- |
| B-7 | 9.30 | 354.74 | 345.44 | ----- |
| B-8 | 8.90 | 353.14 | 344.24 | ----- |
| B-9 | 8.80 | 354.06 | 345.26 | ----- |
| B-10 | 10.00 | 352.87 | 342.87 | ----- |
| B-11 | 9.60 | 353.02 | 343.42 | ----- |
| B-12 | 6.70 | 353.76 | 347.06 | ----- |
| B-13 | 8.20 | 354.82 | 346.62 | ----- |
| B-14 | 9.60 | 355.19 | 345.59 | ----- |
| B-15 | 9.50 | 354.84 | 345.34 | ----- |
| B-16 | 8.90 | 355.02 | 346.12 | ----- |
| B-17 | 6.50 | 351.43 | 344.93 | ----- |
| B-18 | 6.10 | 351.03 | 344.93 | ----- |
| B-19 | 6.20 | 351.29 | 345.09 | ----- |
| B-20 | 4.00 | 351.33 | 347.33 | ----- |
| B-21 | 3.90 | 351.04 | 347.14 | ----- |

* ALL BORINGS WERE DRILLED TO THE TOP OF BEDROCK.



AR300703

TABLE 3-1 (CONT'D)

BORING INVENTORY DATA

| BORING ID | * DEPTH FROM GROUND SURFACE (FEET) | ELEVATION GROUND SURFACE (FEET MSL) | ELEVATION TOP OF BEDROCK (FEET MSL) | NOTE |
|---|---|---|---|---|
| B-22 | 5.50 | 351.78 | 346.28 | ----- |
| B-23 | 7.60 | 351.59 | 343.99 | PT-2D INSTALLED IN BORING |
| B-24 | 7.80 | 353.97 | 346.17 | ----- |
| B-25 | 5.20 | 343.78 | 338.58 | ----- |
| B-26 | 8.50 | 345.53 | 337.03 | ----- |
| B-27 | 6.20 | 345.79 | 339.59 | ----- |
| B-28 | 7.00 | 345.23 | 338.23 | ----- |
| B-29 | 10.90 | 346.33 | 335.43 | ----- |
| B-30 | 13.00 | 347.10 | 334.10 | ----- |
| B-31 | 9.60 | 347.66 | 338.06 | PT-3D INSTALLED IN BORING |
| B-32 | 11.30 | 347.86 | 336.56 | ----- |
| B-33 | 8.50 | 347.70 | 339.20 | ----- |
| B-34 | 9.50 | 347.35 | 337.85 | ----- |
| B-35 | 6.00 | 347.45 | 341.45 | ----- |
| B-36 | 7.50 | 347.74 | 340.24 | ----- |
| B-37 | 10.00 | 347.55 | 337.55 | ----- |
| B-38 | 8.00 | 347.32 | 339.32 | ----- |
| B-39 | 8.20 | 347.85 | 339.65 | ----- |

*ALL BORINGS WERE DRILLED TO THE TOP OF BEDROCK.



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The spoon is then dismantled to allow easy access to the soil sample inside. Per ASTM standards, the spoon is 24 inches in length and is driven with a 140 lb. hammer with a drop of 30 inches. The resulting standardized blow counts recorded reflect the density of the soil at different depths. Continuous split spoon samples were taken, except where the ERM Field Geologist felt it was unnecessary. Each sample was evenly split and placed in two separate jars. One jar was used for an on-site OVM (Organic Vapor Meter) Headspace Analysis and the other sample, depending on the in-field OVM result, was sent to the lab for a complete analysis of priority pollutant volatile organic compounds. Each jar was sealed with teflon tape around the threads and then electrical tape around the lid. A total of 54 soil samples were sent to the lab for analysis.

### 3.2.3 Decontamination

All equipment that was in contact with the soils from the test borings, including drill rods, augers, sampling spoons, wrenches and other tools were steam-cleaned prior to initiation of a new soil boring. Steam cleaning was also conducted before any work started on the site. The split spoons were decontaminated between each sample using a water and Alconox® solution scrub and then a final rinse with distilled water.

## 3.3 Monitoring Well Installation

### 3.3.1 Drilling

A total of 12 monitoring wells were installed to define the ground water flow direction(s) and to determine the extent of ground water contamination (Figure 3-1). Air hammer drilling methods were used to drill the wells. Three (3) deep wells were installed ranging in depth from 122 to 398 feet. These wells were designated as MW-4D, MW-8D, and MW-9D. Nine (9) shallow wells were installed ranging in depth from 31 to 38 feet. These wells were designated as MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, and MW-9. Table 3-2 presents a complete on-site well inventory.

The deep wells were installed to monitor the deeper portions of the aquifer. Each deep well borehole was advanced with an eight inch diameter drill bit to a depth of about 40 feet. The drill rods were then removed followed by the installation of 6 5/8" diameter steel casing. The casing was tremie grouted in place with a bentonite/cement slurry to ground level. This



AR300705

WELL INVE. .RY DATA

TABLE 3-2

| WELL ID | DEPTH TO BOTTOM (TOP OF CASING) (FEET) | SCREENED OR OPEN HOLE LENGTH (FT) | ELEVATION (TOP OF CASING) (FEET MSL) | CASING STICK-UP (FEET) | ELEVATION (GROUND SURFACE) (FEET MSL) | APPROXIMATE WATER YIELD (GPM) | CASING DIAMETER (INCHES) |
|---|---|---|---|---|---|---|---|
| AMETEK WELL 1 | 401.10 | 400.00 | 353.10 | 1.10 | 352.00 | 105 | 6 5/8 |
| AMETEK WELL 2 | 395.95 | 395.00 | 348.25 | 0.95 | 347.30 | 190 | 6 5/8 |
| MW-1 | 36.80 | 20.00 | 354.38 | 1.80 | 352.58 | 3 | 2 |
| MW-2 | 36.66 | 20.00 | 355.34 | 1.66 | 353.68 | <1 | 2 |
| MW-3 | 37.00 | 20.00 | 353.12 | 2.00 | 351.12 | <1 | 2 |
| MW-4 | 36.90 | 20.00 | 354.37 | 1.90 | 352.47 | <1 | 2 |
| MW-4D | 124.20 | 84.20 | 353.77 | 1.20 | 352.57 | 3 | 6 5/8 |
| MW-5 | 36.70 | 20.00 | 348.21 | 1.70 | 346.51 | <1 | 2 |
| MW-6 | 36.90 | 20.00 | 349.63 | 1.90 | 347.73 | <1 | 2 |
| MW-7 | 34.70 | 20.00 | 351.28 | 1.70 | 349.58 | <1 | 2 |
| MW-8 | 32.80 | 20.00 | 362.77 | 1.84 | 360.93 | 3 | 2 |
| MW-8D | 123.92 | 83.92 | 363.12 | 1.92 | 361.20 | 10 | 6 5/8 |
| MW-9 | 39.73 | 20.00 | 347.64 | 1.73 | 345.91 | 4 | 2 |
| MW-9D | 398.80 | 356.60 | 347.86 | 1.80 | 346.06 | 150 | 6 5/8 |

All values in ppb



AR300706

allowed the surface water and shallow ground water to be sealed off. The borehole was then advanced to its appropriate depth inside the casing using a six-inch diameter drill bit. Once the final depth was reached the hole was blown to clear out any existing cuttings and to obtain an estimated water yield from each well. The steel casing was then fitted with a cap and lock (Figure 3-2).

The shallow wells were installed to monitor the upper portion of the aquifer. The boreholes were advanced with a six-inch diameter bit to an average depth of 35 feet. The hole was then blown to clear out any existing cuttings and to get an estimate of water yield. The drill rods were removed, followed by the installation of 20 feet of 2-inch diameter threaded PVC screen with an end plug. On top of this, approximately (depending on well depth) 17 feet of 2-inch diameter threaded PVC casing with a top cap was added. The PVC pipe was lowered to the bottom of the hole and rested on the bottom. A sand pack was then added on the outside of the screen from the bottom to ten feet below the surface of the ground. A two-foot bentonite seal was added on top of the sand pack followed by a bentonite/cement slurry grouted to ground level. A 6 5/8" diameter protective steel casing was installed from a depth of 2 to 3 feet below ground level to about 2 feet above ground level to cover the PVC well stick-up. A hole was then drilled in the steel casing to allow water to drain out of the casing stick-up. The steel casing was then fitted with a cap and lock (Figure 3-3).

All the drilling locations were cleared with the utility companies involved and with Ametek representatives before any drilling procedures began. The entire monitoring well installation program was observed and logged by an ERM Field Geologist. Well logs are presented in Appendix B.

### 3.3.2 Well Development

Each monitoring well was developed for a minimum of one hour and was continued after that as necessary until the water was clean in appearance. This development period allowed any contaminants resulting from drilling to be cleared out of the well.

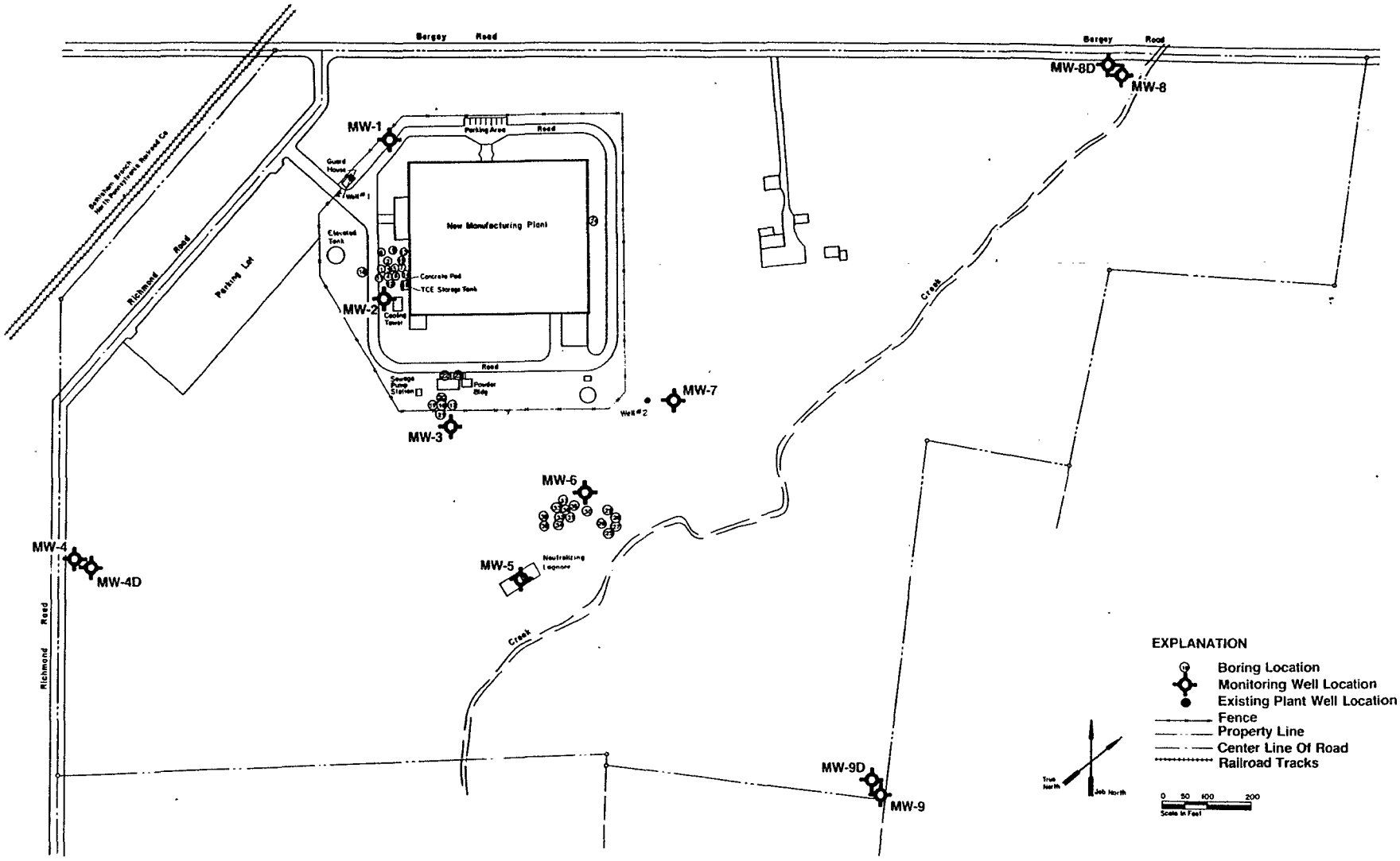
The deep wells were developed using a 3 3/4 inch diameter submersible pump. The pump was lowered to the bottom of Wells MW-4D and MW-8D, and lowered 250 feet down Well MW-9D. The water was discharged onto the ground.

The shallow wells were developed by means of a an air lift system.



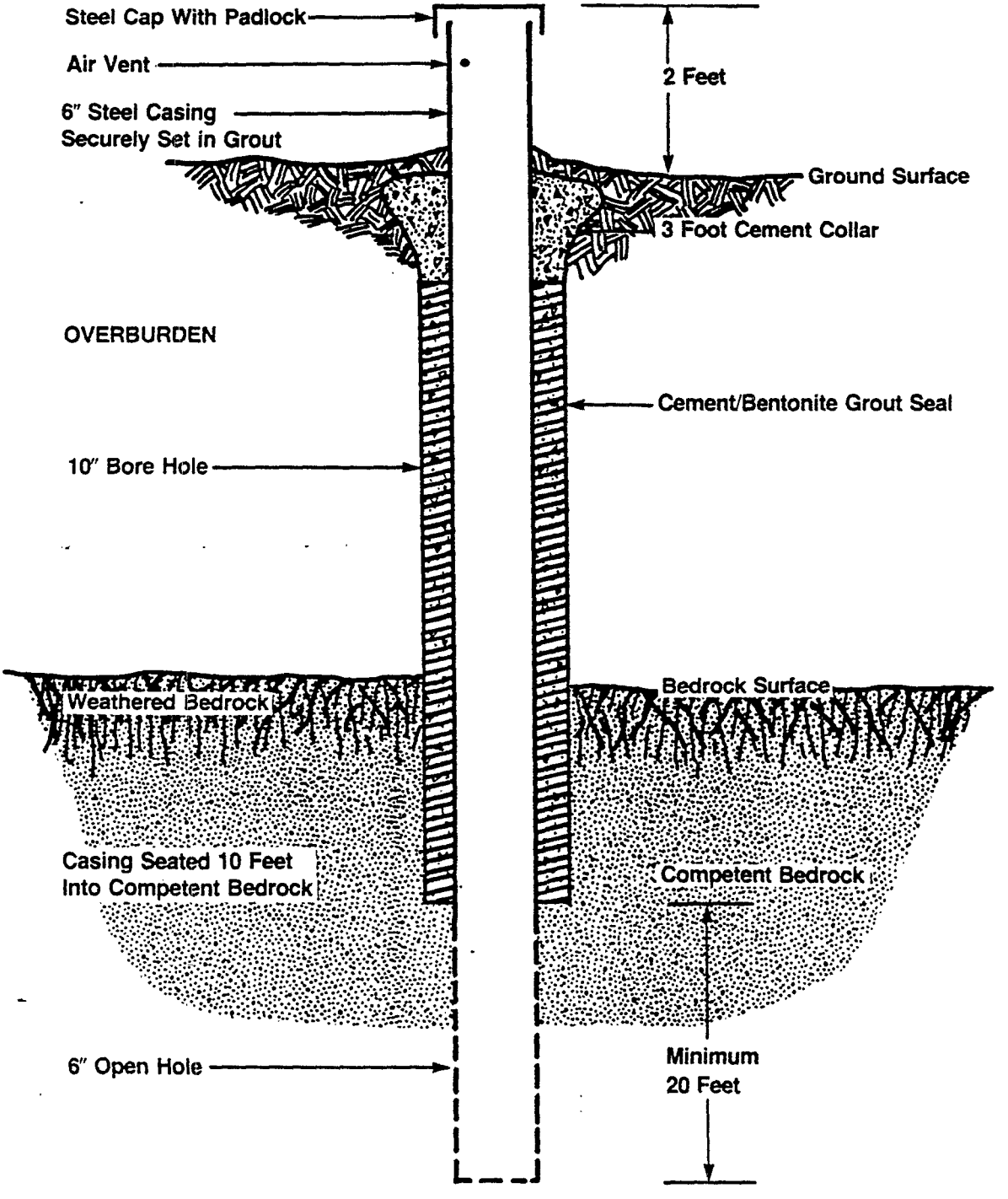
AR300707

# Figure 3-1
## Soil Borings And Monitoring Well Locations




AR300708

# Figure 3-2
# Deep Bedrock Monitoring Well
# Construction Schematic

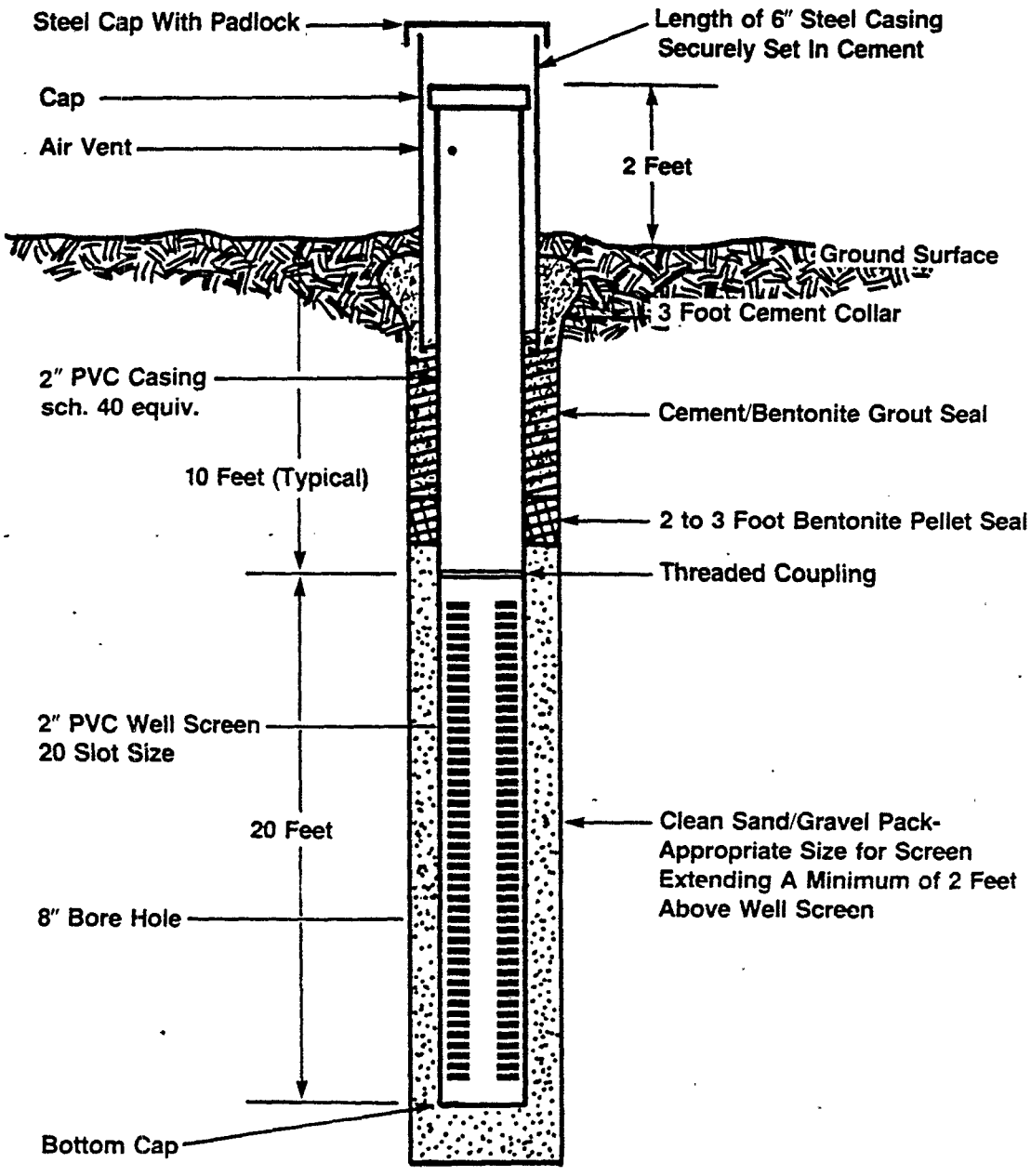



Not to Scale



AR300709

# Figure 3-3
# Shallow Monitoring Well Construction Schematic




Not to Scale



AR300710

A one-inch diameter air hose was inserted to the bottom of each well. A 150 P.S.I. Air Compressor pumped air through the air hose and forced the water in the well to be blown out. The water was discharged onto the ground.

### 3.3.3 Sampling

Ground water samples were collected out of the twelve newly installed wells and out of the two existing plant wells. Prior to sample collection, a minimum of three volumes of water were purged from each of the wells with exception of the two active plant production wells. The deep wells were purged with a 3 3/4 inch diameter submersible pump. The shallow wells were bailed by hand with bottom loading PVC bailers. The plant production wells were run for one half hour to clear the tap lines. Since the two plant wells are active on a daily basis, there was no need to purge a full three volumes from each well. After purging each well, the ground water samples were obtained by use of bottom loading PVC bailers dedicated to each well and decontaminated prior to and after use.

## 3.4 Laboratory Analysis

All samples were sent to Lancaster Laboratories in Lancaster, Pennsylvania for analysis. U.S. EPA accepted methods for sample collection, preparation, preservation, storage, shipping, and chain-of-custody were used to guarantee the representatives of the samples.

The soil and water samples were analyzed for priority pollutant volatile organic compounds.

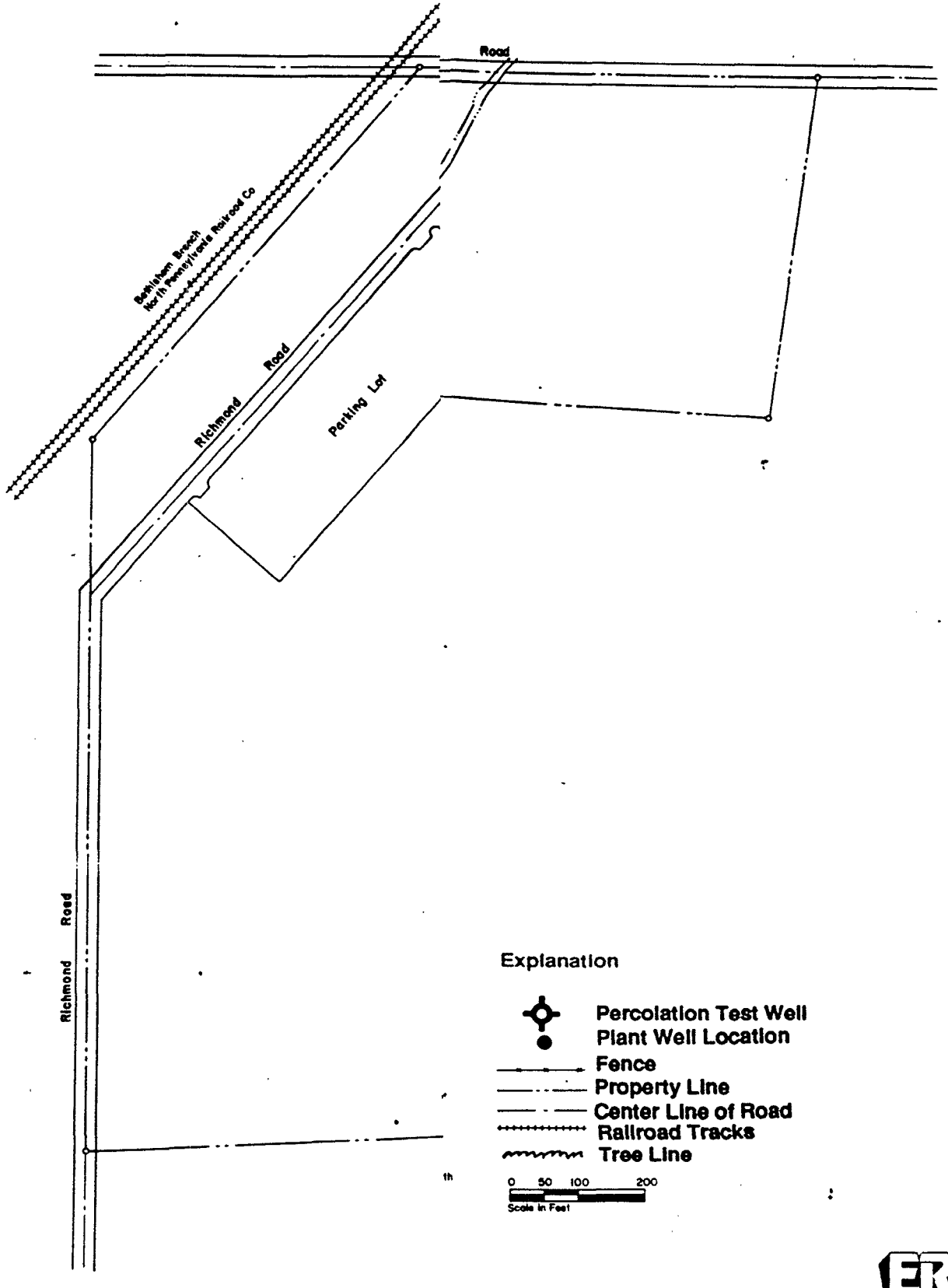
## 3.5 Percolation Tests

Soils percolation tests (slug tests) were conducted to define the permeability (hydraulic conductivity) and transmissivity of the soils in the contaminated area, both above and below the reported fragipan (dense) layer. Three pairs of shallow monitoring wells were installed for this purpose with each pair consisting of a well above and below the fragipan layer (Figure 3-4). The shallower wells installed above and within the fragipan range in depth from three to four feet below the ground surface and are designated as PT-1, PT-2, and PT-3. The deeper wells installed in soil below the fragipan range in depth from seven to nine feet below the ground surface and are designated as PT-1D, PT-2D, and PT-3D.



AR300711

# Figure 3-4
# Percolation Test
# Well Locations




ERM

The construction of the percolation test wells were very similar to the shallow bedrock monitoring wells, differing only in the well screen and the protective casing. The well screen slots were cut into the solid PVC casing allowing a one foot screened interval on each well. An end plug was placed on the bottom of the well and a cap on the top. No protective steel casing was installed. Table 3-3 presents specifications for each percolation test well.

After the installation of all of the percolation test wells, the percolation tests were run using an environmental data logger, which automatically records the change of water level within the well being tested. This is accomplished by inserting a pressure sensitive transducer just off the bottom of the well followed by a measurement of the static water level in the well. The static water level, along with other pertinent data, was entered into the data logger. Distilled water was then added until the casing was full to the top, at which time the data logger is activated to start the test. The rate the water drops in the well, which is indirectly measured and recorded on the data logger, reflects the hydraulic conductivity and transmissivity of the soil at each particular location.

## 3.6 Water Level Measurements

Depth to water measurements were taken from plant production Well 1 and the wells installed during this investigation on 8/11/86, 8/21/86 and 9/2/86 (Table 3-4). Plant production Well 2 was not accessible for a depth to water measurement.

## 3.7 Elevation Survey

At the completion of the drilling, all the soil borings and monitoring wells were surveyed for their vertical elevation in relation to mean sea level. The soil borings were surveyed to ground level and the monitoring wells were surveyed to the top of their casings. The cement floor of the truck loading area in the southeast corner of the plant was used as a benchmark. The elevation of this area is noted as 351.00 feet above mean sea level on plant drawings. All surveyed elevations were tied into this elevation.



AR300713

PERCOLATION TEST WELL DATA
TABLE 3-3

| PERCOLATION WELL I.D. | TOTAL DEPTH (TOP OF CASING) (FEET) | SCREEN LENGTH (FEET) | INSIDE WELL DIAMETER (FEET) | GROUND CONDUCTIVITY (FEET/MIN) | NOTE |
|---|---|---|---|---|---|
| PT-1 | 6.08 | 1.00 | .17 | $1.67 \times 10^{-5}$ | ---- |
| PT-1D | 9.90 | 1.00 | .18 | $1.29 \times 10^{-5}$ | INSTALLED IN BORING B-4 |
| PT-2 | 6.03 | 1.00 | .17 | $1.0 \times 10^{-4}$ | ---- |
| PT-2D | 10.08 | 1.00 | .18 | $4.9 \times 10^{-6}$ | INSTALLED IN BORING B-23 |
| PT-3 | 6.15 | 1.00 | .17 | $1.0 \times 10^{-3}$ | ---- |
| PT-3D | 11.76 | 1.00 | .17 | $4.3 \times 10^{-3}$ | INSTALLED IN BORING B-31 |



AR300714

STATIC WATER LEVEL DATA

TABLE 3-4

| WELL ID | 8/11/86 DEPTH TO WATER (TOP OF CASING) (FEET) | 8/11/86 ELEVATION (FEET MSL) | 8/21/86 DEPTH TO WATER (TOP OF CASING) (FEET) | 8/21/86 ELEVATION (FEET MSL) | *9/2/86 DEPTH TO WATER (TOP OF CASING) (FEET) | *9/2/86 ELEVATION (FEET MSL) |
|---|---|---|---|---|---|---|
| AMETEK WELL 1 | 17.70 | 335.40 | 17.96 | 335.14 | 16.15 | 336.95 |
| AMETEK WELL 2 | --- | --- | --- | --- | --- | --- |
| MW-1 | 17.72 | 336.66 | 17.83 | 336.55 | 15.50 | 338.88 |
| MW-2 | 23.69 | 331.65 | 24.10 | 331.24 | 20.32 | 335.02 |
| MW-3 | 21.85 | 331.27 | 21.79 | 331.33 | 18.30 | 334.82 |
| MW-4 | 13.81 | 340.56 | 13.79 | 340.58 | 11.82 | 342.55 |
| MW-4D | 14.12 | 339.65 | 14.18 | 339.59 | 11.02 | 342.75 |
| MW-5 | 16.35 | 331.86 | 16.51 | 331.70 | 14.06 | 334.15 |
| MW-6 | 19.45 | 330.18 | 19.62 | 330.01 | 16.19 | 331.67 |
|  | 33.18 | 318.10 | 33.41 | 317.87 | 20.73 | 330.55 |
|  | 9.12 | 353.65 | 9.33 | 353.44 | 9.88 | 352.89 |
| N | 9.51 | 353.61 | 9.69 | 353.43 | 10.10 | 353.02 |
| MW | 23.98 | 323.66 | 23.87 | 323.77 | 21.12 | 326.74 |
| MW | 24.12 | 323.74 | 24.25 | 323.61 | 21.30 | 326.34 |

* HEAVY RAIN FOR EIGHT HOURS BEFORE READINGS



AR300715

# SECTION 4

# RESULTS AND DISCUSSION

## 4.1 Site Physical Setting

The Ametek site is located on the lower end of an undulating plain. Topographic relief ranges from 340 to 400 feet above mean sea level. About one third of the site's 87 acres are wooded to the south and to the east. Most of the remaining land is active farm land except for the land that is occupied by the plant itself. A small stream runs through the site to the east of the plant. The stream flows in a southerly direction with flow volume gradually increasing across the site with the inflow of a network of small rills that run throughout the wooded area. The lowest part of the site is to the south and the highest is to the northeast.

All of the Ametek manufacturing, storage, and testing facilities were still active during the investigation. The most notable of these structures is the main manufacturing plant which lies in the northwest portion of the site. Other structures on site include storage sheds, well houses and the foundations and rubble of an abandoned farm located to the northeast of the plant. An abandoned neutralizing lagoon also lies to the southeast of the plant.

It should be noted that the NPWA well (number 15) is located in an industrial park approximately one half mile southeast of the plant. The location of this well appears on Figure 1-3 in Section 1.

## 4.2 Site Soil Characteristics

The typical soil on the Ametek site consists of a red clayey silt which becomes mixed with a decomposed red shale as it nears the parent material (bedrock) which is a highly fractured red shale. The soil changes in depth across the site, varying from four to thirteen feet in thickness. The soils are deepest near the plant and become thinner towards the paint storage area. Between the Paint Storage Area and the stream the soils become thicker.



AR300716

Soils are absent in and along the stream, where outcrops of bedrock can be observed.

In all three of the soil investigation areas (TCE Tank Area, Paint Storage Area, wooded area behind plant), a relatively dense fragipan layer was present. The layer ranged in depth from approximately two to four feet below the ground surface and varied in thickness from one to two feet. The split spoon samples obtained from this layer appeared to have a higher clay content and were more dense than the soils above and below.

The results of the percolation test revealed that the hydraulic conductivity and transmissivity of the soil within the fragipan and below are relatively similar, with the exception of thePT-2/PT-2D nest. The deeper soils in PT-2D were less conductive hydraulically than those of the shallower soils. The soils near the TCE storage area were the least conductive followed by the soils in the vicinity of the paint storage shed. The most conductive soils were in the area behind the plant in the wooded area. It should be noted that this area had large amounts of disturbed soil present. The results of the soil percolation tests (slug tests) are presented in Section 3, Table 3-4. (Table 3-3)

## 4.3 Site Geology

The structure of the bedrock beneath the Ametek site consists of thick to thinly bedded shales and siltstones. The bedrock is exposed in the small stream to the east of the plant. The outcrops in the stream reveal that the rock is highly fractured with all fractures nearly vertical and intersecting at various orientations.

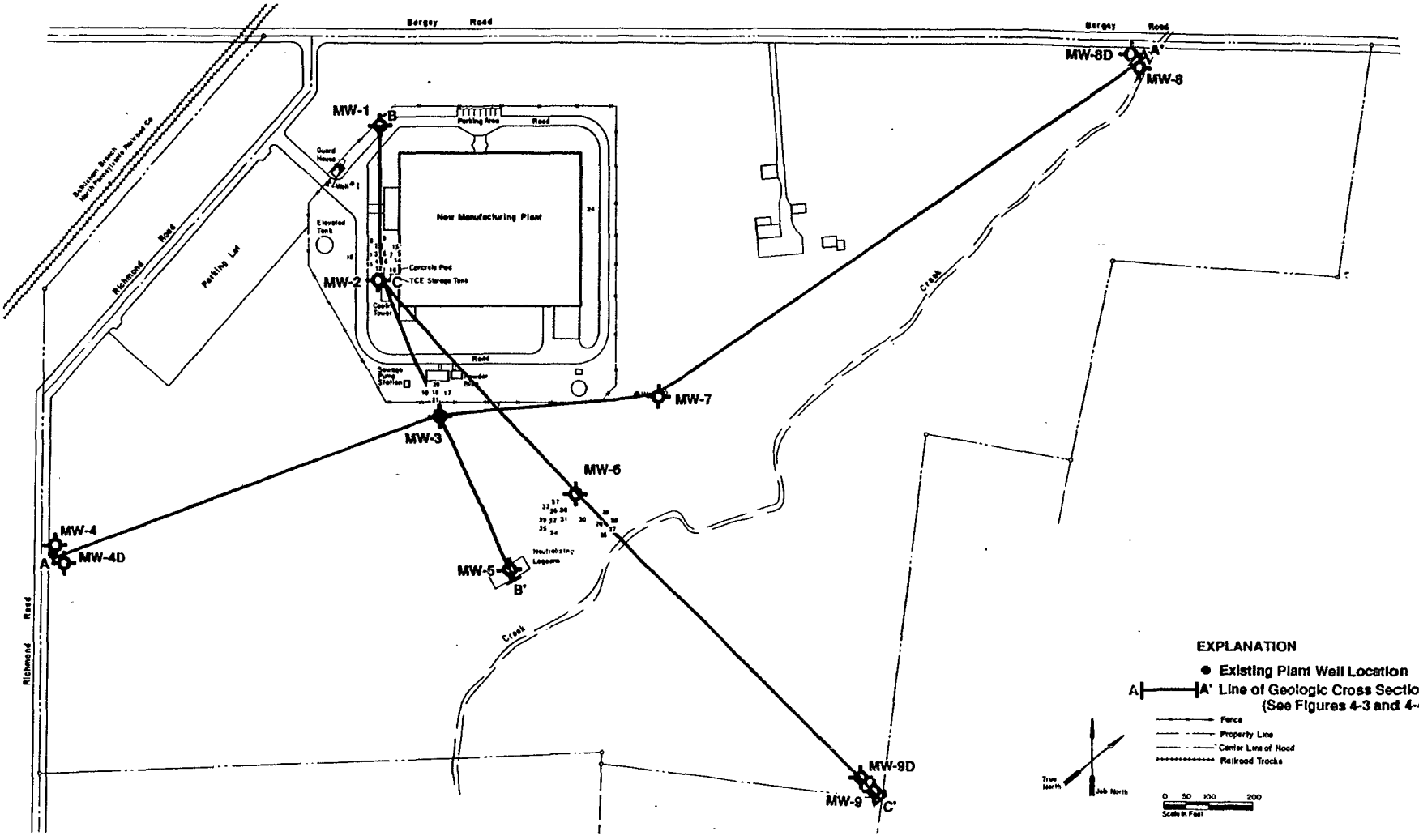
The bedrock underlying the site consists of the Brunswick and Lockatong Formations. Most of the site is underlain by the Brunswick Formation with the exception of the northeast corner of the site where the Lockatong formation has been faulted to the surface (Figure 4-1). On the site, the Brunswick Formation consists dominately of a reddish-brown shale which is interbedded with a dark grey shale thought to be interfingerings of the Lockatong Formation (Figures 4-2, 4-3, 4-4). The Lockatong Formation found on the site consists of a thin to thick-bedded, very dense, dark grey shale and mudstone. Both these formations are highly fractured with the fractures filled with calcite. Detailed drilling logs are presented in Appendix B.

The Chalfont fault passes through the site, traversing a course that is nearly east - west with the upthrown side to the north.



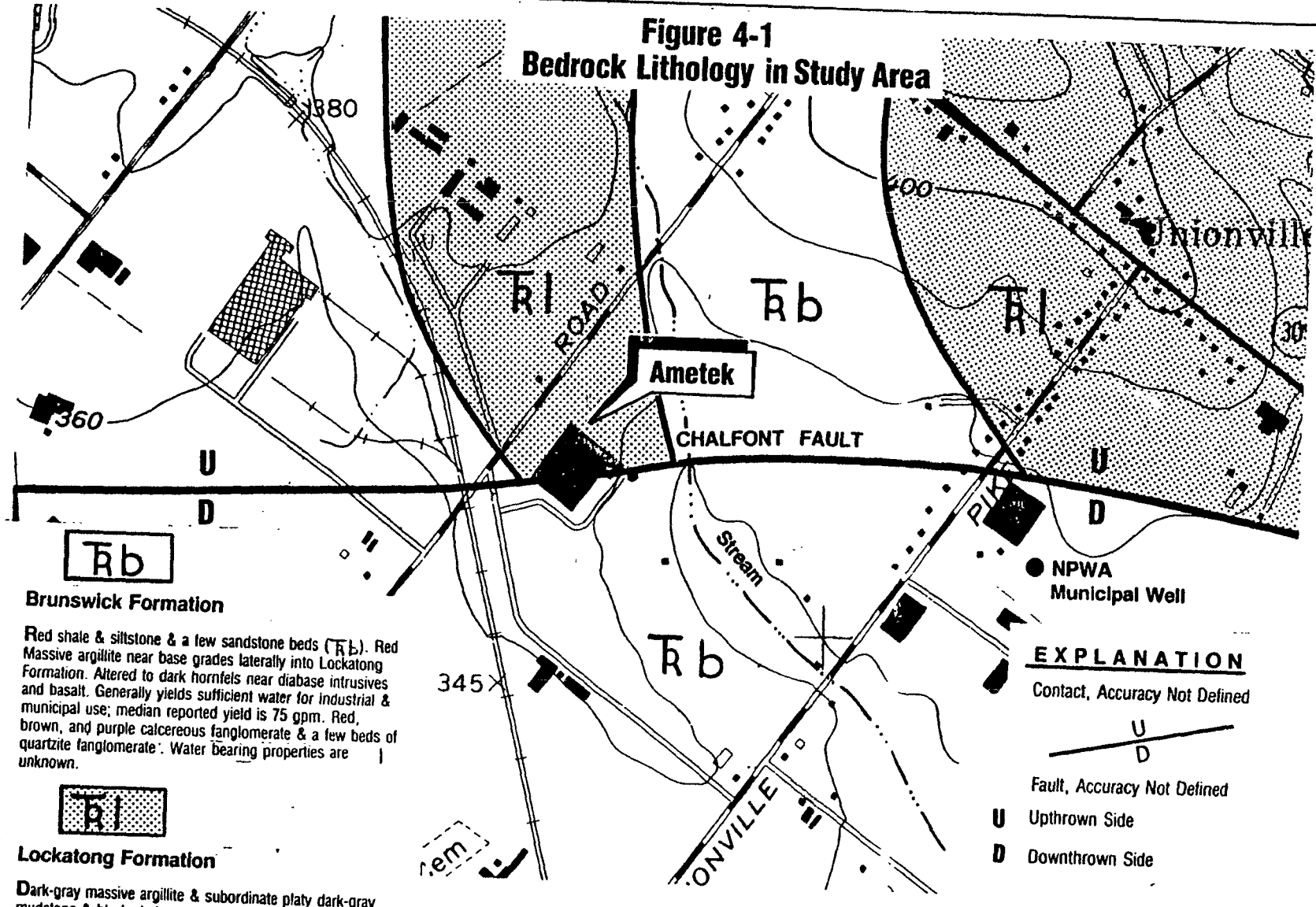
AR300717

# Figure 4-2
## Lines of Hydrogeologic Cross Section




AR300718

# Figure 4-1
# Bedrock Lithology in Study Area

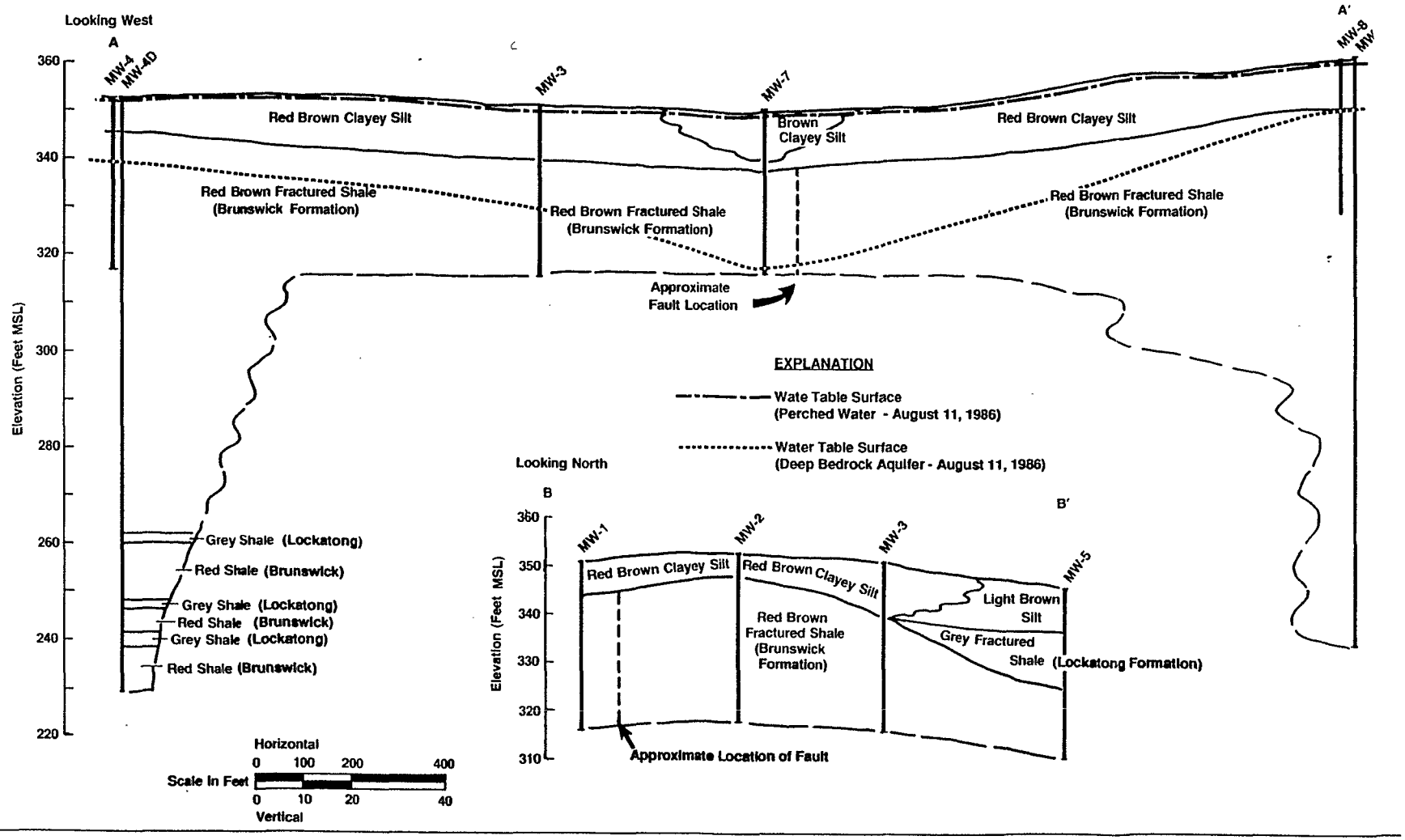



Base Source: U.S.G.S. Telford, PA Topographic Quadrangle
Ground-Water Resources of Montgomery County, Pennsylvania, 1953



AR300719

**Figure 4-3**
**Hydrogeologic Cross Sec**




AR300720

ERM

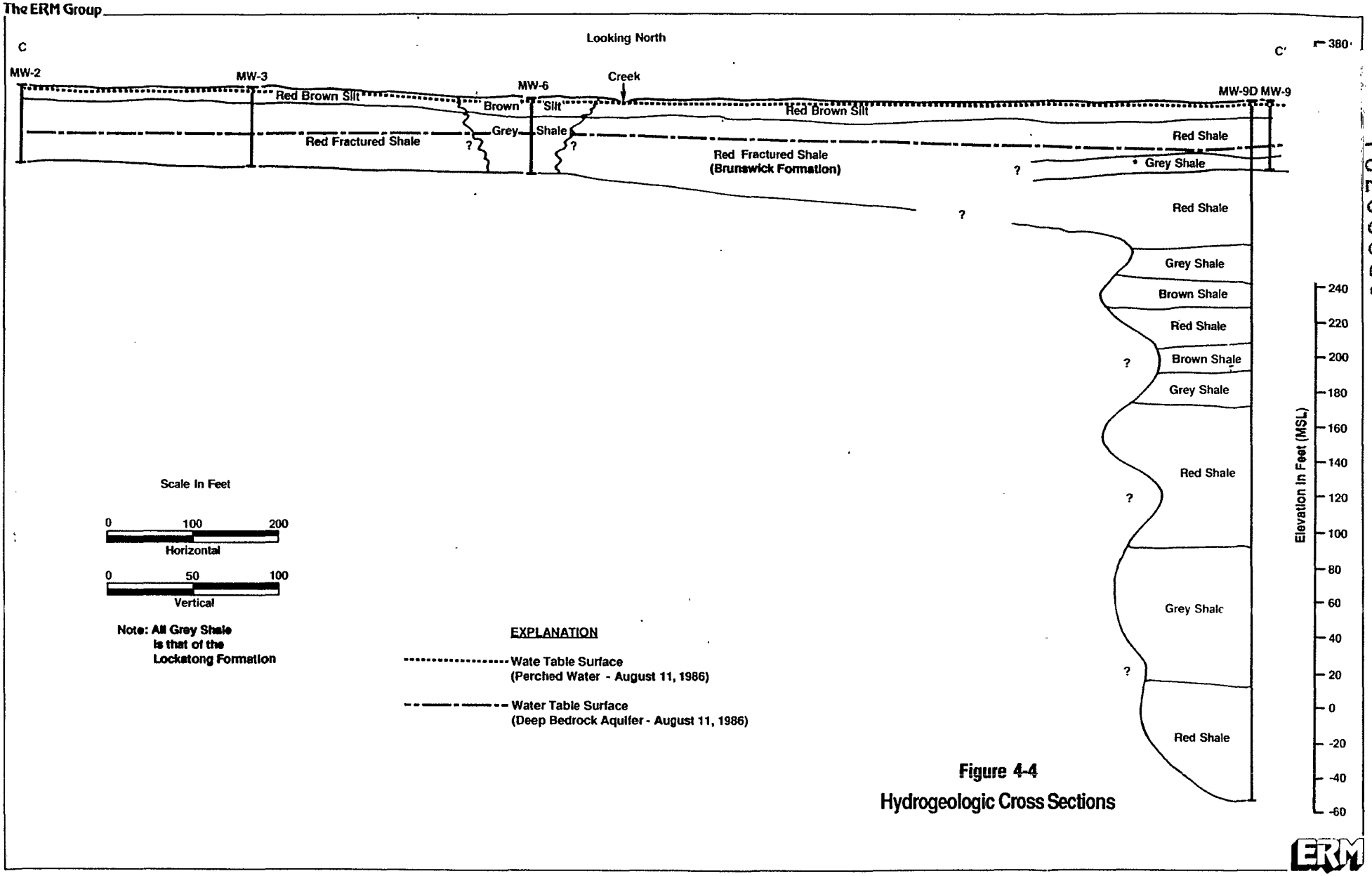



**Figure 4-4**

**Hydrogeologic Cross Sections**

AR300721

(Figure 4-1). The vertical throw of the fault is estimated to be about 3000 feet (Willard, 1959). Drag folding on the upthrown (north) side of the fault indicate that some horizontal displacement has occurred. The Ametek plant building and site appear to be centered over the fault. Heavy fracturing in rocks observed in the stream bed and during the drilling program is probably a direct result of this fault.

## 4.4 Site Hydrogeology

The two types of bedrock on the Ametek site are very similar in their water bearing characteristics. Although the Brunswick Formation has a very small amount of interconnected pore space within the rock itself, a significant amount of ground water occurs in secondary openings such as joints and fractures. This is also generally true for the Lockatong Formation. This formation differs from the Brunswick in that the joints and fractures are narrower and more widely spaced, restricting the amount of ground water that can flow and be contained in the formation.

The stream east of the plant drains most of the site. Two 24 inch storm conduits were built to drain the immediate area around the plant and empty into the stream southeast of the plant. The wooded area to the east of the plant is drained by small rills which network the entire area. Wet ground observed in this area is caused by a perched water table that seems to be underlying the entire site. Based on water level observations in soil borings as compared to water levels in nearby monitoring wells, the water is perched on top of the bedrock and appears to be independent of the deeper aquifer.

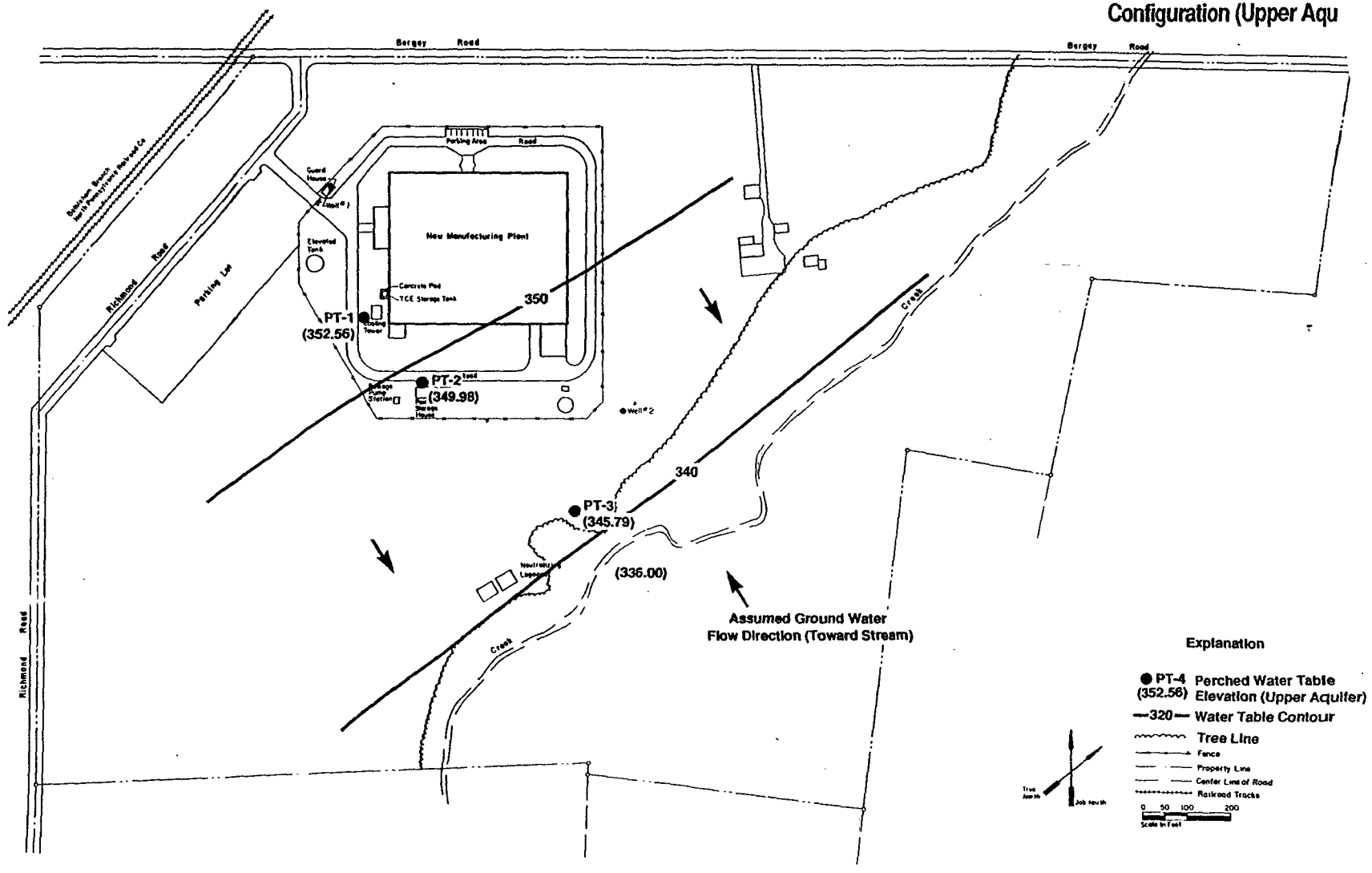
The monitoring wells installed during the Phase II investigation revealed that one deeper aquifer exists below the Ametek site. Therefore, two separate water-bearing zones are present on site: a shallow water table which is perched on the bedrock surface and a deeper bedrock aquifer.

The shallow perched layer of water is generally moving in direct relation to site topographic grade. In the area of the plant, ground water is flowing in an easterly direction toward the stream which traverses the site (Figure 4-5). On the east side of the stream, the small rills flowing in a westerly direction towards the stream suggest that the flow of the shallow water layer on this side of the site also follows topographic grade. This shallow ground water configuration is confirmed by the static water levels measured in the shallow percolation test wells in conjunction with water levels in nearby soil borings.



AR300722

# Figure 4-5
# Perched Water Table Configuration (Upper Aqu




AR300723

The monitoring wells show that the ground water flow in the deep aquifer is inward toward the center of the site and is controlled by the plant production wells. Based on topography, the regional flow direction should be to the south. Both of the plant production wells are located very close to the Chalfont fault trace and have very high water yields. As the wells pump, a somewhat elongated cone of depression is created as water from the highly permeable fault zone is removed. It should be noted that the water production in plant Well 1 has been greatly reduced due to a partial plant shutdown. Water elevation results from 8/11/86 and 8/21/86 reflect this (Figure 4-6). Another round of water elevations obtained on 9/2/86 allowed measurements after the plant production wells were inactive for three days. The ground water configuration was still very similar to the radial pattern, however, the cone of depression became more elongated along the fault trace in an easterly direction, suggesting that the NPWA municipal well could also be influencing ground water flow along the fault (Figure 4-7).

Ametek's plant production Well 1 is located in the gate house in the west corner of the site. This well is 400 feet deep and has the pump intake set at 105 feet. The well produces about 105 G.P.M. Well 2 is located in a small pump house in the east corner of the site. This well was drilled to a depth of 395 feet and has the pump intake set at 226 feet. The well produces about 190 G.P.M. Both of these wells were finished in the Brunswick Formation and produce a greater volume of water than the expected average yield (Brunswick formation average yield is 100 G.P.M.). Both these wells appear to have been purposely drilled along the trace of the Chalfont Fault.

The shallow Phase II monitoring wells vary in water yield from less than 1 gpm to about 4 gpm depending on the well location. The shallow wells closest to the fault zone generally produced more water. Two deep monitoring wells produced water yields of 3 and 10 gpm. The third deep monitoring well, MW-9D, produced 150 gpm due to its excessive depth (398 feet) and proximity to the fault. Several voids were encountered while drilling this well which were very productive water bearing zones. An approximate water yield is given for each well in Section 3, Table 3-3.

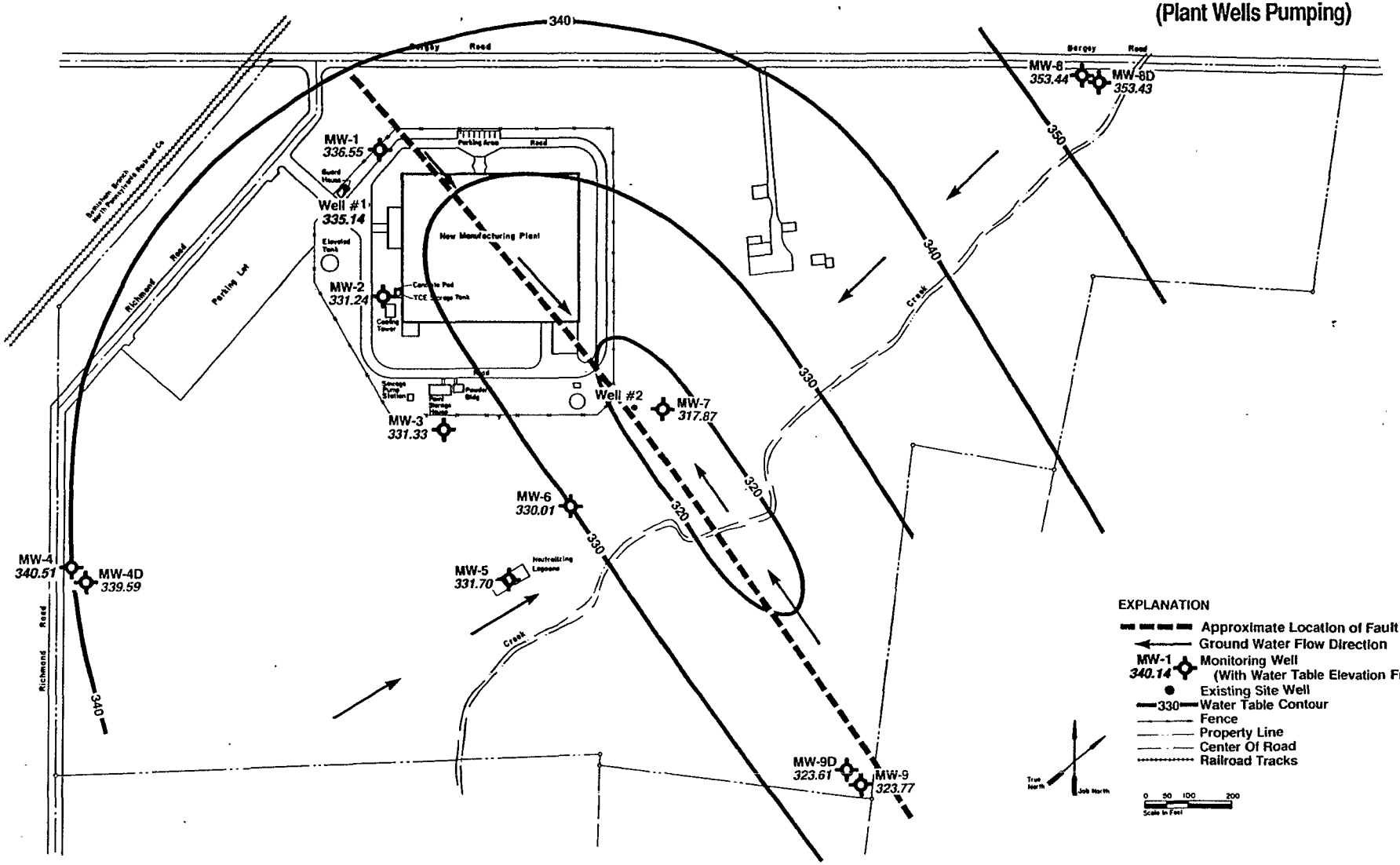
## 4.5 Soil Sampling Survey

The initial results of the soil survey carried out with the OVM on the split spoon samples outlined areas of soil contamination from volatile organic compounds in the vicinities of the TCE Tank Pad, the Paint Storage, and the wooded area behind the plant.



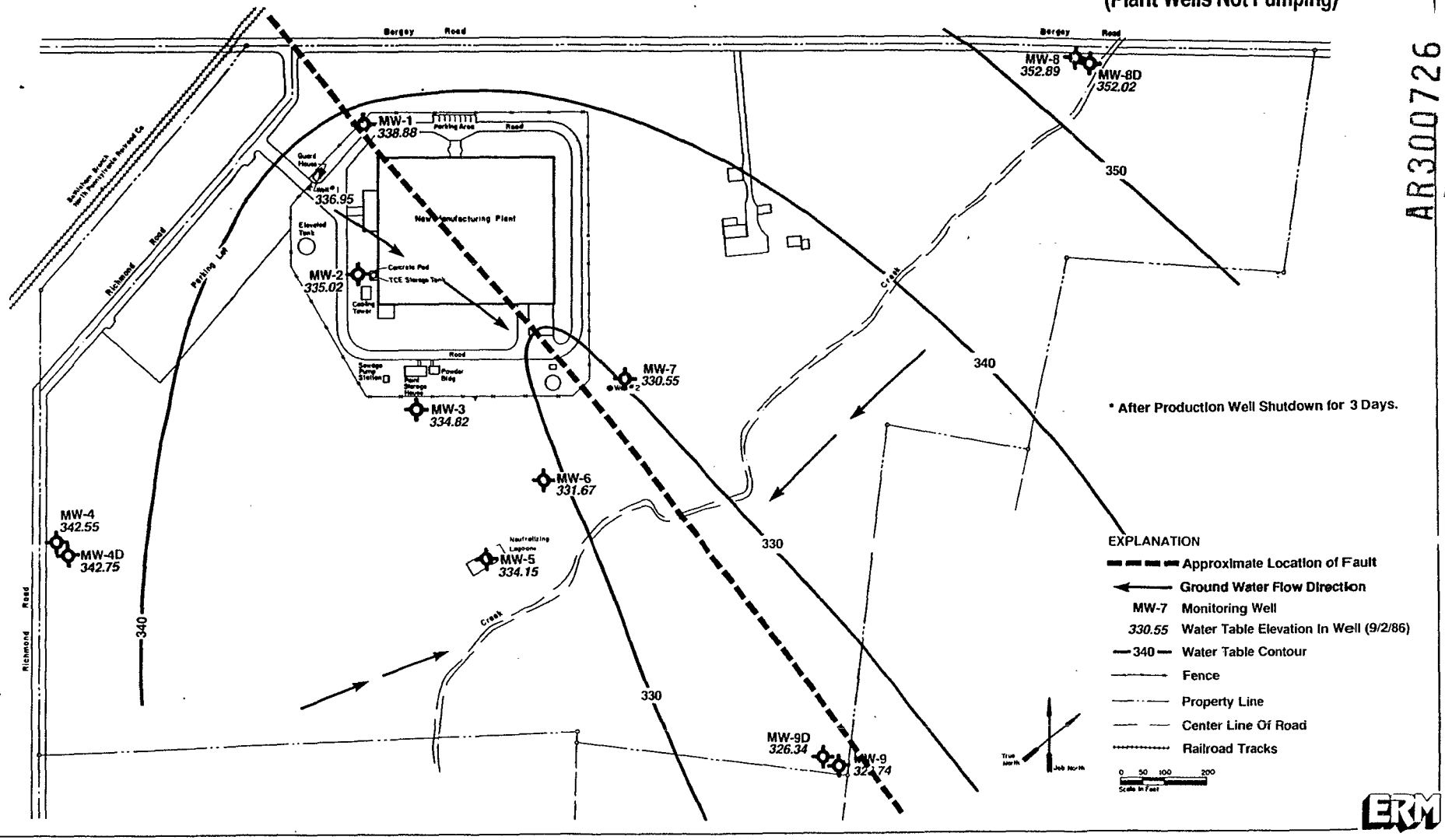
AR300724

**Figure 4-6**
**Water Table Configuration For**
**(Plant Wells Pumping)**




AR300725

## Figure 4-7
## Water Table Configuration For 9/
## (Plant Wells Not Pumping)*




AR300726

The OVM readings obtained from soils in these areas ranged from 1 to >1000 ppm. A complete list of OVM results in relation to sampling depth of each soil boring is presented in Table 4-1. The split spoon samples that had relativley high OVM results were sent to the laboratory for a further and more detailed analysis. Laboratory results from the soil samples are presented in Table 4-2. Laboratory analysis can be found in Appendix C.

The soil samples analyzed by the laboratory generally matched the pattern of soil contamination defined by the OVM results. Three distinct areas of significant soil contamination have been identified: the area around the TCE Tank Pad, the area behind the Paint Storage Shed, and the area along the tree line southeast of the plant. These areas are discussed below.

Area around the TCE Tank Pad - The highest concentrations in this area were those of TCE, which range from 10 to 17,000 ppm. This area also had a relatively high concentration of 1,1,1-TCA, ranging from 0 to 5,700 ppm. Detectable amounts of 1,1-DCE, trans-1,2-DCE, PCE and toluene were also found at this location. Figures 4-8A through 4-8F present the locations and concentrations of all soil analyses in the TCE Tank Pad Area.

Behind the Paint Storage Shed - The concentrations in this area were relatively low. Again, TCE had the highest concentration, ranging from 0 to 1.8 ppm. Trans-1,2 DCE and PCE were also found to be present in lower concentrations. Figures 4-9A through 4-9D present the locations and concentrations of all soil analyses in the Paint Storage Area.

Southeast of the plant along the tree line of the wooded area - This area's highest concentrations were those of TCE, ranging from 0 to 50 ppm. Also present in lower concentrations were 1,1,1-TCA, PCE, toluene, ethylbenzene and fluorotrichloromethane. Figures 4-10A through 4-10F present the locations and concentrations of all soil analyses in this area.

A fourth area of minor contamination was identified from toluene during the Phase I investigation at the northeast corner of the lagoon area. The lagoon area was investigated further during this phase of work by placing a monitoring well (MW-5) in its center.

A soil sample taken during Phase I from the former lagoon was tested for TCE and other volatile organics at that time. This sample was to be tested for heavy metals as part of Phase II. After subsequent discussions with Ametek, it was mutually agreed that the soil sample is probably backfill placed during lagoon



AR300727

OVA/SPLIT SPOON SAMPLING DATA

TABLE 4-1

| BORING ID | SPLIT SPOON NUMBER | SPLIT SPOON SAMPLING INTERVAL (FEET) | OVM READING (PPM) |
|---|---|---|---|
| B-1 | SS-1 | 0-2.0 | 25 |
| | SS-2 | 2.0-4.0 | 350 |
| | SS-3 | 4.0-6.0 | 65 |
| | SS-4 | 6.0-8.0 | 30 |
| B-2 | SS-1 | 0-2.0 | 350 |
| | SS-2 | 2.0-4.0 | 400 |
| | SS-3 | 4.0-6.0 | 80 |
| | SS-4 | 6.0-8.0 | 80 |
| B-3 | SS-1 | 0-2.0 | 50 |
| | SS-2 | 2.0-4.0 | 400 |
| | SS-3 | 4.0-6.0 | 800 |
| | SS-4 | 6.0-7.5 | >1000 |
| B-4 | SS-1 | 0-2.0 | 9 |
| | SS-2 | 2.0-4.0 | 80 |
| | SS-3 | 4.0-6.0 | 70 |
| | SS-4 | 6.0-7.0 | 200 |
| B-5 | SS-1 | 0-2.0 | 250 |
| | SS-2 | 2.0-4.0 | 200 |
| | SS-3 | 4.0-6.0 | >1000 |
| | SS-4 | 6.0-8.0 | 550 |
| | SS-5 | 8.0-8.05 | >1000 |
| B-6 | SS-1 | 0-2.0 | 20 |
| | SS-2 | 2.0-4.0 | 70 |
| | SS-3 | 4.0-6.0 | 350 |
| | SS-4 | 6.0-6.5 | 70 |
| B-7 | SS-1 | 0-2.0 | >1000 |
| | SS-2 | 2.0-4.0 | 450 |
| | SS-3 | 4.0-6.0 | 550 |
| | SS-4 | 6.0-8.0 | >1000 |
| B-8 | SS-1 | 0-2.0 | 2 |
| | SS-2 | 2.0-4.0 | 1 |
| | SS-3 | 4.0-6.0 | 6 |
| | SS-4 | 6.0-8.0 | 15 |
| | SS-5 | 8.0-8.9 | 40 |



AR300728

OVA/SPLIT SPOON SAMPLING DATA (CONT'D)

| BORING ID | SPLIT SPOON NUMBER | SPLIT SPOON SAMPLING INTERVAL (FEET) | OVM READING (PPM) |
|---|---|---|---|
| B-9 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 0 |
| | SS-3 | 4.0-6.0 | 12 |
| | SS-4 | 6.0-8.0 | 115 |
| | SS-5 | 8.0-8.8 | 300 |
| B-10 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 0 |
| | SS-3 | 4.0-6.0 | 0 |
| | SS-4 | 6.0-8.0 | 0 |
| | SS-5 | 8.0-10.0 | 0 |
| B-11 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 1 |
| | SS-3 | 4.0-6.0 | 5 |
| | SS-4 | 6.0-8.0 | 0 |
| | SS-5 | 8.0-9.6 | 0 |
| B-12 | SS-1 | 0-2.0 | 1 |
| | SS-2 | 2.0-4.0 | 30 |
| | SS-3 | 4.0-6.0 | 30 |
| | SS-4 | 6.0-6.7 | 4 |
| B-13 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 1 |
| | SS-3 | 4.0-6.0 | 1 |
| | SS-4 | 7.0-8.2 | 1 |
| B-14 | SS-1 | 1.0-3.0 | >1000 |
| | SS-2 | 3.0-5.0 | >1000 |
| | SS-3 | 5.0-7.0 | >1000 |
| | SS-4 | 7.0-9.0 | >1000 |
| | SS-5 | 9.0-9.6 | >1000 |
| B-15 | SS-1 | 1.0-3.0 | 450 |
| | SS-2 | 3.0-5.0 | 600 |
| | SS-3 | 5.0-7.0 | 950 |
| | SS-4 | 7.0-9.0 | 300 |
| | SS-5 | 9.0-9.5 | 150 |
| B-16 | SS-1 | 0.5-2.5 | 450 |
| | SS-2 | 2.5-4.5 | >1000 |
| | SS-3 | 4.5-6.5 | >1000 |
| | SS-4 | 6.5-8.5 | >1000 |



AR300729

OVA/SPLIT SPOON SAMPLING DATA (CONT'D)

| BORING ID | SPLIT SPOON NUMBER | SPLIT SPOON SAMPLING INTERVAL (FEET) | OVM READING (PPM) |
|---|---|---|---|
| B-17 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 0 |
| | SS-3 | 4.0-6.0 | 1 |
| B-18 | SS-1 | 0-2.0 | 1 |
| | SS-2 | 2.0-4.0 | 7 |
| | SS-3 | 4.0-6.0 | 25 |
| B-19 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 0 |
| | SS-3 | 4.0-6.0 | 1 |
| | SS-4 | 6.0-7.2 | 6 |
| B-20 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 0 |
| B-21 | SS-1 | 2.0-3.9 | 9 |
| B-22 | SS-1 | 0-2.0 | 200 |
| | SS-2 | 2.0-4.0 | 15 |
| | SS-3 | 4.0-5.5 | 80 |
| B-23 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 0 |
| | SS-3 | 4.0-6.0 | 0 |
| | SS-4 | 6.0-7.6 | 0 |
| B-24 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 0 |
| | SS-3 | 4.0-6.0 | 1 |
| | SS-4 | 6.0-7.8 | 1 |
| B-25 | SS-1 | 0-2.0 | 1 |
| | SS-2 | 2.0-4.0 | 5 |
| | SS-3 | 4.0-5.2 | 9 |
| B-26 | SS-1 | 0-2.0 | 6 |
| | SS-2 | 2.0-4.0 | 6 |
| | SS-3 | 4.0-6.0 | 7 |
| | SS-4 | 6.0-8.0 | 20 |
| | SS-5 | 8.0-8.5 | 10 |
| B-27 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 2 |



AR300730

OVA/SPLIT SPOON SAMPLING DATA (CONT'D)

| BORING ID | SPLIT SPOON NUMBER | SPLIT SPOON SAMPLING INTERVAL (FEET) | OVM READING (PPM) |
|---|---|---|---|
| | SS-3 | 4.0-6.0 | 0 |
| | SS-4 | 6.0-6.2 | 2 |
| B-28 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 1 |
| | SS-3 | 4.0-6.0 | 1 |
| | SS-4 | 6.0-7.0 | 2 |
| B-29 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 0 |
| | SS-3 | 4.0-6.0 | 0 |
| | SS-4 | 6.0-8.0 | 2 |
| | SS-5 | 8.0-10.0 | 0 |
| | SS-6 | 10.0-10.9 | 4 |
| B-30 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 0 |
| | SS-3 | 4.0-6.0 | 5 |
| | SS-4 | 6.0-8.0 | 2 |
| | SS-5 | 8.0-10.0 | 1 |
| | SS-6 | 10.0-12.0 | 2 |
| | SS-7 | 12.0-13.0 | 0 |
| B-31 | SS-1 | 0-2.0 | 6 |
| | SS-2 | 2.0-4.0 | 4 |
| | SS-3 | 4.0-6.0 | 7 |
| | SS-4 | 6.0-8.0 | 20 |
| | SS-5 | 8.0-9.6 | 70 |
| B-32 | SS-1 | 0-2.0 | >1000 |
| | SS-2 | 2.0-4.0 | >1000 |
| | SS-3 | 4.0-6.0 | 850 |
| | SS-4 | 6.0-8.0 | 600 |
| | SS-5 | 8.0-10.0 | 500 |
| | SS-6 | 10.0-11.3 | 400 |
| B-33 | SS-1 | 0-2.0 | 8 |
| | SS-2 | 2.0-4.0 | 8 |
| | SS-3 | 4.0-6.0 | 25 |
| | SS-4 | 6.0-8.0 | 12 |
| | SS-5 | 8.0-8.5 | 8 |
| B-34 | SS-1 | 0-2.0 | 20 |
| | SS-2 | 2.0-4.0 | 60 |



AR300731

OVA/SPLIT SPOON SAMPLING DATA (CONT'D)

| BORING ID | SPLIT SPOON NUMBER | SPLIT SPOON SAMPLING INTERVAL (FEET) | OVM READING (PPM) |
|---|---|---|---|
| | SS-3 | 4.0-6.0 | 25 |
| | SS-4 | 6.0-8.0 | 5 |
| B-35 | SS-1 | 0-2.0 | 0 |
| | SS-2 | 2.0-4.0 | 0 |
| | SS-3 | 4.0-6.0 | 0 |
| B-36 | SS-1 | 0-2.0 | 30 |
| | SS-2 | 2.0-4.0 | 800 |
| | SS-3 | 4.0-6.0 | 300 |
| | SS-4 | 6.0-7.5 | 100 |
| B-37 | SS-1 | 0-2.0 | 1 |
| | SS-2 | 2.0-4.0 | 1 |
| | SS-3 | 6.0-8.0 | 15 |
| B-38 | SS-1 | 2.0-4.0 | 10 |
| | SS-2 | 6.0-8.0 | 45 |
| B-39 | SS-1 | 2.0-4.0 | 0 |
| | SS-2 | 6.0-8.0 | 20 |



AR300732

TABLE 4-2

SOIL SAMPLING RESULTS
July - August, 1986

| | 1,1-di-chloro-ethene | 1,1-di-chloro-ethane | trans-1,2 dichloro-ethene | 1,1,1-trichloro-ethane | tri-chloro-ethene | tetra-chloro-ethene | toluene | ethyl-benzene | fluoro-trichloro-methane | Total VOCs* |
|---|---|---|---|---|---|---|---|---|---|---|
| B-1 4.0-6.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-1 8.0-8.5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-2 2.0-4.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-2 4.0-6.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-2 6.0-6.8 | ND | ND | ND | ND | 0.3 | ND | ND | ND | ND | 0.3 |
| B-3 4.0-6.0 | ND | ND | ND | 0.2 | 12 | ND | 0.3 | ND | ND | 12.5 |
| B-3 6.5-7.0 | ND | ND | ND | 0.2 | 16 | ND | ND | ND | ND | 16.2 |
| B-4 4.0-6.0 | ND | ND | ND | ND | ND | ND | 0.3 | ND | ND | 0.3 |
| B-4 6.0-6.5 | ND | ND | ND | 0.4 | 0.4 | ND | 0.3 | ND | ND | 1.1 |
| -6.0 | ND | ND | ND | ND | 0.5 | ND | ND | ND | ND | 0.5 |

lts in ppm
None Detected
atile Organic Compounds



AR300733

TABLE 4-2 (continued)

SOIL SAMPLING RESULTS
July - August, 1986

| | 1,1-di-chloro-ethene | 1,1-di-chloro-ethane | trans-1,2 dichloro-ethene | 1,1,1-trichloro-ethane | tri-chloro-ethene | tetra-chloro-ethene | toluene | ethyl-benzene | fluoro-trichloro-methane | Total VOCs* |
|---|---|---|---|---|---|---|---|---|---|---|
| B-5 6.0-8.0 | ND | ND | ND | 0.2 | 1.5 | ND | ND | ND | ND | 1.7 |
| B-6 4.0-6.0 | ND | ND | ND | 0.9 | 3.9 | ND | ND | ND | ND | 4.8 |
| B-6 6.0-6.5 | ND | ND | ND | 1.1 | 1.4 | ND | ND | ND | ND | 2.5 |
| B-7 2.5-3.5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-7 4.0-6.0 | ND | ND | ND | ND | 0.5 | ND | 0.3 | ND | ND | 0.8 |
| B-7 6.0-8.0 | 2.2 | ND | 0.2 | 14 | 15 | ND | ND | ND | ND | 31.4 |
| B-8 6.0-6.5 | ND | ND | ND | ND | 0.2 | ND | ND | ND | ND | 0.2 |
| B-9 6.0-8.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |

Results in ppm
ND - None Detected
*Volatile Organic Compounds



AR300734

TABLE 4-2 (continued)

SOIL SAMPLING RESULTS
July - August, 1986

| | 1,1-di-chloro-ethene | 1,1-di-chloro-ethane | trans-1,2 dichloro-ethene | 1,1,1-trichloro-ethane | tri-chloro-ethene | tetra-chloro-ethene | toluene | ethyl-benzene | fluoro-trichloro-methane | Total VOCs* |
|---|---|---|---|---|---|---|---|---|---|---|
| B-12 2.0-4.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-12 4.0-6.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-12 6.0-6.5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-14 4.0-5.0 | ND | ND | ND | 21 | 150 | ND | ND | ND | ND | 171 |
| B-14 7.0-9.0 | 0.9 | ND | ND | 80 | 290 | 1.2 | ND | ND | ND | 372.1 |
| B-14 9.0-9.5 | 99 | ND | ND | 5700 | 17000 | 120 | ND | ND | ND | 22919 |
| B-15 3.0-5.0 | 0.4 | ND | ND | 16 | 34 | ND | ND | ND | ND | 50.4 |
| 15 0-7.0 | 0.9 | ND | ND | 2.5 | 1.3 | ND | ND | ND | ND | 4.7 |
| -15 .0-8.0 | 0.9 | ND | ND | 2.0 | 0.7 | ND | ND | ND | ND | 3.6 |

esults in ppm
D - None Detected
Volatile Organic Compounds



AR300735

TABLE 4-2 (continued)

SOIL SAMPLING RESULTS
July - August, 1986

| | 1,1-di-chloro-ethene | 1,1-di-chloro-ethane | trans-1,2 dichloro-ethene | 1,1,1-trichloro-ethane | tri-chloro-ethene | tetra-chloro-ethene | toluene | ethyl-benzene | fluoro-trichloro-methane | Total VOCs* |
|---|---|---|---|---|---|---|---|---|---|---|
| B-16 2.5-4.5 | ND | ND | ND | ND | 3.7 | ND | ND | ND | ND | 3.7 |
| B-16 4.5-6.5 | ND | ND | ND | ND | 7.0 | ND | ND | ND | ND | 7.0 |
| B-17 4.0-6.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-18 2.0-4.0 | ND | ND | 0.2 | ND | ND | ND | ND | ND | ND | 0.2 |
| B-18 4.0-6.0 | ND | ND | 1.6 | ND | 1.8 | ND | ND | ND | ND | 3.4 |
| B-19 4.0-6.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-19 6.0-7.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-20 2.0-3.5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-21 2.0-4.0 | ND | ND | 0.2 | ND | ND | ND | ND | ND | ND | 0.2 |

Results in ppm
ND - None Detected
*Volatile Organic Compounds



AR300736

TABLE 4-2 (continued)

SOIL SAMPLING RESULTS
July - August, 1986

| | 1,1-di-chloro-ethene | 1,1-di-chloro-ethane | trans-1,2 dichloro-ethene | 1,1,1-trichloro-ethane | tri-chloro-ethene | tetra-chloro-ethene | toluene | ethyl-benzene | fluoro-trichloro-methane | Total VOCs* |
|---|---|---|---|---|---|---|---|---|---|---|
| B-22 2.0-4.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-22 4.0-6.0 | ND | ND | ND | ND | 1.2 | 0.3 | ND | ND | ND | 1.5 |
| B-25 4.0-6.0 | ND | ND | ND | ND | 0.9 | ND | ND | 0.4 | ND | 1.3 |
| B-26 4.0-6.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-26 6.0-7.5 | ND | ND | ND | ND | 1.6 | ND | ND | ND | ND | 1.6 |
| B-31 4.0-6.0 | ND | ND | ND | ND | 0.5 | ND | ND | ND | ND | 0.5 |
| B-31 8.0-10.0 | ND | ND | ND | ND | 2.2 | ND | ND | ND | ND | 2.2 |
| B-32 2.0-4.0 | ND | ND | ND | ND | 50 | 0.4 | ND | ND | ND | 50.4 |
| -32 0-6.0 | ND | ND | ND | ND | 3.3 | ND | ND | ND | ND | 3.3 |

ılts in ppm
None Detected
atile Organic Compounds



AR300737

TABLE 4-2 (continued)

SOIL SAMPLING RESULTS
July - August, 1986

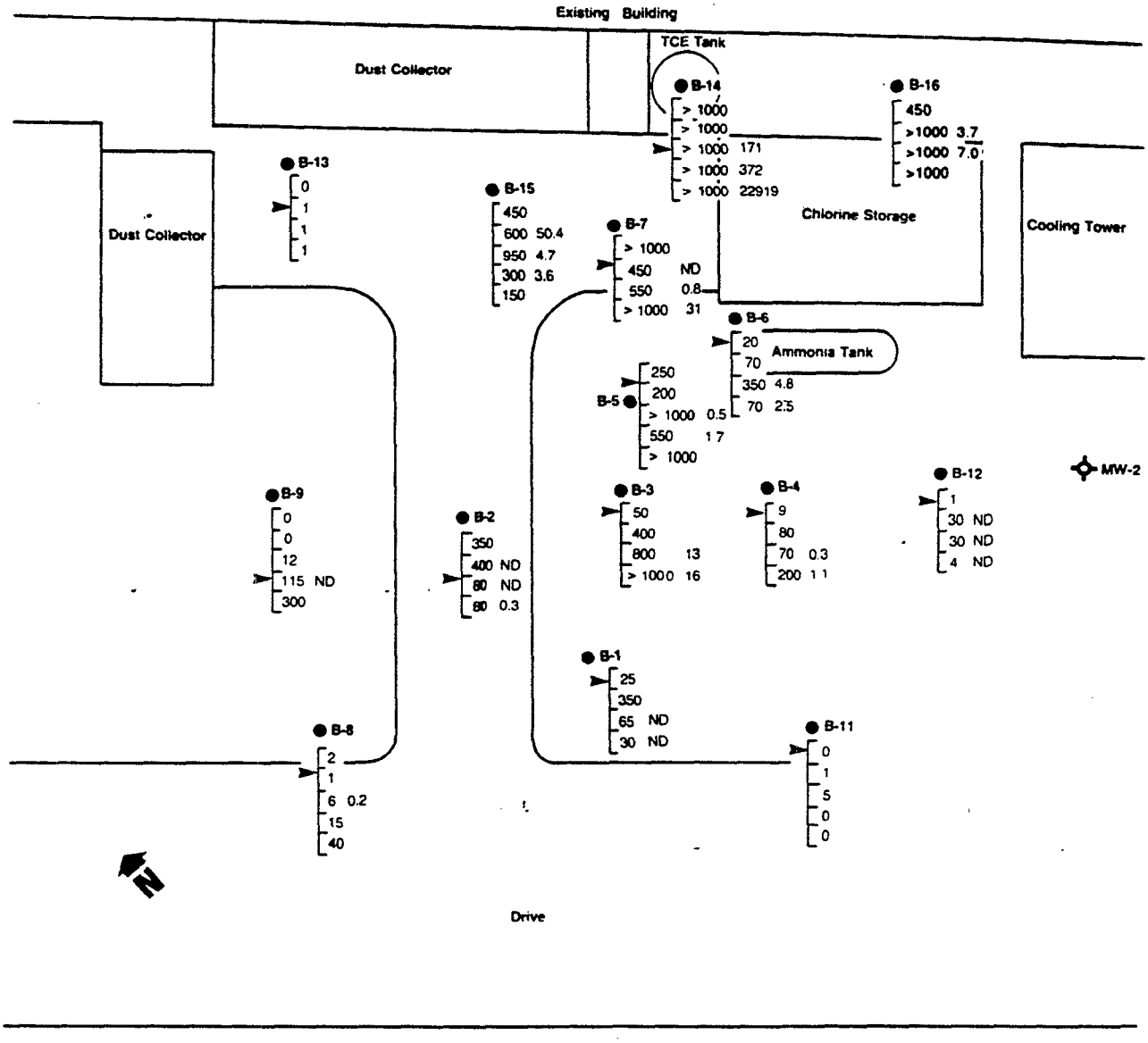
| | 1,1-di-chloro-ethene | 1,1-di-chloro-ethane | trans-1,2 dichloro-ethene | 1,1,1-trichloro-ethane | tri-chloro-ethene | tetra-chloro-ethene | toluene | ethyl-benzene | fluoro-trichloro-methane | Total VOCs* |
|---|---|---|---|---|---|---|---|---|---|---|
| B-32 8.0-10.0 | ND | ND | ND | ND | 21 | 1 | ND | ND | ND | 22 |
| B-33 4.0-6.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-34 2.0-4.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-34 4.0-6.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-36 2.0-4.0 | ND | ND | ND | 0.6 | 18 | 1.7 | 0.5 | ND | 0.3 | 21.1 |
| B-36 6.0-8.0 | ND | ND | ND | 1.2 | 15 | 9.2 | 2.3 | ND | ND | 27.7 |
| B-37 6.0-8.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| B-38 6.0-8.0 | ND | ND | ND | ND | 0.4 | ND | ND | ND | ND | 0.4 |
| B-39 6.0-8.0 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |

Results in ppm
ND - None Detected
*Volatile Organic Compounds



AR300738

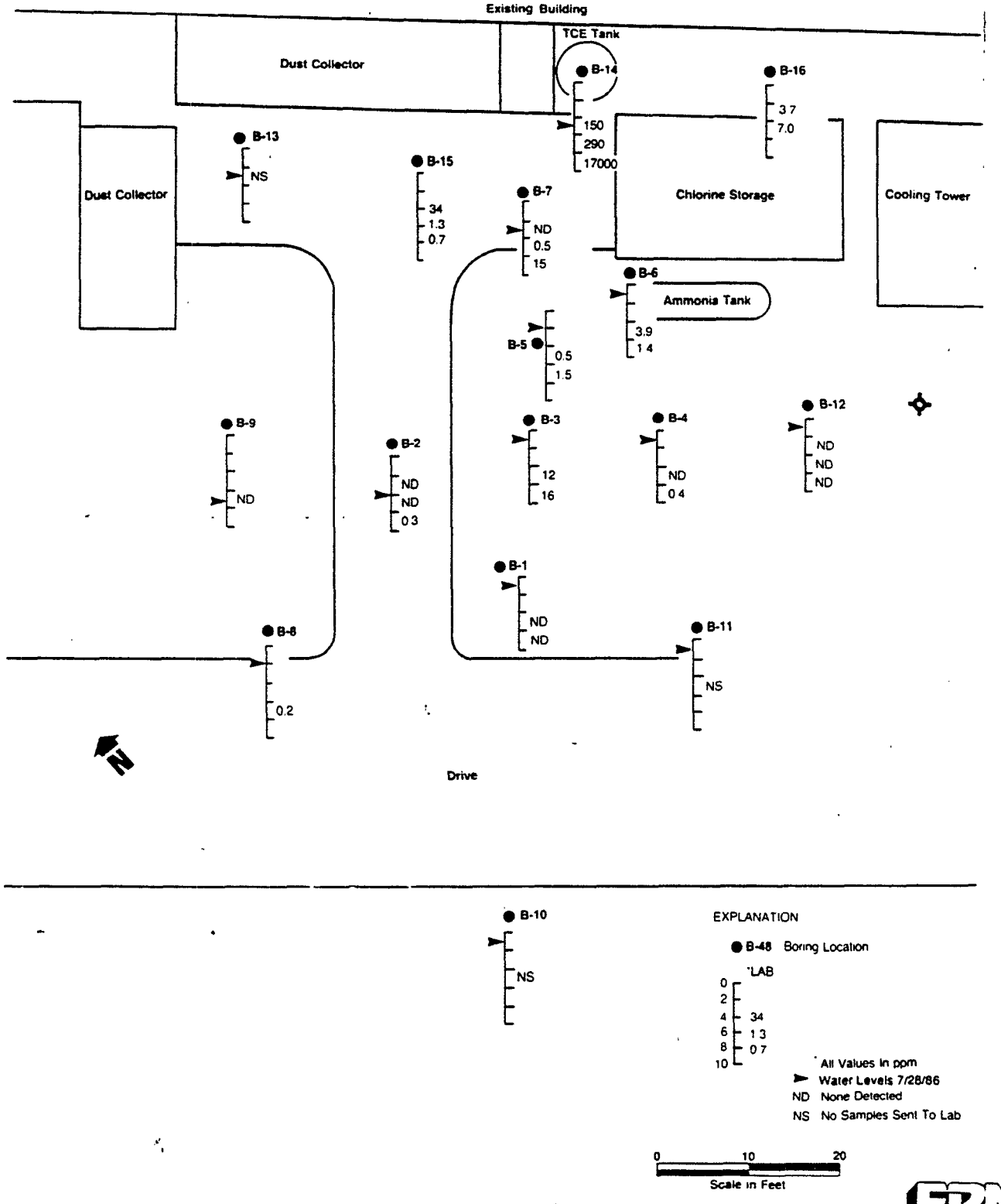
# Figure 4-8A
# TCE Tank Area
# Total VOA Results






AR300739

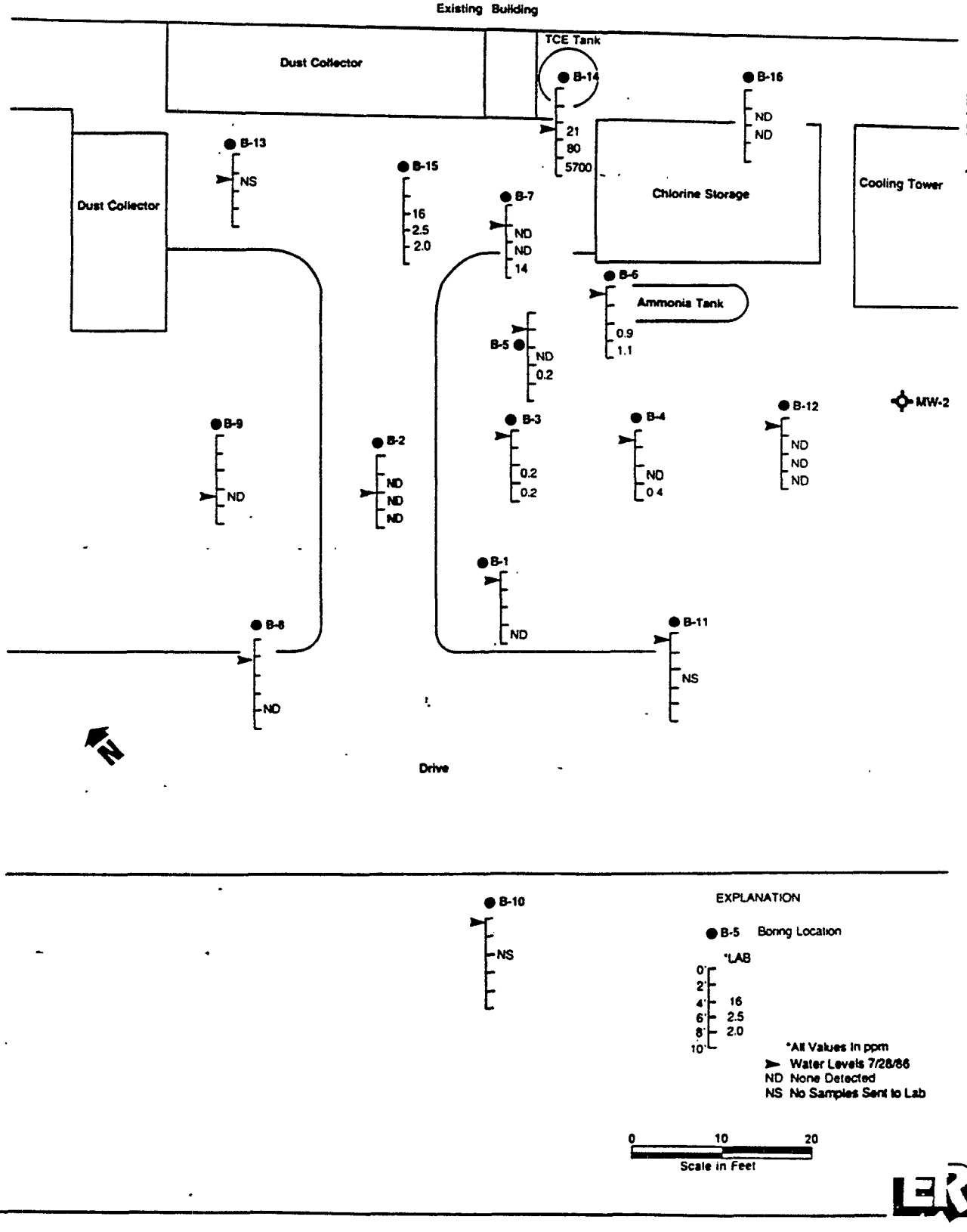
# Figure 4-8B
# TCE Tank Area
# Trichloroethene Results






AR300740

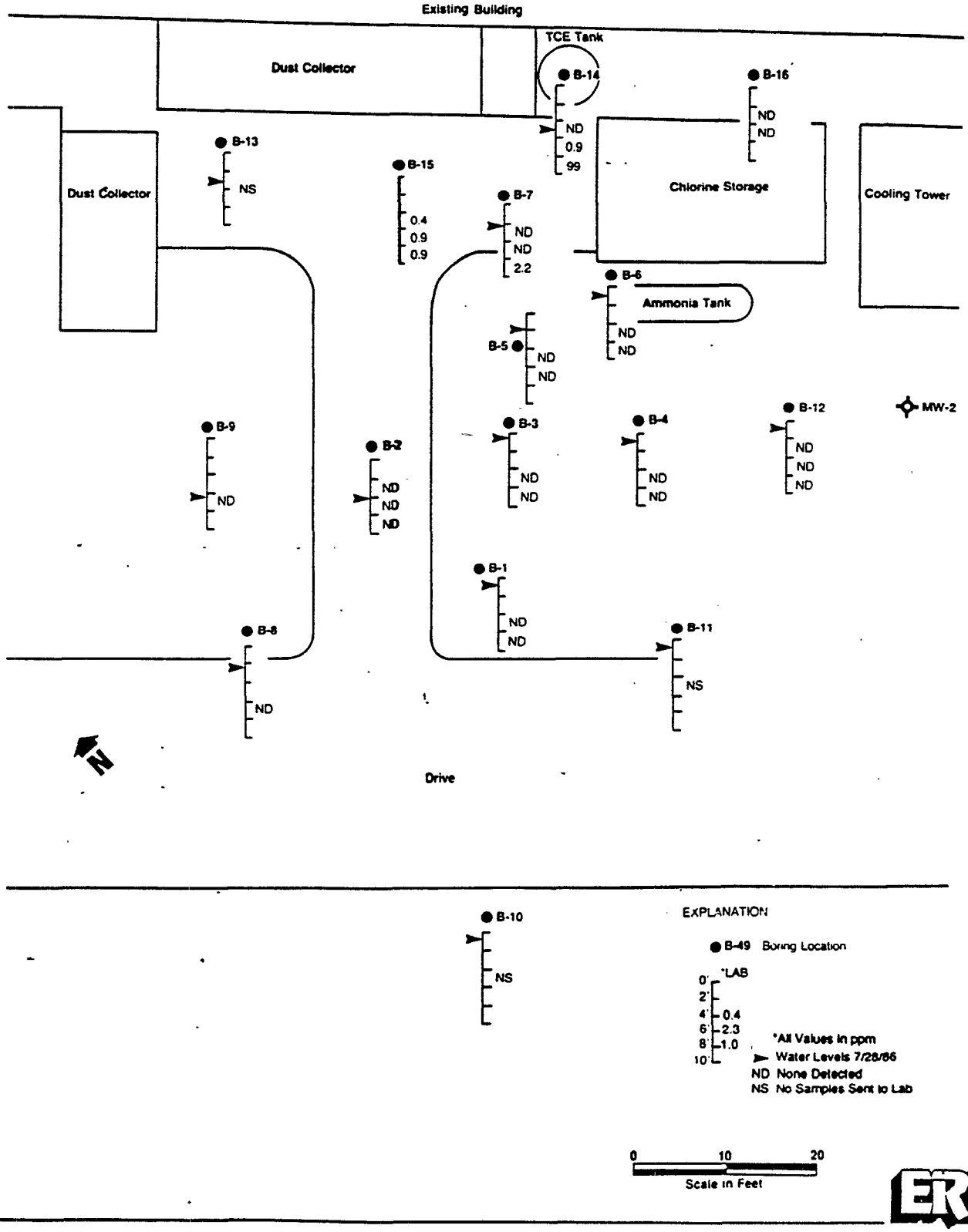
# Figure 4-8C
# TCE Tank Area
# 1,1,1-Trichloroethane Results






AR300741

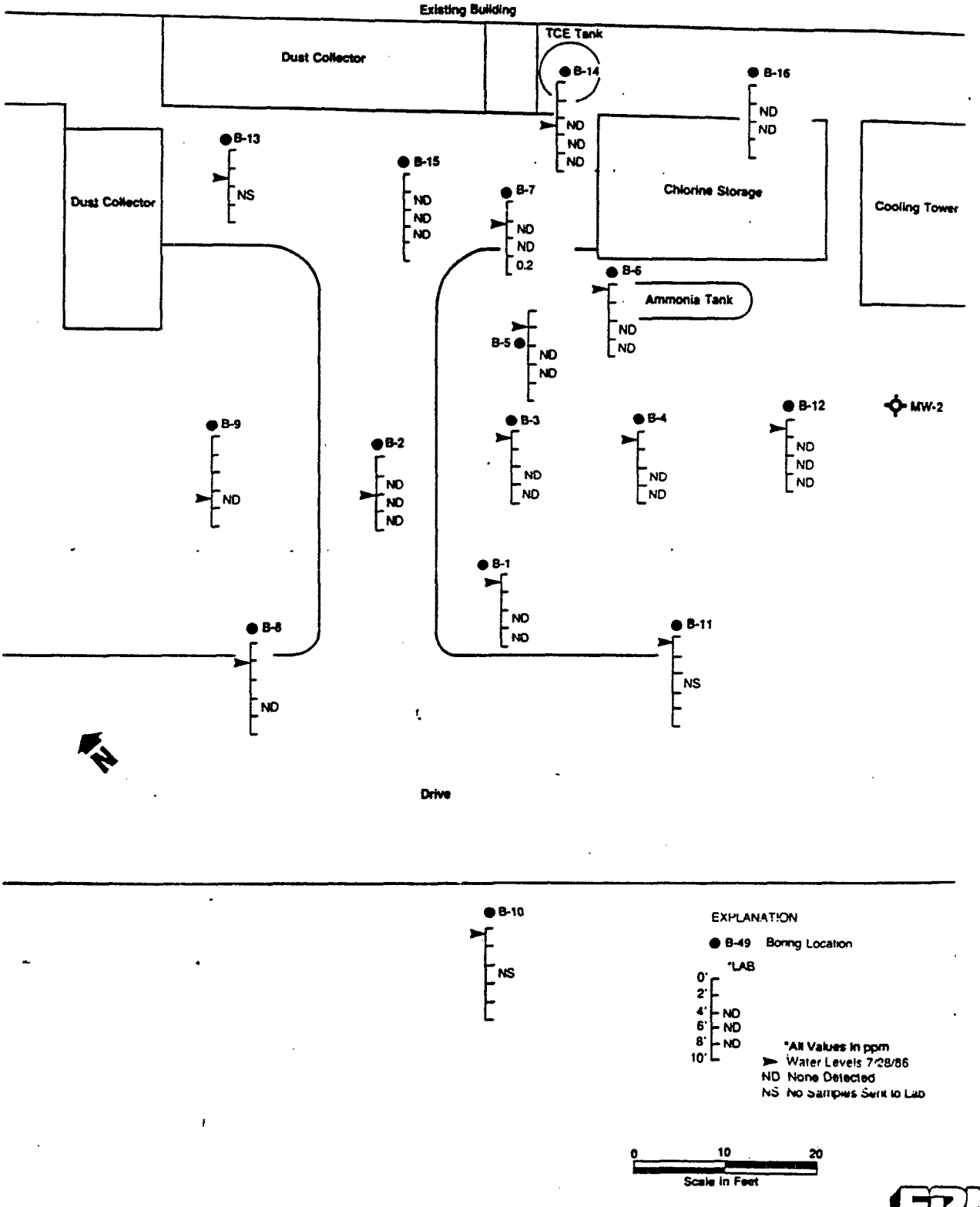
# Figure 4-8D
# TCE Tank Area
# 1,1-Dichloroethene Results






AR300742

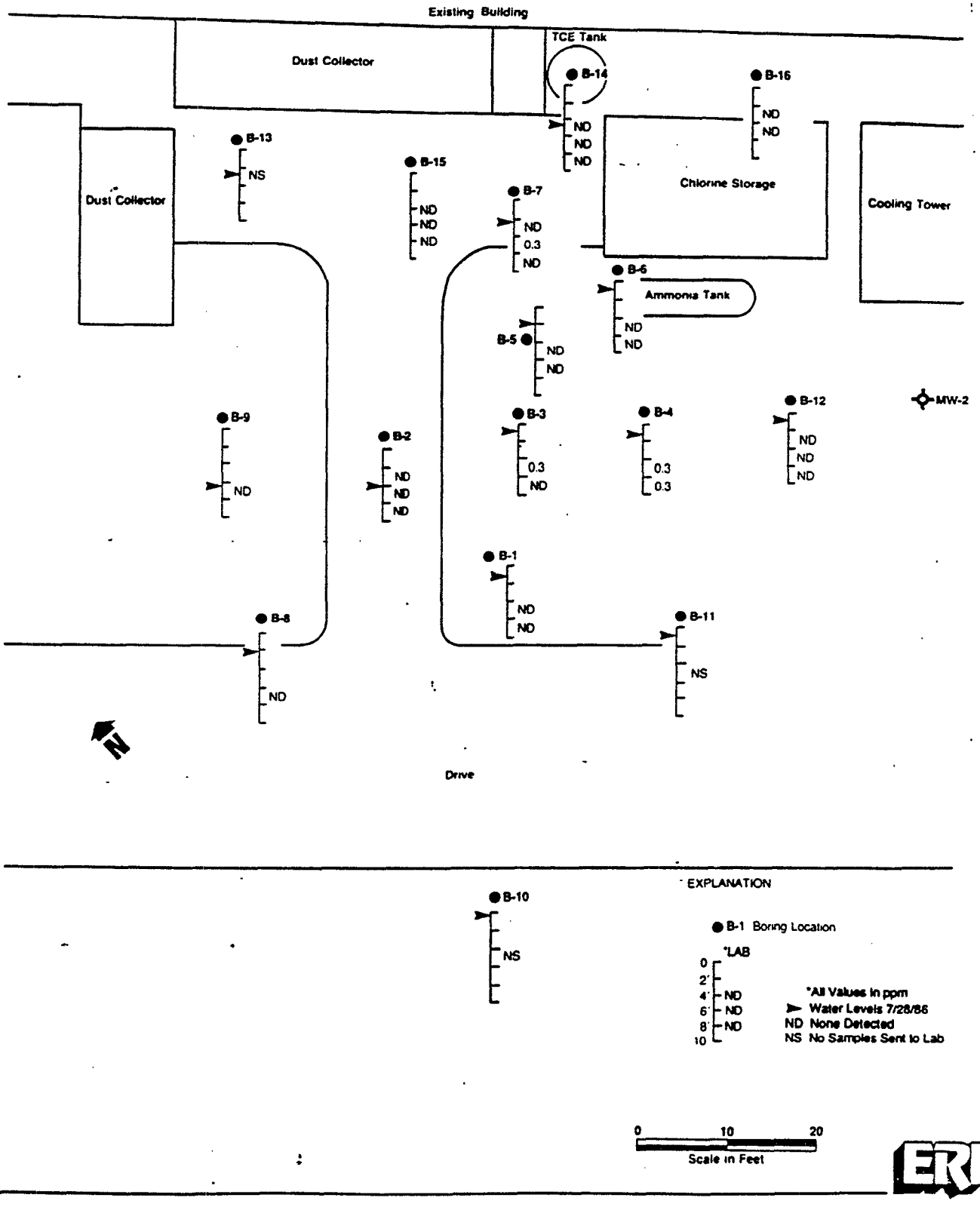
# Figure 4-8E
# TCE Tank Area
# Trans-1,2-Dichloroethene Results






AR300743

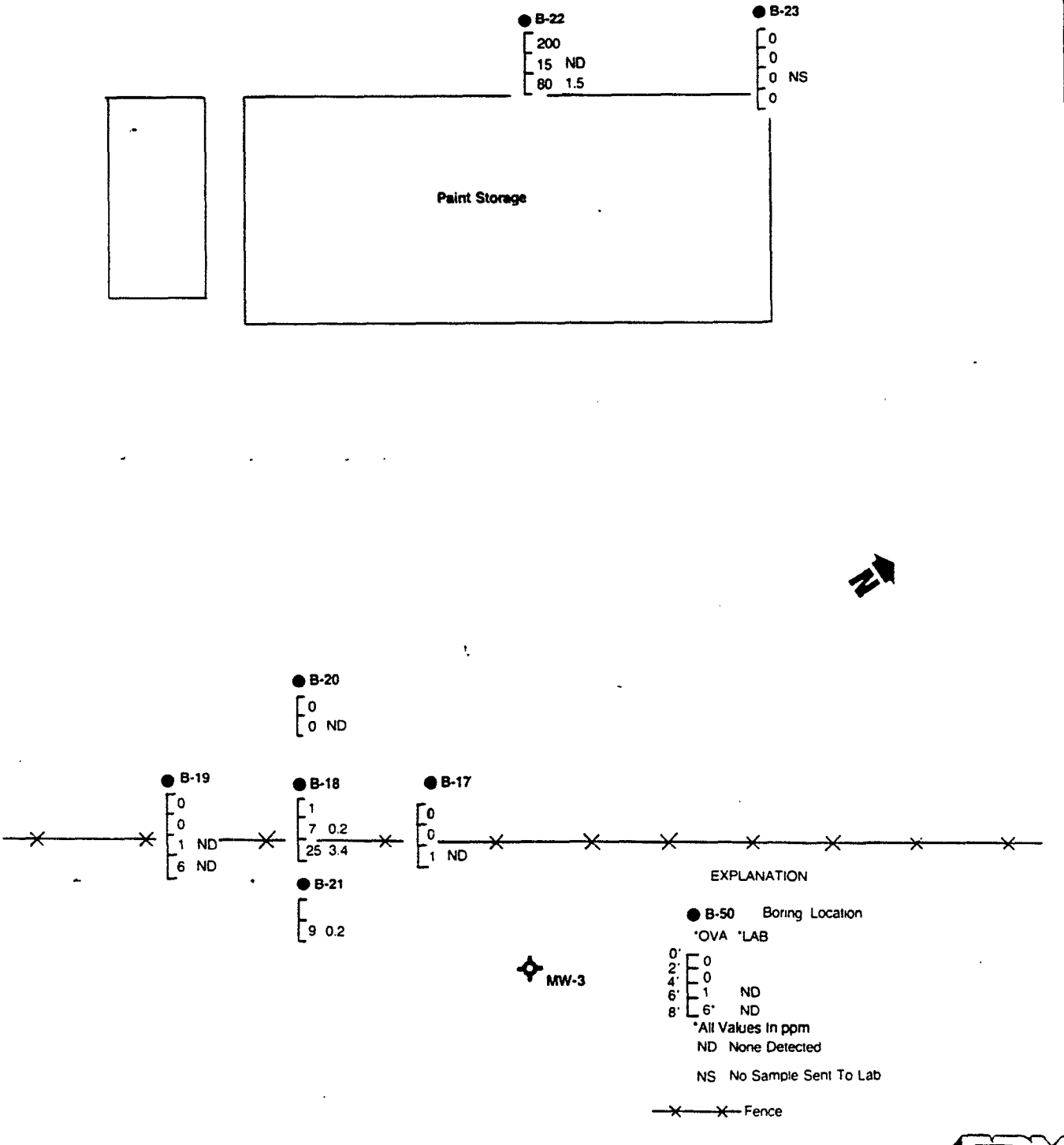
# Figure 4-8F
# TCE Tank Area
# Tolvene Results






AR300744

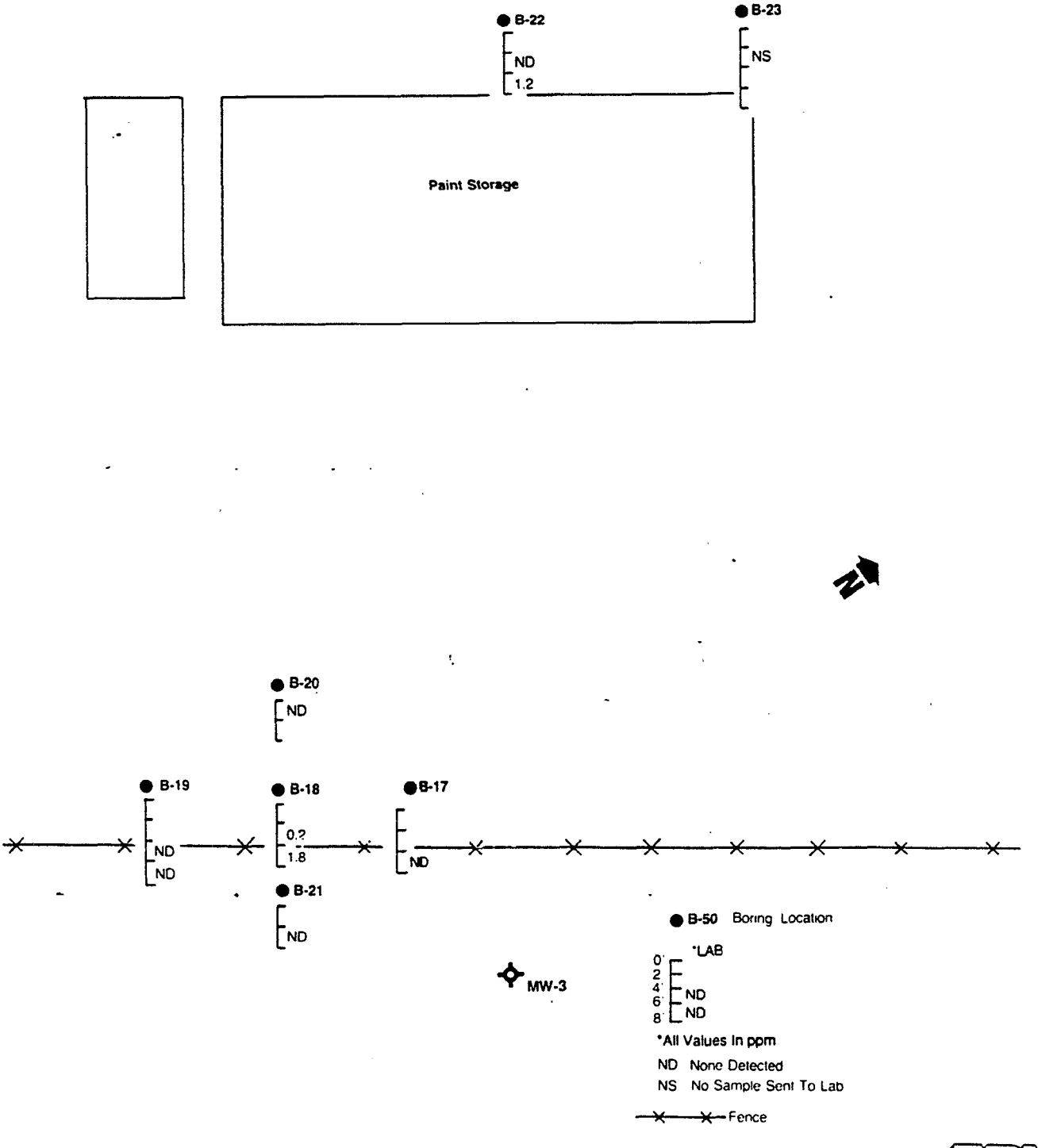
# Figure 4-9A
# Paint Storage Area
# Total VOA Results






AR300745

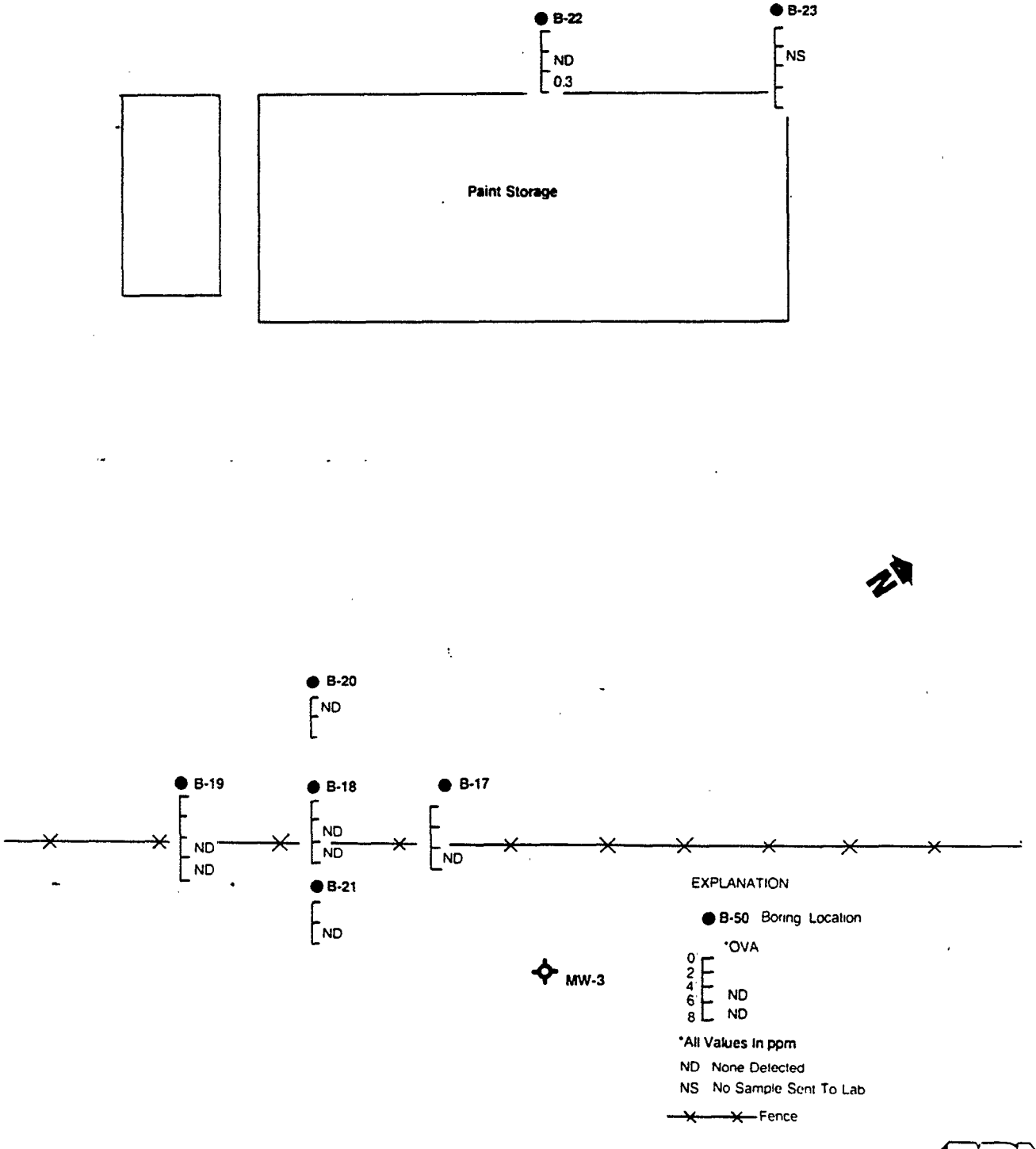
# Figure 4-9B
# Paint Storage Area
# Trichloroethene Results






AR300746

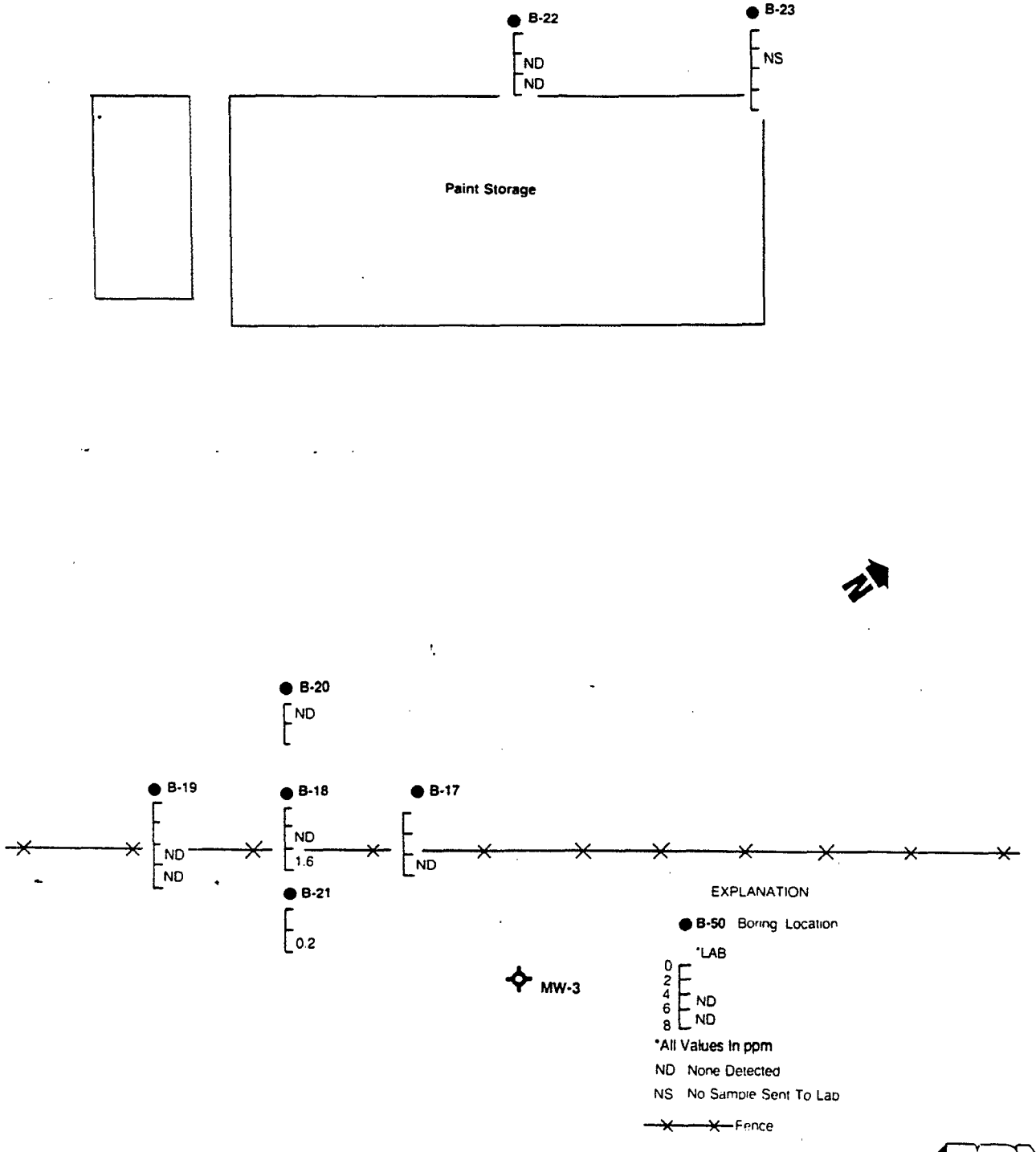
# Figure 4-9C
# Paint Storage Area
# Tetrachloroethene Results






AR300747

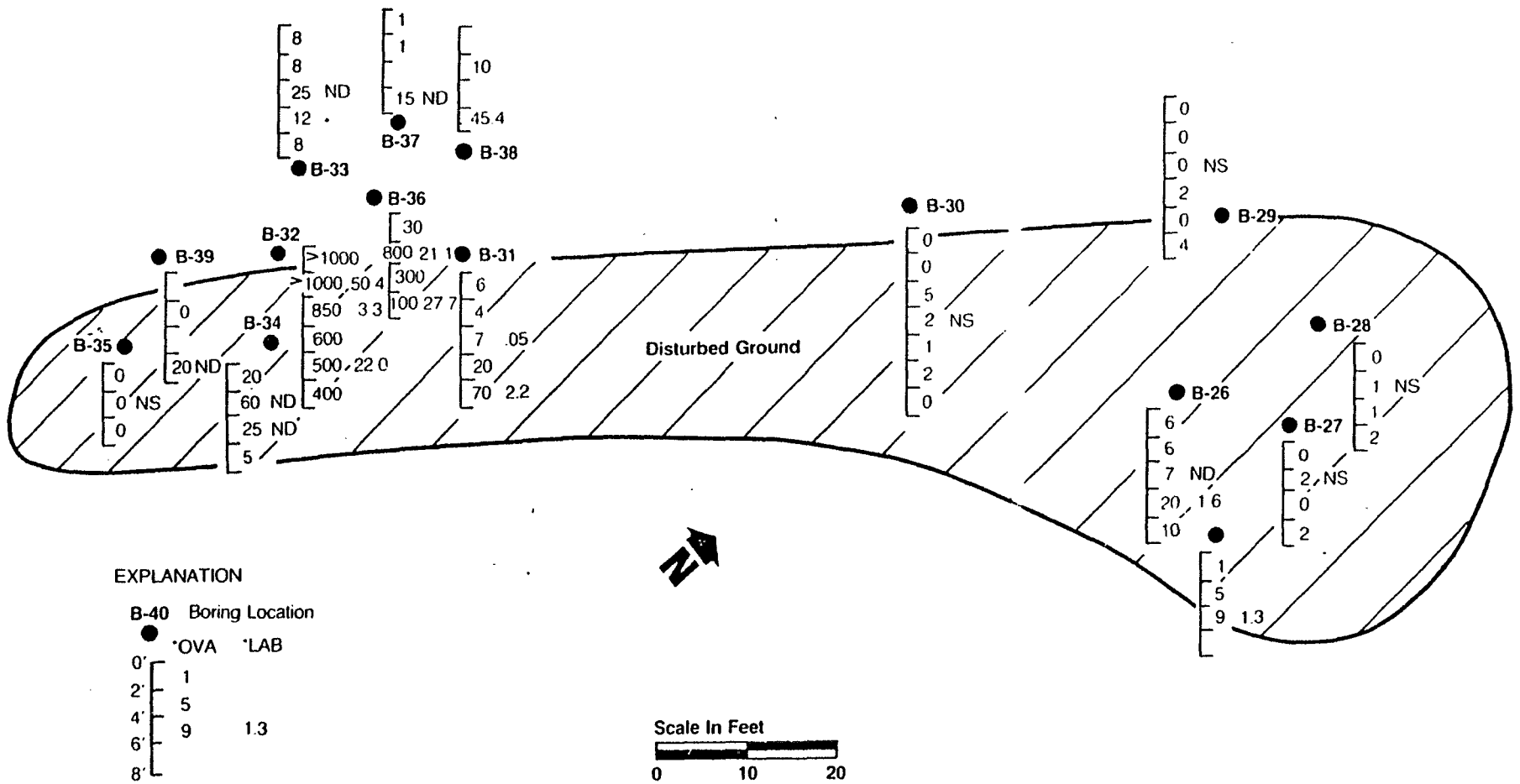
# Figure 4-9D
# Paint Storage Area
# Trans-1,2-Dichloroethene Results






AR300748

# Figure 4-10A
# Wooded Area Behind Plant
# Total VOA Results




*All values in ppm

ND None Detected

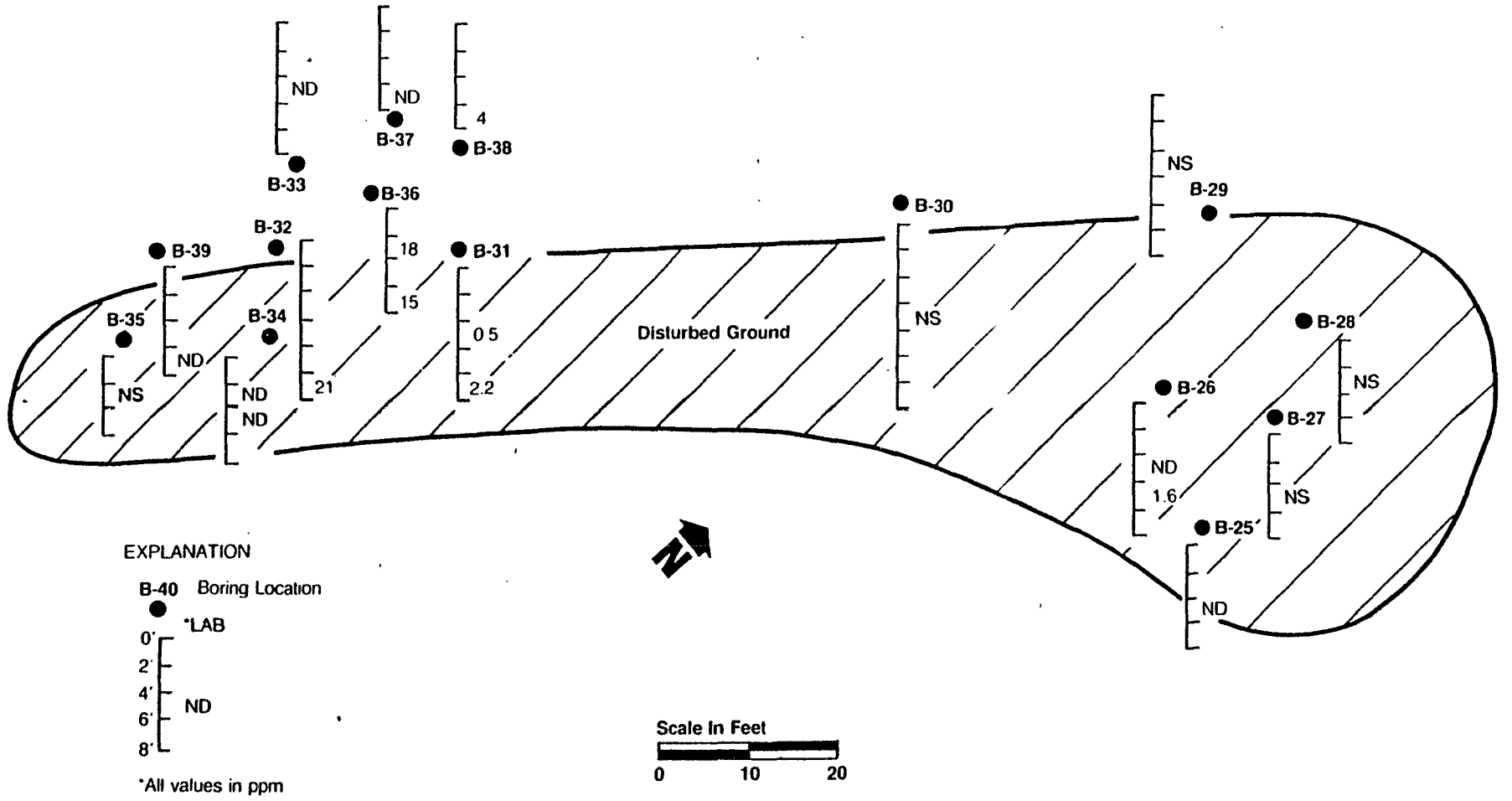
NS No Sample Sent To Lab

The ERM Group



AR300749

# Figure 4-10B
# Wooded Area Behind Plant
# Trichloroethene

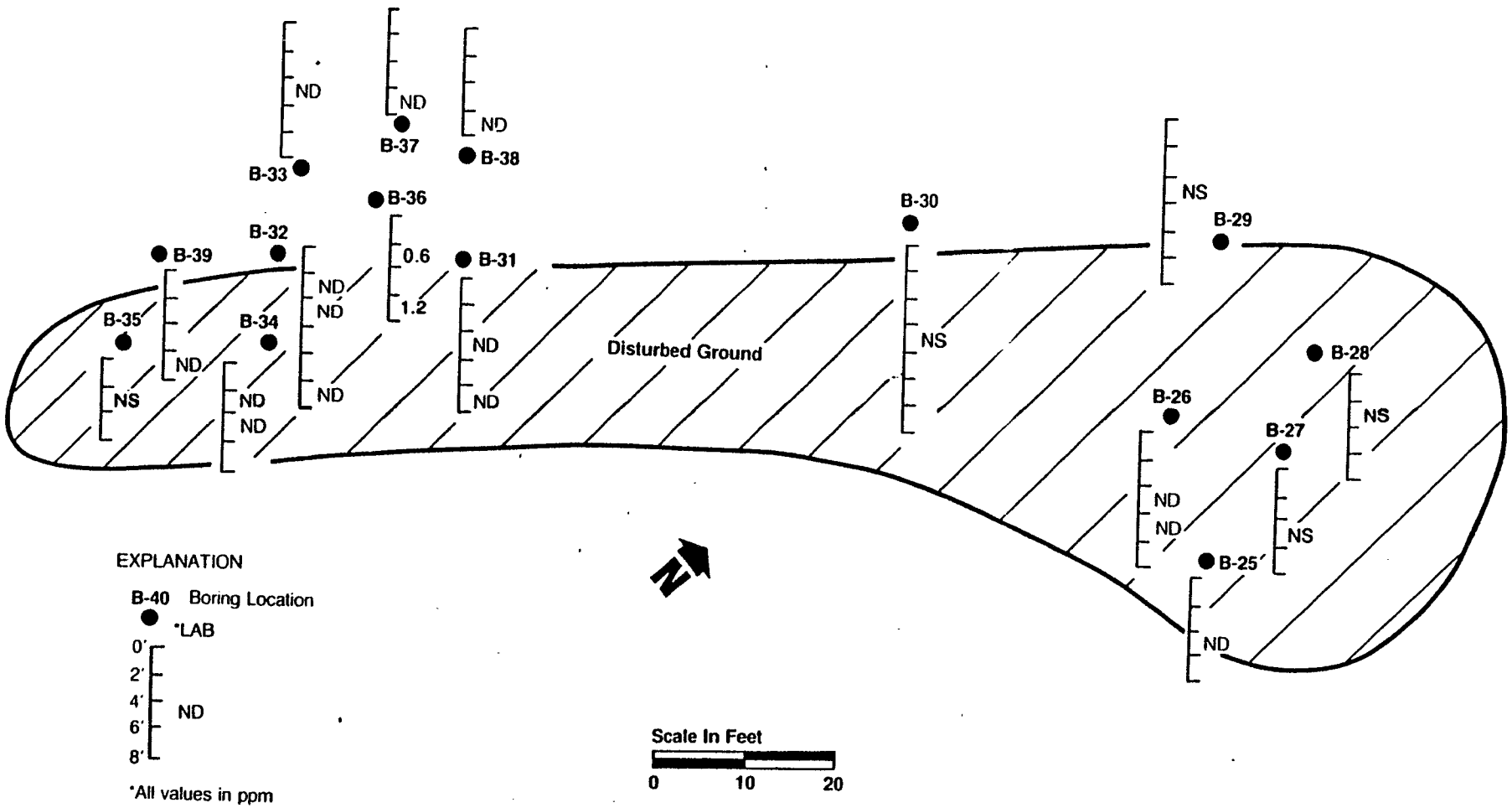





AR300750

The ERM Group

# Figure 4 -10C
## Wooded Area Behind Plant
## 1, 1, 1 - Trichloroethane




The ERM Group



AR300751

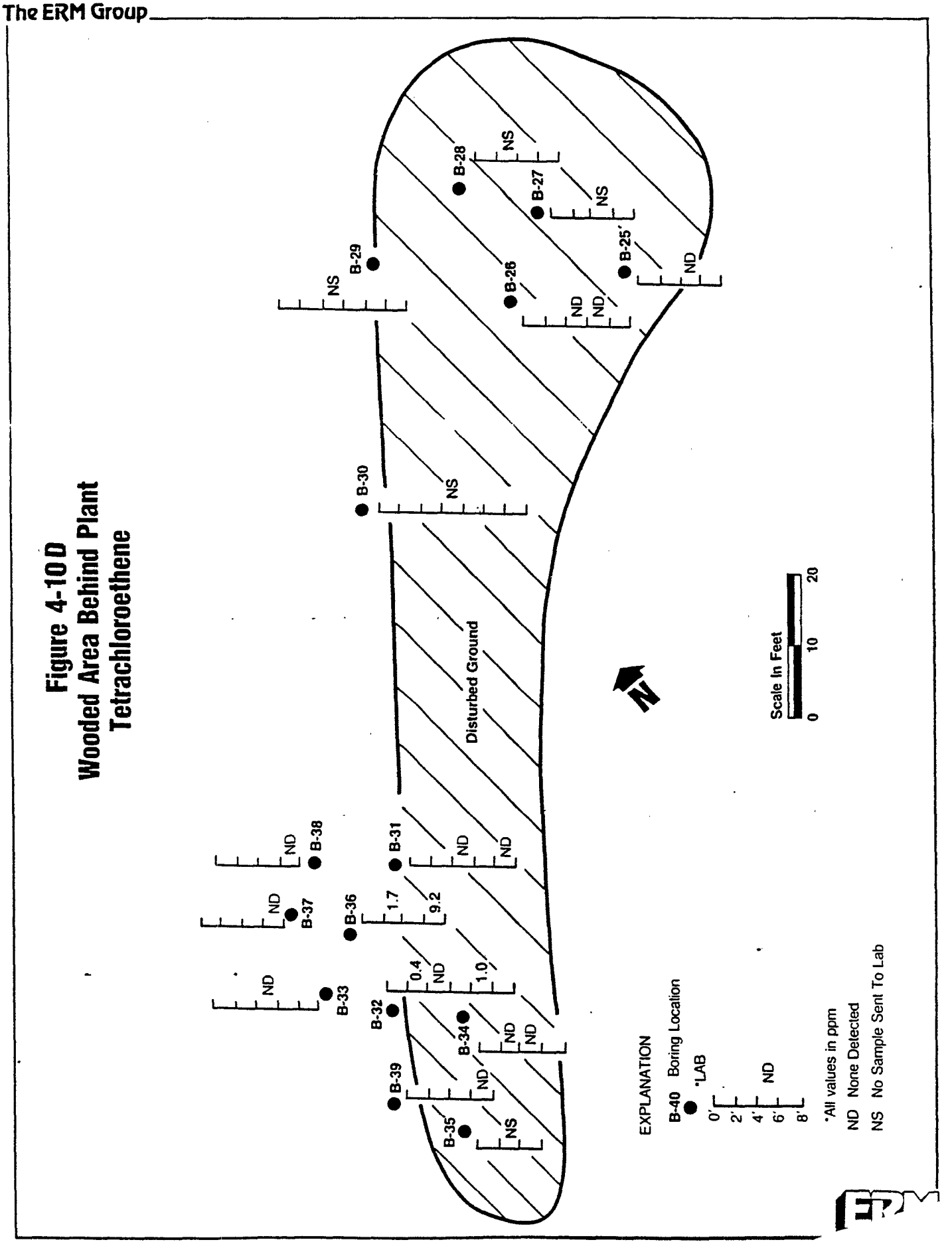
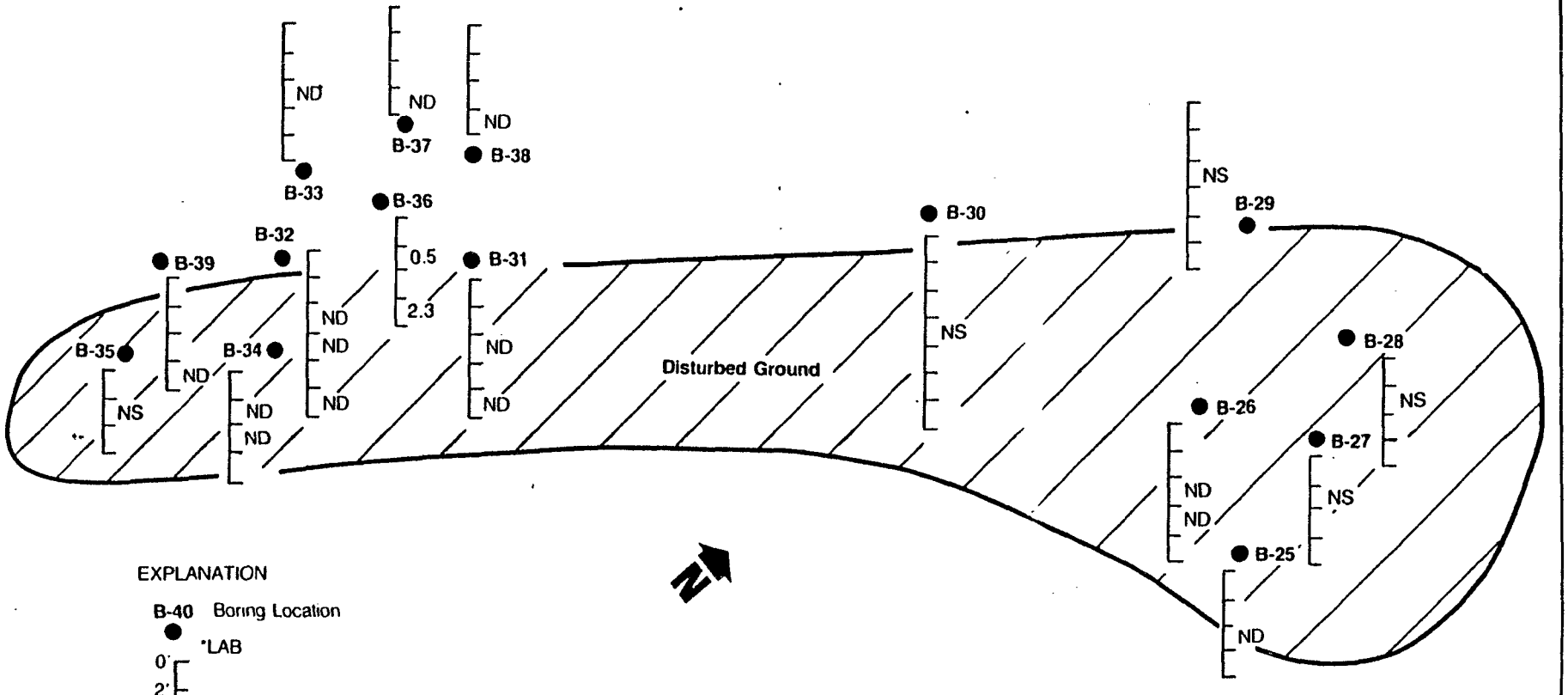


Figure 4-10D
Wooded Area Behind Plant
Tetrachloroethene
B-29
NS
B-28
NS
B-27
NS
B-25'
ND
B-26
ND
ND
B-30
NS
Disturbed Ground
B-38
ND
B-31
ND
ND
B-37
ND
B-36
1.7
9.2
B-33
ND
B-32
0.4
ND
1.0
B-34
ND
ND
B-39
ND
B-35
NS
N
Scale In Feet
0
10
20
EXPLANATION
B-40 Boring Location
*LAB
0'
2'
4'
6'
8'
ND
*All values in ppm
ND None Detected
NS No Sample Sent To Lab



AR300752

# Figure 4-10E
# Wooded Area Behind Plant
# Toluene




*All values in ppm

ND None Detected

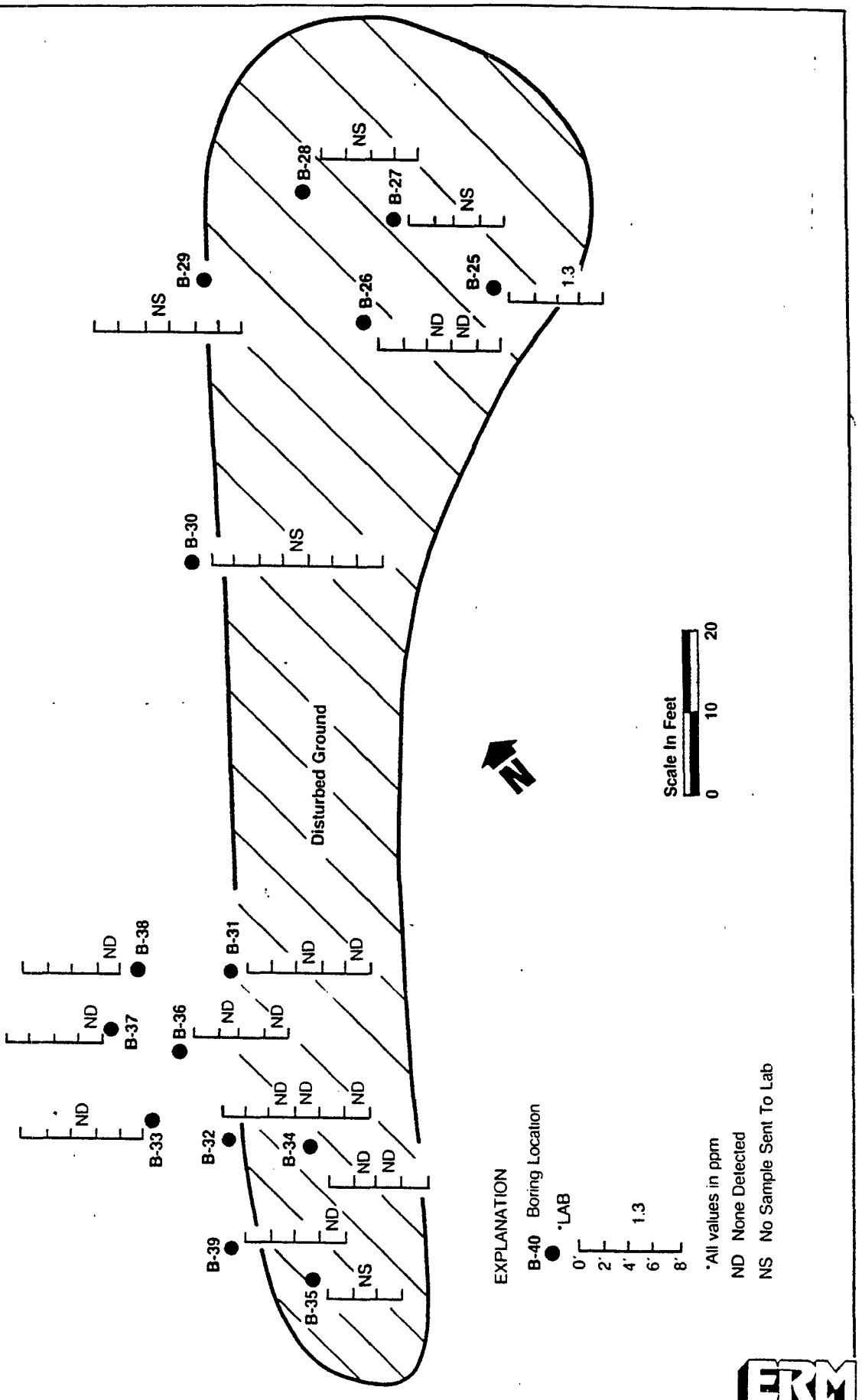
NS No Sample Sent To Lab





AR300753

# Figure 4-10F
# Wooded Area Behind Plant
# Ethylbenzene Results






AR300754

closure and would not have been representative of the soil that underlies the lagoon. Therefore, the sample was not tested.

## 4.6 Ground Water Sampling Survey

Table 4-3 presents the laboratory analysis for the ground water samples collected from the newly installed monitoring well network and the two existing site wells. (Also see Figure 4-11.) Based on the results from these well sample analyses, the contamination in the ground water appears not to be migrating off site. With the exception of Well MW-8, the water samples taken from wells which lie along the perimeter of the site (MW-4, MW-4D, MW-8, MW-8D, MW-9, and MW-9D) revealed that no detectable amounts of volatile organics have reached the outer limits of the site. The presence of toluene in Well MW-8 at a concentration of 10 ppb is presently considered insignificant since the limit of detection for this constituent is also 10 ppb. Based on observed ground water flow directions, it is possible that the toluene, if present, is originating from an off-site source.

The water samples taken from the remaining wells, all located within the perimeter wells, had elevated concentrations of volatile organic contaminants. TCE was detected in all of these wells with the concentrations ranging from 20 to 5,300 ppb. 1,1,1-TCA was detected in all these wells except MW-5, with concentrations ranging from 80 to 2,300 ppb. PCE was detected in Wells MW-3 and MW-5, Well 1, and Well 2 at concentrations ranging from 30 to 90 ppb. In addition, 1,1-dichloroethane, 1,1-dichloroethene, and trans-1,2 dichloroethene were also detected in several of these wells, although it should be noted that these constituents are TCE breakdown products formed through various processes of microbial degradation. Fluorotrichloromethane was also present in some of these wells. This compound is a constituent of most cooling agents found in air conditioning systems and is also referred to as "refrigerant 11".



AR300755

TABLE 4-3
GROUND WATER SAMPLING RESULTS

August 13-14, 1986

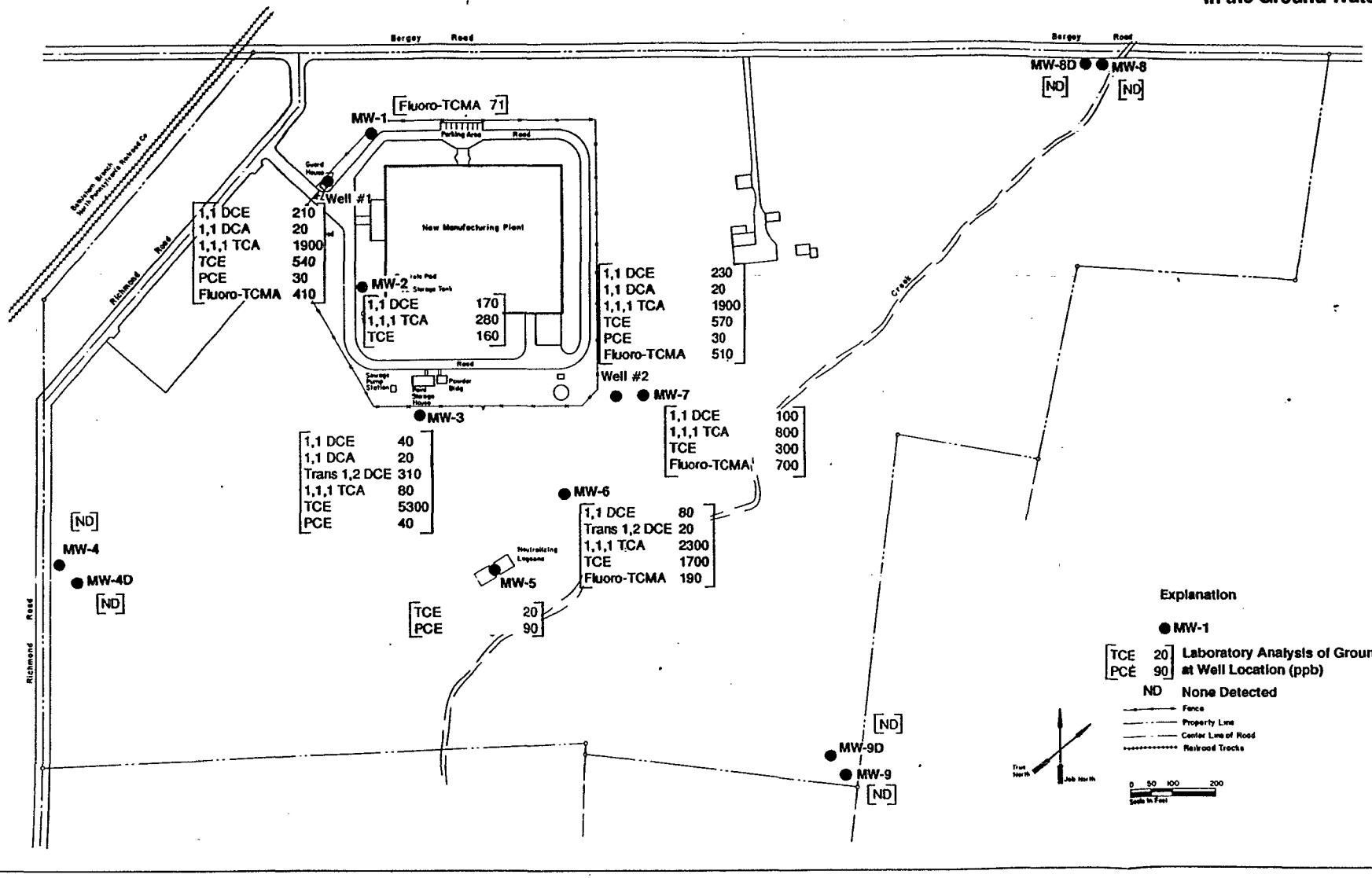
| | 1,1-di-chloro-ethene | 1,1-di-chloro-ethane | trans-1,2 dichloro-ethene | 1,1,1-trichloro-ethane | tri-chloro-ethene | tetra-chloro-ethene | toluene | ethyl-benzene | fluoro-trichloro-methane | Total VOCs* |
|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | ND | ND | ND | ND | ND | ND | ND | ND | 70 | 70 |
| MW-2 | 170 | ND | ND | 280 | 160 | ND | ND | ND | ND | 610 |
| MW-3 | 40 | 20 | 310 | 80 | 5300 | 40 | ND | ND | ND | 5790 |
| MW-4 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| MW-4D | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| MW-5 | ND | ND | ND | ND | 20 | 90 | ND | ND | ND | 110 |
| MW-6 | 80 | ND | 20 | 2300 | 1700 | ND | ND | ND | 190 | 4290 |
| MW-7 | 100 | ND | ND | 800 | 300 | ND | ND | ND | 700 | 1900 |
| MW-8 | ND | ND | ND | ND | ND | ND | 10 | ND | ND | 10 |
| MW-8D | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| MW-9 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| MW-9D | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Well 1 | 210 | 20 | ND | 1900 | 540 | 30 | ND | ND | 410 | 3110 |
| Well 2 | 230 | 20 | ND | 1900 | 570 | 30 | ND | ND | 510 | 3260 |
| Trip blank | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |

Water analysis results in (ppb)
ND - None Detected
*Volatile Organic Compounds



AR300756

# Figure 4-11
# Contaminant Concentrati
# in the Ground Water




AR300757

# SECTION 5

# CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Extent of Contamination

- Significant soil contamination is known to exist down to the top of the bedrock in three separate areas on the Ametek site. The three known areas have been more accurately defined, both vertically and horizontally, in terms of extent of soil contamination. The three areas are as follows, listed in decreasing order in terms of magnitude of contamination:
  - TCE Tank Area to the southwest of the plant
  - The disturbed ground bordering the tree line of the wooded area.
  - The Paint Storage Area to the south of the plant
- The soils are contaminated with 1,1-dichloroethene, trans-1,2 dichloroethene, 1,1,1-trichloroethane, trichloroethene, tetrachloroethene, toluene, and ethylbenzene. The highest total volatile organic compound level was 22,919 ppm in Boring B-14 (TCE Tank Pad).
- A fourth area of minor contamination (both in terms of contaminant concentration and soil volume) from toluene exists in the northeast corner of the former sludge lagoons southeast of the plant.
- Ground water contamination by organic solvents has been found in samples from the plant production wells and the monitoring wells in the central portion of the Ametek site. Due to the active pumping of the Ametek site production wells, this contamination is not currently migrating off site. The ground water on site is contaminated with 1,1-dichloroethene, 1,1-dichloro-ethane, trans-1,2 dichloroethene, 1,1,1-trichloroethane, trichloroethene, tetrachloroethene, toluene, and fluorotrichloromethane.



AR300758

The highest total volatile organic compound level was 5790 ppb in Well MW-3 located southeast of the Paint Storage Building. No contaminants were detected in any of the site perimeter wells.

- Minor toluene contamination present in Well MW-8 at the north edge of the site is questionable because the level reported is at the detection limit. It is possible that this minor contamination, if present, is originating from off-site.

## 5.2 Site Conditions

- While a dense fragipan layer does exist in the soils under the site, the layer does not significantly restrict the flow of water vertically through the soils.

- The water table is formed by a perched layer of water that is present within the soils on the top of the bedrock throughout the site. The presence of this perched water suggests that water is somewhat restricted as it moves down into the deeper aquifer present in the bedrock.

- The upper and lower portions of the bedrock are hydraulically interconnected and form one deeper aquifer. Due to the active pumping of the Ametek Plant site wells, the ground water flow is inward in a radial pattern towards the center of the site. This is currently preventing the contaminated ground water from flowing off site.

- The fault traversing the site is a conduit of high permeability and significant ground water flow which will also act as a major pathway for off-site migration of contaminants, if not controlled by continuous on-site pumping.



AR300759

# APPENDIX A

# SOIL BORING LOGS

AR300760

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: B-1 — Total Depth: 8.50' — Diameter: 6.0"

Surface Elevation: 353.38 — Water Level: Initial 7.45 — 24-hrs. 4.35

Screen: Dia. — Length — Slot Size

Casing: Dia. — Length — Type

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 7-22-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | SS-1 | 0-3.0' Red brown silt, trace clay, trace decomposed red shale, dry, slight odor |
| | | | SS-2 | |
| 5 | | | SS-3 | 3.0-4.0' Brown grey silt, micacious, trace decomposed red shale, dry, no odor |
| | | | SS-4 | |
| 10 | | | | 4.0-6.2' Red brown silt, little decomposed red shale, dry, no odor |
| | | | | 6.2-8.5' Red brown silt and decomposed red shale, damp, no odor |
| 15 | | | | Auger refusal at 8.5' |



AR300761

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: B-2 — Total Depth: 8.80' — Diameter: 6.0"

Surface Elevation: 354.01 — Water Level: Initial: Dry — 24-hrs.: 4.33

Screen: Dia. — Length — Slot Size

Casing: Dia. — Length — Type

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 7-23-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-0.8' Crushed stone |
| | | | SS-1 | 0.8-4.5' Red brown silt, trace clay, trace decomposed red shale, damp, no odor |
| | | | SS-2 | |
| 5 | | | SS-3 | 4.5-8.8' Red brown silt, some decomposed red shale, dry, no odor |
| | | | SS-4 | |
| 10 | | | | Auger refusal at 8.8' |



AR300762

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-3 Total Depth 7.50' Diameter 6.0"

Surface Elevation 353.80 Water Level: Initial Dry 24-hrs. 6.0'

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-22-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | |
| | | | SS-1 | 0-1.0' Red brown silt, trace clay, trace decomposed red shale, dry, no odor |
| | | | SS-2 | 1.0-2.2' Brown grey silt, trace clay, trace decomposed red shale, dry, no odor |
| 5 | | | SS-3 | |
| | | | SS-4 | 2.2-3.5' Red brown silt, some decomposed red shale, dry, no odor |
| | | | | 3.5-4.0' Red brown clay, trace silt, moist, no odor |
| 10 | | | | |
| | | | | 4.0-7.5' Auger refusal at 7.5' |



AR300763

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-4/PT-1D Total Depth 7.00' Diameter 6.0"

Surface Elevation 353.94 Water Level: Initial 4.6 24-hrs. 1.10

Screen: Dia. 2.0" Length 1.0' Slot Size .020

Casing: Dia. 2.0" Length 8.9' Type PVC

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-23-86

Sketch Map

Notes PT-1D installed in Boring B-4

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | |
| | | | SS-1 | 0-2.5' Brown silt, mottled, dry, no odor |
| | | | | 2.5-7.0' Red brown silt, some decomposed red shale, |
| | | | SS-2 | trace clay, dry, no odor |
| 5 | | | SS-3 | |
| | | | | Water encountered at 4.0 feet |
| | | | SS-4 | |
| | | | | Auger refusal at 7.0' |
| 10 | | | | |

PT-1D

| | |
|---|---|
| Total Depth (TOC) | 9.90' |
| Total Depth (TOG) | 6.95' |
| Screen | 1.00' |
| Stick-up | 2.95' |
| Inside Diameter | 0.18' |
| Surface Elevation (TOG) | 353.94' |



AR300764

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD  Owner:

Location: Hatfield, PA  W.O. Number: 449-02

Well Number: PT-1  Total Depth: 3.58'  Diameter: 6.0"

Surface Elevation: 353.84  Water Level: Initial:  24-hrs.:

Screen: Dia. 2.0"  Length: 1.0'  Slot Size: .020

Casing: Dia. 2.0"  Length: 5.08'  Type: PVC

Drilling Company: J.E. Fritts  Drilling Method: HSA

Driller: Ray Miller  Log By: Val F. Britton  Date Drilled: 7-23-86

Sketch Map

Notes
PT - Perk Test Well

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-2.5' Brown silt, mottled, dry, no odor |
| | | | | 2.5-3.58' Red brown silt, some decomposed red shale, trace clay, dry, no odor |
| 5 | | | | |

PT-1

| | |
|---|---|
| Total Depth (TOC) | 6.08' |
| Total Depth (TOG) | 3.58' |
| Screen | 1.00' |
| Stick-up | 2.50' |
| Inside Diameter | 0.17' |
| Surface Elevation (TOG) | 353.84' |



AR300765

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: B-5 — Total Depth: 8.05' — Diameter: 6.0"

Surface Elevation: 354.13 — Water Level: Initial: Dry — 24-hrs.: 2.15

Screen: Dia. — Length — Slot Size

Casing: Dia. — Length — Type

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 7-23-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-1.5' Brown silt, trace decomposed red shale, dry, no odor |
| | | | SS-1 | |
| | | | | 1.5-4.5' Brown silt, trace clay, mottled, damp, no odor |
| | | | SS-2 | |
| 5 | | | SS-3 | |
| | | | | 4.5-8.05' Red brown silt, some decomposed red shale, dry, no odor |
| | | | SS-4 | |
| | | | SS-5 | |
| 10 | | | | Auger refusal at 8.05' |



AR300766

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-6 Total Depth 6.50' Diameter 6.0"

Surface Elevation 354.68 Water Level: Initial Dry 24-hrs. 0.90'

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-23-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | SS-1 | 0-3.0' Red brown silt, little clay, mottled, damp, no odor |
| | | | SS-2 | 3.0-4.2' Red brown silt, trace clay, little decomposed red shale, dry, no odor |
| 5 | | | SS-3 | |
| | | | SS-4 | 4.2-6.5' Red brown silt, trace clay, little decomposed red shale, mottled, damp |
| 10 | | | | Auger refusal at 6.5' |



AR300767

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-7 Total Depth 9.30' Diameter 6.0"

Surface Elevation 354.74 Water Level: Initial Dry 24-hrs. 2.61

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-23-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-1.1' Gravel fill |
| | | | SS-1 | 1.1-2.7' Grey borwn silt, little clay, damp, no odor |
| | | | SS-2 | 2.7-5.0' Red brown silt, trace decomposed red shale, dry, no odor |
| 5 | | | SS-3 | |
| | | | SS-4 | 5.0-9.3' Red brown/grey silt and decomposed red shale, dry, no odor |
| 10 | | | | Auger refusal at 9.30' |



AR300768

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: B-8 — Total Depth: 8.90' — Diameter: 6.0"

Surface Elevation: 353.14 — Water Level: Initial: 3.10 — 24-hrs.: 2.55

Screen: Dia. — Length — Slot Size

Casing: Dia. — Length — Type

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 7-25-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-3.0' Gravel fill, dry, no odor |
| | | | SS-1 | |
| | | | SS-2 | 3.0-5.8' Red brown silt, little clay, mottled, saturated, no odor |
| 5 | | | SS-3 | |
| | | | | 5.8-8.9' Red brown silt and red decomposed shale, |
| | | | SS-4 | saturated, no odor |
| | | | SS-5 | |
| 10 | | | | Auger refusal at 8.90' |



AR300769

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD  Owner:

Location: Hatfield, PA  W.O. Number: 449-02

Well Number: B-9  Total Depth: 8.80'  Diameter: 6.0"

Surface Elevation: 354.06  Water Level: Initial: Dry  24-hrs.: 7.00'

Screen: Dia.:  Length:  Slot Size:

Casing: Dia.:  Length:  Type:

Drilling Company: J.E. Fritts  Drilling Method: HSA

Driller: Ray Miller  Log By: Val F. Britton  Date Drilled: 7-25-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-5.0' Light brown/grey silt, mottled, no odor, dry |
| | | | SS-1 | |
| | | | SS-2 | |
| 5 | | | SS-3 | 5.0-8.8' Red brown silt and decomposed red shale, dry, no odor |
| | | | SS-4 | |
| | | | SS-5 | |
| 10 | | | | Auger refusal at 8.8' |



AR300770

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: B-10 — Total Depth: 10.00' — Diameter: 6.0"

Surface Elevation: 352.87 — Water Level: Initial: Dry — 24-hrs.: 0.60'

Screen: Dia. — Length — Slot Size

Casing: Dia. — Length — Type

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 7-25-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | SS-1 | 0-4.5' Red brown silt, mottled, damp, no odor |
| | | | SS-2 | |
| | | | | 4.5-9.0' Red brown silt, some decomposed red shale, |
| 5 | | | SS-3 | damp, no odor |
| | | | SS-4 | |
| | | | | 9.0-10.0' Red brown decomposed shale, dry, no odor |
| | | | SS-5 | |
| 10 | | | | |
| | | | | Auger refusal at 10.0' |



AR300771

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: B-11 — Total Depth: 9.60' — Diameter: 6.0"

Surface Elevation: 353.02 — Water Level: Initial: Dry — 24-hrs.: 0.95'

Screen: Dia. — Length — Slot Size

Casing: Dia. — Length — Type

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 7-25-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | SS-1 | 0-5.5' Red brown silt, trace clay, mottled, damp, no odor |
| | | | SS-2 | |
| 5 | | | SS-3 | |
| | | | SS-4 | 5.5-9.6' Red brown silt, some decomposed red shale, damp, no odor |
| | | | SS-5 | |
| 10 | | | | Auger refusal at 9.6' |
| | | | | Auger refusal at 10.0' |



AR300772

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-12 Total Depth 6.70' Diameter 6.0"

Surface Elevation 353.76 Water Level: Initial 4.0' 24-hrs. 1.33'

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-28-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | SS-1 | 0-1.5' Red brown silt, little clay, damp, no odor |
| | | | SS-2 | 1.5-4.0' Red brown silt, trace clay, trace decomposed red shale, damp, no odor |
| 5 | | | SS-3 | |
| | | | SS-4 | 4.0-6.8' Red brown silt and decomposed red shale, saturated, no odor |
| 10 | | | | Auger refusal at 6.7' |



AR300773

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-13 Total Depth 8.20' Diameter 6.0"

Surface Elevation 354.82 Water Level: Initial Dry 24-hrs. 2.92'

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-25-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|---|
| 0 | | | | | |
| | | | SS-1 | 0-3.0' | Red brown silt and decomposed red shale, some clay, moist, no odor |
| | | | SS-2 | 3.0-4.0' | Red brown silt, some decomposed grey shale, moist, no odor |
| 5 | | | SS-3 | 4.0-4.5' | Decomposed grey shale, dry, no odor |
| | | | SS-4 | 4.5-8.2' | Decomposed grey shale and grey silt, dry, no odor |
| 10 | | | | | Auger refusal at 8.2' |



AR300774

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-14 Total Depth 9.60' Diameter 6.0"

Surface Elevation 355.19 Water Level: Initial 5.8' 24-hrs. 4.70'

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-28-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-1.0' Concrete and fill material |
| | | | SS-1 | 1.0-6.5' Red brown silt, trace clay, trace decomposed red shale, mottled, moist, strong odor |
| | | | SS-2 | |
| 5 | | | SS-3 | 6.5-7.5' Red brown silt and decomposed red shale, dry, strong odor |
| | | | SS-4 | 7.5-9.6' Red brown silt and decomposed red shale, saturated, strong odor |
| 10 | | | SS-5 | |
| | | | | Auger refusal at 9.6' |



AR300775

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-15 Total Depth 9.50' Diameter 6.0"

Surface Elevation 354.84 Water Level: Initial Dry 24-hrs. Dry

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-28-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-1.0' Pavement and fill material |
| | | | SS-1 | 1.0-3.5' Red brown silt, trace clay, mottled, damp, slight odor |
| | | | SS-2 | |
| 5 | | | | 3.5-6.0' Red brown silt, little decomposed red shale, |
| | | | SS-3 | trace clay, mottled, damp |
| | | | SS-4 | 6.0-9.5' Grey brown/red silt, some decomposed red grey shale, mottled, damp, slight odor |
| 10 | | | SS-5 | |
| | | | | Auger refusal at 9.5' |



AR300776

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-16 Total Depth 8.90' Diameter 6.0"

Surface Elevation 355.02 Water Level: Initial Dry 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 8-6-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-0.5' Concrete |
| | | | | 0.5-4.0' Red brown silt, trace decomposed red shale, |
| | | | SS-1 | dry, no odor |
| | | | SS-2 | |
| 5 | | | | 4.0-8.9' Red brown silt and decomposed red shale, dry, |
| | | | SS-3 | no odor |
| | | | SS-4 | |
| 10 | | | SS-5 | Auger refusal at 8.9' |



AR300777

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-17 Total Depth 6.50' Diameter 6.0"

Surface Elevation 351.43 Water Level: Initial 5.5 24-hrs. 2.25

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-24-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-0.3' Top soil |
| | | | SS-1 | 0.3-4.8' Red brown silt, some decomposed red shale, dry, no odor |
| | | | SS-2 | |
| | | | | 4.8-5.5' Red brown silt, some decomposed red shale, wet, |
| 5 | | | SS-3 | no odor |
| | | | | 5.5-6.5' Red brown silt and decomposed red shale, dry, no odor |
| 10 | | | | |
| | | | | Auger refusal at 6.5' |



AR300778

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-18 Total Depth 6.10' Diameter 6.0"

Surface Elevation 351.03 Water Level: Initial 1.5' 24-hrs. 0.08

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Rav Miller Log By Val F. Britton Date Drilled 7-24-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | |
| | | | SS-1 | 0-0.5' Brown-red silt, some decomposed red shale, dry, slight odor |
| | | | SS-2 | 0.5-6.1' Brown-red silt, some decomposed red shale, saturated, slight odor |
| 5 | | | SS-3 | |
| | | | | Auger refusal at 6.1' |
| 10 | | | | |



AR300779

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-19 Total Depth 7.20' Diameter 6.0"

Surface Elevation 351.29 Water Level: Initial 6.2' 24-hrs. 2.70

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-24-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | |
| | | | SS-1 | 0-3.0' Red brown silt, mottled, dry, no odor |
| | | | | 3.0-4.0' Red brown silt, little decomposed red shale, |
| | | | SS-2 | dry, no odor |
| 5 | | | SS-3 | 4.0-6.0' Red brown silt and decomposed red shale, |
| | | | | saturated, no odor |
| | | | SS-4 | |
| | | | | 6.0-7.0' Red brown silt and decomposed red shale, dry, |
| | | | | no odor |
| 10 | | | | |
| | | | | Auger refusal at 7.2' |



AR300780

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-20 Total Depth 4.00' Diameter 6.0"

Surface Elevation 351.33 Water Level: Initial Dry 24-hrs. 1.25

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-24-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-4.0' Red brown silt, little decomposed red shale, |
| | | | SS-1 | dry, no odor |
| | | | SS-2 | |
| | | | | Auger refusal at 4.0' |
| 5 | | | | |
| 10 | | | | |



AR300781

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: B-21 — Total Depth: 3.90' — Diameter: 6.0"

Surface Elevation: 351.04 — Water Level: Initial 1.6' — 24-hrs. 0.05

Screen: Dia. — Length — Slot Size

Casing: Dia. — Length — Type

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 7-24-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-1.5' Red brown silt and decomposed red shale, dry, no odor |
| | | | SS-1 | |
| | | | | 1.5-3.9' Red brown silt and decomposed red shale, saturated, no odor |
| 5 | | | | |
| | | | | Auger refusal at 3.9' |
| 10 | | | | |



AR300782

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD  Owner:

Location: Hatfield, PA  W.O. Number: 449-02

Well Number: B-22  Total Depth: 5.50'  Diameter: 6.0"

Surface Elevation: 351.78  Water Level: Initial:  24-hrs.:

Screen: Dia.:  Length:  Slot Size:

Casing: Dia.:  Length:  Type:

Drilling Company: J.E. Fritts  Drilling Method: HSA

Driller: Ray Miller  Log By: Val F. Britton  Date Drilled: 7-29-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | SS-1 | 0-2.2' Red brown silt, mottled, damp, no odor |
| | | | SS-2 | 2.2-5.6' Red brown silt, little decomposed red shale, damp, no odor |
| 5 | | | SS-3 | (Water encountered at 4.0' to 5.0'; an oily sheen is present; dry at 5.0-5.6') |
| 10 | | | | Auger refusal at 5.6' |



AR300783

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-23 Total Depth 7.60' Diameter 6.0"

Surface Elevation 351.59 Water Level: Initial 7.0' 24-hrs.

Screen: Dia. 2" Length 1.00' Slot Size .020

Casing: Dia. 2" Length 9.09 Type PVC

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-29-86

Sketch Map

Notes
PT-2D was installed in Boring B-23

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | |
| | | | SS-1 | 0-5.5' Red brown silt, some decomposed red shale, damp, no odor (saturated 4.0-5.5') |
| | | | SS-2 | 5.5-7.6' Red brown silt and decomposed red brown shale, dry, no odor |
| 5 | | | SS-3 | |
| | | | SS-4 | Auger refusal at 7.6' |
| 10 | | | | |

PT-2D

| | |
|---|---|
| Total Depth (TOC) | 10.08' |
| Total Depth (TOG) | 7.58' |
| Screen | 1.00' |
| Stick-up | 2.50' |
| Inside Diameter | 0.18' |
| Surface Elevation | 351.59' |



AR300784

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number PT-2 Total Depth 3.93' Diameter 6.0"

Surface Elevation 351.62 Water Level: Initial 24-hrs.

Screen: Dia. 2" Length 1.00' Slot Size .020

Casing: Dia. 2" Length 5.03 Type PVC

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-29-86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-3.93' Red brown silt, some decomposed red shale, damp, no odor |
| 5 | | | | |

PT-2

| | |
|---|---|
| Total Depth (TOC) | 6.03' |
| Total Depth (TOG) | 3.93' |
| Screen | 1.00' |
| Stick-up | 2.10' |
| Inside Diameter | 0.17' |
| Surface Elevation | 351.62' |



AR300785

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-24 Total Depth 7.80' Diameter 6.0"

Surface Elevation 353.97 Water Level: Initial Dry 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-29-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | SS-1 | 0-2.0' Red brown silt, mottled, damp, no odor |
| | | | SS-2 | 2.0-4.5' Grey silt, mottled, damp, no odor |
| 5 | | | SS-3 | 4.5-7.8' Red brown silt and decomposed red shale, damp, no odor |
| | | | SS-4 | |
| 10 | | | | Auger refusal at 7.8' |



AR300786

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: B-25 — Total Depth: 5.20' — Diameter: 6.0"

Surface Elevation: 343.78 — Water Level: Initial: 4.80 — 24-hrs.: 3.5

Screen: Dia. — Length — Slot Size

Casing: Dia. — Length — Type

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 7-29-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-1.0' Red brown silt, wet, slight odor |
| | | | SS-1 | 1.0-2.3' Red brown silt, trace clay, slight odor, wet, sheen, mottled |
| | | | SS-2 | |
| | | | | 2.3-5.2' Red brown silt and decomposed red shale, slight |
| 5 | | | SS-3 | odor, sheen |
| | | | | Auger refusal at 5.2' |
| 10 | | | | |



AR300787

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: B-26 — Total Depth: 8.50' — Diameter: 6.0"

Surface Elevation: 345.53 — Water Level: Initial: Dry — 24-hrs.:

Screen: Dia.: — Length: — Slot Size:

Casing: Dia.: — Length: — Type:

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Rav Miller — Log By: Val F. Britton — Date Drilled: 7-30-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | |
| | | | SS-1 | 0-2.5' Red brown disturbed silt, mottled, damp, no odor |
| | | | SS-2 | 2.5-4.5' Red brown silt, little decomposed red shale, mottled, damp, no odor |
| 5 | | | SS-3 | |
| | | | | 4.5-6.0' Red brown silt and decomposed red shale, mottled, damp, no odor |
| | | | | 6.0-8.5' Brown silt and decomposed grey-black siltstone, damp, no odor |
| 10 | | | | |
| | | | | Auger refusal at 8.5' |



AR300788

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-27 Total Depth 6.20' Diameter 6.0"

Surface Elevation 345.79 Water Level: Initial Dry 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-30-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-5.5' Red brown silt, trace decomposed red shale, |
| | | | SS-1 | damp, mottled, no odor |
| | | | SS-2 | |
| 5 | | | SS-3 | 5.5-6.2' Brown silt and red-brown decomposed shale, dry, |
| | | | SS-4 | no odor |
| 10 | | | | Auger refusal at 6.2' |



AR300789

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-28 Total Depth 7.00' Diameter 6.0"

Surface Elevation 345.23 Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-30-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | SS-1 | 0-2.5' Brown silt, damp, no odor |
| | | | SS-2 | 2.5-5.0' Red brown silt, some decomposed red shale, mottled, damp, no odor |
| 5 | | | SS-3 | 5.0-7.0' Light brown silt and decomposed red shale, dry, no odor |
| | | | SS-4 | |
| 10 | | | | Auger refusal at 7.0' |



AR300790

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-29 Total Depth 10.90' Diameter 6.0"

Surface Elevation 346.33 Water Level: Initial Dry 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-30-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | |
| | | | SS-1 | 0-2.2' Red brown silt, little decomposed red shale, mottled, damp, no odor |
| | | | SS-2 | 2.2-6.0' Red brown silt and decomposed grey angular shale, dry, no odor |
| 5 | | | SS-3 | |
| | | | SS-4 | 6.0-7.0' Red brown/grey silt, damp, no odor |
| | | | SS-5 | 7.0-10.9' Red brown silt and decomposed grey shale, damp, no odor |
| 10 | | | SS-6 | |
| | | | | Auger refusal at 10.9' |



AR300791

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:
Location: Hatfield, PA — W.O. Number: 449-02
Well Number: B-30 — Total Depth: 13.00' — Diameter: 6.0"
Surface Elevation: 347.10 — Water Level: Initial: Dry — 24-hrs.:
Screen: Dia.: — Length: — Slot Size:
Casing: Dia.: — Length: — Type:
Drilling Company: J.E. Fritts — Drilling Method: HSA
Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 7-30-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | SS-1 | 0-5.0' Red brown silt, trace clay, trace decomposed red shale, damp, no odor |
| | | | SS-2 | |
| 5 | | | SS-3 | 5.0-6.5' Light brown silt, trace decomposed red brown shale, dry, no odor |
| | | | SS-4 | |
| | | | SS-5 | 6.5-8.0' Light brown silt and decomposed red brown shale dry, no odor |
| 10 | | | SS-6 | 8.0-8.3' Red brown silt and decomposed grey shale, damp, no odor |
| | | | SS-7 | 8.3-10.0' Decomposed grey shale and red brown silt, damp, no odor |
| | | | | 10.0-13.0' Decomposed grey shale, damp, no odor |
| | | | | Auger refusal at 13.0' |



AR300792

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD  Owner:

Location: Hatfield, PA  W.O. Number: 449-02

Well Number: B-31/PT-3D  Total Depth: 9.60'  Diameter: 6.0"

Surface Elevation: 347.66  Water Level: Initial:  24-hrs.:

Screen: Dia.: 2.0"  Length: 1.0'  Slot Size: .020

Casing: Dia.: 2.0"  Length: 10.76  Type: PVC

Drilling Company: J.E. Fritts  Drilling Method: HSA

Driller: Ray Miller  Log By: Val F. Britton  Date Drilled: 7-31-86

Sketch Map

Notes: PT-3D installed in Boring B-31

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | |
| | | | SS-1 | 0-1.5' Brown silt, mottled, dry, no odor |
| | | | | 1.5-8.0' Light brown silt and decomposed red brown |
| | | | SS-2 | shale, mottled, dry, no odor |
| 5 | | | SS-3 | |
| | | | | 8.0-9.6' Light brown silt and decomposed red brown |
| | | | SS-4 | shale, mottled, saturated, no odor |
| | | | SS-5 | |
| 10 | | | | |
| | | | | Auger refusal at 9.5' |

PT-3D

| | |
|---|---|
| Total Depth (TOC) | 11.76' |
| Total Depth (TOG) | 9.16' |
| Screen | 1.00' |
| Stick-up | 2.60' |
| Inside diameter | 0.17' |
| Surface Elevation | 347.66' |



AR300793

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number PT-3 Total Depth 3.01' Diameter 6.0"

Surface Elevation 347.51 Water Level: Initial 24-hrs.

Screen: Dia. 2.0" Length 1.0' Slot Size .020

Casing: Dia. 2.0" Length 5.15 Type PVC

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-31-86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-1.5' Brown silt, mottled, no odor |
| | | | | 1.5-3.01' Light brown silt and decomposed red brown shale, mottled, no odor |
| 5 | | | | |
| | | | | PT-3 |
| 10 | | | | Total Depth (TOC) 6.15' |
| | | | | Total Depth (TOG) 3.01' |
| | | | | Screen 1.00' |
| | | | | Stick-up 3.14' |
| | | | | Inside Diameter 0.17' |
| | | | | Surface Elevation 347.51' |



AR300794

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-32 Total Depth 11.3' Diameter 6.0"

Surface Elevation 347.86 Water Level: Initial 10.70' 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-31-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-1.0' Red brown silt, damp, strong odor |
| | | | SS-1 | |
| | | | | 1.0-3.0' Red brown silt, saturated, strong odor |
| | | | SS-2 | |
| | | | | 3.0-6.3' Red brown silt, little decomposed red shale, |
| 5 | | | SS-3 | damp, strong odor |
| | | | SS-4 | 6.3-10.0' Brown red decomposed red shale, some silt, |
| | | | | damp, strong odor |
| | | | SS-5 | |
| 10 | | | | 10.0-11.3' Decomposed red brown shale, moist, slight odor |
| | | | | Auger refusal at 11.3' |

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-33 Total Depth 8.5' Diameter 6.0"

Surface Elevation 347.70 Water Level: Initial 7.2 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-31-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | SS-1 | 0-3.0' Red brown silt, mottled, damp, no odor |
| | | | SS-2 | 3.0-6.0' Red brown silt, trace decomposed red shale, mottled, damp, no odor |
| 5 | | | SS-3 | |
| | | | SS-4 | 6.0-7.5' Red brown silt, some decomposed red shale, damp, no odor |
| | | | SS-5 | |
| 10 | | | | 7.5-8.5' Red brown decomposed shale and red brown silt, saturated, no odor |
| | | | | Auger refusal at 8.5' |



AR300796

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: B-34 — Total Depth: 9.5' — Diameter: 6.0"

Surface Elevation: 347.35 — Water Level: Initial: — 24-hrs.:

Screen: Dia.: — Length: — Slot Size:

Casing: Dia.: — Length: — Type:

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 7-31-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | SS-1 | 0-1.5' Red brown silt, mottled, wet, strong odor |
| | | | SS-2 | 1.5-4.0' Red brown silt, mottled, strong odor, damp |
| 5 | | | SS-3 | 4.0-9.5' Red brown silt and decomposed red shale, damp, slight odor |
| | | | SS-4 | |
| 10 | | | | Auger refusal at 9.5' |



AR300797

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: B-35 — Total Depth: 6.0' — Diameter: 6.0"

Surface Elevation: 347.45 — Water Level: Initial — 24-hrs.

Screen: Dia. — Length — Slot Size

Casing: Dia. — Length — Type

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 7-31-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | SS-1 | 0-5.5' Red brown silt, little decomposed red shale, damp, strong odor |
| | | | SS-2 | |
| 5 | | | SS-3 | 5.5-6.0' Red brown decomposed shale and silt, damp, slight odor |
| 10 | | | | Auger refusal at 6.0'. |



AR300798

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: B-36 — Total Depth: 7.5' — Diameter: 6.0"

Surface Elevation: 347.74 — Water Level: Initial: — 24-hrs.:

Screen: Dia.: — Length: — Slot Size:

Casing: Dia.: — Length: — Type:

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 7-31-86

Sketch Map

Notes: Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | |
| | | | SS-1 | 0-1.5' Brown silt and gravel fill, damp, slight odor |
| | | | SS-2 | 1.5-7.5' Red brown silt, trace decomposed red brown shale, damp, slight odor |
| 5 | | | SS-3 | |
| | | | SS-4 | |
| | | | | Auger refusal at 7.5' |
| 10 | | | | |



AR300799

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-37 Total Depth 10.0' Diameter 6.0"

Surface Elevation 347.55 Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Rav Miller Log By Val F. Britton Date Drilled 7-31-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | SS-1 | 0-1.5' Brown silt and gravel fill, no odor, damp |
| | | | SS-2 | 1.5-8.0' Red brown silt, trace decomposed red shale, mottled, damp, no odor |
| 5 | | | SS-3 | 8.0-10.0' Decomposed red shale |
| 10 | | | | Auger refusal at 10.0' |



AR300800

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-38 Total Depth 8.0' Diameter 6.0"

Surface Elevation 347.32 Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-31-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-1.5' Brown silt with gravel fill |
| | | | | 1.5-5.5' Red brown silt,mottled, damp, no odor |
| | | | SS-1 | |
| 5 | | | | 5.5-8.0' Red brown silt and decomposed red brown shale, saturated, no odor |
| | | | SS-2 | |
| 10 | | | | Auger refusal at 8.0' |



AR300801

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number B-39 Total Depth 8.2' Diameter 6.0"

Surface Elevation 347.85 Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 7-31-86

Sketch Map

Notes

Boring only

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-1.0' Brown silt, dry, no odor |
| | | | SS-1 | 1.0-6.5' Red brown silt, trace decomposed red shale, damp, no odor |
| 5 | | | | |
| | | | SS-2 | 6.5-8.2' Red brown silt and decomposed red shale, saturated, no odor |
| 10 | | | | Auger refusal at 8.2' |



AR300802

# APPENDIX B

## MONITORING WELL DRILLING LOGS

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD  Owner:

Location: Hatfield, PA  W.O. Number: 449-02

Well Number: MW-1  Total Depth: 35.00'  Diameter: 6.0"

Surface Elevation: 354.38  Water Level: Initial 17.68'  24-hrs. 18.50'

Screen: Dia. 2"  Length 20.00'  Slot Size 20.00'

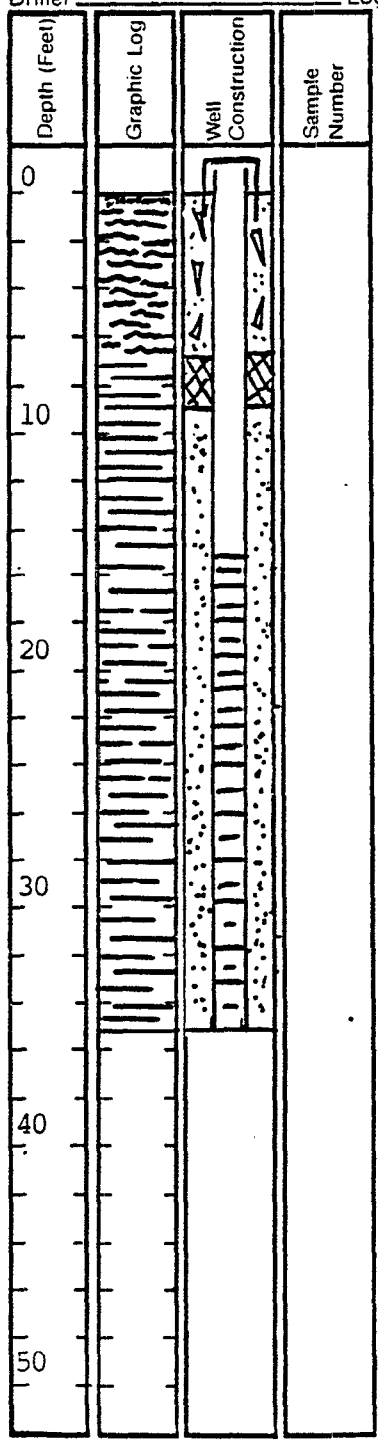
Casing: Dia. 2"  Length 15.00'  Type PVC Sch.40

Drilling Company: C.S. Garber  Drilling Method: Air Hammer

Driller: Greg Herbst  Log By: F.D.Smith  Date Drilled: 7-31-86

Sketch Map

Notes: injected water to control dust




Description/Soil Classification
(Color, Texture, Structures)

| | |
|---|---|
| 0-0.5' | Brown top soil |
| 0.5-5.0' | Dark red brown silt with trace clay and shale fragments |
| 5.0-7.0' | Red brown weathered shale with trace silt, dry, no odor |
| 7.0-14.0' | Same, dry, no odor |
| 14.0-23.0' | Red brown shale, dry, no odor |
| 23.0-25.0' | Same, dry, no odor |
| 25.0-35.0' | Same, dry, no odor |
| | Wet at 33' |
| | Total depth 35.0' rate <1.0 gpm (est.) |
| | Screen 35 to 15' |
| | Solid 15 to G/L |
| | Sand 35 to 9.5' |
| | Bentonite 9.5 to 7.5' |
| | Grout 7.5 to G/L |
| | Stick-up 2.0' |



AR300804

**Environmental Resources Management**

# Drilling Log

Project Ametek Owner

Location Hatfield, PA W.O. Number 449-02

Well Number MW-2 Total Depth 35.00' Diameter 6"

Surface Elevation 355.34 Water Level: Initial 21.0' 24-hrs. 25.20'

Screen: Dia. 2" Length 20.00' Slot Size 20.00'

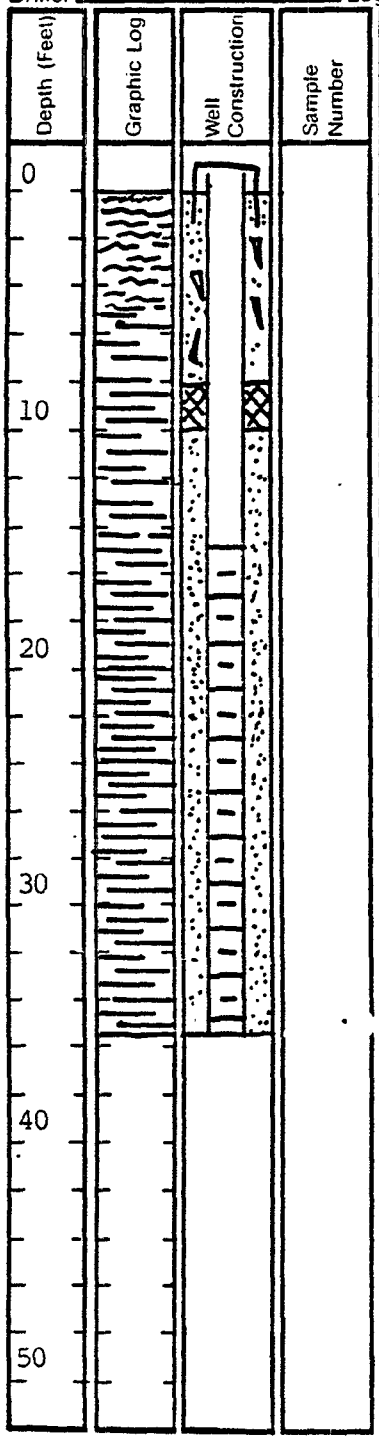
Casing: Dia. 2" Length 15.00' Type PVS Sch.40

Drilling Company C.S. Garber Drilling Method Air Hammer

Driller Greg Herbst Log By F.D.Smith Date Drilled 7-31-86

Sketch Map

Notes injected water to control dust




Description/Soil Classification (Color, Texture, Structures)

| | |
|---|---|
| 0-0.5'. | Brown top soil. |
| 0.5-5.0' | Dark red brown silt with trace clay and shale fragments |
| 5.0-7.0' | Red brown weathered shale with trace silt, dry, no odor |
| 7.0-14.0' | Same, dry, no odor |
| 14.0-23.0' | Red brown shale, dry, no odor |
| 23.0-25.0 | Same, dry, no odor |
| 25.0-35.0 | Same, dry, no odor |
| Wet at 33' | |

Total depth 35.0' rate <1.0 gpm (est.)

Screen 35 to 15'
Solid 15 to G/L
Sand 35 to 10.0'
Bentonite 10.0' to 8.0'
Grout 8.0 to G/L
Stickup 2.0'



AR300805

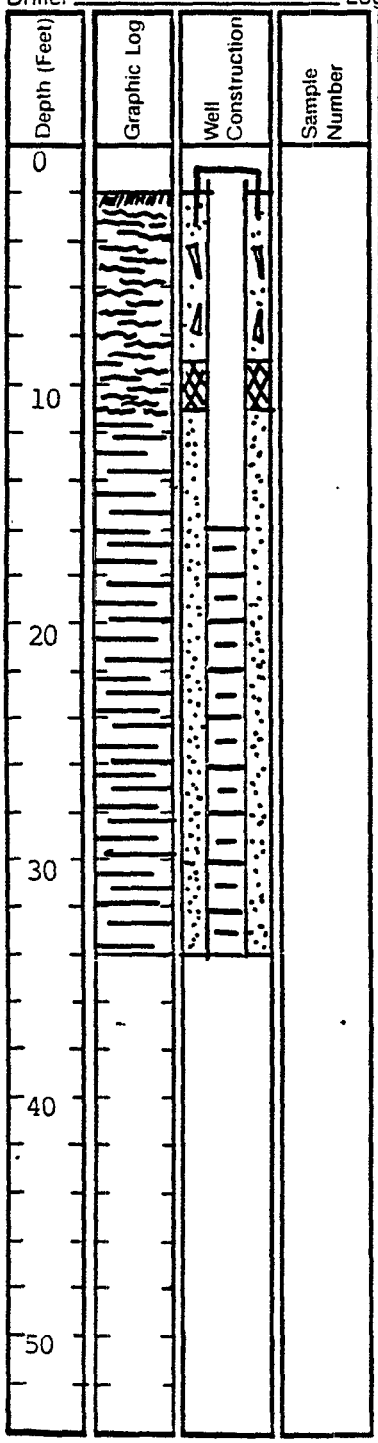
**Environmental Resources Management**

# Drilling Log

Project: Ametek — Owner:
Location: Hatfield, PA — W.O. Number: 449-02
Well Number: MW-3 — Total Depth: 35.00' — Diameter: 6"
Surface Elevation: 353.12 — Water Level: Initial: 30.0' — 24-hrs.:
Screen: Dia.: 2" — Length: 20.00' — Slot Size: 20.00'
Casing: Dia.: 2" — Length: 14.00' — Type: PVC Sch.40
Drilling Company: C.S. Garber — Drilling Method: Air Hammer
Driller: Greg Herbst — Log By: F.D.Smith — Date Drilled: 8-1-86

Sketch Map

Notes: Injected water to control dust




Description/Soil Classification
(Color, Texture, Structures)

0-0.5'. Brown top soil.

0.5-11.0' Red brown clayey silt with shale fragments, dry, no odor.

11.0-16.0' Red brown weathered shale, dry, no odor, trace silt

16.0-25.0' Red brown shale, dry, no odor

25.0-35.0' Same, dry, no odor

Total depth 35.0' rate <1.0 gpm (est.)

Note: Hole caved to 34'

Screen 35 to 14'
Solid 14 to G/L
Sand 34 to 9.5'
Bentonite 9.5 to 7.5'
Grout 7.5 to G/L
Stickup 2.0'



AR300806

**Environmental Resources Management**

# Drilling Log

Project Ametek Owner

Location Hatfield, PA W.O. Number 449-02

Well Number MW-4 Total Depth 35.00' Diameter 6"

Surface Elevation 354.37 Water Level: Initial 15.00' 24-hrs. 14.42'

Screen: Dia. 2" Length 20.00' Slot Size 20.00'

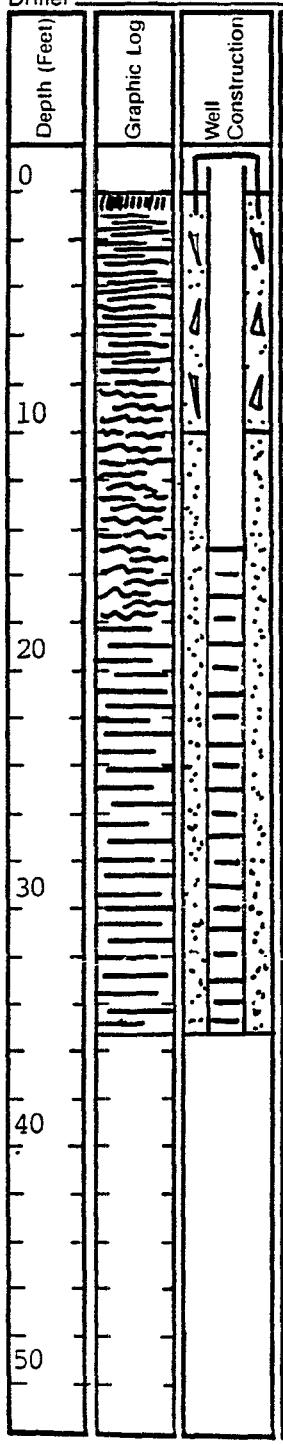
Casing: Dia. 2" Length 15.00' Type PVS Sch.40

Drilling Company C.S. Garber Drilling Method Air Hammer

Driller Greg Herbst Log By F.D.Smith Date Drilled 7-31-86

Sketch Map

Notes
injected water to control dust




Description/Soil Classification
(Color, Texture, Structures)

| | |
|---|---|
| 0-0.5'. | Brown top soil. |
| 0.5-3.0' | Lt.br. silty clay w/rock fragments,dry,no odor |
| 3.0-7.5' | Brown silty clay with rock fragments |
| 7.5-10.0' | Red brown clayey silt with shale fragments, dry, no odor |
| 10.0-18.0' | Red brown clayey silt w/shale fragments increasing with depth, dry, no odor |
| 18.0-20.0' | Red brown weathered shale, slightly moist, no odor |
| 20.0-24.0' | Red brown weathered shale, s.moist, no odor |
| 24.0-35.0' | Red brown shale, moist, no odor |

Total depth 35.0' rate <1gpm (est.)

Screen 35 to 15'
Solid 15 to G/L
Sand 35 to 10.0'
Bentonite 10.0 to 8.0'
Grout 8' to G/L
Stickup 2.0'



AR300807

**Environmental Resources Management**

# Drilling Log

Project Ametek Owner

Location Hatfield, PA W.O. Number 449-02

Well Number MW-4D Total Depth 123.00' Diameter 6"

Surface Elevation 353.77 Water Level: Initial 14.75 24-hrs. 13.76

Screen: Dia. Open Hole Length Slot Size

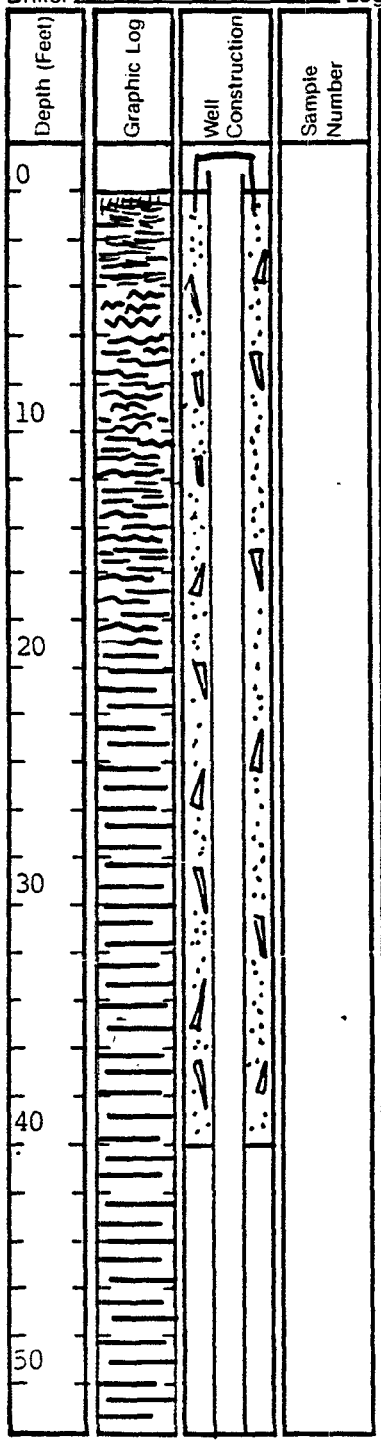
Casing: Dia. 6 5/8" Length 40.00' Type Carbon steel

Drilling Company C.S. Garber Drilling Method Air Hammer

Driller Greg Herbst Log By F.D.Smith Date Drilled 7-31-86

Sketch Map

Notes: injected water to control dust




| Description/Soil Classification (Color, Texture, Structures) | |
|---|---|
| 0-0.50' | Brown topsoil |
| 0.5-4.0' | Light brown silty soil w/light brown rock fragments |
| 4.0-10.0' | Red brown silt w/shake fragments and trace clay, dry, no odor |
| 10.0-19.0' | Red brown clayey silt w/shale fragments, dry, no odor |
| 19.0-23.0' | Red brown weathered shale, slightly moist, no odor |
| 23.0-30.0' | Red brown shale, slightly moist, no odor |
| 30.0-50.0' | Same, moist, no odor |
| | Fracture at 31' |
| | Wet at 34' |
| | Fracture - water-bearing zone - 45' - 2 to 3 gpm |



AR300808

**Environmental Resources Management**

# Drilling Log

Project: Ametek — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: MW-4D — Total Depth: 123.00' — Diameter: 6"

Surface Elevation: 353.77 — Water Level: Initial: 14.75 — 24-hrs.: 13.76

Screen: Dia.: Open Hole — Length: — Slot Size:

Casing: Dia.: 6 5/8" — Length: 40.00' — Type: Carbon steel

Drilling Company: C.S. Garber — Drilling Method: Air Hammer

Driller: Greg Herbst — Log By: F.D.Smith — Date Drilled: 7-31-86

Sketch Map

Notes: injected water to control dust

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 50 | | | | 50.0-75.0' Same, wet, no odor |
| | | | | Fracture - water bearing zone - 54' |
| | | | | Fracture - water-bearing zone - 58' |
| 60 | | | | Fracture - water-bearing zone - 61' |
| 70 | | | | Fracture - 70.0' |
| | | | | 75.0-90.0' Same, wet, no odor |
| 80 | | | | |
| 90 | | | | 90.0-92.0' Dark gray shale, wet, no odor |
| | | | | 92.0-100' Red brown shale, wet, no odor |
| 100 | | | | |



AR300809

**Environmental Resources Management**

# Drilling Log

Project Ametek Owner

Location Hatfield, PA W.O. Number 449-02

Well Number MW-4D Total Depth 123.00' Diameter 6"

Surface Elevation 353.77 Water Level: Initial 14.75 24-hrs. 13.76

Screen: Dia. Open Hole Length Slot Size

Casing: Dia. 6 5/8" Length 40.00' Type Carbon steel

Drilling Company C.S. Garber Drilling Method Air Hammer

Driller Greg Herbst Log By F.D.Smith Date Drilled 7-31-86

Sketch Map

Notes: injected water to control dust

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 100 | | | | 100.0-104.0' Same, wet, no odor |
| | | | | 104.0-105.0' Dark gray shale, wet, no odor |
| | | | | 105.0-110.0' Red brown shale, wet, no odor |
| 110 | | | | 110.0-113.0' Dark gray shale, wet, no odor |
| | | | | 113.0-123.0' Red brown shale, wet, no odor |
| | | | | 114.0-116.0' Fracture zone - water-bearing zone |
| 120 | | | | Total Depth 123' |
| | | | | Rate at Test 123'-12gpm |
| | | | | 55'-8 gpm |
| 130 | | | | 6 5/8" Steel 40 to G/L |
| | | | | Grout 40 to G/L |
| 140 | | | | |
| 150 | | | | |



AR300810

**Environmental Resources Management**

# Drilling Log

Project: Ametek — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: MW-5 — Total Depth: 35.00' — Diameter: 6"

Surface Elevation: 348.21 — Water Level: Initial: 33.00' — 24-hrs.:

Screen: Dia.: 2" — Length: 20.00' — Slot Size: 20.00'

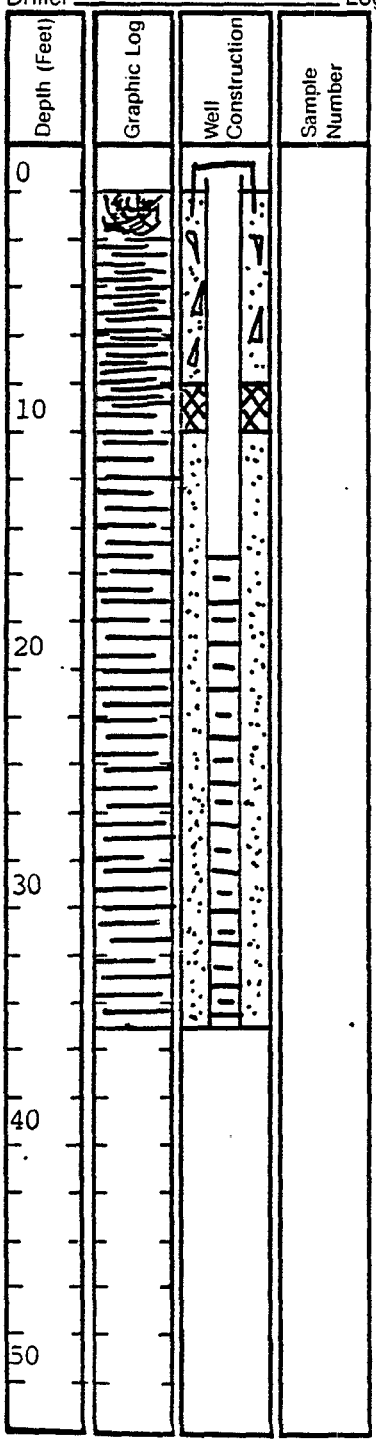
Casing: Dia.: 2" — Length: 15.00' — Type: PVC Sch.40

Drilling Company: C.S. Garber — Drilling Method: Air Hammer

Driller: Greg Herbst — Log By: F.D.Smith — Date Drilled: 8-1-86

Sketch Map

Notes: injected water to control dust




Description/Soil Classification (Color, Texture, Structures)

0-1.0' Brown gravel and soil (fill)

1.0-9.0' Light brown silt clay with brown rock fragments, dry, no odor

9.0-13.0' Gray brown argillite, weathered, dry, no odor

13.0-21.0' Gray argillite, dry, no odor

21.0-25.0' Red brown shale, dry, no odor

25.0-35.0' Red brown shale, dry, no odor

Total depth 35.0'

Screen 35 to 15'
Solid 15 to G/L
Sand 35 to 10.0'
Bentonite 10.0 to 8.0'
Grout 8.0 to G/L
Stickup 2.0'



AR300811

**Environmental Resources Management**

# Drilling Log

Project: Ametek — Owner: Hatfield, PA

Location: 449-02 — W.O. Number: MW-6

Well Number: 35.00' — Total Depth: 6" — Diameter: 349.63

Surface Elevation: 30.70' — Water Level: Initial: 18.50' — 24-hrs.: 20.00'

Screen: Dia.: 2" — Length: 20.00' — Slot Size: 15.00'

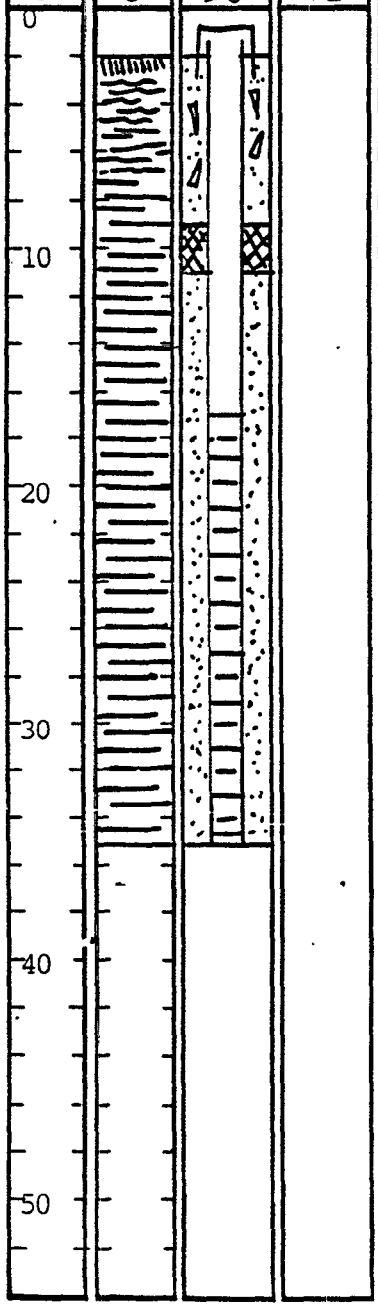
Casing: Dia.: 2" — Length: PVS Sch.40 — Type:

Drilling Company: C.S. Garber — Drilling Method: Air Hammer

Driller: Greg Herbst — Log By: F.D.Smith — Date Drilled: 7-31-86

Sketch Map

Note: Injected water to control dust




| Description/Soil Classification (Color, Texture, Structures) | |
|---|---|
| 0-0.5'. | Brown top soil. |
| 0.5-3.0' | Light brown clayey silt with rock fragments, dry, no odor |
| 3.0-5.0' | Brownish gray silt with shale fragments |
| 5.0-8.0' | Gray weathered argillite, dry, no odor |
| 15.0-25.0' | Same, dry, no odor |
| 25.0-35.0' | Same, dry, no odor |

Total depth 35.0' rate <1.0 gpm (est.)

Screen 35 to 15'
Solid 15 to G/L
Sand 35 to 9.0'
Bentonite 9.0 to 7.0'
Grout 7.0 to G/L
Stickup 2.0'



AR300812

**Environmental Resources Management**

# Drilling Log

Project Ametek Owner

Location Hatfield, PA W.O. Number 449-02

Well Number MW-7 Total Depth 33.00' Diameter 6"

Surface Elevation 351.28 Water Level: Initial 24-hrs.

Screen: Dia. 2" Length 20.00' Slot Size .020

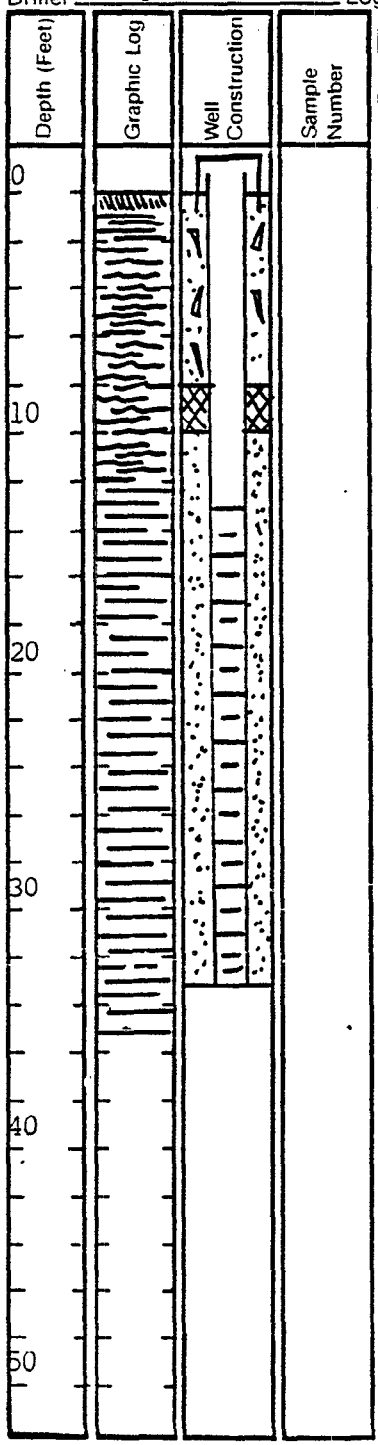
Casing: Dia. 2" Length 13.00' Type PVS Sch.40

Drilling Company C.S. Garber Drilling Method Air Hammer

Driller Greg Herbst Log By F.D.Smith Date Drilled 7-31-86

Sketch Map

Notes
injected water to control dust




Description/Soil Classification
(Color, Texture, Structures)

0-0.5'. Brown top soil.

0.5-3.0' Light brown silty clay with rock fragments

3.0-9.0' Brown clayey silt w/rock fragments, dry, no odor

9.0-12.0' Red brown silt with shale fragments, dry, no odor

12.0-16.0' Red brown weathered shale, dry, no odor

16.0-25.0' Red brown shale, dry, no odor

25.0-35.0' Same, dry, no odor

Total depth 35.0' rate <1.0 gpm (est.)

Note: Hole caved to 33'

Screen 33 to 13'

Solid 13 to G/L

Sand 33 to 10.0'

Bentonite 10.0 to 8.0'

Grout 8.0 to G/L



AR300813

**Environmental Resources Management**

# Drilling Log

Project Ametek Owner

Location Hatfield, PA W.O. Number 449-02

Well Number MW-8 Total Depth 31.00' Diameter 6"

Surface Elevation 362.77 Water Level: Initial 24-hrs.

Screen: Dia. 2" Length 20.00' Slot Size .020

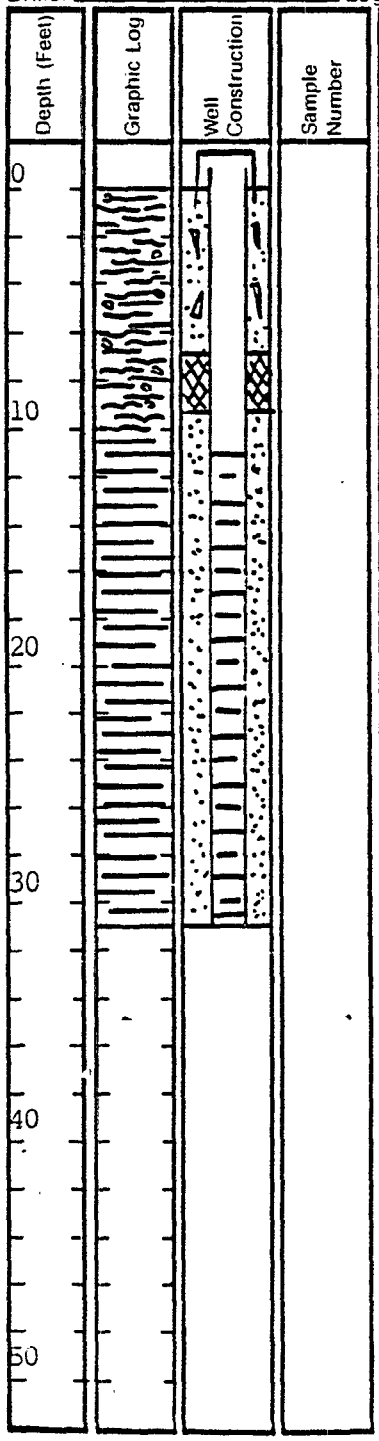
Casing: Dia. 2" Length 15.00' Type PVS Sch.40

Drilling Company C.S. Garber Drilling Method Air Hammer

Driller Warren Smith Log By Val F. Britton Date Drilled 8-6-86

Sketch Map

Notes




Description/Soil Classification
(Color, Texture, Structures)

0-10.0' Red brown silt and decomposed red shale, dry, no odor

10.0-24.0' Red brown fractured shale, damp, no odor

24.0-25.0' Void filled with red brown clay, wet, no odor

25.0-31.0' Red brown fractured shale, saturated, no odor

Water encountered at 26.0'

Screen 31.0' to 11'
Solid 11.0' to 0'
Sand 31' to 8'
Bentonite 8' to 6'
Grout 6' to 0'

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number MW-8D Total Depth 122.00' Diameter 6"

Surface Elevation 363.12 Water Level: Initial 24-hrs.

Screen: Dia. Open hole Length Slot Size

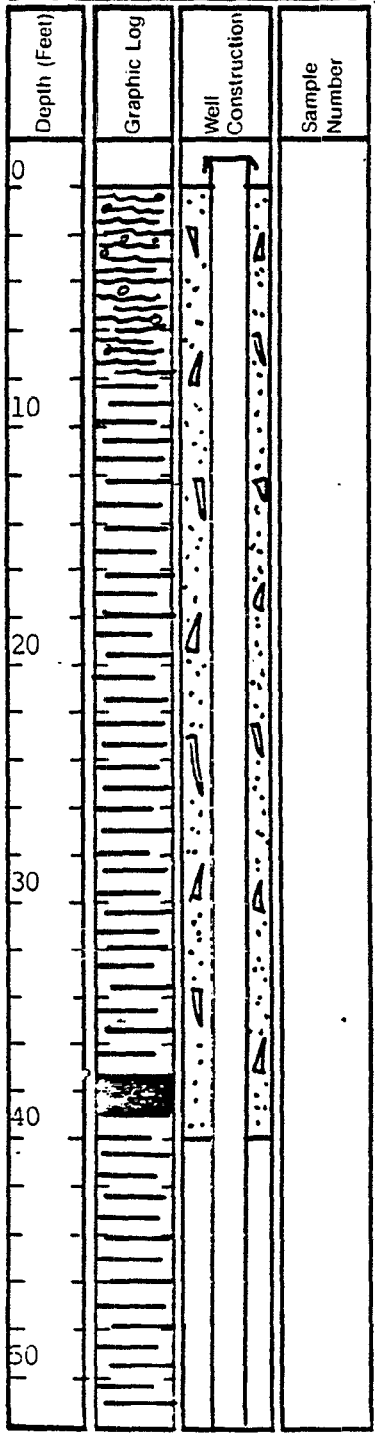
Casing: Dia. 6 5/8" Length 40.00' Type Carbon steel

Drilling Company C.S. Garber Drilling Method Air Hammer

Driller Warren Smith Log By Val F. Britton Date Drilled 8-5-86

Sketch Map

Notes




| Description/Soil Classification (Color, Texture, Structures) | |
|---|---|
| 0-8.0' | Red silt and decomposed red shale, dry, no odor |
| 8.0-37.0' | Red shale, fractured, no odor |
| | (Water encountered at 25.0') |
| 37.0-39.0' | Void (soft) |
| 39.0-122.0' | Red shale, fractured, no odor |



AR300815

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: MW-8D — Total Depth: 122.00' — Diameter: 6"

Surface Elevation: 363.12 — Water Level: Initial: — 24-hrs.:

Screen: Dia.: Open hole — Length: — Slot Size:

Casing: Dia.: 6 5/8" — Length: 40.00' — Type: Carbon steel

Drilling Company: C.S. Garber — Drilling Method: Air Hammer

Driller: Warren Smith — Log By: Val F. Britton — Date Drilled: 8-5-86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 50 | | | | 50.0-100.0' Red shale, fractured, no odor |
| 60 | | | | |
| 70 | | | | |
| 80 | | | | |
| 90 | | | | |
| 100 | | | | |



AR300816

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number MW-8D Total Depth 122.00' Diameter 6"

Surface Elevation 363.12 Water Level: Initial 24-hrs.

Screen: Dia. Open hole Length Slot Size

Casing: Dia. 6 5/8" Length 40.00' Type Carbon steel

Drilling Company C.S. Garber Drilling Method Air Hammer

Driller Warren Smith Log By Val F. Britton Date Drilled 8-5-86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 100 | | | | 100.0-122.0' Red shale, fractured, no odor |
| 110 | | | | |
| 120 | | | | Total Depth 122.00'<br>Open hole 122.0-40.0'<br>Steel casing 40.0-0'<br>Stick-up 2.0'<br>Grout 40.0-0' |
| 130 | | | | Well yield 8 gpm |
| 140 | | | | |
| 150 | | | | |



AR300817

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number MW-9 Total Depth 38.00' Diameter 6.0"

Surface Elevation 347.64 Water Level: Initial 24-hrs.

Screen: Dia. 2" Length 20.00' Slot Size .020

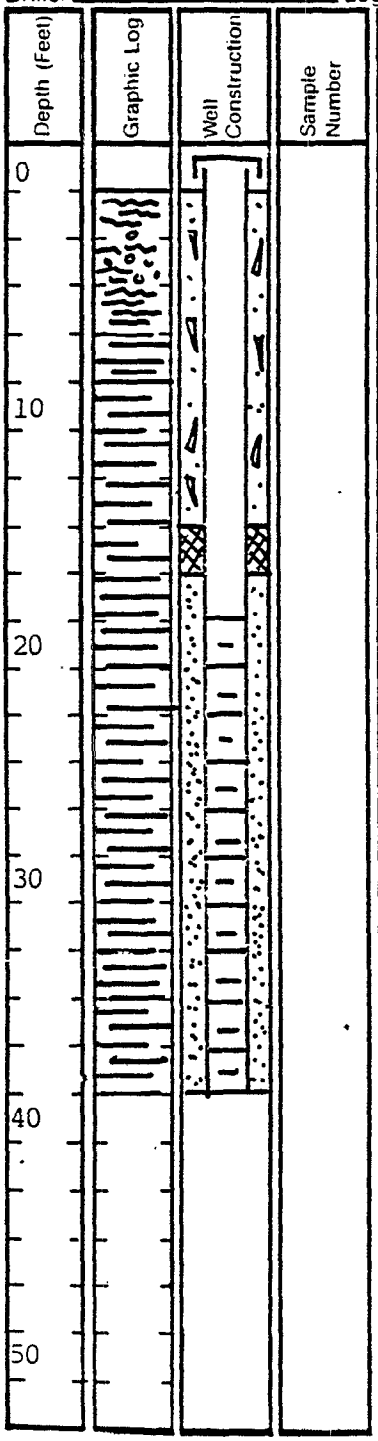
Casing: Dia. 2" Length 18.00' Type PVC

Drilling Company C.S. Garber Drilling Method Air Hammer

Driller Warren Smith Log By Val F. Britton Date Drilled 8-4-86

Sketch Map

Notes




| Description/Soil Classification (Color, Texture, Structures) | |
|---|---|
| 0-2.0' | Grey silt, dry, no odor |
| 2.0-5.0' | Red brown silt and decomposed red shale, dry, no odor |
| 5.0-33.0' | Red shale, fractured, no odor |
| 33.0-35.0' | Grey shale, fractured, no odor |
| 35.0-38.0' | Red shale, fractured, no odor |
| | (Water encountered at 38.0') |

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number MW-9D Total Depth 397.00' Diameter 6.0"

Surface Elevation 347.86 Water Level: Initial 24-hrs.

Screen: Dia. Open hole Length Slot Size

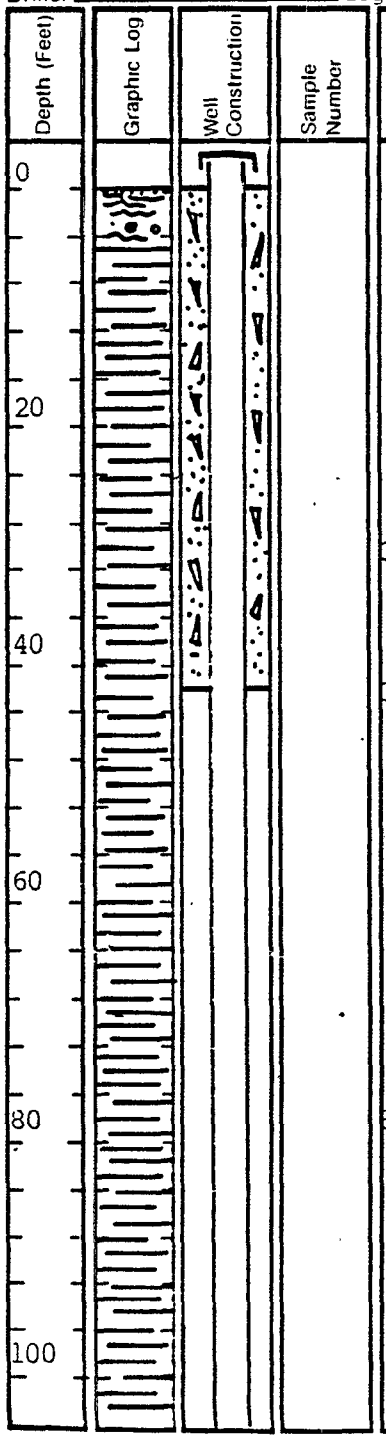
Casing: Dia. 6 5/8" Length 42.20' Type Carbon steel

Drilling Company C.S. Garber Drilling Method Air Hammer

Driller Warren Smith Log By Val F. Britton Date Drilled 8-4-86

Sketch Map

Notes




| Description/Soil Classification (Color, Texture, Structures) | |
|---|---|
| 0-2.0' | Grey silt, dry, no odor |
| 2.0-5.0' | Red brown silt and decomposed red shale, dry, no odor |
| 5.0-33.0' | Red shale, fractured, dry, no odor |
| 33.0-35.0' | Grey shale, fractured, dry, no odor |
| 35.0-80.0' | Red shale, fractured, no odor (Water encountered at 38.0') |
| 80.0-103.0' | Grey shale, fractured, fractures filled with calcite, no odor |



AR300819

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number MW-9D Total Depth 397.00' Diameter 6.0"

Surface Elevation 347.86 Water Level: Initial 24-hrs.

Screen: Dia. Open hole Length Slot Size

Casing: Dia. 6 5/8" Length 42.20' Type Carbon steel

Drilling Company C.S. Garber Drilling Method Air Hammer

Driller Warren Smith Log By Val F. Britton Date Drilled 8-4-86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 100 | | | | 103.0-105.0' Void (20 gpm at this point) |
| | | | | 105.0-115.0' Brown shale, fractured, fractures filled with calcite, no odor |
| 120 | | | | 115.0-134.0' Red brown shale, fractured, fractures filled with calcite, no odor |
| 140 | | | | 134.0-150.0' Brown shale, fractured, fractures filled with calcite, no odor |
| | | | | 150.0-169.0' Grey shale, fractured, fractures filled with calcite, no odor |
| 160 | | | | 169.0-210.0' Red brown shale, fractured, fractures filled with calcite, no odor |
| 180 | | | | |
| 200 | | | | |

**Environmental Resources Management**

# Drilling Log

Project: Ametek HSD — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: MW-9D — Total Depth: 397.00' — Diameter: 6.0"

Surface Elevation: 347.86 — Water Level: Initial: — 24-hrs.:

Screen: Dia.: Open hole — Length: — Slot Size:

Casing: Dia.: 6 5/8" — Length: 42.20' — Type: Carbon steel

Drilling Company: C.S. Garber — Drilling Method: Air Hammer

Driller: Warren Smith — Log By: Val F. Britton — Date Drilled: 8-4-86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 200 | | | | 210.0-212.0' Void (60 gpm at this point)<br>212.0-249.0' Red brown shale, fractured, fractures filled with calcite, no odor |
| 220 | | | | 215.0-234.0' Red brown shale, fractured, fractures filled with calcite, no odor |
| 240 | | | | 249.0-334.0' Grey shale, fractured, fractures filled with calcite, no odor |
| 260 | | | | |
| 280 | | | | |
| 300 | | | | |



AR300821

**Environmental Resources Management**

# Drilling Log

Project Ametek HSD Owner

Location Hatfield, PA W.O. Number 449-02

Well Number MW-9D Total Depth 397.00' Diameter 6.0"

Surface Elevation 347.86 Water Level: Initial 24-hrs.

Screen: Dia. Open hole Length Slot Size

Casing: Dia. 6 5/8" Length 42.20' Type Carbon steel

Drilling Company C.S. Garber Drilling Method Air Hammer

Driller Warren Smith Log By Val F. Britton Date Drilled 8-4-86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 300 | | | | |
| 320 | | | | 334.0-364.0' Red shale, fractured, fractures filled with calcite, no odor |
| 340 | | | | |
| 360 | | | | 364.0-366.0' Void (100 gpm at this point) |
| 380 | | | | 366.0-397.0' Red shale, fractured, fractures filled with calcite, no odor |
| 400 | | | | Total Depth 397.00'<br>Open hole 397.0-42.20'<br>Steel casing 42.20-0' |



AR300822

# APPENDIX C

# LABORATORY ANALYTICAL DATA

AR300823

**ERM** Environmental Resources Management, Inc.

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. Amtek 4490Z Sheet No. 1 OF 1

Sampler(s) VAL F. BRITTON SUSAN T. BARRY Bottles Supplied By LANC. LABS

Date Sampled 8/14/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| MW-7 | GROUND WATER | GRAB | PVC BAILER | 0950 | 2-40ml VIAL | VOA EPA 624 | RUSH |
| MW-4 | " | " | " | 1040 | " | " | " |
| WELL 1 | " | " | TAP | 1145 | " | " | " |
| MW-8 | " | " | PVC BAILER | 1215 | " | " | " |
| MW-9 | " | " | " | 1415 | " | " | " |
| MW-9D | " | " | " | 1530 | " | " | " |
| WELL 2 | " | " | TAP | 1545 | " | " | " |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| [illegible] | [illegible] | 8/13/86 0735 | Bottle Prep |
| [illegible] | Val F. Britton | 8/13/86 0730 | Bottle Drop Off |
| Val F. Britton | [illegible] | 8/15/86 1355 | Trans to Lab |
| | | | |
| | | | |

Copies: White - Sampler; Yellow - Lab; Pink - Client; Gold - File

AR300824

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. WW 1092045

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-7 Grab Groundwater Sample
Collected 8/14/86 (0950) by VFB & STB

Date Reported 8/22/86
Date Submitted 8/15/86
Discard Date 8/30/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 1000. | 082400000S |
| Acrylonitrile | N.D. | ppb | 1000. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 100. | 082600000S |
| Chloromethane | N.D. | ppb | 100. | 082700000S |
| Bromomethane | N.D. | ppb | 100. | 082800000S |
| Vinyl chloride | N.D. | ppb | 100. | 082900000S |
| Chloroethane | N.D. | ppb | 100. | 083000000S |
| Methylene chloride | N.D. | ppb | 100. | 083100000S |
| 1,1-Dichloroethene | 100. | ppb | 100. | 083200000S |
| 1,1-Dichloroethane | N.D. | ppb | 100. | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppb | 100. | 083400000S |
| Chloroform | N.D. | ppb | 100. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 100. | 083600000S |
| 1,1,1-Trichloroethane | 800. | ppb | 100. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 100. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 100. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 100. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 100. | 084100000S |
| Trichloroethene | 300. | ppb | 100. | 084200000S |
| Benzene | N.D. | ppb | 100. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 100. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 100. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 100. | 084600000S |
| Bromoform | N.D. | ppb | 100. | 084700000S |
| Tetrachloroethene | N.D. | ppb | 100. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 100. | 084900000S |
| Toluene | N.D. | ppb | 100. | 085000000S |
| Chlorobenzene | N.D. | ppb | 100. | 085100000S |
| Ethylbenzene | N.D. | ppb | 100. | 085200000S |
| Fluorotrichloromethane | 700. | ppb | 100. | 079000000S |

A dilution was run of this sample due to the elevated levels of VOA compounds present and thus the reporting limits are raised.

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist- GC/MS

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Chemical & Biological Fields of Testing

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AR300825

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. WW 1092046

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-4 Grab Groundwater Sample
Collected 8/14/86 (1040) by VFB & STB

Date Reported 8/22/86
Date Submitted 8/15/86
Discard Date 8/30/86
Collected by C
P.O. 44902
Rel:

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000S |
| Chloromethane | N.D. | ppb | 10. | 082700000S |
| Bromomethane | N.D. | ppb | 10. | 082800000S |
| Vinyl chloride | N.D. | ppb | 10. | 082900000S |
| Chloroethane | N.D. | ppb | 10. | 083000000S |
| Methylene chloride | N.D. | ppb | 10. | 083100000S |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000S |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000S |
| Chloroform | N.D. | ppb | 10. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000S |
| Trichloroethene | N.D. | ppb | 10. | 084200000S |
| Benzene | N.D. | ppb | 10. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000S |
| Bromoform | N.D. | ppb | 10. | 084700000S |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000S |
| Toluene | N.D. | ppb | 10. | 085000000S |
| Chlorobenzene | N.D. | ppb | 10. | 085100000S |
| Ethylbenzene | N.D. | ppb | 10. | 085200000S |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and

Nelson H. Ri
Senior Chemist - GC/MS

The American Association for Laboratory Accreditation
Chemical & Biological Fields of Testing

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AR300826

# Lancaster Laboratories

LLI Sample No. WW 1092047

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Well 1 Grab Groundwater Sample
Collected 8/14/86 (1145) by VFB & STB

Date Reported 8/22/86
Date Submitted 8/15/86
Discard Date 8/30/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000S |
| Chloromethane | N.D. | ppb | 10. | 082700000S |
| Bromomethane | N.D. | ppb | 10. | 082800000S |
| Vinyl chloride | N.D. | ppb | 10. | 082900000S |
| Chloroethane | N.D. | ppb | 10. | 083000000S |
| Methylene chloride | N.D. | ppb | 10. | 083100000S |
| 1,1-Dichloroethene | 210. | ppb | 10. | 083200000S |
| 1,1-Dichloroethane | 20. | ppb | 10. | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000S |
| Chloroform | N.D. | ppb | 10. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000S |
| 1,1,1-Trichloroethane | 1,900. | ppb | 10. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000S |
| Trichloroethene | 540. | ppb | 10. | 084200000S |
| Benzene | N.D. | ppb | 10. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000S |
| Bromoform | N.D. | ppb | 10. | 084700000S |
| Tetrachloroethene | 30. | ppb | 10. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000S |
| Toluene | N.D. | ppb | 10. | 085000000S |
| Chlorobenzene | N.D. | ppb | 10. | 085100000S |
| Ethylbenzene | N.D. | ppb | 10. | 085200000S |
| Fluorotrichloromethane | 410. | ppb | 10. | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist- GC/MS

The American Association for Laboratory Accreditation
Chemical & Biological Fields of Testing

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# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. WW 1092048

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-8 Grab Groundwater Sample
Collected 8/14/86 (1215) by VFB & STB

Date Reported 8/22/86
Date Submitted 8/15/86
Discard Date 8/30/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000S |
| Chloromethane | N.D. | ppb | 10. | 082700000S |
| Bromomethane | N.D. | ppb | 10. | 082800000S |
| Vinyl chloride | N.D. | ppb | 10. | 082900000S |
| Chloroethane | N.D. | ppb | 10. | 083000000S |
| Methylene chloride | N.D. | ppb | 10. | 083100000S |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000S |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000S |
| Chloroform | N.D. | ppb | 10. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000S |
| Trichloroethene | N.D. | ppb | 10. | 084200000S |
| Benzene | N.D. | ppb | 10. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000S |
| Bromoform | N.D. | ppb | 10. | 084700000S |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000S |
| Toluene | 10. | ppb | 10. | 085000000S |
| Chlorobenzene | N.D. | ppb | 10. | 085100000S |
| Ethylbenzene | N.D. | ppb | 10. | 085200000S |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

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Chemical & Biological Tests of Testing

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Ris
Senior Chemis

AR300828

Lancaster Laboratories

WK4587 D-3

LLI Sample No. WW 1092049

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-9 Grab Groundwater Sample
Collected 8/14/86 (1415) by VFB & STB

Date Reported 8/22/86
Date Submitted 8/15/86
Discard Date 8/30/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000S |
| Chloromethane | N.D. | ppb | 10. | 082700000S |
| Bromomethane | N.D. | ppb | 10. | 082800000S |
| Vinyl chloride | N.D. | ppb | 10. | 082900000S |
| Chloroethane | N.D. | ppb | 10. | 083000000S |
| Methylene chloride | N.D. | ppb | 10. | 083100000S |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000S |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000S |
| Chloroform | N.D. | ppb | 10. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000S |
| Trichloroethene | N.D. | ppb | 10. | 084200000S |
| Benzene | N.D. | ppb | 10. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000S |
| Bromoform | N.D. | ppb | 10. | 084700000S |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000S |
| Toluene | N.D. | ppb | 10. | 085000000S |
| Chlorobenzene | N.D. | ppb | 10. | 085100000S |
| Ethylbenzene | N.D. | ppb | 10. | 085200000S |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

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Chemical & Biological fields of testing

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Ris
Senior Chemis

AR300829

Lancaster Laboratories

LLI Sample No. WW 1092050

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-9D Grab Groundwater Sample
Collected 8/14/86 (1530) by VFB & STB

Date Reported 8/22/86
Date Submitted 8/15/86
Discard Date 8/30/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000S |
| Chloromethane | N.D. | ppb | 10. | 082700000S |
| Bromomethane | N.D. | ppb | 10. | 082800000S |
| Vinyl chloride | N.D. | ppb | 10. | 082900000S |
| Chloroethane | N.D. | ppb | 10. | 083000000S |
| Methylene chloride | N.D. | ppb | 10. | 083100000S |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000S |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000S |
| Chloroform | N.D. | ppb | 10. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000S |
| Trichloroethene | N.D. | ppb | 10. | 084200000S |
| Benzene | N.D. | ppb | 10. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000S |
| Bromoform | N.D. | ppb | 10. | 084700000S |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000S |
| Toluene | N.D. | ppb | 10. | 085000000S |
| Chlorobenzene | N.D. | ppb | 10. | 085100000S |
| Ethylbenzene | N.D. | ppb | 10. | 085200000S |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000S |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser
Senior Chemist

AR300830

LLI Sample No. WW 1092051

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Well 2 Grab Groundwater Sample
Collected 8/14/86 (1545) by VFB & STB

Date Reported 8/22/86
Date Submitted 8/15/86
Discard Date 8/30/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000S |
| Chloromethane | N.D. | ppb | 10. | 082700000S |
| Bromomethane | N.D. | ppb | 10. | 082800000S |
| Vinyl chloride | N.D. | ppb | 10. | 082900000S |
| Chloroethane | N.D. | ppb | 10. | 083000000S |
| Methylene chloride | N.D. | ppb | 10. | 083100000S |
| 1,1-Dichloroethene | 230. | ppb | 10. | 083200000S |
| 1,1-Dichloroethane | 20. | ppb | 10. | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000S |
| Chloroform | N.D. | ppb | 10. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000S |
| 1,1,1-Trichloroethane | 1,900. | ppb | 10. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000S |
| Trichloroethene | 570. | ppb | 10. | 084200000S |
| Benzene | N.D. | ppb | 10. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000S |
| Bromoform | N.D. | ppb | 10. | 084700000S |
| Tetrachloroethene | 30. | ppb | 10. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000S |
| Toluene | N.D. | ppb | 10. | 085000000S |
| Chlorobenzene | N.D. | ppb | 10. | 085100000S |
| Ethylbenzene | N.D. | ppb | 10. | 085200000S |
| Fluorotrichloromethane | 510. | ppb | 10. | 079000000S |

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The American Association for Laboratory Accreditation
Chemical & Biological Testing

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.
Senior Chemist- GC/

AR300831

SUE BARRY

**ERM Environmental Resources Management, Inc.**

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. Ametek 44907 Sheet No. 1 of 1

Sampler(s) VAL F. BRITTON SUSAN T BARRY Bottles Supplied By LANC. LABS

Date Sampled 8/13/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| MW-4D | GROUND WATER | GRAB | PVC BAILER | 1100 | 2-40ml VIALS | VOA EPA 624 | RUSH |
| MW-2 | " | " | " | 1150 | " | " | " |
| MW-1 | " | " | " | 1310 | " | " | " |
| MW-3 | " | " | " | 1345 | " | " | " |
| MW-5 | " | " | " | 1355 | " | " | " |
| MW-8D | " | " | " | 1510 | " | " | " |
| MW-6 | " | " | " | 1540 | " | " | " |
| TRIP BLANK | TAP | " | TAP | 1200 | 1-40ml VIAL | " | [illegible] |
| Decon 1 | " | " | " | 1600 | 1-40ml | " | probe 105 NO RUSH |
| Decon 2 | " | " | " | 1610 | " | " | probe 108 No RUSH |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| [signature] | [signature] | 8/13/86 0755 | Bottle Pick |
| [signature] | [signature] | 8/13/86 0730 | Bottle drop off |
| [signature] | [signature] | 8/14/86 1307 | Sample pick up |
| | | | |
| | | | |

Copies: White - Sampler, Yellow - Lab; Pink - Client; Gold - File

AR300832

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. WW 1091586

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-4D Grab Water Sample
Collected on 08/13/86 (1100) by VFB/STB

Date Reported 8/29/86
Date Submitted 8/14/86
Discard Date 9/ 6/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000 |
| Chloromethane | N.D. | ppb | 10. | 082700000 |
| Bromomethane | N.D. | ppb | 10. | 082800000 |
| Vinyl chloride | N.D. | ppb | 10. | 082900000 |
| Chloroethane | N.D. | ppb | 10. | 083000000 |
| Methylene chloride | N.D. | ppb | 10. | 083100000 |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000 |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000 |
| Chloroform | N.D. | ppb | 10. | 083500000 |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000 |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000 |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000 |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000 |
| Trichloroethene | N.D. | ppb | 10. | 084200000 |
| Benzene | N.D. | ppb | 10. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000 |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000 |
| Bromoform | N.D. | ppb | 10. | 084700000 |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000 |
| Toluene | N.D. | ppb | 10. | 085000000 |
| Chlorobenzene | N.D. | ppb | 10. | 085100000 |
| Ethylbenzene | N.D. | ppb | 10. | 085200000 |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist

The American Association for Laboratory Accreditation
Chemical & Biological Fields of Testing

Member American Council of Independent Laboratories, Inc.

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300833

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. WW 1091587

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-2 Grab Water Sample
Collected on 08/13/86 (1150) by VFB/STB

Date Reported 8/19/86
Date Submitted 8/14/86
Discard Date 8/27/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000S |
| Chloromethane | N.D. | ppb | 10. | 082700000S |
| Bromomethane | N.D. | ppb | 10. | 082800000S |
| Vinyl chloride | N.D. | ppb | 10. | 082900000S |
| Chloroethane | N.D. | ppb | 10. | 083000000S |
| Methylene chloride | N.D. | ppb | 10. | 083100000S |
| 1,1-Dichloroethene | 170. | ppb | 10. | 083200000S |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000S |
| Chloroform | N.D. | ppb | 10. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000S |
| 1,1,1-Trichloroethane | 280. | ppb | 10. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000S |
| Trichloroethene | 160. | ppb | 10. | 084200000S |
| Benzene | N.D. | ppb | 10. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000S |
| Bromoform | N.D. | ppb | 10. | 084700000S |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000S |
| Toluene | N.D. | ppb | 10. | 085000000S |
| Chlorobenzene | N.D. | ppb | 10. | 085100000S |
| Ethylbenzene | N.D. | ppb | 10. | 085200000S |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risse
Senior Chemist

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300834

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. WW 1091588

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-1 Grab Water Sample
Collected on 08/13/86 (1310) by VFB/STB

Date Reported 8/19/86
Date Submitted 8/14/86
Discard Date 8/27/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000S |
| Chloromethane | N.D. | ppb | 10. | 082700000S |
| Bromomethane | N.D. | ppb | 10. | 082800000S |
| Vinyl chloride | N.D. | ppb | 10. | 082900000S |
| Chloroethane | N.D. | ppb | 10. | 083000000S |
| Methylene chloride | N.D. | ppb | 10. | 083100000S |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000S |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000S |
| Chloroform | N.D. | ppb | 10. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000S |
| Trichloroethene | N.D. | ppb | 10. | 084200000S |
| Benzene | N.D. | ppb | 10. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000S |
| Bromoform | N.D. | ppb | 10. | 084700000S |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000S |
| Toluene | N.D. | ppb | 10. | 085000000S |
| Chlorobenzene | N.D. | ppb | 10. | 085100000S |
| Ethylbenzene | N.D. | ppb | 10. | 085200000S |
| Fluorotrichloromethane | 70. | ppb | 10. | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist

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The American Association for Laboratory Accreditation
Member American Council of Independent Laboratories

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. WW 1091589

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-3 Grab Water Sample
Collected on 08/13/86 (1345) by VFB/STB

Date Reported 8/19/86
Date Submitted 8/14/86
Discard Date 8/27/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000S |
| Chloromethane | N.D. | ppb | 10. | 082700000S |
| Bromomethane | N.D. | ppb | 10. | 082800000S |
| Vinyl chloride | N.D. | ppb | 10. | 082900000S |
| Chloroethane | N.D. | ppb | 10. | 083000000S |
| Methylene chloride | N.D. | ppb | 10. | 083100000S |
| 1,1-Dichloroethene | 40. | ppb | 10. | 083200000S |
| 1,1-Dichloroethane | 20. | ppb | 10. | 083300000S |
| trans-1,2-Dichloroethene | 310. | ppb | 10. | 083400000S |
| Chloroform | N.D. | ppb | 10. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000S |
| 1,1,1-Trichloroethane | 80. | ppb | 10. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000S |
| Trichloroethene | 5,300. | ppb | 10. | 084200000S |
| Benzene | N.D. | ppb | 10. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000S |
| Bromoform | N.D. | ppb | 10. | 084700000S |
| Tetrachloroethene | 40. | ppb | 10. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000S |
| Toluene | N.D. | ppb | 10. | 085000000S |
| Chlorobenzene | N.D. | ppb | 10. | 085100000S |
| Ethylbenzene | N.D. | ppb | 10. | 085200000S |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist- GC/MS

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300836

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. WW 1091590

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-5 Grab Water Sample
Collected on 08/13/86 (1355) by VFB/STB

Date Reported 8/19/86
Date Submitted 8/14/86
Discard Date 8/27/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000S |
| Chloromethane | N.D. | ppb | 10. | 082700000S |
| Bromomethane | N.D. | ppb | 10. | 082800000S |
| Vinyl chloride | N.D. | ppb | 10. | 082900000S |
| Chloroethane | N.D. | ppb | 10. | 083000000S |
| Methylene chloride | N.D. | ppb | 10. | 083100000S |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000S |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000S |
| Chloroform | N.D. | ppb | 10. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000S |
| Trichloroethene | 20. | ppb | 10. | 084200000S |
| Benzene | N.D. | ppb | 10. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000S |
| Bromoform | N.D. | ppb | 10. | 084700000S |
| Tetrachloroethene | 90. | ppb | 10. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000S |
| Toluene | N.D. | ppb | 10. | 085000000S |
| Chlorobenzene | N.D. | ppb | 10. | 085100000S |
| Ethylbenzene | N.D. | ppb | 10. | 085200000S |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist

AR300837

LLI Sample No. WW 1091591

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-8D Grab Water Sample
Collected on 08/13/86 (1510) by VFB/STB

Date Reported 8/19/86
Date Submitted 8/14/86
Discard Date 8/27/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000S |
| Chloromethane | N.D. | ppb | 10. | 082700000S |
| Bromomethane | N.D. | ppb | 10. | 082800000S |
| Vinyl chloride | N.D. | ppb | 10. | 082900000S |
| Chloroethane | N.D. | ppb | 10. | 083000000S |
| Methylene chloride | N.D. | ppb | 10. | 083100000S |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000S |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000S |
| Chloroform | N.D. | ppb | 10. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000S |
| Trichloroethene | N.D. | ppb | 10. | 084200000S |
| Benzene | N.D. | ppb | 10. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000S |
| Bromoform | N.D. | ppb | 10. | 084700000S |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000S |
| Toluene | N.D. | ppb | 10. | 085000000S |
| Chlorobenzene | N.D. | ppb | 10. | 085100000S |
| Ethylbenzene | N.D. | ppb | 10. | 085200000S |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risse
Senior Chemist

AR300838

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. WW 1091592

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-6 Grab Water Sample
Collected on 08/13/86 (1540) by VFB/STB

Date Reported 8/19/86
Date Submitted 8/14/86
Dis.rd Date 8/27/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000S |
| Chloromethane | N.D. | ppb | 10. | 082700000S |
| Bromomethane | N.D. | ppb | 10. | 082800000S |
| Vinyl chloride | N.D. | ppb | 10. | 082900000S |
| Chloroethane | N.D. | ppb | 10. | 083000000S |
| Methylene chloride | N.D. | ppb | 10. | 083100000S |
| 1,1-Dichloroethene | 80. | ppb | 10. | 083200000S |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000S |
| trans-1,2-Dichloroethene | 20. | ppb | 10. | 083400000S |
| Chloroform | N.D. | ppb | 10. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000S |
| 1,1,1-Trichloroethane | 2,300. | ppb | 10. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000S |
| Trichloroethene | 1,700. | ppb | 10. | 084200000S |
| Benzene | N.D. | ppb | 10. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000S |
| Bromoform | N.D. | ppb | 10. | 084700000S |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000S |
| Toluene | N.D. | ppb | 10. | 085000000S |
| Chlorobenzene | N.D. | ppb | 10. | 085100000S |
| Ethylbenzene | N.D. | ppb | 10. | 085200000S |
| Fluorotrichloromethane | 190. | ppb | 10. | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser
Senior Chemist

AR300839

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Trip Blank Water Sample
Collected on 08/13/86 (1200) by VFB/STB

Date Reported 8/19/86
Date Submitted 8/14/86
Discard Date 8/27/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 100. | 082400000S |
| Acrylonitrile | N.D. | ppb | 100. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000S |
| Chloromethane | N.D. | ppb | 10. | 082700000S |
| Bromomethane | N.D. | ppb | 10. | 082800000S |
| Vinyl chloride | N.D. | ppb | 10. | 082900000S |
| Chloroethane | N.D. | ppb | 10. | 083000000S |
| Methylene chloride | N.D. | ppb | 10. | 083100000S |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000S |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000S |
| Chloroform | N.D. | ppb | 10. | 083500000S |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000S |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000S |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000S |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000S |
| Trichloroethene | N.D. | ppb | 10. | 084200000S |
| Benzene | N.D. | ppb | 10. | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000S |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000S |
| Bromoform | N.D. | ppb | 10. | 084700000S |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000S |
| Toluene | N.D. | ppb | 10. | 085000000S |
| Chlorobenzene | N.D. | ppb | 10. | 085100000S |
| Ethylbenzene | N.D. | ppb | 10. | 085200000S |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories. Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemis

SEE REVERSE SIDE FOR EXPLANATION
OF SYMBOLS AND ABBREVIATIONS

Environmental Resources Management, Inc.

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. I.D. AMETEK 44902 Sheet No. 1 OF 1

Sampler(s) VAL F. BRITTON Bottles Supplied By LANC. LABS

Date Sampled 8/6/86 Bottle Batch No. -

| Sample I D | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| B-16 2.5-4.5' | SOIL | GRAB | SPLIT SPOON | 1025 | 1-LITER JAR | EPA 624 VOA | RUSH |
| B-16 4.5-6.5' | " | " | " | 1030 | " | " | " |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date Time | Reason For Transfer |
|---|---|---|---|
| Val F. Britton | Val F. Britton | 8/6/86 0900 | SAMPLING |
| Val F. Britton | [illegible] | 8/7/86 1315 | [illegible] |
| | | | |
| | | | |
| | | | |

Copies White - Sampler Yellow - Lab Pink - Client Gold - File

AR300841

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1089996

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-16 2.5-4.5 Grab Soil Sample
Collected 08/06/86 (1025) by VFB

Date Reported 8/29/86
Date Submitted 8/ 7/86
Discard Date 9/29/86
Collected by C
P.O. 44-902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 3.7 | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A
Senior Chem

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300842

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1089997

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-16 4.5-6.5 Grab Soil Sample
Collected 08/06/86 (1030) by VFB

Date Reported 8/29/86
Date Submitted 8/ 7/86
Discard Date 9/29/86
Collected by C
P.O. 44-902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 7.0 | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Ris
Senior Chemis

SEE REVERSE SIDE FOR EXPLANATION
OF SYMBOLS AND ABBREVIATIONS

AR300843

**ERM** Environmental Resources Management, Inc.

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. Amelek 44902 Sheet No. 2 of 2

Sampler(s) VAL F. BRITTON Bottles Supplied By LANC LABS

Date Sampled 7/31/86 7/30/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| B-30 6.0-8.0 | SOIL | GRAB | SPLIT SPOON | 1745 | 1-LITER JAR | VOA EPA 624 | RUSH |
| B-37 6.0-8.0 | " | " | " | 1815 | " | " | " |
| B-38 6.0-8.0 | " | " | " | 1845 | " | " | " |
| B-39 6.0-8.0 | " | " | " | 1935 | " | " | " |
| B-33 4.0-6.0 | " | " | " | 1321 | " | " | " |
| B-34 2.0-4.0 | " | " | " | 1422 | " | " | " |
| B-34 4.0-6.0 | " | " | " | 1440 | " | " | " |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| Rick Miller | [signature] | 7/4/86 0715 | Bottle Prep |
| [signature] | Val F. Britton | | [illegible] |
| Val F. Britton | [signature] | 8/4/86 1158 | Trans. to Lab |
| | | | |
| | | | |

Copies: White - Sampler, Yellow - Lab, Pink - Client, Gold - File

AR300844

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-34 4.0-6.0 Soil Grab Sample
Collected 07/31/86 (1440) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

ANALYSIS REPORT

Lancaster Laboratories

WK4125 D 3 17

LLI Sample No. SW 1089098

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-33 4.0-6.0 Soil Grab Sample
Collected 07/31/86 (1321) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for [illegible]

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser
Group Lead

AR300846

Lancaster Laboratories

LLI Sample No. SW 1089100

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-34 2.0-4.0 Soil Grab Sample
Collected 07/31/86 (1422) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 08240000ON |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300847

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1089094

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-36 6.0-8.0 Soil Grab Sample
Collected 07/31/86 (1745) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | 1.2 | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 15. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | 9.2 | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | 2.3 | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane. | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader, GC/MS

AR300848

LLI Sample No. SW 1089095

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-37 6.0-8.0 Soil Grab Sample
Collected 07/31/86 (1815) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader

# ANALYSIS REPORT

## Lancaster Laboratories

WK4125 D 3 17

LLI Sample No. SW 1089096

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-38 6.0-8.0 Soil Grab Sample
Collected 07/31/86 (1845) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 0.4 | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully
Lancaster Lab[illegible], Inc.
Reviewed and Approved by:

Nelson H. Risser, B.A.
Group Leader - GC/MS

AR300850

LLI Sample No. SW 1089097

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-39 6.0-8.0 Soil Grab Sample
Collected 07/31/86 (1935) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Su
Lancaster Labor , Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader, GC/MS

**ERM Environmental Resources Management, Inc.**

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. Ametek #44982 Sheet No. 1 of 2

Sampler(s) VAL F. BRITTON Bottles Supplied By LANL. LABS

Date Sampled 7/31/86 7/30/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| B-18 | GROUND WATER | GRAB | PVC BAILER | 1645 | 2-40ml 3-1 liter | VOA BASE NEUTRALS ACID EXTRACTABLES | |
| B-25 4.0-6.0 | SOIL | GRAB | SPLIT SPOON | 1456 | 1-LITER JAR | VOA EPA 624 | RUSH |
| B-32 2.0-4.0 | " | " | " | 1059 | " | " | " |
| B-32 4.0-6.0 | " | " | " | 1113 | " | " | " |
| B-32 8.0-10.0 | " | " | " | 1130 | " | " | " |
| B-26 4.0-6.0 | " | " | " | 0757 | " | " | " |
| B-26 6.0-7.5 | " | " | " | 0805 | " | " | " |
| B-31 4.0-6.0 | " | " | " | 0845 | " | " | " |
| B-31 8.0-10.0 | " | " | " | 0906 | " | " | " |
| B-36 2.0-4.0 | " | " | " | 1730 | " | " | " |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| [illegible] | [illegible] | 7-31-86 7:30 | [illegible] |
| [illegible] | Val F. Britton | | Bottle drop off |
| Val F. Britton | [illegible] | 8/4/86 1158 | [illegible] |
| | | | |
| | | | |

Copies White - Sampler Yellow - Lab Pink - Client Gold - File

AR300852

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1089085

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-25 4.0-6.0 Soil Grab Sample
Collected 07/29/86 (1456) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 0.9 | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | 0.4 | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. R
Group Leade

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300853

ANALYSIS REPORT

Lancaster Laboratories

LLI Sample No. SW 1089089

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-26 4.0-6.0 Soil Grab Sample
Collected 07/30/86 (0757) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation Chemical & Biological Fields of Testing

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H.
Group Leade

AR300854

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1089090

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-26 6.0-7.5 Soil Grab Sample
Collected 07/30/86 (0805) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 1.6 | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane* | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation
American Council of Independent Laboratories

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster La
Reviewed and

Nelson H. Risser B.A.
Group Leader - GC/MS

AR300855

LLI Sample No. SW 1089091

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-31 4.0-6.0 Soil Grab Sample
Collected 07/31/86 (0845) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 0.5 | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Labora
Reviewed and

Nelson H. Riss B.A.
Group Leader, GC/MS

AR300856

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1089092

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-31 8.0-10.0 Soil Grab Sample
Collected 07/31/86 (0906) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 2.2 | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. [illegible]
Group Lead

The American Association for Laboratory Accreditation
Member American Council of Independent Laboratories, Inc.

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1089086

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-32 2.0-4.0 Soil Grab Sample
Collected 07/31/86 (1059) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 50. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | 0.4 | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

The American Association for Laboratory Accreditation

ACLA

ember American Council of Independent Laboratories

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300858

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1089087

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-32 4.0-6.0 Soil Grab Sample
Collected 07/31/86 (1113) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 3.3 | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300859

ANALYSIS REPORT

Lancaster Laboratories

LLI Sample No. SW 1089088

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Amtek B-32 8.0-10.0 Soil Grab Sample
Collected 07/31/86 (1130) by VFB

Date Reported 8/18/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 10. | 082400000N |
| Acrylonitrile | N.D. | ppm | 10. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 1. | 082600000 |
| Chloromethane | N.D. | ppm | 1. | 082700000 |
| Bromomethane | N.D. | ppm | 1. | 082800000 |
| Vinyl chloride | N.D. | ppm | 1. | 082900000 |
| Chloroethane | N.D. | ppm | 1. | 083000000 |
| Methylene chloride | N.D. | ppm | 1. | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 1. | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 1. | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 1. | 083400000 |
| Chloroform | N.D. | ppm | 1. | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 1. | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 1. | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 1. | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 1. | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 1. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 1. | 084100000 |
| Trichloroethene | 21. | ppm | 1. | 084200000 |
| Benzene | N.D. | ppm | 1. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 1. | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 1. | 084500000 |
| Dibromochloromethane | N.D. | ppm | 1. | 084600000 |
| Bromoform | N.D. | ppm | 1. | 084700000 |
| Tetrachloroethene | 1. | ppm | 1. | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 1. | 084900000 |
| Toluene | N.D. | ppm | 1. | 085000000 |
| Chlorobenzene | N.D. | ppm | 1. | 085100000 |
| Ethylbenzene | N.D. | ppm | 1. | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 1. | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300860

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1089093

Environ. Resources Management

999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Amtek B-36 2.0-4.0 Soil Grab Sample
Collected 07/31/86 (1730) by VFB

Date Reported 8/18/86

Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O.
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | 0.6 | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 18. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | 1.7 | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | 0.5 | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | 0.3 | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser
Group Leader - GC

AR300861

**Environmental Resources Management, Inc.**

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. I.D. Ametek #44902 Sheet No. 1 of 1

Sampler(s) VALE. BRYTTON Bottles Supplied By LANC. LABS.

Date Sampled 7/29/86 Bottle Batch No.

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| B-22 20-40 | SOIL | GRAB | SPLIT SPOON | 0927 | 1 LITER JAR | VOA EPA 624 | RUSH |
| B-22 40-60 | " | " | " | 0938 | " | " | " |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
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| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date Time | Reason For Transfer |
|---|---|---|---|
| [signature] | [signature] | 7-29-86 | Lab Prep |
| [signature] | [signature] | 7/29/86 1700 | Lab Prep |
| [signature] | [signature] | 7/30/86 1645 | A.O.X Lab |
| | | | |
| | | | |

Copies White - Sampler Yellow - Lab. Pink - Client. Gold - File

AR300862

ANALYSIS REPORT

Lancaster Laboratories

LLI Sample No. SW 1087839

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-22 2.0-4.0 Grab Soil Sample
Collected on 07/29/86 (0927) by VFB

Date Reported 8/18/86
Date Submitted 7/29/86
Discard Date 9/18/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

SEE REVERSE SIDE FOR EXPLANATION
OF SYMBOLS AND ABBREVIATIONS

AR300863

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-22 4.0-6.0 Grab Soil Sample
Collected on 07/29/86 (0938) by VFB

Date Reported 8/18/86
Date Submitted 7/29/86
Discard Date 9/18/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 1.2 | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | 0.3 | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

**Environmental Resources Management, Inc.**

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. I.D. Cometek 44902 Sheet No. 1 of 1

Sampler(s) VAL F BRITTON Bottles Supplied By LANC. LABS

Date Sampled 7/25/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| B-12 2.0-4.0 | SOIL | GRAB | SPLIT SPOON | 0745 | 1-200 ml JAR | VOA EPA 624 | RUSH |
| B-12 4.0-6.0 | " | " | " | 0800 | " | " | " |
| B-12 6.0-6.5 | " | " | " | 0810 | " | " | " |
| B-14 4.0-5.0 | " | " | " | 0930 | " | " | " |
| B-14 7.0-9.0 | " | " | " | 0955 | " | " | " |
| B-14 9.0-9.5 | " | " | " | 1005 | " | " | " |
| B-15 3.0-5.0 | " | " | " | 1100 | " | " | " |
| B-15 5.0-7.0 | " | " | " | 1115 | " | " | " |
| B-15 7.0-8.0 | " | " | " | 1125 | " | " | " |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date Time | Reason For Transfer |
|---|---|---|---|
| Duke Miller | [illegible] | 7/29/86 0715 | Bottle Pkg |
| [illegible] | Val F Britton | 7/25/86 1630 | Bottle drop off |
| Val F Britton | [illegible] | 7/28/86 1645 | del to Lab |
| | | | |
| | | | |

Copies: White - Sampler, Yellow - Lab, Pink - Client, Gold - File

AR300865

Lancaster Laboratories

LLI Sample No. SW 1087830

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-12 2.0-4.0 Grab Soil Sample
Collected on 07/28/86 (0745) by VFB

Date Reported 8/18/86
Date Submitted 7/29/86
Discard Date 9/18/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader

AR300866

LLI Sample No. SW 1087831

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-12 4.0-6.0 Grab Soil Sample
Collected on 07/28/86 (0800) by VFB

Date Reported 8/18/86
Date Submitted 7/29/86
Discard Date 9/18/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

SEE REVERSE SIDE FOR EXPLANATION
OF SYMBOLS AND ABBREVIATIONS

AR300867

Lancaster Laboratories

LLI Sample No. SW 1087832

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-12 6.0-6.5 Grab Soil Sample
Collected on 07/28/86 (0810) by VFB

Date Reported 8/18/86
Date Submitted 7/29/86
Discard Date 9/18/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Ris
Group Leader

AR300868

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1087833

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-14 4.0-5.0 Grab Soil Sample
Collected on 07/28/86 (0930) by VFB

Date Reported 8/18/86
Date Submitted 7/29/86
Discard Date 9/18/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 20. | 082400000N |
| Acrylonitrile | N.D. | ppm | 20. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 2. | 082600000 |
| Chloromethane | N.D. | ppm | 2. | 082700000 |
| Bromomethane | N.D. | ppm | 2. | 082800000 |
| Vinyl chloride | N.D. | ppm | 2. | 082900000 |
| Chloroethane | N.D. | ppm | 2. | 083000000 |
| Methylene chloride | N.D. | ppm | 2. | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 2. | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 2. | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 2. | 083400000 |
| Chloroform | N.D. | ppm | 2. | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 2. | 083600000 |
| 1,1,1-Trichloroethane | 21. | ppm | 2. | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 2. | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 2. | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 2. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 2. | 084100000 |
| Trichloroethene | 150. | ppm | 2. | 084200000 |
| Benzene | N.D. | ppm | 2. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 2. | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 2. | 084500000 |
| Dibromochloromethane | N.D. | ppm | 2. | 084600000 |
| Bromoform | N.D. | ppm | 2. | 084700000 |
| Tetrachloroethene | N.D. | ppm | 2. | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 2. | 084900000 |
| Toluene | N.D. | ppm | 2. | 085000000 |
| Chlorobenzene | N.D. | ppm | 2. | 085100000 |
| Ethylbenzene | N.D. | ppm | 2. | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 2. | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Riss
Group Leader

LLI Sample No. SW 1087834

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-14 7.0-9.0 Grab Soil Sample
Collected on 07/28/86 (0955) by VFB

Date Reported 8/18/86
Date Submitted 7/29/86
Discard Date 9/18/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | 0.9 | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | 80. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 2. | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 290. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | 1.2 | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved

Nelson H. I
Group Leade

AR300870

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1087835

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-14 9.0-9.5 Grab Soil Sample
Collected on 07/28/86 (1005) by VFB

Date Reported 8/18/86
Date Submitted 7/29/86
Discard Date 9/18/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 250. | 082400000N |
| Acrylonitrile | N.D. | ppm | 250. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 25. | 082600000 |
| Chloromethane | N.D. | ppm | 25. | 082700000 |
| Bromomethane | N.D. | ppm | 25. | 082800000 |
| Vinyl chloride | N.D. | ppm | 25. | 082900000 |
| Chloroethane | N.D. | ppm | 25. | 083000000 |
| Methylene chloride | N.D. | ppm | 25. | 083100000 |
| 1,1-Dichloroethene | 99. | ppm | 25. | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 25. | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 25. | 083400000 |
| Chloroform | N.D. | ppm | 25. | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 25. | 083600000 |
| 1,1,1-Trichloroethane | 5,700. | ppm | 25. | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 25. | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 25. | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 25. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 25. | 084100000 |
| Trichloroethene | 17,000. | ppm | 25. | 084200000 |
| Benzene | N.D. | ppm | 25. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 25. | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 25. | 084500000 |
| Dibromochloromethane | N.D. | ppm | 25. | 084600000 |
| Bromoform | N.D. | ppm | 25. | 084700000 |
| Tetrachloroethene | 120. | ppm | 25. | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 25. | 084900000 |
| Toluene | N.D. | ppm | 25. | 085000000 |
| Chlorobenzene | N.D. | ppm | 25. | 085100000 |
| Ethylbenzene | N.D. | ppm | 25. | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 25. | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risse
Group Leader

AR300871

Lancaster Laboratories

LLI Sample No. SW 1087836

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-15 3.0-5.0 Grab Soil Sample
Collected on 07/28/86 (1100) by VFB

Date Reported 8/18/86
Date Submitted 7/29/86
Discard Date 9/18/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | 0.4 | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | 16. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 34. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Labor
Reviewed and App

Nelson H. Risser B.A.
Group Leader - GC/MS

AR300872

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1087837

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-15 5.0-7.0 Grab Soil Sample
Collected on 07/28/86 (1115) by VFB

Date Reported 8/18/86
Date Submitted 7/29/86
Discard Date 9/18/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | 0.9 | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | 2.5 | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 1.3 | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfull
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

AR300873

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1087838

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-15 7.0-8.0 Grab Soil Sample
Collected on 07/28/86 (1125) by VFB

Date Reported 8/18/86
Date Submitted 7/29/86
Discard Date 9/18/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000N |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | 0.9 | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | 2.0 | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 0.7 | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully
Lancaster Lab
Reviewed and [illegible] by:

Nelson H. Risser B.A.
Group Leader - GC/MS

SEE REVERSE SIDE FOR EXPLANATION
OF SYMBOLS AND ABBREVIATIONS

AR300874

ERM Environmental Resources Management, Inc.

# Chain Of Custody Record

999 West Chester Pike • West Chester Pennsylvania 19382 ☎ (215) 696-9110

Project No. I.D. Cimetek 44922 Sheet No. 1 OF 1

Sampler(s) VAL F. BRITTON Bottles Supplied By LANC. LABS.

Date Sampled 7/25/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| B-8 6.0-6.5 | SOIL | GRAB | SPLIT SPOON | 0800 | 1-40ml | VOA EPA 624 | RUSH |
| B-9 6.0-8.0 | SOIL | " | " | 0925 | " | " | " |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| [signature] | [signature] | 7/24/86 1715 | BOTTLE PUP |
| [signature] | [signature] | 7/25/86 1545 | [illegible] |
| [signature] | [signature] | 7/28/86 0945 | [illegible] |
| | | | |
| | | | |

Copies: White - Sampler Yellow - Lab Pink - Client Gold - File

AR300875

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek 44902 B-8 6.0-6.5 Grab Soil Sample
Collected 07/25/86 (0800) by VFB

Date Reported 8/ 7/86
Date Submitted 7/28/86
Discard Date 9/ 7/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 0.2 | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Lancaster Laboratories

LLI Sample No. SW 1087341

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek 44902 B-9 6.0-8.0 Grab Soil Sample
Collected 07/25/86 (0925) by VFB

Date Reported 8/ 7/86
Date Submitted 7/28/86
Discard Date 9/ 7/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Ris
Group Leader

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300877

**ERM Environmental Resources Management, Inc.**

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. Ametek #44902 Sheet No. 1 of 1

Sampler(s) VAL F BRITTON Bottles Supplied By LANC LABS

Date Sampled 7/24/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| B-12 4.0-6.0 | SOIL | GRAB | SPLIT SPOON | 0940 | 1250 ml JAR | VOA EPA 624 | RUSH |
| B-14 4.0-6.0 | " | " | " | 1055 | " | " | " |
| B-19 4.0-6.0 | " | " | " | 1300 | " | " | " |
| B-17 6.0-7.0 | " | " | " | 1310 | " | " | " |
| B-20 2.0-3.5 | " | " | " | 1400 | " | " | " |
| B-21 2.0-4.0 | " | " | " | 1510 | " | " | " |
| B-18 2.0-4.0 | " | " | " | 1050 | " | " | " |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date Time | Reason For Transfer |
|---|---|---|---|
| [signature] | [signature] | 7-21-86 7:30 | [signature] |
| [signature] | [signature] | 7/24/86 1730 | bottle drop off |
| [signature] | [signature] | 7/25/86 1747 | SAMPLING [illegible] |
| | | | |
| | | | |

Copies White - Sampler Yellow - Lab Pink - Client Gold - File

AR300878

ANALYSIS REPORT

Lancaster Laboratories

LLI Sample No. SW 1086790

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-17 4.0-6.0 Soil
Collected 07/24/86 (0940) by VFB

Date Reported 7/31/86
Date Submitted 7/25/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader

SEE REVERSE SIDE FOR EXPLANATION
OF SYMBOLS AND ABBREVIATIONS

AR300879

LLI Sample No. SW 1086796

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-18 2.0-4.0 Soil
Collected 07/24/86 (1500) by VFB

Date Reported 7/31/86
Date Submitted 7/25/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | 0.2 | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser
Group Leader

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1086791

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-18 4.0-6.0 Soil
Collected 07/24/86 (1055) by VFB

Date Reported 7/31/86
Date Submitted 7/25/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | 1.6 | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | 1.8 | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

AR300881

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-19 4.0-6.0 Soil
Collected 07/24/86 (1300) by VFB

Date Reported 7/31/86
Date Submitted 7/25/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser R
Group Leader

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-19 6.0-7.0 Soil
Collected 07/24/86 (1310) by VFB

Date Reported 7/31/86
Date Submitted 7/25/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-20 2.0-3.5 Soil
Collected 07/24/86 (1400) by VFB

Date Reported 7/31/86
Date Submitted 7/25/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A
Group Leader

Lancaster Laboratories

LLI Sample No. SW 1086795

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-21 2.0-4.0 Soil
Collected 07/24/86 (1510) by VFB

Date Reported 7/31/86
Date Submitted 7/25/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | 0.2 | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Appr

Nelson H. Risser I
Group Leader - GC

Environmental Resources Management, Inc.

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. I.D. AMETEK 44902 Sheet No. 2 OF 2

Sampler(s) VAL F. BRITTON Bottles Supplied By LANC LABS

Date Sampled 7/23/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| B-7 4.0-6.0 | SOIL | GRAB | SPLIT SPOON | 1545 | 1.40 ml | VOA EPA 624 | RUSH |
| B-7 6.0-8.0 | " | " | " | 1600 | " | " | " |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| Val F. Britton | J. R. Hackman | 7/23/86 1930 | SAMPLING Transfer |
| | | | |
| | | | |
| | | | |
| | | | |

Copies: White - Sampler; Yellow - Lab; Pink - Client; Gold - File

AR300886

ANALYSIS REPORT

Lancaster Laboratories

LLI Sample No. SW 1086359

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-7 4.0-6.0 Grab Soil Sample
Collected 07/23/86 (1545) by VFB

Date Reported 7/31/86
Date Submitted 7/24/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | 0.5 | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | 0.3 | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser
Group Le

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300887

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1086360

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-7 6.0-8.0 Grab Soil Sample
Collected 07/23/86 (1600) by VFB

Date Reported 7/31/86
Date Submitted 7/24/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | 2.2 | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | 0.2 | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | 14. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | 15. | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES-TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/

SEE REVERSE SIDE FOR EXPLANATION
OF SYMBOLS AND ABBREVIATIONS

AR300888

**Environmental Resources Management, Inc.**

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. I.D. Ametek 44902 Sheet No. 1 of 2

Sampler(s) Val F Britton Bottles Supplied By LANC. LABS

Date Sampled 7/23/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| B-5 4.0-6.0 | SOIL | GRAB | SPLIT SPOON | 0915 | 1-40 ml | VOA EPA 624 | RUSH |
| B-5 6.0-8.0 | " | " | " | 0920 | " | " | " |
| B-4 4.0-6.0 | " | " | " | 1030 | " | " | " |
| B-4 6.0-6.5 | " | " | " | 1045 | " | " | " |
| B-6 4.0-6.0 | | " | " | 1140 | " | " | " |
| B-6 6.0-6.5 | " | " | " | 1150 | " | " | " |
| B-2 2.0-4.0 | " | " | " | 1350 | " | " | " |
| B-2 4.0-6.0 | " | " | " | 1400 | " | " | " |
| B-2 6.0-6.8 | " | " | " | 1420 | " | " | " |
| B-7 2.5-3.5 | " | " | " | 1530 | " | " | " |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| [illegible] | [illegible] | 7/18/86 0715 | [illegible] |
| [illegible] | Val F. Britton | 7/23/86 1730 | [illegible] |
| Val F. Britton | [illegible] | 7/24/86 1415 | Sampling [illegible] |
| | | | |
| | | | |

AR300889

Copies: White - Sampler, Yellow - Lab, Pink - Client, Gold - File

Lancaster Laboratories

LLI Sample No. SW 1086354

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek 44902 B-2 2.0-4.0 Grab Soil Sample
Collected 07/23/86 (1350) by VFB

Date Reported 7/31/86
Date Submitted 7/24/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES-TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Lancaster Laboratories

LLI Sample No. SW 1086355

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek 44902 B-2 4.0-6.0 Grab Soil Sample
Collected 07/23/86 (1400) by VFB

Date Reported 7/31/86
Date Submitted 7/24/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A
Group Leader - (

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1086356

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek 44902 B-2 6.0-6.8 Grab Soil Sample
Collected 07/23/86 (1420) by VFB

Date Reported 7/31/86
Date Submitted 7/24/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | 0.3 | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300892

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1086350

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek 44902 B-4 4.0-6.0 Grab Soil Sample
Collected 07/23/86 (1030) by VFB

Date Reported 7/31/86
Date Submitted 7/24/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | 0.3 | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC

AR300893

Lancaster Laboratories

LLI Sample No. SW 1086351

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek 44902 B-4 6.0-6.5 Grab Soil Sample
Collected 07/23/86 (1045) by VFB

Date Reported 7/31/86
Date Submitted 7/24/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | 0.4 | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | 0.4 | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | 0.3 | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES-TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1086348

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek 44902 B-5 4.0-6.0 Grab Soil Sample
Collected 07/23/86 (0915) by VFB

Date Reported 7/31/86
Date Submitted 7/24/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | 0.5 | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300895

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek 44902 B-5 6.0-8.0 Grab Soil Sample
Collected 07/23/86 (0920) by VFB

Date Reported 7/31/86
Date Submitted 7/24/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | 0.2 | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | 1.5 | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

SEE REVERSE SIDE FOR EXPLANATION
OF SYMBOLS AND ABBREVIATIONS

# Lancaster Laboratories

LLI Sample No. SW 1086352

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek 44902 B-6 4.0-6.0 Grab Soil Sample
Collected 07/23/86 (1140) by VFB

Date Reported 7/31/86
Date Submitted 7/24/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | 0.9 | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | 3.9 | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Lancaster Laboratories
717-656-2300

LLI Sample No: SW 1086353

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek 44902 B-6 6.0-6.5 Grab Soil Sample
Collected 07/23/86 (1150) by VFB

Date Reported 7/31/86
Date Submitted 7/24/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | 1.1 | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | 1.4 | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES-TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

SEE REVERSE SIDE FOR EXPLANATION
OF SYMBOLS AND ABBREVIATIONS

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1086357

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek 44902 B-7 2.5-3.5 Grab Soil Sample
Collected 07/23/86 (1530) by VFB

Date Reported 7/31/86
Date Submitted 7/24/86
Discard Date 8/31/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES-TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser
Group Leader

SEE REVERSE SIDE FOR EXPLANATION
OF SYMBOLS AND ABBREVIATIONS

Member American Council of Independent Laboratories, Inc.

Environmental Resources Management, Inc.

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. SMITH 44902 Sheet No. 1 of 1

Sampler(s) VAL F. BRITTON Bottles Supplied By LANC. LABS.

Date Sampled 7/22/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| B-1 4.0-6.0 | SOIL | GRAB | SPLIT SPOON | 1322 | 1 - 40ml | VOA EPA 624 | RUSH |
| B-1 8.0-8.5 | " | " | " | 1352 | " | " | " |
| B-3 4.0-6.0 | " | " | " | 1520 | " | " | " |
| B-3 7.5-7.0 | " | " | " | 1530 | " | " | " |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date Time | Reason For Transfer |
|---|---|---|---|
| [signature] | [signature] | 7/18/86 0715 | Bottle Prep. |
| [signature] | [signature] | 7/21/86 0800 | Bottle drop off |
| [signature] | [signature] | 7/23/86 1515 | SAMPLING |
| | | | |
| | | | |

Copies: White - Sampler Yellow - Lab Pink - Client Gold - File

AR300900

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-1 4.0-6.0 Grab Soil Sample
Collected on 07/22/86 (1322) by VFB

Date Reported 7/30/86
Date Submitted 7/23/86
Discard Date 8/30/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 0824000005 |
| Acrylonitrile | N.D. | ppm | 2. | 082500000 |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000 |
| Chloromethane | N.D. | ppm | 0.2 | 082700000 |
| Bromomethane | N.D. | ppm | 0.2 | 082800000 |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000 |
| Chloroethane | N.D. | ppm | 0.2 | 083000000 |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000 |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000 |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000 |
| Chloroform | N.D. | ppm | 0.2 | 083500000 |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000 |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000 |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000 |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000 |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000 |
| Benzene | N.D. | ppm | 0.2 | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000 |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000 |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000 |
| Bromoform | N.D. | ppm | 0.2 | 084700000 |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000 |
| Toluene | N.D. | ppm | 0.2 | 085000000 |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000 |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000 |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000 |

3 COPIES-TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. SW 1085898

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-1 8.0-8.5 Grab Soil Sample
Collected on 07/22/86 (1352) by VFB

Date Reported 7/30/86
Date Submitted 7/23/86
Discard Date 8/30/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | N.D. | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | N.D. | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved

Nelson H. Ri
Group Leader

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

AR300902

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-3 4.0-6.0 Grab Soil Sample
Collected on 07/22/86 (1520) by VFB

Date Reported 7/30/86
Date Submitted 7/23/86
Discard Date 8/30/86
Collected by C
P.O. 44902
Rel.

| | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Purgables Method # 624 | | | | |
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | 0.2 | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Chlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | 12. | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | 0.3 | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by

Nelson H.
Group Lead

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Lancaster Laboratories

LLI Sample No. SW 1085900

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-3 6.5-7.0 Grab Soil Sample
Collected on 07/22/86 (1530) by VFB

Date Reported 7/30/86
Date Submitted 7/23/86
Discard Date 8/30/86
Collected by C
P.O. 44902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppm | 2. | 082400000S |
| Acrylonitrile | N.D. | ppm | 2. | 082500000S |
| 2-Chloroethylvinyl ether | N.D. | ppm | 0.2 | 082600000S |
| Chloromethane | N.D. | ppm | 0.2 | 082700000S |
| Bromomethane | N.D. | ppm | 0.2 | 082800000S |
| Vinyl chloride | N.D. | ppm | 0.2 | 082900000S |
| Chloroethane | N.D. | ppm | 0.2 | 083000000S |
| Methylene chloride | N.D. | ppm | 0.2 | 083100000S |
| 1,1-Dichloroethene | N.D. | ppm | 0.2 | 083200000S |
| 1,1-Dichloroethane | N.D. | ppm | 0.2 | 083300000S |
| trans-1,2-Dichloroethene | N.D. | ppm | 0.2 | 083400000S |
| Chloroform | N.D. | ppm | 0.2 | 083500000S |
| 1,2-Dichloroethane | N.D. | ppm | 0.2 | 083600000S |
| 1,1,1-Trichloroethane | 0.2 | ppm | 0.2 | 083700000S |
| Carbon tetrachloride | N.D. | ppm | 0.2 | 083800000S |
| Dichlorobromomethane | N.D. | ppm | 0.2 | 083900000S |
| 1,2-Dichloropropane | N.D. | ppm | 0.2 | 084000000S |
| trans-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084100000S |
| Trichloroethene | 16. | ppm | 0.2 | 084200000S |
| Benzene | N.D. | ppm | 0.2 | 084300000S |
| cis-1,3-Dichloropropene | N.D. | ppm | 0.2 | 084400000S |
| 1,1,2-Trichloroethane | N.D. | ppm | 0.2 | 084500000S |
| Dibromochloromethane | N.D. | ppm | 0.2 | 084600000S |
| Bromoform | N.D. | ppm | 0.2 | 084700000S |
| Tetrachloroethene | N.D. | ppm | 0.2 | 084800000S |
| 1,1,2,2-Tetrachloroethane | N.D. | ppm | 0.2 | 084900000S |
| Toluene | N.D. | ppm | 0.2 | 085000000S |
| Chlorobenzene | N.D. | ppm | 0.2 | 085100000S |
| Ethylbenzene | N.D. | ppm | 0.2 | 085200000S |
| Fluorotrichloromethane | N.D. | ppm | 0.2 | 079000000S |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Group Leader - GC/MS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

JUN 2.0 1988

Mr. James D. Clementi, Engineer
Versar Inc.
6850 Versar Center
Springfield, VA 22151

Dear Jim:

This letter transmits my comments for the "Draft Report Technical Evaluation of zone of contamination 2 (Ametek, Inc. Site), Montgomery County, PA" report. This letter also transmits the items which need to be accomplished in order to finalize the report.

In general, I believe the report is put together, and written better than Work Assignment #329. However, some of the same areas need to be reworked as follows:

1. References need to be better identified. Each time information is referenced, the referenced is to be numbered. The number is to be listed in the "Reference Section " of the report, along with the title, Author, and date of the reference, and the applicable pages within the reference.

2. The bound material for Ametek is included with this letter. This information is to be duplicated and a reference package is to be included with the final report. The originals are to be in bounded and returned as soon as possible.

3. The May 1986 site visit is to be finalized and included in the reference package.

4. All personal communications are to be documented and included in the reference package. All previous comments concerning how information is to be referenced are applicable.

5. All quantitative values for all sampling included in the narative is to be presented in table form.

AR300905

6. A Map(s) is to be included indicating the following:

    a) All wells mentioned in report;
    b) All PRP locations;
    c) Location of surface waters;
    d) All items appearing in the line by line review of the report. (i.e. where a map is requested).

7. Photographs collected during the May 3, 1987 inspection report report are to be included in the final report, in the reference package. Photographs are to be numbered, identified and described. A list of the photographs and their descriptions is to precede the photographs themselves.

Concerning the "Addendum to the technical evaluations of zones of Contamination 2" the information contained therein is to be referenced in the main report. For example, if information contained in the Addendum supports or further describes items being presented in the main report, at these points, the main report should say, see page___ of Addendum. A reference package for the addendum is to be prepared and included for the addendum per the directions set forth in number 3 above.

Please call me at 215-597-8216 to discuss Work Assignment #330, my comments, and finalizing the report.

Sincerely,

Christopher B. Pilla

Christopher B. Pilla
Environmental Scientist

COMMENTS
Draft Technical Evaluation of Zone of Contamination 2
(Ametek, Inc. Site), Montgomery County PA

| | |
|---|---|
| p4 Line 24 | What are sample results? Plot well location on Map. What are State standards? |
| p5 Line 4-5 | What is reference? Provide map showing flows. |
| p5 Line 5 | Show well location on map. |
| p5 Line 7-12 | Indicate the organization conducting the sampling. Show well NP-15 location on map. Better identify reference. |
| p5 Line 14,30 | Better identify |
| p5 Line 20 | Show location on map. |
| p5 Line 28-33 | Show locations on map. Better identify referemce. |
| p5 Line 33 | "Rills" ? What is rills? |
| p6 Line 5,8,10,30 | Better identify references. |
| p6 Line 12 | Reported by who? What is basis for statement? |
| p6 Line 17 | Show former location of storage tank on map. |
| p6 Line 24 | Is Chemclene correct? |
| p6 Line 23-25 | Are copies of manifests included in reference package? |
| p6 Line 28 | Reported by who? What is basis for this statement? |
| p7 Line 3,11,20 | Better identify reference. |
| p7 Line 12-18 | Show location of rinse tanks, setting basin, strem behind plant, unlined lagoons. |
| p7 Line 18 | How do we know lagoons are unlined? |
| p8 Line 8,14,19 26,30 | Better identify references. |
| p8 Line 3 | Are lagoons unlined or not? |

AR300907

| | |
|---|---|
| p8 Line 14 | Was personal communication documented? Is it included in reference package? |
| p8 Line 20 | Show well locations on map. |
| p8 Line 30 | Was personal communication documented. Is it included in reference package? |
| p9 Line 3,10,18 | Better identify references. |
| p9 Line 3-4 | What are sample results? Present in Table form. |
| p9 Line 9 | Show well location on map. |
| p9 Line 15 | Show well location on map. |
| p9 Line 16-18 | Please give additional details. What was the date of sale? |
| p9 Line 23-26 | Are spent solvents handled? |
| p9 Line 26 | Soils which have been contaminated with what? |
| p9 Line 27 | Are manifests included in the reference package? |
| p10 Line 1, 13 19, 21 | Better identify references. |
| p10 Line 3-13 | Describe processes further. |
| p10 Line 5 | What is the basis for statement? Do we know for sure? Is there a fire report available from the Fire Department? |
| p10 Line 6 | What kind of brushes? Metal? |
| p10 Line 9 | Show locations on map. |
| p10 Line 12 | Created during what operations? |
| p10 Line 15 | How near is it located? Show well location and B & G on map. |
| p10 Line 14-19 | What is nature of B & G, and Ted Manufacturing businesses? |
| p10 Line 20 | What is nature of SPS Technologi to what extent is SPS a known us Please elaborate. |

| | |
|---|---|
| p11 Line 6 | Show tributary to Neshaminay Creek location on map. |
| p11 Line 11,20, 26,33 | Bettery identify references. |
| p11 Line 17 | Is letter included in reference package? |
| p11 Line 29-31 | Show locations on maps. |
| p12 Line 3, 13, 18, 30 | Better identify references. |
| p12 Line 7-15 | Place locations on map. Is study included in reference package? |
| p12 Line 16-17 | Who was study conducted for? |
| p13 Line 5,11, 23,24 | Better identify references. |
| p13 Line 1-5 | Where are results of the graph? What were results of fracture trace analysis? |
| p13 Line 6-11 | Is there a map showing sample locations? Has it been included as a reference? |
| p13 Line 13-15 | Is there a map showing locations or production wells? What is the name of the stream? |
| p13 Line 15 | Is there a map showing sample locations? |
| p14 Line 21,26 | Better identify references. |
| p16 Line 4 | Present analytical results in a table. |
| p16 Line 5,10,13 | Better identify references. |
| p17 Line 2,5,14 20,26,27,32,33 | Better identify references. |
| p17 Line 1-2 | Does this pertain to shallow or deep aquifer? |
| p17 Line 2 | Figure 1 of Versar report or ERM-study? |
| p17 Line 3-14 | Place wells on map. Present table with sample results. |

| | |
|---|---|
| p17 Line 26-27 | Place wells on map. Place area of phase III study on map. |
| p17 Line 28-31 | Show area of high metallic content on map. What were analytical results for soil bovings. Present results in table. |
| p17 Line 31-32 | What contaminants? What are results? What is basis for this statement? |
| p18 Line 4,8, 19,24 | Better identify references. |
| p18 Line 1-3 | Place wells on map. What were results? When sampled? |
| p18 Line 6-24 | Show all sample results in table form |
| p18 Line 28 | Where is collection pit? place on map. |
| p18 Line 25-30 | Did DER Document Site visit ? What is reference? |
| p19 Line 2,7,19 25 | Better identify references. |
| p19 Line 3-8 | Where are wells? Place on map. What were results? Present in table form. |
| p19 Line 3 | Can we find out exact date? |
| p19 Line 11-12 | According to who? What are results? |
| p19 Line 17-19 | Place pond on map. What were results? "no unusual results" does not suffice. |
| p19 Line 20-24 | Is inspection report included as reference? |
| | Place holding tank on map. What is volume of tank? What is content of rinse water? How is it generated? |
| p19 Line 26-29 | Is inspection report included as reference? |
| p20 Line 10,16,18 | Better identify references. |
| p20 Line 1-4 | Has quench oil ever been tested? Place quench oil cooler on map. |
| p20 Line 8-19 | Did Steiert remove soil? How much? What did it contain? |

ATTACHMENT A

DRILLING LOGS

AR300911

**Environmental Resources Management**

# Drilling Log

Project: Ametek — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: S-1 — Total Depth: 7.9' — Diameter: 6.0"

Surface Elevation: — Water Level: Initial: Dry — 24-hrs.:

Screen: Dia.: 2.0" — Length: 2.0' — Slot Size:

Casing: Dia.: 2.0" — Length: — Type: PVC

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 10/10/86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-0.5' Top soil, no odor, dry. |
| | | | | 0.5-4.0' Dark brown silt, trace gravel fill, no odor, dry. |
| | | | | 4.0-7.9' Red brown silt, trace decomposed red shale, mottled, no odor, dry. |
| 5 | | | | |
| | | | | Auger refusal at 7.9' |
| 10 | | | | |

AR300912

**Environmental Resources Management**

# Drilling Log

Project: Ametek  Owner:

Location: Hatfield, PA  W.O. Number: 449-02

Well Number: S-2  Total Depth: 5.6'  Diameter: 6.0"

Surface Elevation:  Water Level: Initial: Dry  24-hrs.:

Screen: Dia.: 2.0"  Length: 2.0'  Slot Size:

Casing: Dia.: 2.0"  Length:  Type: PVC

Drilling Company: J.E. Fritts  Drilling Method: HSA

Driller: Ray Miller  Log By: Val F. Britton  Date Drilled: 10/10/86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-0.2' Top soil, no odor, dry. |
| | | | | 0.2-5.6' Red brown silt, little decomposed red shale, mottled, no odor, damp. |
| 5 | | | | |
| | | | | Auger refusal at 5.6' |
| 10 | | | | |

AR300913

**Environmental Resources Management**

# Drilling Log

Project Ametek Owner

Location Hatfield, PA W.O. Number 449-02

Well Number S-3 Total Depth 7.0' Diameter 6.0"

Surface Elevation Water Level: Initial Dry 24-hrs.

Screen: Dia. 2.0" Length 2.0' Slot Size

Casing: Dia. 2.0" Length Type PVC

Drilling Company J.E. Fritts Drilling Method HSA

Driller Ray Miller Log By Val F. Britton Date Drilled 10/10/86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-0.2' Top soil, no odor, dry. |
| | | | | 0.2-7.0' Red brown silt, little decomposed red shale, trace clay, no odor, damp. |
| 5 | | | | |
| | | | | Auger refusal at 7.0' |
| 10 | | | | |

AR300914

**Environmental Resources Management**

# Drilling Log

Project: Ametek — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: S-4 — Total Depth: 5.6' — Diameter: 6.0"

Surface Elevation: — Water Level: Initial: Dry — 24-hrs.:

Screen: Dia.: 2.0" — Length: 2.0' — Slot Size:

Casing: Dia.: 2.0" — Length: — Type: PVC

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 10/10/86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-0.2' Top soil, no odor, dry. |
| | | | | 0.2-5.6' Red brown silt, little decomposed red shale, no odor, damp. |
| 5 | | | | |
| | | | | Auger refusal at 5.6' |
| 10 | | | | |

AR300915

**Environmental Resources Management**

# Drilling Log

Project: Ametek — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: S-5 — Total Depth: 1.7' — Diameter: 6.0"

Surface Elevation: — Water Level: Initial: Dry — 24-hrs.:

Screen: Dia.: ---- — Length: ---- — Slot Size: ----

Casing: Dia.: ---- — Length: ---- — Type: ----

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 10/10/86

Sketch Map

Notes

No well installed

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-0.2' Top soil, no odor, dry. |
| | | | | 0.2-1.7' Red brown silt and red brown decomposed shale, no odor, dry. |
| 5 | | | | |
| | | | | Auger refusal at 1.7' |
| 10 | | | | |

AR300916

**Environmental Resources Management**

# Drilling Log

Project: Ametek — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: S-6 — Total Depth: 3.5' — Diameter: 6.0"

Surface Elevation: — Water Level: Initial: Dry — 24-hrs.:

Screen: Dia.: 2.0" — Length: 2.0' — Slot Size:

Casing: Dia.: 2.0" — Length: — Type: PVC

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 10/10/86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-0.2' Top soil, no odor, dry. |
| | | | | 0.2-5.6' Red brown silt and decomposed red shale, no odor, damp. |
| 5 | | | | |
| | | | | Auger refusal at 3.5' |
| 10 | | | | |

AR300917

**Environmental Resources Management**

# Drilling Log

Project: Ametek  Owner:

Location: Hatfield, PA  W.O. Number: 449-02

Well Number: S-7  Total Depth: 6.0'  Diameter: 6.0"

Surface Elevation:  Water Level: Initial: Dry  24-hrs.:

Screen: Dia.: 2.0"  Length: 2.0'  Slot Size:

Casing: Dia.: 2.0"  Length:  Type: PVC

Drilling Company: J.E. Fritts  Drilling Method: HSA

Driller: Ray Miller  Log By: Val F. Britton  Date Drilled: 10/10/86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-0.2' Top soil. |
| | | | | 0.2-6.0' Red brown silt and decomposed red shale, no odor, damp. |
| 5 | | | | |
| | | | | Auger refusal at 6.0' |
| 10 | | | | |

AR300918

**Environmental Resources Management**

# Drilling Log

Project: Ametek — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: S-8 — Total Depth: 6.0' — Diameter: 6.0"

Surface Elevation: — Water Level: Initial: Dry — 24-hrs.:

Screen: Dia.: 2.0" — Length: 2.0' — Slot Size:

Casing: Dia.: 2.0" — Length: — Type: PVC

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 10/10/86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-0.2' Top soil, no odor, dry. |
| | | | | 0.2-6.0' Red brown silt and decomposed red shale, no odor, damp. |
| 5 | | | | |
| | | | | Auger refusal at 6.0' |
| 10 | | | | |

AR300919

**Environmental Resources Management**

# Drilling Log

Project: Ametek — Owner:

Location: Hatfield, PA — W.O. Number: 449-02

Well Number: S-9 — Total Depth: 3.0' — Diameter: 4.0"

Surface Elevation: — Water Level: Initial: — 24-hrs.:

Screen: Dia.: 2.0" — Length: 1.0' — Slot Size:

Casing: Dia.: 2.0" — Length: — Type: PVC

Drilling Company: J.E. Fritts — Drilling Method: HSA

Driller: Ray Miller — Log By: Val F. Britton — Date Drilled: 10/7/86

Sketch Map

Notes

| Depth (Feet) | Graphic Log | Well Construction | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| 0 | | | | 0-0.5' Top soil, no odor, dry. |
| | | | | 0.5-2.5' Dark brown clay, trace silt, no odor, damp. |
| 5 | | | | 2.5-3.0' Dark brown clay, trace silt, trace decomposed red shale, no odor, damp. |
| | | | | Auger refusal at 3.0' |
| 10 | | | | |

AR300920

ATTACHMENT B

SOIL SAMPLING
RESULTS

AR300921

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

# ANALYSIS REPORT

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek S-70 2.0' Soil Sample
Collected on 09/25/86 (1125) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| Purgeable Aromatics M#602 | RESULT DRY WT. BASIS | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Benzene | N.D. | ppb | 20. | 070300000N |
| Toluene | N.D. | ppb | 20. | 070400000N |
| Chlorobenzene | N.D. | ppb | 20. | 070500000N |
| Ethylbenzene | N.D. | ppb | 20. | 070600000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved

Richard C
Group Lea ...alysis

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# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-70 2.0' Soil Sample
Collected on 09/25/86 (1125) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| Purgeable Halocarbons M601 | RESULT DRY WT. BASIS | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 100. | 071100000N |
| Bromomethane | N.D. | ppb | 100. | 071200000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 200. | 071300000N |
| Vinyl chloride | N.D. | ppb | 20. | 071400000N |
| Chloroethane | N.D. | ppb | 20. | 071500000N |
| Methylene chloride | N.D. | ppb | 20. | 071600000N |
| 1,1-Dichloroethene | N.D. | ppb | 20. | 071700000N |
| 1,1-Dichloroethane | N.D. | ppb | 20. | 071800000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 20. | 071900000N |
| Chloroform | N.D. | ppb | 20. | 072000000N |
| 1,2-Dichloroethane | N.D. | ppb | 20. | 072100000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 20. | 072200000N |
| Carbon tetrachloride | N.D. | ppb | 20. | 072300000N |
| Dichlorobromomethane | N.D. | ppb | 20. | 072400000N |
| 1,2-Dichloropropane | N.D. | ppb | 20. | 072500000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 20. | 072600000N |
| Trichloroethene | N.D. | ppb | 20. | 072700000N |
| Dibromochloromethane | N.D. | ppb | 20. | 072800000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 20. | 072900000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 20. | 073000000N |
| Bromoform | N.D. | ppb | 50. | 073100000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 50. | 073200000N |
| Tetrachloroethene | N.D. | ppb | 20. | 073300000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richar
Group ... ...lysis

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Chemical & Biological fields of testing

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# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA. 17601

LLI Sample No. SW 1103415

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-70 2.0' Soil Sample
Collected on 09/25/86 (1125) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| ANALYSIS | RESULT DRY WT. BASIS | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgeable Aromatics M#602 | attached | | 018010000 |
| Purgeable Halocarbons M601 | attached | | 018210000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

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Chemical & Biological fields of testing

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Respectfully s
Lancaster
Reviewed by:

Richard C. Entz, B.A.
Group Leader, Organic Analysis

ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-71 2.5' Soil Sample
Collected on 09/25/86 (1135) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| ANALYSIS | RESULT DRY WT. BASIS | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgeable Aromatics M#602 | attached | | 018010000 |
| Purgeable Halocarbons M601 | attached | | 018210000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectf
Lancaste , Inc.
Reviewed and Approved by:

Richard C. Entz, B.A.
Group Leader, Organic Analysis

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ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-71 2.5' Soil Sample
Collected on 09/25/86 (1135) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| Purgeable Aromatics M#602 | RESULT DRY WT. BASIS | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Benzene | N.D. | ppb | 20. | 070300000N |
| Toluene | N.D. | ppb | 20. | 070400000N |
| Chlorobenzene | N.D. | ppb | 20. | 070500000N |
| Ethylbenzene | N.D. | ppb | 20. | 070600000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Entz, B.A.
Group Leader, Organic Analysis

AR300926

ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-71 2.5' Soil Sample
Collected on 09/25/86 (1135) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| Purgeable Halocarbons M601 | RESULT DRY WT. BASIS | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 100. | 071100000N |
| Bromomethane | N.D. | ppb | 100. | 071200000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 200. | 071300000N |
| Vinyl chloride | N.D. | ppb | 20. | 071400000N |
| Chloroethane | N.D. | ppb | 20. | 071500000N |
| Methylene chloride | 35. | ppb | 20. | 071600000N |
| 1,1-Dichloroethene | N.D. | ppb | 20. | 071700000N |
| 1,1-Dichloroethane | N.D. | ppb | 20. | 071800000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 20. | 071900000N |
| Chloroform | N.D. | ppb | 20. | 072000000N |
| 1,2-Dichloroethane | N.D. | ppb | 20. | 072100000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 20. | 072200000N |
| Carbon tetrachloride | N.D. | ppb | 20. | 072300000N |
| Dichlorobromomethane | N.D. | ppb | 20. | 072400000N |
| 1,2-Dichloropropane | N.D. | ppb | 20. | 072500000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 20. | 072600000N |
| Trichloroethene | N.D. | ppb | 20. | 072700000N |
| Dibromochloromethane | N.D. | ppb | 20. | 072800000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 20. | 072900000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 20. | 073000000N |
| Bromoform | N.D. | ppb | 50. | 073100000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 50. | 073200000N |
| Tetrachloroethene | N.D. | ppb | 20. | 073300000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Entz, B.A.
Group Leader, Organic Analysis

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ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek S-72 3' Soil Sample
Collected on 09/25/86 (1045) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| ANALYSIS | RESULT DRY WT. BASIS | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgeable Aromatics M#602 | attached | | 018010000 |
| Purgeable Halocarbons M601 | attached | | 018210000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Entz, B.A.
Group Leader

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2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

LLI Sample No. SW 1103412

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-72 3' Soil Sample
Collected on 09/25/86 (1045) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| Purgeable Aromatics M#602 | RESULT DRY WT. BASIS | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Benzene | N.D. | ppb | 20. | 070300000N |
| Toluene | N.D. | ppb | 20. | 070400000N |
| Chlorobenzene | N.D. | ppb | 20. | 070500000N |
| Ethylbenzene | N.D. | ppb | 20. | 070600000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Entz
Group Lea

Lancaster Laboratories
INCORPORATED
NEW HOLLAND PIKE, LANCASTER, PA 17601

LLI Sample No. SW 1103412

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-72 3' Soil Sample
Collected on 09/25/86 (1045) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| Purgeable Halocarbons M601 | RESULT DRY WT. BASIS | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 100. | 071100000N |
| Bromomethane | N.D. | ppb | 100. | 071200000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 200. | 071300000N |
| Vinyl chloride | N.D. | ppb | 20. | 071400000N |
| Chloroethane | N.D. | ppb | 20. | 071500000N |
| Methylene chloride | N.D. | ppb | 20. | 071600000N |
| 1,1-Dichloroethene | N.D. | ppb | 20. | 071700000N |
| 1,1-Dichloroethane | N.D. | ppb | 20. | 071800000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 20. | 071900000N |
| Chloroform | N.D. | ppb | 20. | 072000000N |
| 1,2-Dichloroethane | N.D. | ppb | 20. | 072100000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 20. | 072200000N |
| Carbon tetrachloride | N.D. | ppb | 20. | 072300000N |
| Dichlorobromomethane | N.D. | ppb | 20. | 072400000N |
| 1,2-Dichloropropane | N.D. | ppb | 20. | 072500000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 20. | 072600000N |
| Trichloroethene | N.D. | ppb | 20. | 072700000N |
| Dibromochloromethane | N.D. | ppb | 20. | 072800000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 20. | 072900000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 20. | 073000000N |
| Bromoform | N.D. | ppb | 50. | 073100000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 50. | 073200000N |
| Tetrachloroethene | N.D. | ppb | 20. | 073300000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully,
Lancaster La[illegible], Inc.
Reviewed and approved by:

Richard C. Entz, B.A.
Group Leader, Organic Analysis

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Chemical & Biological fields of testing

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# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

LL# Sample No. SW 1103413

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-73 1.5' Soil Sample
Collected on 09/25/86 (1100) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| ANALYSIS | RESULT DRY WT. BASIS | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgeable Aromatics M#602 | attached | | 018010000 |
| Purgeable Halocarbons M601 | attached | | 018210000 |

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Chemical & Biological Fields of Testing

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Respectfully Submitted
Lancaster Laboratories
Reviewed and

Richard C. En
Group Leader, Organic Analysis

AR300931

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

# ANALYSIS REPORT

LLI Sample No. SW 1103413

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-73 1.5' Soil Sample
Collected on 09/25/86 (1100) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| Purgeable Aromatics M#602 | RESULT DRY WT. BASIS | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Benzene | N.D. | ppb | 30. | 070300000N |
| Toluene | N.D. | ppb | 30. | 070400000N |
| Chlorobenzene | N.D. | ppb | 30. | 070500000N |
| Ethylbenzene | N.D. | ppb | 30. | 070600000N |

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Chemical & Biological fields of testing

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Member American Council of Independent Laboratories Inc

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Fehr, B.A.
Group Leader, Organic Analysis

AR 300932

LLI Sample No. SW 1103413

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-73 1.5' Soil Sample
Collected on 09/25/86 (1100) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| Purgeable Halocarbons M601 | RESULT DRY WT. BASIS | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 100. | 071100000N |
| Bromomethane | N.D. | ppb | 100. | 071200000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 300. | 071300000N |
| Vinyl chloride | N.D. | ppb | 30. | 071400000N |
| Chloroethane | N.D. | ppb | 30. | 071500000N |
| Methylene chloride | N.D. | ppb | 30. | 071600000N |
| 1,1-Dichloroethene | N.D. | ppb | 30. | 071700000N |
| 1,1-Dichloroethane | N.D. | ppb | 30. | 071800000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 30. | 071900000N |
| Chloroform | N.D. | ppb | 30. | 072000000N |
| 1,2-Dichloroethane | N.D. | ppb | 30. | 072100000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 30. | 072200000N |
| Carbon tetrachloride | N.D. | ppb | 30. | 072300000N |
| Dichlorobromomethane | N.D. | ppb | 30. | 072400000N |
| 1,2-Dichloropropane | N.D. | ppb | 30. | 072500000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 30. | 072600000N |
| Trichloroethene | N.D. | ppb | 30. | 072700000N |
| Dibromochloromethane | N.D. | ppb | 30. | 072800000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 30. | 072900000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 30. | 073000000N |
| Bromoform | N.D. | ppb | 50. | 073100000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 50. | 073200000N |
| Tetrachloroethene | N.D. | ppb | 30. | 073300000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Entz, B.A.
Group Leader, Organic Analysis

AR300933

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA. 17601

LLI Sample No. SW 1103414

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-74 1.5' Soil Sample
Collected on 09/25/86 (1115) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| ANALYSIS | RESULT DRY WT. BASIS | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgeable Aromatics M#602 | attached | | 018010000 |
| Purgeable Halocarbons M601 | attached | | 018210000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Fritz, BSA
Group Leader, Organic Analysis

AR300934

ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

LLI Sample No. SW 1103414

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-74 1.5' Soil Sample
Collected on 09/25/86 (1115) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| Purgeable Aromatics M#602 | RESULT DRY WT. BASIS | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Benzene | N.D. | ppb | 20. | 070300000N |
| Toluene | N.D. | ppb | 20. | 070400000N |
| Chlorobenzene | N.D. | ppb | 20. | 070500000N |
| Ethylbenzene | N.D. | ppb | 20. | 070600000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Entz, B.A.
Group Leader, Organic Analysis

AR300035

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

LLI Sample No. SW 1103414

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-74 1.5' Soil Sample
Collected on 09/25/86 (1115) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| Purgeable Halocarbons M601 | RESULT DRY WT. BASIS | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 100. | 071100000N |
| Bromomethane | N.D. | ppb | 100. | 071200000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 200. | 071300000N |
| Vinyl chloride | N.D. | ppb | 20. | 071400000N |
| Chloroethane | N.D. | ppb | 20. | 071500000N |
| Methylene chloride | N.D. | ppb | 20. | 071600000N |
| 1,1-Dichloroethene | N.D. | ppb | 20. | 071700000N |
| 1,1-Dichloroethane | N.D. | ppb | 20. | 071800000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 20. | 071900000N |
| Chloroform | N.D. | ppb | 20. | 072000000N |
| 1,2-Dichloroethane | N.D. | ppb | 20. | 072100000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 20. | 072200000N |
| Carbon tetrachloride | N.D. | ppb | 20. | 072300000N |
| Dichlorobromomethane | N.D. | ppb | 20. | 072400000N |
| 1,2-Dichloropropane | N.D. | ppb | 20. | 072500000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 20. | 072600000N |
| Trichloroethene | N.D. | ppb | 20. | 072700000N |
| Dibromochloromethane | N.D. | ppb | 20. | 072800000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 20. | 072900000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 20. | 073000000N |
| Bromoform | N.D. | ppb | 50. | 073100000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 50. | 073200000N |
| Tetrachloroethene | N.D. | ppb | 20. | 073300000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Entz, AR300936
Group Leader, Organic Analysis

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

# ANALYSIS REPORT

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-75 1.5' Soil Sample
Collected on 09/25/86 (1215) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| ANALYSIS | RESULT DRY WT. BASIS | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgeable Aromatics M#602 | attached | | 018010000 |
| Purgeable Halocarbons M601 | attached | | 018210000 |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Entz, B.A.
Group Leader, Organic Analysis

AR300937

ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

LLI Sample No. SW 1103417

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-75 1.5' Soil Sample
Collected on 09/25/86 (1215) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| Purgeable Aromatics M#602 | RESULT DRY WT. BASIS | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Benzene | N.D. | ppb | 20. | 070300000N |
| Toluene | N.D. | ppb | 20. | 070400000N |
| Chlorobenzene | N.D. | ppb | 20. | 070500000N |
| Ethylbenzene | N.D. | ppb | 20. | 070600000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Entz, B.A.
Group Leader, Organic Analysis

AR300938

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

# ANALYSIS REPORT

LLL Sample No. SW 1103417

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-75 1.5' Soil Sample
Collected on 09/25/86 (1215) by STB/GRE

Date Reported 10/20/86
Date Submitted 9/26/86
Discard Date 11/20/86
Collected by C
P.O. 449-01
Rel.

| Purgeable Halocarbons M601 | RESULT DRY WT. BASIS | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 100. | 071100000N |
| Bromomethane | N.D. | ppb | 100. | 071200000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 200. | 071300000N |
| Vinyl chloride | N.D. | ppb | 20. | 071400000N |
| Chloroethane | N.D. | ppb | 20. | 071500000N |
| Methylene chloride | N.D. | ppb | 20. | 071600000N |
| 1,1-Dichloroethene | N.D. | ppb | 20. | 071700000N |
| 1,1-Dichloroethane | N.D. | ppb | 20. | 071800000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 20. | 071900000N |
| Chloroform | N.D. | ppb | 20. | 072000000N |
| 1,2-Dichloroethane | N.D. | ppb | 20. | 072100000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 20. | 072200000N |
| Carbon tetrachloride | N.D. | ppb | 20. | 072300000N |
| Dichlorobromomethane | N.D. | ppb | 20. | 072400000N |
| 1,2-Dichloropropane | N.D. | ppb | 20. | 072500000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 20. | 072600000N |
| Trichloroethene | N.D. | ppb | 20. | 072700000N |
| Dibromochloromethane | N.D. | ppb | 20. | 072800000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 20. | 072900000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 20. | 073000000N |
| Bromoform | N.D. | ppb | 50. | 073100000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 50. | 073200000N |
| Tetrachloroethene | N.D. | ppb | 20. | 073300000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Richard C. Entz, B.A.
Group Leader, Organic Analysis

AR300939

ATTACHMENT C

GROUND WATER QUALITY RESULTS

# DEEP BEDROCK
# AQUIFER RESULTS

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-1 Grab Ground Water Sample
Collected on 10/1/86 at (1300) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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Chemical & Biological fields of testing

00767 0.00 022000

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist

Member American Council of Independent Laboratories Inc

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-1 Grab Ground Water Sample
Collected on 10/1/86 at (1300) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000 |
| Vinyl chloride | N.D. | ppb | 10. | 082900000 |
| Chloroethane | N.D. | ppb | 10. | 083000000 |
| Acrolein | N.D. | ppb | 100. | 082400000 |
| Acrylonitrile | N.D. | ppb | 100. | 082500000 |
| Methylene chloride | N.D. | ppb | 10. | 083100000 |
| Fluorotrichloromethane | 360. | ppb | 10. | 079000000 |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000 |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000 |
| Chloroform | N.D. | ppb | 10. | 083500000 |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000 |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000 |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000 |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000 |
| Trichloroethene | N.D. | ppb | 10. | 084200000 |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000 |
| Benzene | N.D. | ppb | 10. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000 |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000 |
| Bromoform | N.D. | ppb | 10. | 084700000 |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000 |
| Toluene | N.D. | ppb | 10. | 085000000 |
| Chlorobenzene | N.D. | ppb | 10. | 085100000 |
| Ethylbenzene | N.D. | ppb | 10. | 085200000 |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B
Senior Chemist- GC

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Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek MW-2 Grab Ground Water Sample
Collected on 10/1/86 at (1320) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Riss
Senior Chemist

Member American Council of Independent Laboratories Inc

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ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-2 Grab Ground Water Sample
Collected on 10/1/86 at (1320) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000 |
| Vinyl chloride | N.D. | ppb | 10. | 082900000 |
| Chloroethane | N.D. | ppb | 10. | 083000000 |
| Acrolein | N.D. | ppb | 100. | 082400000 |
| Acrylonitrile | N.D. | ppb | 100. | 082500000 |
| Methylene chloride | N.D. | ppb | 10. | 083100000 |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000 |
| 1,1-Dichloroethene | 570. | ppb | 10. | 083200000 |
| 1,1-Dichloroethane | 20. | ppb | 10. | 083300000 |
| trans-1,2-Dichloroethene | 150. | ppb | 10. | 083400000 |
| Chloroform | N.D. | ppb | 10. | 083500000 |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000 |
| 1,1,1-Trichloroethane | 2,300. | ppb | 10. | 083700000 |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000 |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000 |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000 |
| Trichloroethene | 740. | ppb | 10. | 084200000 |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000 |
| Benzene | N.D. | ppb | 10. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000 |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000 |
| Bromoform | N.D. | ppb | 10. | 084700000 |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000 |
| Toluene | N.D. | ppb | 10. | 085000000 |
| Chlorobenzene | N.D. | ppb | 10. | 085100000 |
| Ethylbenzene | N.D. | ppb | 10. | 085200000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A
Senior Chemist

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# ANALYSIS REPORT

Lancaster Laboratories
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2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek MW-3 Grab Groundwater Sample
Collected 10/02/86 (1245) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Riss
Senior Chemist

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# ANALYSIS REPORT

Lancaster Laboratories
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2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-3 Grab Groundwater Sample
Collected 10/02/86 (1245) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000N |
| 1,1-Dichloroethene | 20. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | 280. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | 40. | ppb | 10. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | 2,300. | ppb | 10. | 084200000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | 20. | ppb | 10. | 084800000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Riss
Senior Chemist

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# ANALYSIS REPORT

Lancaster Laboratories
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2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Sample No. WW 104908

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-4 Grab Ground Water Sample
Collected on 10/1/86 at (1430) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Riss
Senior Chemist

Member American Council of Independent Laboratories Inc

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

# ANALYSIS REPORT

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-4 Grab Ground Water Sample
Collected on 10/1/86 at (1430) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000 |
| Vinyl chloride | N.D. | ppb | 10. | 082900000 |
| Chloroethane | N.D. | ppb | 10. | 083000000 |
| Acrolein | N.D. | ppb | 100. | 082400000 |
| Acrylonitrile | N.D. | ppb | 100. | 082500000 |
| Methylene chloride | N.D. | ppb | 10. | 083100000 |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000 |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000 |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000 |
| Chloroform | N.D. | ppb | 10. | 083500000 |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000 |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000 |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000 |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000 |
| Trichloroethene | N.D. | ppb | 10. | 084200000 |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000 |
| Benzene | N.D. | ppb | 10. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000 |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000 |
| Bromoform | N.D. | ppb | 10. | 084700000 |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000 |
| Toluene | N.D. | ppb | 10. | 085000000 |
| Chlorobenzene | N.D. | ppb | 10. | 085100000 |
| Ethylbenzene | N.D. | ppb | 10. | 085200000 |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. R
Senior Chem.

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# ANALYSIS REPORT

Lancaster Laboratories
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2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-4D Grab Groundwater Sample
Collected 10/02/86 (1450) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Riss
Senior Chemist

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ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-4D Grab Groundwater Sample
Collected 10/02/86 (1450) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000N |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | N.D. | ppb | 10. | 084200000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H.
Senior Ch

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

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Member American Council of Independent Laboratories, Inc.

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

LLI Sample No. WW 1104903

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-5 Grab Ground Water Sample
Collected on 10/1/86 at (1355) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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The American Association for Laboratory Accreditation
Chemical & Biological fields of testing 00767 0.00 022000

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Respectfully Submitted
Lancaster
Reviewed a

Nelson H. Risser B.A.
Senior Chemist, GC/MS

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AR300952

ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

LLI Sample No. WW 1104903

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-5 Grab Ground Water Sample
Collected on 10/1/86 at (1355) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000 |
| Vinyl chloride | N.D. | ppb | 10. | 082900000 |
| Chloroethane | N.D. | ppb | 10. | 083000000 |
| Acrolein | N.D. | ppb | 100. | 082400000 |
| Acrylonitrile | N.D. | ppb | 100. | 082500000 |
| Methylene chloride | 40. | ppb | 10. | 083100000 |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000 |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000 |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000 |
| trans-1,2-Dichloroethene | 20. | ppb | 10. | 083400000 |
| Chloroform | N.D. | ppb | 10. | 083500000 |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000 |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000 |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000 |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000 |
| Trichloroethene | 50. | ppb | 10. | 084200000 |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000 |
| Benzene | N.D. | ppb | 10. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000 |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000 |
| Bromoform | N.D. | ppb | 10. | 084700000 |
| Tetrachloroethene | 20. | ppb | 10. | 084800000 |
| Toluene | N.D. | ppb | 10. | 085000000 |
| Chlorobenzene | N.D. | ppb | 10. | 085100000 |
| Ethylbenzene | N.D. | ppb | 10. | 085200000 |

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The American Association for Laboratory Accreditation
Chemical & Biological Fields of Testing

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved

Nelson H. R
Senior Chem.

AR300953

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

LLL Sample No. WW 1104905

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-6 Grab Ground Water Sample
Collected on 10/1/86 at (1410) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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The American Association for Laboratory Accreditation
Chemical & Biological fields of testing 00767 0.00 022000

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Riss
Senior Chemist

AR300954

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# ANALYSIS REPORT

## Lancaster Laboratories

LLI Sample No. WW 1104905

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-6 Grab Ground Water Sample
Collected on 10/1/86 at (1410) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000 |
| Vinyl chloride | N.D. | ppb | 10. | 082900000 |
| Chloroethane | N.D. | ppb | 10. | 083000000 |
| Acrolein | N.D. | ppb | 100. | 082400000 |
| Acrylonitrile | N.D. | ppb | 100. | 082500000 |
| Methylene chloride | N.D. | ppb | 10. | 083100000 |
| Fluorotrichloromethane | 100. | ppb | 10. | 079000000 |
| 1,1-Dichloroethene | 10. | ppb | 10. | 083200000 |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000 |
| trans-1,2-Dichloroethene | 10. | ppb | 10. | 083400000 |
| Chloroform | N.D. | ppb | 10. | 083500000 |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000 |
| 1,1,1-Trichloroethane | 1,300. | ppb | 10. | 083700000 |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000 |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000 |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000 |
| Trichloroethene | 410. | ppb | 10. | 084200000 |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000 |
| Benzene | N.D. | ppb | 10. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000 |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000 |
| Bromoform | N.D. | ppb | 10. | 084700000 |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000 |
| Toluene | N.D. | ppb | 10. | 085000000 |
| Chlorobenzene | N.D. | ppb | 10. | 085100000 |
| Ethylbenzene | N.D. | ppb | 10. | 085200000 |

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Chemical & Biological Fields of Testing

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by

Nelson H. E
Senior Chem

Member American Council of Independent Laboratories, Inc.

AR000055

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

LLI Sample No. WW 1104906

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek MW-7 Grab Ground Water Sample
Collected on 10/1/86 at (1415) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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The American Association for Laboratory Accreditation
Chemical & Biological fields of testing 00767 0.00 022000

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Ri
Senior Chemi

Member American Council of Independent Laboratories, Inc.

AR300956

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

LLI Sample No. WW 1104906

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-7 Grab Ground Water Sample
Collected on 10/1/86 at (1415) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000 |
| Vinyl chloride | N.D. | ppb | 10. | 082900000 |
| Chloroethane | N.D. | ppb | 10. | 083000000 |
| Acrolein | N.D. | ppb | 100. | 082400000 |
| Acrylonitrile | N.D. | ppb | 100. | 082500000 |
| Methylene chloride | N.D. | ppb | 10. | 083100000 |
| Fluorotrichloromethane | 170. | ppb | 10. | 079000000 |
| 1,1-Dichloroethene | 100. | ppb | 10. | 083200000 |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000 |
| Chloroform | N.D. | ppb | 10. | 083500000 |
| ',2-Dichloroethane | N.D. | ppb | 10. | 083600000 |
| .,1,1-Trichloroethane | 630. | ppb | 10. | 083700000 |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000 |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000 |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000 |
| Trichloroethene | 400. | ppb | 10. | 084200000 |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000 |
| Benzene | N.D. | ppb | 10. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000 |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000 |
| Bromoform | N.D. | ppb | 10. | 084700000 |
| Tetrachloroethene | 10. | ppb | 10. | 084800000 |
| Toluene | N.D. | ppb | 10. | 085000000 |
| Chlorobenzene | N.D. | ppb | 10. | 085100000 |
| Ethylbenzene | N.D. | ppb | 10. | 085200000 |

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Chemical & Biological fields of testing

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved

Nelson H. Ris
Senior Chemist-GC/MS

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER PA 17601

LL# Sample No. WW 1104907

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-8 Grab Ground Water Sample
Collected on 10/1/86 at (1425) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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The American Association for Laboratory Accreditation
Chemical & Biological Fields of Testing 00767 0.00 022000

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Rissel
Senior Chemist

AR300958

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ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

LLL Sample No. WW 1104907

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-8 Grab Ground Water Sample
Collected on 10/1/86 at (1425) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000 |
| Vinyl chloride | N.D. | ppb | 10. | 082900000 |
| Chloroethane | N.D. | ppb | 10. | 083000000 |
| Acrolein | N.D. | ppb | 100. | 082400000 |
| Acrylonitrile | N.D. | ppb | 100. | 082500000 |
| Methylene chloride | N.D. | ppb | 10. | 083100000 |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000 |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000 |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000 |
| Chloroform | N.D. | ppb | 10. | 083500000 |
| ',2-Dichloroethane | N.D. | ppb | 10. | 083600000 |
| .,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000 |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000 |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000 |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000 |
| Trichloroethene | N.D. | ppb | 10. | 084200000 |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000 |
| Benzene | N.D. | ppb | 10. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000 |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000 |
| Bromoform | N.D. | ppb | 10. | 084700000 |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000 |
| Toluene | N.D. | ppb | 10. | 085000000 |
| Chlorobenzene | N.D. | ppb | 10. | 085100000 |
| Ethylbenzene | N.D. | ppb | 10. | 085200000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Appr[illegible]

Nelson H. Risser
Senior Chemist

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

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# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek MW-8D Grab Groundwater Sample
Collected 10/02/86 (1350) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B
Senior Chemist- GC

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek MW-8D Grab Groundwater Sample
Collected 10/02/86 (1350) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000N |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | N.D. | ppb | 10. | 084200000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist

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Chemical & Biological fields of testing

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Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

# ANALYSIS REPORT

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-9 Grab Ground Water Sample
Collected on 10/1/86 at (1440) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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Chemical & Biological fields of testing

00767 0.00 022000

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Member American Council of Independent Laboratories, Inc

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risse
Senior Chemist

ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-9 Grab Ground Water Sample
Collected on 10/1/86 at (1440) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000 |
| Vinyl chloride | N.D. | ppb | 10. | 082900000 |
| Chloroethane | N.D. | ppb | 10. | 083000000 |
| Acrolein | N.D. | ppb | 100. | 082400000 |
| Acrylonitrile | N.D. | ppb | 100. | 082500000 |
| Methylene chloride | N.D. | ppb | 10. | 083100000 |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000 |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000 |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000 |
| Chloroform | N.D. | ppb | 10. | 083500000 |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000 |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000 |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000 |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000 |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000 |
| Trichloroethene | N.D. | ppb | 10. | 084200000 |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000 |
| Benzene | N.D. | ppb | 10. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000 |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000 |
| Bromoform | N.D. | ppb | 10. | 084700000 |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000 |
| Toluene | N.D. | ppb | 10. | 085000000 |
| Chlorobenzene | N.D. | ppb | 10. | 085100000 |
| Ethylbenzene | N.D. | ppb | 10. | 085200000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Ap

Nelson H. Risser B.A.
Senior Chemist GC/MS

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek MW-9D Grab Groundwater Sample
Collected 10/02/86 (1620) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Cyanide | N.D. | mg/l | 0.005 | 023703000 |
| Antimony | N.D. | mg/l | 0.004 | 024401200 |
| Arsenic | N.D. | mg/l | 0.004 | 024502200 |
| Beryllium | N.D. | mg/l | 0.005 | 024701200 |
| Cadmium | N.D. | mg/l | 0.005 | 024901200 |
| Chromium | N.D. | mg/l | 0.05 | 025101200 |
| Copper | N.D. | mg/l | 0.03 | 025301200 |
| Lead | N.D. | mg/l | 0.05 | 025501200 |
| Mercury | N.D. | mg/l | 0.001 | 025902200 |
| Nickel | N.D. | mg/l | 0.05 | 026101200 |
| Selenium | N.D. | mg/l | 0.004 | 026402200 |
| Silver | N.D. | mg/l | 0.01 | 026601200 |
| Zinc | 0.08 | mg/l | 0.01 | 027201200 |
| `hallium | N.D. | mg/l | 0.1 | 042201200 |
| henols | N.D. | mg/l | 0.004 | 043402800 |
| Purgables Method # 624 | | attached | | 052022000 |
| Acid Extractables | | attached | | 055214000 |
| Base Neutrals | | attached | | 055326000 |
| Base Neutrals (cont) | | attached | | 055400000 |
| Dioxin Screen (2,3,7,8-TCDD) Not detected | | | | 900104000 |

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00767 0.00 090400

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser I
Senior Chemist- GC

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Chemical & Biological Fields of Testing

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Member American Council of Independent Laboratories Inc

ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-9D Grab Groundwater Sample
Collected 10/02/86 (1620) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000N |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000N |
| arbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | N.D. | ppb | 10. | 084200000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser
Senior Chemist

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories, Inc.

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek MW-9D Grab Groundwater Sample
Collected 10/02/86 (1620) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| Acid Extractables | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| 2-chlorophenol | N.D. | ppb | 10. | 064600000N |
| phenol | N.D. | ppb | 10. | 065500000N |
| 2-nitrophenol | N.D. | ppb | 10. | 065100000N |
| 2,4-dimethylphenol | N.D. | ppb | 10. | 064800000N |
| 2,4-dichlorophenol | N.D. | ppb | 10. | 064700000N |
| 4-chloro-3-methylphenol | N.D. | ppb | 10. | 065300000N |
| 2,4,6-trichlorophenol | N.D. | ppb | 10. | 065600000N |
| 2,4-dinitrophenol | N.D. | ppb | 30. | 065000000N |
| 4-nitrophenol | N.D. | ppb | 30. | 065200000N |
| 2-methyl-4,6-dinitrophenol | N.D. | ppb | 30. | 064900000N |
| pentachlorophenol | N.D. | ppb | 30. | 065400000N |

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Lancaster Laboratories, Inc.
Reviewed and Approved by:

Robert Walker, B.
Chemist II, GC/MS

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ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-9D Grab Groundwater Sample
Collected 10/02/86 (1620) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| Base Neutrals | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| N-nitrosodimethylamine | N.D. | ppb | 10. | 069700000N |
| bis (2-chloroethyl) ether | N.D. | ppb | 10. | 066700000N |
| 1,3-dichlorobenzene | N.D. | ppb | 10. | 067700000N |
| 1,4-dichlorobenzene | N.D. | ppb | 10. | 067800000N |
| 1,2-dichlorobenzene | N.D. | ppb | 10. | 067600000N |
| bis (2-chloroisopropyl) ether | N.D. | ppb | 10. | 066800000N |
| hexachloroethane | N.D. | ppb | 10. | 069200000N |
| N-nitrosodi-n-propylamine | N.D. | ppb | 10. | 069800000N |
| nitrobenzene | N.D. | ppb | 10. | 069600000N |
| isophorone | N.D. | ppb | 10. | 069400000N |
| bis (2-chloroethoxy) methane | N.D. | ppb | 10. | 066600000N |
| 1,2,4-trichlorobenzene | N.D. | ppb | 10. | 070200000N |
| naphthalene | N.D. | ppb | 10. | 069500000N |
| hexachlorobutadiene | N.D. | ppb | 10. | 069000000N |
| hexachlorocyclopentadiene | N.D. | ppb | 10. | 069100000N |
| 2-chloronaphthalene | N.D. | ppb | 10. | 067200000N |
| acenaphthylene | N.D. | ppb | 10. | 065800000N |
| dimethyl phthalate | N.D. | ppb | 10. | 068100000N |
| 2,6-dinitrotoluene | N.D. | ppb | 10. | 068400000N |
| acenaphthene | N.D. | ppb | 10. | 065700000N |
| 2,4-dinitrotoluene | N.D. | ppb | 10. | 068300000N |
| fluorene | N.D. | ppb | 10. | 068800000N |
| 4-chlorophenyl phenyl ether | N.D. | ppb | 10. | 067300000N |
| diethyl phthalate | N.D. | ppb | 10. | 068000000N |
| 1,2-diphenylhydrazine | N.D. | ppb | 10. | 068600000N |
| N-nitrosodiphenylamine | N.D. | ppb | 10. | 069900000N |
| 4-bromophenyl phenyl ether | N.D. | ppb | 10. | 067000000N |
| hexachlorobenzene | N.D. | ppb | 10. | 068900000N |
| phenanthrene | N.D. | ppb | 10. | 070000000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Robert Walker, B.A.
Chemist II, GC/M

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Chemical & Biological Fields of Testing

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ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek MW-9D Grab Groundwater Sample
Collected 10/02/86 (1620) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| Base Neutrals (cont) | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| anthracene | N.D. | ppb | 10. | 065900000N |
| di-n-butyl phthalate | N.D. | ppb | 10. | 068200000N |
| fluoranthene | N.D. | ppb | 10. | 068700000N |
| pyrene | N.D. | ppb | 10. | 070100000N |
| benzidine | N.D. | ppb | 30. | 066000000N |
| butyl benzyl phthalate | N.D. | ppb | 10. | 067100000N |
| benzo (a) anthracene | N.D. | ppb | 10. | 066100000N |
| chrysene | N.D. | ppb | 10. | 067400000N |
| 3,3'-dichlorobenzidine | N.D. | ppb | 30. | 067900000N |
| bis (2-ethylhexyl) phthalate | 40. | ppb | 10. | 066900000N |
| di-n-octyl phthalate | N.D. | ppb | 10. | 068500000N |
| benzo (b) fluoranthene | N.D. | ppb | 10. | 066300000N |
| benzo (K) fluoranthene | N.D. | ppb | 10. | 066500000N |
| benzo (a) pyrene | N.D. | ppb | 10. | 066200000N |
| indeno (1,2,3-cd) pyrene | N.D. | ppb | 10. | 069300000N |
| dibenzo (a,h) anthracene | N.D. | ppb | 10. | 067500000N |
| benzo (ghi) perylene | N.D. | ppb | 10. | 066400000N |

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# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Well 1 Grab Groundwater Sample
Collected 10/02/86 (1710) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

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The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risse
Senior Chemist

AR300969

Member American Council of Independent Laboratories, Inc.

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Well 1 Grab Groundwater Sample
Collected 10/02/86 (1710) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| Fluorotrichloromethane | 400. | ppb | 10. | 079000000N |
| 1,1-Dichloroethene | 200. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | 40. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | 1,400. | ppb | 10. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | 580. | ppb | 10. | 084200000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | 30. | ppb | 10. | 084800000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
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Nelson H. Risser I
Senior Chemist- GC

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# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Well 2 Grab Groundwater Sample
Collected 10/02/86 (1730) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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Chemical & Biological Fields of Testing

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ANALYSIS REPORT

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INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Well 2 Grab Groundwater Sample
Collected 10/02/86 (1730) by VFB/DEK

Date Reported 11/ 7/86
Date Submitted 10/ 3/86
Discard Date 11/15/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| Fluorotrichloromethane | 340. | ppb | 10. | 079000000N |
| 1,1-Dichloroethene | 230. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | 20. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | 1,800. | ppb | 10. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | 600. | ppb | 10. | 084200000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | 30. | ppb | 10. | 084800000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |

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Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist- GC

The American Association for Laboratory Accreditation
Chemical & Biological Fields of Testing

Member American Council of Independent Laboratories Inc

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# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Trip Blank Grab Tap Water Sample
Collected on 10/1/86 at (1300) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

00767 0.00 022000

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Member American Council of Independent Laboratories Inc

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser P
Senior Chemist- G

AR300973

ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2426 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Trip Blank Grab Tap Water Sample
Collected on 10/1/86 at (1300) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000N |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000N |
| arbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | N.D. | ppb | 10. | 084200000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. R[illegible]
Senior Chemi

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# SHALLOW PERCHED WATER
# RESULTS

AR300975

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-1 Grab Groundwater Sample
Collected on 10/15/86 (0950) by VFB/ACF

Date Reported 10/27/86
Date Submitted 10/16/86
Discard Date 11/ 4/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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00767 0.00 022000

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist

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Chemical & Biological fields of testing

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AR300976

ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-1 Grab Groundwater Sample
Collected on 10/15/86 (0950) by VFB/ACF

Date Reported 10/27/86
Date Submitted 10/16/86
Discard Date 11/ 4/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000N |
| 1,1-Dichloroethene | 20. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | 200. | ppb | 10. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | 20. | ppb | 10. | 084200000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist- GC/MS

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Chemical & Biological Fields of Testing

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ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-9 Grab Groundwater Sample
Collected on 10/15/86 (1030) by VFB/ACF

Date Reported 10/27/86
Date Submitted 10/16/86
Discard Date 11/ 4/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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Chemical & Biological fields of testing

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Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A
Senior Chemis

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# ANALYSIS REPORT

## Lancaster Laboratories

INCORPORATED

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek S-9 Grab Groundwater Sample
Collected on 10/15/86 (1030) by VFB/ACF

Date Reported 10/27/86
Date Submitted 10/16/86
Discard Date 11/ 4/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| Methylene chloride | N.D. | ppb | 10. | 083100000N |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000N |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000N |
| Chloroform | N.D. | ppb | 10. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 10. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000N |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000N |
| Trichloroethene | 20. | ppb | 10. | 084200000N |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000N |
| Benzene | N.D. | ppb | 10. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Bromoform | N.D. | ppb | 10. | 084700000N |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000N |
| Toluene | N.D. | ppb | 10. | 085000000N |
| Chlorobenzene | N.D. | ppb | 10. | 085100000N |
| Ethylbenzene | N.D. | ppb | 10. | 085200000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risse
Senior Chemist

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Chemical & Biological fields of testing

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ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek PT-1D Grab Ground Water Sample
Collected on 10/1/86 at (1330) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Rissel
Senior Chemist

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ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek PT-1D Grab Ground Water Sample
Collected on 10/1/86 at (1330) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000 |
| Vinyl chloride | N.D. | ppb | 10. | 082900000 |
| Chloroethane | N.D. | ppb | 10. | 083000000 |
| Acrolein | N.D. | ppb | 100. | 082400000 |
| Acrylonitrile | N.D. | ppb | 100. | 082500000 |
| Methylene chloride | N.D. | ppb | 10. | 083100000 |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000 |
| 1,1-Dichloroethene | 1,700. | ppb | 10. | 083200000 |
| 1,1-Dichloroethane | 110. | ppb | 10. | 083300000 |
| trans-1,2-Dichloroethene | 450. | ppb | 10. | 083400000 |
| Chloroform | N.D. | ppb | 10. | 083500000 |
| 1,2-Dichloroethane | N.D. | ppb | 10. | 083600000 |
| 1,1,1-Trichloroethane | 22,000. | ppb | 10. | 083700000 |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000 |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000 |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000 |
| Trichloroethene | 19,000. | ppb | 10. | 084200000 |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000 |
| Benzene | N.D. | ppb | 10. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000 |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000 |
| Bromoform | N.D. | ppb | 10. | 084700000 |
| Tetrachloroethene | 20. | ppb | 10. | 084800000 |
| Toluene | N.D. | ppb | 10. | 085000000 |
| Chlorobenzene | N.D. | ppb | 10. | 085100000 |
| Ethylbenzene | N.D. | ppb | 10. | 085200000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A
Senior Chemist

The American Association for Laboratory Accreditation
Chemical & Biological fields of Testing

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# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek PT-20 Grab Ground Water Sample
Collected on 10/1/86 at (1345) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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Chemical & Biological fields of testing

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist- GC/MS

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# ANALYSIS REPORT

## Lancaster Laboratories

INCORPORATED
NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike

P. O. Box 357
West Chester, PA 19380
Ametek PT-20 Grab Ground Water Sample
Collected on 10/1/86 at (1345) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86

Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000 |
| Vinyl chloride | 20. | ppb | 10. | 082900000 |
| Chloroethane | N.D. | ppb | 10. | 083000000 |
| Acrolein | N.D. | ppb | 100. | 082400000 |
| Acrylonitrile | N.D. | ppb | 100. | 082500000 |
| Methylene chloride | N.D. | ppb | 10. | 083100000 |
| Fluorotrichloromethane | N.D. | ppb | 10. | 079000000 |
| 1,1-Dichloroethene | 40. | ppb | 10. | 083200000 |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000 |
| trans-1,2-Dichloroethene | N.D. | ppb | 10. | 083400000 |
| Chloroform | N.D. | ppb | 10. | 083500000 |
| ',2-Dichloroethane | N.D. | ppb | 10. | 083600000 |
| ,1,1-Trichloroethane | 80. | ppb | 10. | 083700000 |
| Carbon tetrachloride | 10. | ppb | 10. | 083800000 |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000 |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000 |
| Trichloroethene | 10. | ppb | 10. | 084200000 |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000 |
| Benzene | N.D. | ppb | 10. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000 |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000 |
| Bromoform | N.D. | ppb | 10. | 084700000 |
| Tetrachloroethene | N.D. | ppb | 10. | 084800000 |
| Toluene | N.D. | ppb | 10. | 085000000 |
| Chlorobenzene | N.D. | ppb | 10. | 085100000 |
| Ethylbenzene | N.D. | ppb | 10. | 085200000 |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist- GC/MS

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# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Lab Sample No. WW 1104904

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek PT-30 Grab Ground Water Sample
Collected on 10/1/86 at (1405) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

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Chemical & Biological Fields of Testing 00767 0.00 022000

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist- GC/MS

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# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

LLL Sample No. WW 1104904

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek PT-30 Grab Ground Water Sample
Collected on 10/1/86 at (1405) by VFB&DEK

Date Reported 10/10/86
Date Submitted 10/ 2/86
Discard Date 10/18/86
Collected by C
P.O. 449-02
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000 |
| Vinyl chloride | N.D. | ppb | 10. | 082900000 |
| Chloroethane | N.D. | ppb | 10. | 083000000 |
| Acrolein | N.D. | ppb | 100. | 082400000 |
| Acrylonitrile | N.D. | ppb | 100. | 082500000 |
| Methylene chloride | N.D. | ppb | 10. | 083100000 |
| Fluorotrichloromethane | 80. | ppb | 10. | 079000000 |
| 1,1-Dichloroethene | N.D. | ppb | 10. | 083200000 |
| 1,1-Dichloroethane | N.D. | ppb | 10. | 083300000 |
| trans-1,2-Dichloroethene | 880. | ppb | 10. | 083400000 |
| Chloroform | N.D. | ppb | 10. | 083500000 |
| ,2-Dichloroethane | N.D. | ppb | 10. | 083600000 |
| ,1,1-Trichloroethane | 30. | ppb | 10. | 083700000 |
| Carbon tetrachloride | N.D. | ppb | 10. | 083800000 |
| Dichlorobromomethane | N.D. | ppb | 10. | 083900000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 10. | 084900000 |
| 1,2-Dichloropropane | N.D. | ppb | 10. | 084000000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 10. | 084100000 |
| Trichloroethene | 4,400. | ppb | 10. | 084200000 |
| Dibromochloromethane | N.D. | ppb | 10. | 084600000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 10. | 084500000 |
| Benzene | N.D. | ppb | 10. | 084300000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 10. | 084400000 |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000 |
| Bromoform | N.D. | ppb | 10. | 084700000 |
| Tetrachloroethene | 70. | ppb | 10. | 084800000 |
| Toluene | N.D. | ppb | 10. | 085000000 |
| Chlorobenzene | N.D. | ppb | 10. | 085100000 |
| Ethylbenzene | N.D. | ppb | 10. | 085200000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

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Respectfully ...ed
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist

# ANALYSIS REPORT

## Lancaster Laboratories

INCORPORATED
NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-18 Grab Water Sample
Collected on 07/30/86 (1645) by VFB

Date Reported 9/10/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O. 44-902
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |
| Acid Extractables | attached | | 055120500 |
| Base Neutrals | attached | | 055326000 |
| Base Neutrals (cont) | attached | | 055400000 |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully s
Lancaster , Inc.
Reviewed ved by:

Nelson H. Risser B.A.
Senior Chemist- GC/MS

00767 0.00 068500

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# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
NEW HOLLAND PIKE LANCASTER PA 17601

Lab Sample No. VW 1089208

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-18 Grab Water Sample
Collected on 07/30/86 (1645) by VFB

Date Reported 9/10/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O. 44-902
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Acrolein | N.D. | ppb | 1000. | 082400000N |
| Acrylonitrile | N.D. | ppb | 1000. | 082500000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 100. | 082600000N |
| Chloromethane | N.D. | ppb | 100. | 082700000N |
| Bromomethane | N.D. | ppb | 100. | 082800000N |
| Vinyl chloride | N.D. | ppb | 100. | 082900000N |
| Chloroethane | N.D. | ppb | 100. | 083000000N |
| Methylene chloride | N.D. | ppb | 100. | 083100000N |
| 1,1-Dichloroethene | N.D. | ppb | 100. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 100. | 083300000N |
| trans-1,2-Dichloroethene | 2,100. | ppb | 100. | 083400000N |
| Chloroform | N.D. | ppb | 100. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 100. | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 100. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 100. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 100. | 083900000N |
| 1,2-Dichloropropane | N.D. | ppb | 100. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 100. | 084100000N |
| Trichloroethene | N.D. | ppb | 100. | 084200000N |
| Benzene | N.D. | ppb | 100. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 100. | 084400000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 100. | 084500000N |
| Dibromochloromethane | N.D. | ppb | 100. | 084600000N |
| Bromoform | N.D. | ppb | 100. | 084700000N |
| Tetrachloroethene | N.D. | ppb | 100. | 084800000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 100. | 084900000N |
| Toluene | N.D. | ppb | 100. | 085000000N |
| Chlorobenzene | N.D. | ppb | 100. | 085100000N |
| Ethylbenzene | N.D. | ppb | 100. | 085200000N |
| Fluorotrichloromethane | N.D. | ppb | 100. | 079000000N |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist- GC/MS

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AR300987

Lancaster Laboratories
INCORPORATED
NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek B-18 Grab Water Sample
Collected on 07/30/86 (1645) by VFB

Date Reported 9/10/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O. 44-902
Rel.

| Acid Extractables | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| 2-chlorophenol | N.D. | ppb | 10. | 064600000N |
| phenol | N.D. | ppb | 10. | 065500000N |
| 2-nitrophenol | N.D. | ppb | 10. | 065100000N |
| 2,4-dimethylphenol | N.D. | ppb | 10. | 064800000N |
| 2,4-dichlorophenol | N.D. | ppb | 10. | 064700000N |
| 4-chloro-3-methylphenol | N.D. | ppb | 10. | 065300000N |
| 2,4,6-trichlorophenol | N.D. | ppb | 10. | 065600000N |
| 2,4-dinitrophenol | N.D. | ppb | 25. | 065000000N |
| 4-nitrophenol | N.D. | ppb | 25. | 065200000N |
| 2-methyl-4,6-dinitrophenol | N.D. | ppb | 10. | 064900000N |
| pentachlorophenol | N.D. | ppb | 25. | 065400000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Robert Walker, B.A.
Chemist II, GC/MS

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Chemical & Biological fields of testing

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Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-18 Grab Water Sample
Collected on 07/30/86 (1645) by VFB

Date Reported 9/10/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O. 44-902
Rel.

| Base Neutrals | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| N-nitrosodimethylamine | N.D. | ppb | 10. | 069700000N |
| bis (2-chloroethyl) ether | N.D. | ppb | 10. | 066700000N |
| 1,3-dichlorobenzene | N.D. | ppb | 10. | 067700000N |
| 1,4-dichlorobenzene | N.D. | ppb | 10. | 067800000N |
| 1,2-dichlorobenzene | N.D. | ppb | 10. | 067600000N |
| bis (2-chloroisopropyl) ether | N.D. | ppb | 10. | 066800000N |
| hexachloroethane | N.D. | ppb | 10. | 069200000N |
| N-nitrosodi-n-propylamine | N.D. | ppb | 10. | 069800000N |
| nitrobenzene | N.D. | ppb | 10. | 069600000N |
| isophorone | N.D. | ppb | 10. | 069400000N |
| bis (2-chloroethoxy) methane | N.D. | ppb | 10. | 066600000N |
| 1,2,4-trichlorobenzene | N.D. | ppb | 10. | 070200000N |
| naphthalene | N.D. | ppb | 10. | 069500000N |
| hexachlorobutadiene | N.D. | ppb | 10. | 069000000N |
| hexachlorocyclopentadiene | N.D. | ppb | 10. | 069100000N |
| 2-chloronaphthalene | N.D. | ppb | 10. | 067200000N |
| acenaphthylene | N.D. | ppb | 10. | 065800000N |
| dimethyl phthalate | N.D. | ppb | 10. | 068100000N |
| 2,6-dinitrotoluene | N.D. | ppb | 10. | 068400000N |
| acenaphthene | N.D. | ppb | 10. | 065700000N |
| 2,4-dinitrotoluene | N.D. | ppb | 10. | 068300000N |
| fluorene | N.D. | ppb | 10. | 068800000N |
| 4-chlorophenyl phenyl ether | N.D. | ppb | 10. | 067300000N |
| diethyl phthalate | N.D. | ppb | 10. | 068000000N |
| 1,2-diphenylhydrazine | N.D. | ppb | 10. | 068600000N |
| N-nitrosodiphenylamine | N.D. | ppb | 10. | 069900000N |
| 4-bromophenyl phenyl ether | N.D. | ppb | 10. | 067000000N |
| hexachlorobenzene | N.D. | ppb | 10. | 068900000N |
| phenanthrene | N.D. | ppb | 10. | 070000000N |

3 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Robert Walker, B.A.
Chemist II, GC/MS

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Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek B-18 Grab Water Sample
Collected on 07/30/86 (1645) by VFB

Date Reported 9/10/86
Date Submitted 8/ 4/86
Discard Date 9/18/86
Collected by C
P.O. 44-902
Rel.

| Base Neutrals (cont) | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| anthracene | N.D. | ppb | 10. | 065900000N |
| di-n-butyl phthalate | N.D. | ppb | 10. | 068200000N |
| fluoranthene | N.D. | ppb | 10. | 068700000N |
| pyrene | N.D. | ppb | 10. | 070100000N |
| benzidine | N.D. | ppb | 25. | 066000000N |
| butyl benzyl phthalate | N.D. | ppb | 10. | 067100000N |
| benzo (a) anthracene | N.D. | ppb | 10. | 066100000N |
| chrysene | N.D. | ppb | 10. | 067400000N |
| 3,3'-dichlorobenzidine | N.D. | ppb | 10. | 067900000N |
| bis (2-ethylhexyl) phthalate | N.D. | ppb | 10. | 066900000N |
| di-n-octyl phthalate | N.D. | ppb | 10. | 068500000N |
| benzo (b) fluoranthene | N.D. | ppb | 10. | 066300000N |
| benzo (K) fluoranthene | N.D. | ppb | 10. | 066500000N |
| benzo (a) pyrene | N.D. | ppb | 10. | 066200000N |
| ndeno (1,2,3-cd) pyrene | N.D. | ppb | 10. | 069300000N |
| ibenzo (a,h) anthracene | N.D. | ppb | 10. | 067500000N |
| benzo (ghi) perylene | N.D. | ppb | 10. | 066400000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Robert Walker, B.A.
Chemist II, GC/MS

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ERM CO-SAMPLING RESULTS

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Well 2 Ground Grab Water Sample
Collected 11/18/86 (1035) by VFB

Date Reported 12/ 5/86
Date Submitted 11/18/86
Discard Date 12/13/86
Collected by C
P.O. 449-02 VB
Rel.

| ANALYSIS | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| pH | 7.60 | | | 020000500 |
| Phenolphthalein Alk. | N.D. | mg/l | 1. | 020100500 |
| Total Alkalinity | 165. | mg/l | 1. | 020200500 |
| Total Dissolved Solids | 320. | mg/l | 5. | 021201100 |
| Nitrite Nitrogen | N.D. | mg/l | 0.05 | 021900700 |
| Nitrate Nitrogen | 0.7 | mg/l | 0.5 | 022000800 |
| Chloride | 39. | mg/l | 2. | 022401500 |
| M. B. A. S. | N.D. | mg/l | 0.1 | 022502800 |
| Sulfate | 32. | mg/l | 5. | 022801500 |
| Sulfide | N.D. | mg/l | 0.1 | 023001500 |
| Arsenic | N.D. | mg/l | 0.004 | 024502200 |
| Barium | 0.4 | mg/l | 0.1 | 024601200 |
| Cadmium | N.D. | mg/l | 0.005 | 024901200 |
| Calcium | 60.1 | mg/l | 0.05 | 025001200 |
| Chromium | N.D. | mg/l | 0.05 | 025101200 |
| Copper | N.D. | mg/l | 0.03 | 025301200 |
| Iron | 0.08 | mg/l | 0.05 | 025401200 |
| Lead | N.D. | mg/l | 0.05 | 025501200 |
| Manganese | N.D. | mg/l | 0.01 | 025801200 |
| Mercury | N.D. | mg/l | 0.001 | 025902200 |
| Fluoride | 0.1 | mg/l | 0.1 | 026301200 |
| Selenium | N.D. | mg/l | 0.004 | 026402200 |
| Silver | N.D. | mg/l | 0.01 | 026601200 |
| Zinc | N.D. | mg/l | 0.01 | 027201200 |
| Color | N.D. | C P units | 5. | 027700600 |
| Color reported is the APPARENT color. Comparison was done on the sample as received. | | | | |
| Turbidity | N.D. | N T U | 1. | 027900700 |
| Odor | 1. | T.O.N. | 1. | 035105000 |
| Phenols | 0.015 | mg/l | 0.004 | 043402800 |
| Purgables Method # 624 | | attached | | 052022000 |
| Langelier Index | 0.1 | | 0.1 | 057600100 |

The Langelier Index was calculated for a water temperature of 20 degrees C.

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Elizabeth Wl
Water Chemistry

AR300992

ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Well 2 Ground Grab Water Sample
Collected 11/18/86 (1035) by VFB

Date Reported 12/ 5/86
Date Submitted 11/18/86
Discard Date 12/13/86
Collected by C
P.O. 449-02 VB
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| Methylene chloride | N.D. | ppb | 5. | 083100000N |
| Fluorotrichloromethane | 360. | ppb | 5. | 079000000N |
| 1,1-Dichloroethene | 200. | ppb | 5. | 083200000N |
| 1,1-Dichloroethane | 6. | ppb | 5. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 5. | 083400000N |
| Chloroform | N.D. | ppb | 5. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 5. | 083600000N |
| 1,1,1-Trichloroethane | 1,300. | ppb | 5. | 083700000N |
| arbon tetrachloride | N.D. | ppb | 5. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 5. | 083900000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 5. | 084900000N |
| 1,2-Dichloropropane | N.D. | ppb | 5. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 5. | 084100000N |
| Trichloroethene | 550. | ppb | 5. | 084200000N |
| Dibromochloromethane | N.D. | ppb | 5. | 084600000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 5. | 084500000N |
| Benzene | N.D. | ppb | 5. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 5. | 084400000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Bromoform | N.D. | ppb | 5. | 084700000N |
| Tetrachloroethene | 32. | ppb | 5. | 084800000N |
| Toluene | N.D. | ppb | 5. | 085000000N |
| Chlorobenzene | N.D. | ppb | 5. | 085100000N |
| Ethylbenzene | N.D. | ppb | 5. | 085200000N |

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed

Nelson H.
Senior Chemist- GC/MS

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# ANALYSIS REPORT

## Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Well 1 Ground Grab Water Sample
Collected 11/18/86 (~~1033~~ 0933) by VFB

Date Reported 12/ 5/86
Date Submitted 11/18/86
Discard Date 12/13/86
Collected by C
P.O. 449-02 VB
Rel.

| ANALYSIS | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| pH | 7.94 | | | 020000500 |
| Phenolphthalein Alk. | N.D. | mg/l | 1. | 020100500 |
| Total Alkalinity | 135. | mg/l | 1. | 020200500 |
| Total Dissolved Solids | 289. | mg/l | 5. | 021201100 |
| Nitrite Nitrogen | N.D. | mg/l | 0.05 | 021900700 |
| Nitrate Nitrogen | N.D. | mg/l | 0.5 | 022000800 |
| Chloride | 38. | mg/l | 2. | 022401500 |
| M. B. A. S. | N.D. | mg/l | 0.1 | 022502800 |
| Sulfate | 31. | mg/l | 5. | 022801500 |
| Sulfide | N.D. | mg/l | 0.1 | 023001500 |
| Arsenic | 0.009 | mg/l | 0.004 | 024502200 |
| Barium | 0.1 | mg/l | 0.1 | 024601200 |
| Cadmium | N.D. | mg/l | 0.005 | 024901200 |
| Calcium | 59.8 | mg/l | 0.05 | 025001200 |
| Chromium | N.D. | mg/l | 0.05 | 025101200 |
| Copper | N.D. | mg/l | 0.03 | 025301200 |
| Iron | 0.14 | mg/l | 0.05 | 025401200 |
| Lead | N.D. | mg/l | 0.05 | 025501200 |
| Manganese | 0.04 | mg/l | 0.01 | 025801200 |
| Mercury | N.D. | mg/l | 0.001 | 025902200 |
| Fluoride | 0.1 | mg/l | 0.1 | 026301200 |
| Selenium | N.D. | mg/l | 0.004 | 026402200 |
| Silver | N.D. | mg/l | 0.01 | 026601200 |
| Zinc | N.D. | mg/l | 0.01 | 027201200 |
| Color | N.D. | C P units | 5. | 027700600 |
| Color reported is the APPARENT color. Comparison was done on the sample as received. | | | | |
| Turbidity | N.D. | N T U | 1. | 027900700 |
| Odor | 2. | T.O.N. | 1. | 035105000 |
| Phenols | N.D. | mg/l | 0.004 | 043402800 |
| Purgables Method # 624. | | attached | | 052022000 |
| Langelier Index | 0.4 | | 0.1 | 057600100 |

The Langelier Index was calculated for a water temperature of 20 degrees C.

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Elizabeth White, Group Leader
Water Chemistry

AR300994

# ANALYSIS REPORT

## Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Well 1 Ground Grab Water Sample
Collected 11/18/86 ~~(1033)~~ (0933) by VFB

Date Reported 12/ 5/86
Date Submitted 11/18/86
Discard Date 12/13/86
Collected by C
P.O. 449-02 VB
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CO |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 0827000 |
| Bromomethane | N.D. | ppb | 10. | 0828000 |
| Vinyl chloride | N.D. | ppb | 10. | 0829000 |
| Chloroethane | N.D. | ppb | 10. | 0830000 |
| Acrolein | N.D. | ppb | 100. | 0824000 |
| Acrylonitrile | N.D. | ppb | 100. | 0825000 |
| Methylene chloride | N.D. | ppb | 5. | 0831000 |
| Fluorotrichloromethane | 570. | ppb | 5. | 0790000 |
| 1,1-Dichloroethene | 270. | ppb | 5. | 0832000 |
| 1,1-Dichloroethane | 25. | ppb | 5. | 0833000 |
| trans-1,2-Dichloroethene | N.D. | ppb | 5. | 0834000 |
| Chloroform | N.D. | ppb | 5. | 0835000 |
| 1,2-Dichloroethane | N.D. | ppb | 5. | 0836000 |
| 1,1,1-Trichloroethane | 1800. | ppb | 5. | 0837000 |
| Carbon tetrachloride | N.D. | ppb | 5. | 0838000 |
| Dichlorobromomethane | N.D. | ppb | 5. | 0839000 |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 5. | 0849000 |
| 1,2-Dichloropropane | N.D. | ppb | 5. | 0840000 |
| trans-1,3-Dichloropropene | N.D. | ppb | 5. | 0841000 |
| Trichloroethene | 700. | ppb | 5. | 0842000 |
| Dibromochloromethane | N.D. | ppb | 5. | 0846000 |
| 1,1,2-Trichloroethane | N.D. | ppb | 5. | 0845000 |
| Benzene | N.D. | ppb | 5. | 0843000 |
| cis-1,3-Dichloropropene | N.D. | ppb | 5. | 0844000 |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 0826000 |
| Bromoform | N.D. | ppb | 5. | 0847000 |
| Tetrachloroethene | 38. | ppb | 5. | 0848000 |
| Toluene | N.D. | ppb | 5. | 0850000 |
| Chlorobenzene | N.D. | ppb | 5. | 0851000 |
| Ethylbenzene | N.D. | ppb | 5. | 0852000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

Member American Council of Independent Laboratories Inc

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist - GC/MS

# ANALYSIS REPORT

Lancaster Laboratories
INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Well 1 Ground Grab Water Sample
Collected 11/18/86 (~~1050~~) by VFB
(0950)

Date Reported 12/ 5/86
Date Submitted 11/18/86
Discard Date 12/13/86
Collected by C
P.O. 449-02 VB
Rel.

| ANALYSIS | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| pH | 7.62 | | | 020000500 |
| Phenolphthalein Alk. | N.D. | mg/l | 1. | 020100500 |
| Total Alkalinity | 172. | mg/l | 1. | 020200500 |
| Total Dissolved Solids | 316. | mg/l | 5. | 021201100 |
| Nitrite Nitrogen | N.D. | mg/l | 0.05 | 021900700 |
| Nitrate Nitrogen | 0.6 | mg/l | 0.5 | 022000800 |
| Chloride | 37. | mg/l | 2. | 022401500 |
| M. B. A. S. | N.D. | mg/l | 0.1 | 022502800 |
| Sulfate | 32. | mg/l | 5. | 022801500 |
| Sulfide | N.D. | mg/l | 0.1 | 023001500 |
| Arsenic | N.D. | mg/l | 0.004 | 024502200 |
| Barium | 0.3 | mg/l | 0.1 | 024601200 |
| Cadmium | N.D. | mg/l | 0.005 | 024901200 |
| Calcium | 55.5 | mg/l | 0.05 | 025001200 |
| Chromium | N.D. | mg/l | 0.05 | 025101200 |
| Copper | N.D. | mg/l | 0.03 | 025301200 |
| Iron | N.D. | mg/l | 0.05 | 025401200 |
| Lead | N.D. | mg/l | 0.05 | 025501200 |
| Manganese | 0.03 | mg/l | 0.01 | 025801200 |
| Mercury | N.D. | mg/l | 0.001 | 025902200 |
| Fluoride | 0.1 | mg/l | 0.1 | 026301200 |
| Selenium | N.D. | mg/l | 0.004 | 026402200 |
| Silver | N.D. | mg/l | 0.01 | 026601200 |
| Zinc | N.D. | mg/l | 0.01 | 027201200 |
| Color | N.D. | C P units | 5. | 027700600 |
| Color reported is the APPARENT color. Comparison was done on the sample as received. | | | | |
| Turbidity | N.D. | N T U | 1. | 027900700 |
| Odor | 1.0 | T.O.N. | 0.99 | 035105000 |
| Phenols | N.D. | mg/l | 0.004 | 043402800 |
| Purgables-Method # 624 . | | attached | | 052022000 |
| Langelier Index | 0.1 | | 0.1 | 057600100 |

The Langelier Index was calculated for a water temperature of 20 degrees C.
The Langelier Index was calculated for a water temperature of 20 degrees C.

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation
Chemical & Biological Fields of Testing

00767 5.50 062950

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Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Elizabeth White, Group Leader
Water Chemistry

Member American Council of Independent Laboratories, Inc.

ANALYSIS REPORT

Lancaster Laboratories

INCORPORATED
2425 NEW HOLLAND PIKE, LANCASTER, PA 17601

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Well 1 Ground Grab Water Sample
Collected 11/18/86 ~~(1050)~~ (0950) by VFB

Date Reported 12/ 5/86
Date Submitted 11/18/86
Discard Date 12/13/86
Collected by C
P.O. 449-02 VB
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| Methylene chloride | N.D. | ppb | 5. | 083100000N |
| Fluorotrichloromethane | 490. | ppb | 5. | 079000000N |
| 1,1-Dichloroethene | 280. | ppb | 5. | 083200000N |
| 1,1-Dichloroethane | 15. | ppb | 5. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 5. | 083400000N |
| Chloroform | N.D. | ppb | 5. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 5. | 083600000N |
| 1,1,1-Trichloroethane | 1,900. | ppb | 5. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 5. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 5. | 083900000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 5. | 084900000N |
| 1,2-Dichloropropane | N.D. | ppb | 5. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 5. | 084100000N |
| Trichloroethene | 720. | ppb | 5. | 084200000N |
| Dibromochloromethane | N.D. | ppb | 5. | 084600000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 5. | 084500000N |
| Benzene | N.D. | ppb | 5. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 5. | 084400000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Bromoform | N.D. | ppb | 5. | 084700000N |
| Tetrachloroethene | 44. | ppb | 5. | 084800000N |
| Toluene | N.D. | ppb | 5. | 085000000N |
| Chlorobenzene | N.D. | ppb | 5. | 085100000N |
| Ethylbenzene | N.D. | ppb | 5. | 085200000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist- GC/MS

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

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AR300997

# ANALYSIS REPORT

## Lancaster Laboratories

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380
Ametek Field Blank Distilled Grab Water Sample
Collected 11/18/86 (0900) by VFB

Date Reported 12/ 5/86
Date Submitted 11/18/86
Discard Date 12/13/86
Collected by C
P.O. 449-02 VB
Rel.

| ANALYSIS | RESULT AS RECEIVED | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|
| Purgables Method # 624 | attached | | 052022000 |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation
Chemical & Biological fields of testing

00767 5.50 022550

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Member American Council of Independent Laboratories, Inc

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Elizabeth White, Group Leader
Water Chemistry

AR300998

Lancaster Laboratories
INCORPORATED
NEW HOLLAND PIKE, LANCASTER, PA 17601

PT 111568

Environ. Resources Management
999 West Chester Pike
P. O. Box 357
West Chester, PA 19380

Ametek Field Blank Distilled Grab Water Sample
Collected 11/18/86 (0900) by VFB

Date Reported 12/ 5/86
Date Submitted 11/18/86
Discard Date 12/13/86
Collected by C
P.O. 449-02 VB
Rel.

| Purgables Method # 624 | RESULT AS RECEIVED | | LIMIT OF DETECTION | LAB CODE |
|---|---|---|---|---|
| Chloromethane | N.D. | ppb | 10. | 082700000N |
| Bromomethane | N.D. | ppb | 10. | 082800000N |
| Vinyl chloride | N.D. | ppb | 10. | 082900000N |
| Chloroethane | N.D. | ppb | 10. | 083000000N |
| Acrolein | N.D. | ppb | 100. | 082400000N |
| Acrylonitrile | N.D. | ppb | 100. | 082500000N |
| Methylene chloride | N.D. | ppb | 5. | 083100000N |
| Fluorotrichloromethane | N.D. | ppb | 5. | 079000000N |
| 1,1-Dichloroethene | N.D. | ppb | 5. | 083200000N |
| 1,1-Dichloroethane | N.D. | ppb | 5. | 083300000N |
| trans-1,2-Dichloroethene | N.D. | ppb | 5. | 083400000N |
| Chloroform | N.D. | ppb | 5. | 083500000N |
| 1,2-Dichloroethane | N.D. | ppb | 5. | 083600000N |
| 1,1,1-Trichloroethane | N.D. | ppb | 5. | 083700000N |
| Carbon tetrachloride | N.D. | ppb | 5. | 083800000N |
| Dichlorobromomethane | N.D. | ppb | 5. | 083900000N |
| 1,1,2,2-Tetrachloroethane | N.D. | ppb | 5. | 084900000N |
| 1,2-Dichloropropane | N.D. | ppb | 5. | 084000000N |
| trans-1,3-Dichloropropene | N.D. | ppb | 5. | 084100000N |
| Trichloroethene | N.D. | ppb | 5. | 084200000N |
| Dibromochloromethane | N.D. | ppb | 5. | 084600000N |
| 1,1,2-Trichloroethane | N.D. | ppb | 5. | 084500000N |
| Benzene | N.D. | ppb | 5. | 084300000N |
| cis-1,3-Dichloropropene | N.D. | ppb | 5. | 084400000N |
| 2-Chloroethylvinyl ether | N.D. | ppb | 10. | 082600000N |
| Bromoform | N.D. | ppb | 5. | 084700000N |
| Tetrachloroethene | N.D. | ppb | 5. | 084800000N |
| Toluene | N.D. | ppb | 5. | 085000000N |
| Chlorobenzene | N.D. | ppb | 5. | 085100000N |
| Ethylbenzene | N.D. | ppb | 5. | 085200000N |

2 COPIES TO Environmental Resources Mgmt. ATTN: David R. Blye

The American Association for Laboratory Accreditation
Chemical & Biological Fields of Testing

Member American Council of Independent Laboratories, Inc.

SEE REVERSE SIDE FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Nelson H. Risser B.A.
Senior Chemist- GC/MS

AR300999

ATTACHMENT D

CHAIN OF CUSTODY FORMS

**Environmental Resources Management, Inc.**

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. Amtek 449-02 Sheet No. ~~1 of 1~~ 2 of 2

Sampler(s) VAL F BRITTON DAVID E. KIER Bottles Supplied By LANC LAB

Date Sampled 10/1/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| MW-4 | GROUND WATER | GRAB | PVC BAILER | 1430 | 2-40 ml VIALS | VOA EPA 624 | |
| MW-9 | " | " | " | 1440 | " | " | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| [signature] | [signature] | 9/24/86 | Bottle Prep |
| [signature] | [signature] | 10/1/86 | Bottle drop off |
| [signature] | [signature] | 10/3/86 1040 | |
| | | | |
| | | | |

Copies: White - Sampler; Yellow - Lab; Pink - Client; Gold - File

AR301001

**Environmental Resources Management, Inc.**

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. Amoco 444-05 Sheet No. 1 OF 2

Sampler(s) VAL F. BRITTON DOUG E. KEER Bottles Supplied By LANC. LABS.

Date Sampled 10/1/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| TRIP BLANK | TAP | GRAB | TAP | 1300 | 2-40 ml VIALS | VOA EPA 624 | |
| MW-1 | GROUND WATER | " | PVC BAILER | 1300 | " | " | |
| MW-2 | " | " | " | 1320 | " | " | |
| PT-10 | " | " | " | 1330 | " | " | |
| PT-20 | " | " | " | 1345 | " | " | |
| MW-5 | " | " | " | 1355 | " | " | |
| PT-30 | " | " | " | 1405 | " | " | |
| MW-6 | " | " | " | 1410 | " | " | |
| MW-7 | " | " | " | 1415 | " | " | |
| MW-8 | " | " | " | 1425 | " | " | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| | | 9/29/86 | Split in Pairs |
| | | 10/1/86 | Bottle drop off |
| | | 10/2/86 1610 | |
| | | | |
| | | | |

Copies: White - Sampler; Yellow - Lab; Pink - Client; Gold - File

AR301002

**ERM** Environmental Resources Management, Inc.

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. Ametek 449-01 Sheet No. 1 of 2

Sampler(s) S.T. Barry / E R Emilsson Bottles Supplied By L. Labs

Date Sampled 9-25-86 Bottle Batch No.

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| S-72 | Soil 3' | Soil | auger | 1045 | 1/250 ml | VOA | GC |
| S-73 | Soil 1.5' | Soil | " | 1100 | " | " | |
| S 74 | Soil 1.5' | " | " | 1115 | " | " | |
| S-76 | Soil 2' | " | " | 1125 | " | " | |
| S-71 | Soil 2.5' | " | " | 1135 | " | " | |
| S 75 | Soil 1.5' | " | " | 1215 | " | " | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| [signature] | [signature] | 9/19/86 | Bottle Prep |
| [signature] | S. Barry | 9/24/86 | Bottle Drop off |
| S Barry | [signature] | 9/26/86 1515 | Sample pick |
| | | | |
| | | | |

Copies: White - Sampler; Yellow - Lab; Pink - Client; Gold - File

AR301003

Environmental Resources Management, Inc.

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. 449-02 AMETEK Sheet No.

Sampler(s) VAL F. BRITTEN DOUG E. KIER Bottles Supplied By LANC LABS.

Date Sampled 10/2/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| MW-3 | GROUND WATER | GRAB | PVC BAILER | 1245 | 2-40 ml VIAL | VOA EPA 624 | |
| MW-9D | " | " | " | 1350 | " | " | |
| MW-4D | " | " | " | 1450 | " | " | |
| MW-9D | " | " | " | 1620 | 8 | FULL P.P. (MINUS PEST/PCB's) | METALS WERE FIELD FILTERED |
| WELL 1 | " | " | TAP | 1710 | " | VOA EPA 624 | |
| WELL 2 | " | " | " | 1730 | " | " | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| | Val F. Britten | 10/2/86 1030 | FIELD SAMPLING |
| Val F. Britten | [signature] | 10/3/86 1133 | [illegible] |
| | | | |
| | | | |
| | | | |

Copies: White - Sampler; Yellow - Lab; Pink - Client; Gold - File

AR301004

**Environmental Resources Management, Inc.**

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. 449-02 AMETEK Sheet No. 1 OF 1

Sampler(s) VAL F. BRITTON ALAN C. FUNK Bottles Supplied By LAWC LABS

Date Sampled 10/15/86 Bottle Batch No. —

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| S-1 | GROUND WATER | GRAB | BOTTLE ON STRING | 0950 | 2-40 ml VIALS. | VOA EPA 624 | |
| S-9 | " | " | " | 1030 | " | " | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| | Val F. Britton | 10/15/86 0600 | SAMPLING |
| Val F. Britton | J. Blackman | 10/16/86 1401 | Trans. to Lab |
| | | | |
| | | | |

Copies: White - Sampler; Yellow - Lab; Pink - Client; Gold - File

AR301005

**Environmental Resources Management, Inc.**

# Chain Of Custody Record

999 West Chester Pike • West Chester, Pennsylvania 19382 ☎ (215) 696-9110

Project No. / I.D. ametek 449-02 Sheet No. 1 of 4

Sampler(s) AL F. BRITTON Bottles Supplied By LANC LABS

Date Sampled 11-8-86 Bottle Batch No.

| Sample I.D. | Sample Description | Sample Type | Sampling Method | Time | No. Of Containers | Analysis Requested | Remarks |
|---|---|---|---|---|---|---|---|
| FIELD BLANK | DISTILLED WATER | GRAB | OUT OF BOTTLE | 0900 | 2-40 ml VIALS | EPA VOA 624 | RUSH |
| WELL 3 | GROUND WATER | " | TAP | 0932 | | EPA VOA 624 PRIMARY SECONDARY | RUSH |
| WELL 1 | " | " | TAP | 0950 | | EPA VOA 624 PRIMARY SECONDARY | RUSH |
| WELL 2 | " | " | TAP | 1035 | | " | RUSH |
| [redacted] | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Signature) | Received By (Signature) | Date/Time | Reason For Transfer |
|---|---|---|---|
| [signature] | [signature] | 11/14/86 | Bottle Prep |
| [signature] | [signature] | 11/18/86 | Sample |
| [signature] | [signature] | 11/18/86 1422 | Sample |
| | | | |
| | | | |

Copies: White - Sampler; Yellow - Lab; Pink - Client; Gold - File

AR301006

REFERENCE 6
Ametek Environmental Control Survey
Dated 2/1/72.

AR301007

# AMETEK ENVIRONMENTAL CONTROL SURVEY

Location of Plant (City, County, State) Hatfield, Montgomery County, Pennsylvania 19440

Survey Prepared By R. C. Allen Date 2-1-72

Products Springs, Stampings, Test Equip.

Normal Plant Operation

A. Circle one: 1 2 (3) Shifts Per Day

B. Circle one: (5) 6 7 Days Per Week

C. Number of employes 300

## I. WATER SURVEY

### A. Water Supply

1. Total incoming water 300,000 gallons per week.

2. Source of water - circle one or more:

River (Private Well)

Municipal Water Supply Other (Specify)

### B. Water Usage (Gallons per week or percentages of total incoming water supply. If percentages are used, total should be 100%.)

1. Domestic (drinking, sanitary, food preparation) 60,000 gals

2. Cooling 230,000 "

3. Process 2,600 "

4. Other (Examples: boilers - landscape) 7,400 Gals.

5. Does incoming process water require additional treatment? No

### C. Cooling Water

1. Is cooling water recycled? No. If yes, indicate processes for treatment prior to recycle.

2. Volume treated per week. _____

3. Blowdown (gallons per week) 1,500 gals.

4. Disposal of blowdown -

Storm Sewer Sanitary Sewer

(Surface Watercourse)

Other (Explain) _____

### D. Liquid wastes from air pollution control devices (wet scrubbers, etc.)

1. Volume (gal. per day or shift) None

2. Source -

3. Analyses -

### E. Water Conservation

1. Do you recycle any water? See Note 1-E-1

2. If so, specify source of recycled water by process Water Tower

3. Volume of water recycled 30,000 gals.

4. Treatment of water previous to recycling Gas Chlorination

5. Analyses of water recycled after treatment See Laboratory Analysis Report Exhibit 1-E-5



AR301008

F. Treatment of waste water prior to final discharge:

1. Volume (gallons per shift or day) 2,600 gals/wk

2. Point of disposal: Circle one or more. If more than one, estimate percentage of volume for each.

Municipal Sewer  Surface Watercourse

Deepwell  Storm Drain  (Lagoon)

3. Please describe pretreatment or treatment facilities & procedures.

Lancy Integrated Waste Treatment System

G. Disposal of side streams (sludge, other solids; include solutions hauled away)

| Material | Disposal | Quantity Per Week |
|---|---|---|
| Metallic Oxides | Lagoon | 1,300 gal/wk |
| " Hydroxides | " | 1,300 gal/wk |
| Tumbling Sludges | " | 50 gal/wk |

H. Capital cost of treatment facilities (and year)

| | |
|---|---|
| Chlorinating System, 1969 | $ 1,388.31 |
| Waste Treat. Blk Oxide, 1965 | 5,500.00 |
| Plating Waste Treat. 1963 | 63,778.20 |
| Total Capital Cost | $70,666.51 |

1. Annual operating costs $4,411.42

2. Cost of hauling (annual) $10,000.

* 3. Cost of use of municipal systems (annual) - See Note 1-H-3 $3,595.18/yr.

4. Number of treatment personnel 3

I. List regulatory agencies which now control discharge of liquid wastes and wastewaters. See below

Please attach copy of effluent standards you must meet. See Exhibit 1-I-1

Additional comments: (Please send us as much pertinent data as possible, including any reports you have made either internally or for regulating agencies. Please list any references you think would be useful in this audit, and name any individuals who could supply additional information.) See Exhibit 1-I-2

J. Manufacturing Processes - Complete a separate process sheet for each manufacturing process used. See attached examples.

I. (a) Dept. of Health, Sanitary Water Board, Harrisburg

(b) U.S. Army, Corps of Engineers

* Proposal for Hunter Spring to tie into Municipal Sewer System listed as Exhibit 1-I-2-A



AR301009

Manufacturing Process

Name Chemical Cleaning - Steel

Description (List steps in process)

1. Degrease
2. Alkaline Clean
3. Rinse
4. Acid Clean
5. Rinse
6. Zinc Plate
7. Rinse
8. Cyanide Treatment
9. Rinse
10. Rinse Hot

Process production rate (average weekly production by unit: i.e. pounds per week)

| | Chemicals used (by steps above) | Quantity (used per week) | Concentration | Disposal By percentage: 3 columns should total 100% | | |
|---|---|---|---|---|---|---|
| | | | | Hauled away | Flush | Consumed* |
| 1 | Trichloroethane | 50 gals/wk | 100% | | | 100% |
| 2 | Cleanite #74 | 160# for 300 gal | 25% | Lagoon | | |
| 4 | Phosphoric Acid | 60 gals/wk | 25% | " | | |
| 6 | Zinc Plate | 5#/wk | | " | | |
| 8 | Cyanide | 20#/wk | | " | | |

*Includes evaporation loss

AR301010

Manufacturing Process

Name Chemical Cleaning - Stainless Steel

Description (List steps in process)

1. Degrease
2. Passivate
3. Rinse
4. Rinse Hot
5. 
6. 
7. 
8. 
9. 
10. 

Process production rate (average weekly production by unit: i.e. pounds per week)

| | Chemicals used (by steps above) | Quantity (used per week) | Concentration | Disposal By percentage: 3 columns should total 100% | | |
|---|---|---|---|---|---|---|
| | | | | Hauled away | Flush | Consumed* |
| 1 | Trichloroethane | 50 gals/wk | 100% | | | 100% |
| 2 | Nitric Acid | 25 gals/wk | 20% | Lagoons | | |

*Includes evaporation loss



AR301011

Manufacturing Process

Name Chemical Cleaning - Stainless Steel

Description (List steps in process)

1. Degrease
2. Alkaline Clean
3. Rinse
4. Delead
5. Rinse Cold
6. Rinse Hot
7. 
8. 
9. 
10. 

Process production rate (average weekly production by unit: i.e. pounds per week)

| | Chemicals used (by steps above) | Quantity (used per week) | Concentration | Disposal By percentage: 3 columns should total 100% Hauled away | Flush | Consumed* |
|---|---|---|---|---|---|---|
| 1 | Trichloroethane | 50 gals/wk | 100% | | | 100% |
| 2 | Cleanite #74 | 160# for 300 gals | 25% | Lagoon | | |
| 4 | Nitric Acid | 50 gals/wk | 50% | " | | |

*Includes evaporation loss



AR301012

Manufacturing Process

Name Chemical Cleaning - Steel

Description (List steps in process)

1. Degrease
2. Alkaline Clean
3. Rinse
4. Acid Clean
5. Rinse
6. Cadmium Plate
7. Rinse
8. Cyanide Treatment
9. Rinse
10. Rinse Hot

Process production rate (average weekly production by unit: i.e. pounds per week)

| | Chemicals used (by steps above) | Quantity (used per week) | Concentration | Disposal By percentage: 3 columns should total 100% | | |
|---|---|---|---|---|---|---|
| | | | | Hauled away | Flush | Consumed* |
| 1 | Trichloroethane | 50 gals/wk | 100% | | | 100% |
| 2 | Cleanite #74 | 50#/wk | 4% | Lagoon | | |
| 4 | Phosphoric Acid | 60 gals/wk | 25% | " | | |
| 6 | Cadmium Oxide | 5#/wk | | " | | |
| 8. | Cyanide | 20#/wk | | " | | |

*Includes evaporation loss

AR301013

Manufacturing Process

Name Chemical Cleaning - Steel & Stainless Steel

Description (List steps in process)

1. Degrease
2. Alkaline Clean
3. Rinse
4. Acid Clean
5. Rinse
6. Blacking
7. Rinse Cold
8. Rinse Hot
9. Oil
10. 

Process production rate (average weekly production by unit: i.e. pounds per week)

| | Chemicals used (by steps above) | Quantity (used per week) | Concentration | Disposal By percentage: 3 columns should total 100% | | |
|---|---|---|---|---|---|---|
| | | | | Hauled away | Flush | Consumed* |
| 1 | Trichloroethane | 50 gals/wk | 100% | | | 100% |
| 2 | Cleanite #74 | 25#/wk | 2% | Lagoon | | |
| 4 | Phosphoric Acid | 60 gals/wk | 25% | " | | |
| 6 | Du-Lite-3.0 | 50 gals/mo | 5#/gal | " | | |
| 9 | Haughto 853 | 10 gals/wk | 100% | " | | |

*Includes evaporation loss

AR301014

Manufacturing Process

Name Chemical Coating - Zinc Phosphate

Description (List steps in process)

1. Degrease
2. Zinc Phosphate
3. Rinse Cold
4. Rinse Cold
5. Rinse Hot
6. Oil
7. 
8. 
9. 
10. 

Process production rate (average weekly production by unit: i.e. pounds per week)

| | Chemicals used (by steps above) | Quantity (used per week) | Concentration | Disposal By percentage: 3 columns should total 100% Hauled away | Flush | Consumed* |
|---|---|---|---|---|---|---|
| 1 | Trichloroethane | 50 gals/wk | 100% | | | 100% |
| 2 | Haughto Phosphate | 4.5 gals/wk | 4.5 gals to 154 gals. Water | Lagoon | | |
| 6 | Haughto 853 | 10 gals/wk | 100% | " | | |

*Includes evaporation loss

AR301015

## II. AIR SURVEY

A. Number of Fuel Burning Units at plant. The total number of units in which fuel combustion for indirect heating occurs, either for space heat or industrial use 2

B. Annual fuel usage. The total quantities of all fuels should be listed. If different grades of coal or fuel oil were used, they should be listed separately.

| | Fuel Type | Quantity | (Units) | Sulfur Content (%) |
|---|---|---|---|---|
| 1. | #5 | 127,263 | 2 | 1.0% |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |

C. Air Pollution Controls. Any controls removing particulate material or $SO_2$ from the flue gas streams should be specified in this item.

| | Equipment Type | Particulate Control Efficiency (%) | Amount of Combustion Capacity Controlled (%) |
|---|---|---|---|
| 1. | | None | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

Comments: _____

D. Applicable air pollution control code (Federal, State, local or regional) _____
Federal - Clean Air Act of 1970
State - Air Pollution Control Act

| | |
|---|---|
| $SO_2$ | ppm |
| $NO_x$ | ppm |
| CO | ppm |
| Hydrocarbons | ppm |
| Particulates | grains/SCF |
| Odors | ppm, micrograms/$M^3$ or scentometer No. |

E. Name of air pollution control official in your

1. County Montgomery County
   Name Mr. Willard
   Address 1875 New Hope St. Norristown,
   Telephone No. 215-277-3210

2. State Pennsylvania
   Name Mr. George T. O'Brien
   Address Pa. Dept of Health, P.O.Box 9(
   Telephone No. Harrisburg, Pa. 1
   717-238-7700

F. Have you received any complaint(s) from any of the public officials?

Yes _____ No X

G. If yes, state nature and disposal status of complaint(s). Attach separate sheet.

H. Have you received any complaint(s) from the general public?

Yes _____ No X

If yes, state nature and disposal status of complaint(s). Attach separate sheet.

If no, do you expect [illegible]
separate sheet. No

AR301016

## III. SOLID WASTE SURVEY

A. Type of solid waste. The section should present a comprehensive display of the types and quantities of solid wastes generated by plant operations. Quantities reported should reflect average daily operating conditions.

| Type | Quantity (Tons/Day) | Disposal On-Site (%) | Disposal Off-Site (%) |
|---|---|---|---|
| 1. Rock, sand, gravel, etc. | None | - | - |
| 2. Ash | .0075 | | 100% |
| 3. Collected Fly Ash | None | - | - |
| 4. Sludge | None | - | - |
| 5. Metal Scrap, Containers | .89 | | 100% |
| 6. Paper Scrap, Containers | 1.2 | 95% | 5% |
| 7. Plastic | None | | |
| 8. Garbage | Included in item 6 | | |
| 9. Glass | See Comments | | 100% |
| 10. Other (specify)___ | | | |

B. Disposal Methods. All solid wastes produced must eventually be disposed of in some manner. The intent of this item is to indicate what disposal methods or techniques are currently in use at the plant site.

1. Total Off-Site Disposal (Tons/Day) Cost ($/Ton)

   (a) Private Incineration ____ (%) ____

   (b) Private Landfill .0075 (%) $40.00

   (c) Private Sanitary Landfill ____ (%) ____

   (d) Municipal Disposal ____ (%) ____

   (e) By-Product Use Or Recovery ____ (%) ____
   Sell

   (f) Other (Specify) A-5 (%) $70.20/ton Credit

2. Total On-Site Disposal (Tons/Day)

   (a) Incineration* 1.2 (%) 100%

   (b) Landfill ____ (%) ____

   (c) Other (Specify) ____ (%) ____

Comments:
III-A-9 We average 4.2 Fluorescent Tubes per day

III-B-2-a Our incinerator should be replaced - See Exhibit III-B-2-A

*On-Site incineration, while providing a solution to a solid waste problem, may create an air pollution situation.

## IV. NOISE SURVEY

A. Objective Noise Measurements. Information concerning objective sound level measurements is desired.

1. Have environmental noise measurements been made? Yes X No ____
   See Attached Sheet IV-A-1

   If Yes (a) Date of last measurement 2-8-72

   (b) Organization or group conducting tests R. C. Allen

   (c) Type of equipment used See Report

   (d) Maximum Boundary-Line Sound Levels (dB) ____

   (e) Report of tests: Enclosed X
   Available ____
   Unavailable ____

B. Complaints of Excessive Noise. In the absence of objective environmental criteria relating to noise, complaints may be used in identifying and defining any potential problems. Parts (a) and (b) of this item refer to employe and community generated complaints, respectively.

AR301017

1. Are complaints received from workers regarding noise? Yes _____ No X

If Yes (a) Describe source(s) of noise referred to in complaints _____

(b) Has protective or remedial action been taken? Yes _____ No _____

2. Have persons in the area of this facility complained to plant or local authorities concerning noise from this plant?

Yes _____ No X

If Yes (a) Describe circumstances, action taken and deposition of this complaint _____

C. Noise Producing Equipment. A general descriptive title should be used.

List below equipment capable of generating high sound levels.

| | Type Of Equipment | Number | Hours Operated/Shift |
|---|---|---|---|
| 1. | Power Press | 20 | 40 q |
| 2. | Verti-Slide | 12 | 40 q |
| 3. | | | |
| 4. | | | |
| 5. | | | |

Comments:

_____

_____

_____

_____

## V. RADIOACTIVE MATERIALS

A. Use of Radioactive Materials:

1. Are radio isotopes at this facility? Yes _____ No X If No, do not complete remainder of this form.

2. Type of use. Define generally what use is made of the radioactive material; specifics are not necessary.

(a) Manufacturing _____

(b) Testing _____

(c) Research _____

(d) Other _____ (Specify) _____

B. Individual Responsible for Control of the Radioactive Materials:

1. Name: _____

2. Title: _____

3. Organization: _____

4. Area Code/Phone/Extension: _____

C. Type and Quantities of Material Utilized:

1. Average quantity of radio isotopes on hand during 1971 _____ (Curies, C)

2. Isotopic composition of the above. Chemical symbol and atomic weight are sufficient; i.e., $I^{131}$, $Sr^{90}$, $U^{235}$. Quantities may be expressed in curies or microcuries, whichever is more convenient.

(a) Isotope _____ Quantity _____ (c)

(b) Isotope _____ Quantity _____ (c)

(c) Isotope _____ Quantity _____ (c)

(d) Isotope _____ Quantity _____ (c)



AR301018

3. Amount of radioactive material in sealed sources _____ (c). (Radio isotopes in this form are not dangerous from an environmental contamination standpoint.)

D. Removal or release of radioactive material:

1. Quantity of material leaving plant (1971) (c) _____.

2. Specific isotopes involved. This item should be filled in as fully as possible including the quantities associated with each type of release.

| | Radioisotope | Incorporated In Product (c) | Release To Environment (c) |
|---|---|---|---|
| (a) | | | |
| (b) | | | |
| (c) | | | |
| (d) | | | |
| (e) | | | |

3. Amount of Radioactive Material accidently released 1971 _____. Any substantial accidental release should be fully documented in an attachment.

E. Form of Release to Environment:

1. Amount of radioactive materials given special handling disposal 1971 (c)_____ _____.

2. Conditions of release to the air.

| | Radioisotope | Chemical Species | Quantity (c) | Specific Activity ($uc/m^3$) | Type Of Release* |
|---|---|---|---|---|---|
| (a) | | | | | |
| (b) | | | | | |
| (c) | | | | | |

3. Conditions of release to the water:

| | Radioisotope | Chemical Species | Quantity (c) | Specific Activity (uc/1) | Type Of Release* |
|---|---|---|---|---|---|
| (a) | | | | | |
| (b) | | | | | |
| (c) | | | | | |

4. Conditions of release in solid waste:

| | Radioisotope | Chemical Species | Quantity (c) | Specific Activity (uc/lb) | Special Handling |
|---|---|---|---|---|---|
| (a) | | | | | |
| (b) | | | | | |
| (c) | | | | | |

Comments:

_____

_____

_____

_____

_____

*Continuous, Intermittent, Accidental



AR301019

REFERENCE 7
Hazardous Waste Manifests
8/15/84 and 4/4/85
Generator: Ametek, TSD Facility: Marisol, Inc.

AR301020

Form VHW-001 (5/82)

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION

*Please TYPE all information.*

# HAZARDOUS WASTE MANIFEST

PART A: GENERATOR'S COPY

DOCUMENT NO. NJ **0201273**

| | | |
|---|---|---|
| GENERATOR NAME: Ametek | PHONE (INCLUDE AREA CODE): 215-822-2971 | EPA ID NO.: PAD002342475 |
| ADDRESS (STREET - CITY - STATE): 1 Spring Ave, Hatfield, PA. 19440 | | ZIP CODE: 19440 |
| TRANSPORTER NO. 1: Marisol Inc. | PHONE (INCLUDE AREA CODE): 201-469-5100 | EPA ID NO.: NJD002454544 |
| ADDRESS (STREET - CITY - STATE): 125 Factory Lane Middlesex N.J. | | ZIP CODE: 08846 |
| TRANSPORTER NO. 2 | PHONE (INCLUDE AREA CODE) | EPA ID NO. |
| ADDRESS (STREET - CITY - STATE) | | ZIP CODE |
| TREATMENT, STORAGE OR DISPOSAL (TSD) FACILITY: Marisol Inc. | PHONE (INCLUDE AREA CODE): 201-469-5100 | EPA ID NO.: NJD002454544 |
| SITE ADDRESS (STREET - CITY - STATE): 125 Factory Lane Middlesex N.J. | | ZIP CODE: 08846 |

IF MORE THAN TWO TRANSPORTERS ARE TO BE UTILIZED, FILL OUT THE FOLLOWING AS APPROPRIATE
THIS FORM IS NO. _____ OF A TOTAL OF _____. THE FIRST MANIFEST DOCUMENT NO. IS NJ →

| | PROPER US DOT SHIPPING NAME | US DOT HAZARD CLASS | UN NUMBER | FORM | NET QUANTITY | UNITS | CONTAINERS NO. | CONTAINERS TYPE | EPA HAZ CODE | EPA WASTE TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | Waste Trichloroethylene | ORM-A | 1710 | 1 | 00550 | 1 | 011 | 01 | T | F001 |
| 2. | | | | | | | | | | |
| 3. | | | | | | | | | | |
| | | | | | | | | | | |
| 5. | | | | | | | | | | |
| 6. | | | | | | | | | | |

SPECIAL HANDLING INSTRUCTIONS INCLUDING CONTAINER EXEMPTION (i.e. IDENTIFICATION OF ADDITIONAL WASTES INCLUDED IN SHIPMENT OF A NONHAZARDOUS NATURE WHICH DO NOT HAVE TO BE MANIFESTED)

GENERATOR'S CERTIFICATION: This is to certify that the above named materials are properly classified, described, marked and labelled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation, U.S. EPA and the State. The wastes described above were consigned to the Transporter named. The Treatment, Storage or Disposal Facility can and will accept the shipment of hazardous waste, and has a valid permit to do so. I certify that the foregoing is true and correct to the best of my knowledge.

| GENERATOR'S SIGNATURE - ALSO PRINT SIGNATURE | TITLE | DATE SHIPPED (MO. DAY YR.) | EXPECTED ARRIVAL DATE (MO. DAY YR.) |
|---|---|---|---|
| DURRELL CASSEL [signature] | PLANT ENG | 08 15 84 | 08 15 84 |

| TRANSPORTER NO. 1 SIGNATURE AND CERTIFICATION OF RECEIPT OF SHIPMENT - ALSO PRINT SIGNATURE | TRANSPORTER NO. 1 VEHICLE ID NO. | DATE RECEIVED (MO. DAY YR.) |
|---|---|---|
| TONY LAEYT [signature] | NJSWAS 280930 | 08 15 84 |

TEAR AT THIS PERFORATION

AR301021

**PART B: GENERATOR'S COPY**

GENERATOR NAME: Ametek

GENERATOR EPA ID NO.: PAD002342471

TRANSPORTER NO. 1 SIGNATURE AND CERTIFICATION OF DELIVERY AND NON-TAMPERING WITH SHIPMENT - ALSO PRINT SIGNATURE: Tony Lacyt Tony Lacyt

DATE DELIVERED: 08 15 84 (MO. DAY YR.)

TRANSPORTER NO. 2 SIGNATURE AND CERTIFICATION OF RECEIPT OF SHIPMENT - ALSO PRINT SIGNATURE:

TRANSPORTER NO. 2 VEHICLE ID NO.: NJSWAS

DATE RECEIVED: (MO. DAY YR.)

TRANSPORTER NO. 2 SIGNATURE AND CERTIFICATION OF DELIVERY AND NON-TAMPERING WITH SHIPMENT - ALSO PRINT SIGNATURE:

DATE DELIVERED: (MO. DAY YR.)

TREATMENT STORAGE OR DISPOSAL FACILITY INDICATION OF ANY DIFFERENCES BETWEEN MANIFEST AND SHIPMENT OR LISTING OF REASONS FOR AND DISPOSITION OF REJECTED MATERIALS:

HANDLING METHOD

1: T63 | 2: | 3: | 4: | 5: | 6:

TSD FACILITY EPA ID NO.: NJD022454544

FACILITY NAME: Marisol, Inc.

TREATMENT STORAGE OR DISPOSAL FACILITY SIGNATURE & CERTIFICATION OF RECEIPT OF SHIPMENT - ALSO PRINT SIGNATURE: A Braden A Braden

TITLE: Dispatcher

DATE RECEIVED: 08 15 F4 (MO. DAY YR.)

In case of emergency or spill immediately call the State the Emergency occurred in and the N.J. Dept. of Environmental Protection.
(609) 292-5560 (Day) (609) 292-7172 (Night)

DOCUMENT NO. NJ 0201273

TO BE FILLED OUT BY TRANSPORTER

TO BE FILLED OUT BY TSD FACILITY

[redacted]

[redacted]

AR301022

# MARISOL INCORPORATED

125 FACTORY LANE • MIDDLESEX, NEW JERSEY 08846 • PHONE 201-469-5100

## MESSAGE

TO Ametek
1 Spring Avenue
Hatfield, Pennsylvania

ATTN: MR. Durrell Cassel.

DATE 3-21-85

SUBJECT N.J. Uniform Manifest

Please find enclosed a N.J. Manifest I typed out for you. Note I have enclosed a copy for you to go by in the future. Please complete the highlighted sections and sign off in section #16 and date. When you are ready with your paperwork, and the drums are labeled call me and we will set-up a pick-up date. At that time I will know who the transporter will be! Thanks, Joann.

SIGNED

## REPLY

DATE

16

FRED

SIGNED

AR301023

# HAZARDOUS WASTE

## FEDERAL LAW PROHIBITS IMPROPER DISPOSAL

**PROPER D.O.T. SHIPPING NAME**

TRICHLORETHYLENE UN 1170

IF FOUND, CONTACT THE NEAREST POLICE
OR PUBLIC SAFETY AUTHORITY OR
U.S. ENVIRONMENTAL PROTECTION AGENCY

F001

**GENERATOR INFORMATION:**

NAME Ametek / Hunter Spring

ADDRESS 1 Spring Ave

CITY Hatfield STATE Pa ZIP 19440

E.P.A. IDENTIFICATION NO. PAD 00234 2475

MANIFEST DOCUMENT NO. _____

ACCUMULATION START DATE _____

**CONTAINS HAZARDOUS OR TOXIC WASTES**

# HANDLE WITH CARE!

1981 W. H. BRADY CO. All rights reserved STOCK NO 87047

**State of New Jersey**
**Department of Enviromental Protection**
**Division of Waste Management**
**CN 028, Trenton, NJ 08625**

**Please print or type.** (Form designed for use on elite (12-pitch) typewriter.) **Form Approved. OMB No. 2000-0404. Expires 7-31-8**

# UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No: PAD002342475 Manifest Document No: 45193
2. Page 1 of 1

Information in the shaded areas is not required by Federal law *

3. Generator's Name and Mailing Address: Ametek, 1 Spring Avenue, Hatfield, Pennsylvania 19440

A. State Manifest Document Number: NJA0045193

B. State Gen. ID: SAME

4. Generator's Phone: (215) 822-2971

5. Transporter 1 Company Name: [illegible]
6. US EPA ID Number: [illegible]
C. State Transporter's ID: NJ DEP 280731

7. Transporter 2 Company Name:
8. US EPA ID Number:
D. Transporter's Phone: 201-969-5400

9. Designated Facility Name and Site Address: Marisol, Inc., 125 Factory Lane, Middlesex, New Jersey 08846
10. US EPA ID Number: NJD002454544
E. State Transporter's ID:
F. Transporter's Phone:
G. State Facility's ID:
H. Facility's Phone: 201/469-5100

| 11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number) | 12. Containers No. | Type | 13. Total Quantity | 14. Unit Wt/Vol | Waste No. |
|---|---|---|---|---|---|
| a. Waste Trichloroethylene ORM-A UN 1710 | [illegible] | DM | [illegible] | G | F001 |
| b. | | | | | |
| c. | | | | | |
| d. | | | | | |

GENERATOR

J. Additional Descriptions for Materials Listed Above
a. T, L
b.
c.
d.

K. Handling codes for Wastes Listed Above
a.
b.
c.
d.

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations, and all applicable State laws and regulations.

Printed/Typed Name: [illegible] Signature: [illegible] Date: Month Day Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: [illegible] Signature: [illegible] Date: Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: Signature: Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name: Signature: Date: Month Day Year

AR301025

In Case of an emergency or spill immediately call the State the emergency occurred in and the N.J. Dept. of Environmental Protection. (609) 292-5560 (Day) (609) 292-7172 (Night)

EPA Form 8700-22 (3-84)

8 – GENERATOR COPY

MR. Burrell Cassel.

State of New Jersey
Department of Enviromental Protection
Division of Waste Management
CN 028, Trenton, NJ 08625

- COPY -

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2000-0404. Expires 7-31-8

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's EPA ID: P A D 0 0 2 3 4 2 4 7 5 4 5 1 9 3

2. Page 1 of 1

3. Generator's Name and Mailing Address: Ametek
1 Spring Avenue
Hatfield, Pennsylvania 19440

4. State Manifest Document Number: NJA0045193

5. State Gen. ID: SAME

Generator's Phone: 215 822-2971

6. Transporter 1 Company Name | 6. US EPA ID Number | C. State Transporter's ID

7. Transporter 2 Company Name | 8. US EPA ID Number | D. Transporter's Phone

E. State Transporter's ID

F. Transporter's Phone

G. State Facility's ID

H. Facility's Phone: 201/469-5100

Designated Facility Name and Site Address: Marisol, Inc.
125 Factory Lane
Middlesex, New Jersey 08846

10. US EPA ID Number: N J D 0 0 2 4 5 4 5 4 4

| US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number) | 12. Containers No. | Type | 13. Total Quantity | 14. Unit Wt./Vol. | Waste No. |
|---|---|---|---|---|---|
| Waste Trichloroethylene ORM-A UN 1710 | 18 | DM | 990 | G | F001 |

GENERATOR

Additional Descriptions for Materials Listed Above: T, L

K. Handling codes for Wastes Listed Above: a. b. c. d.

Special Handling Instructions and Additional Information

GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations, and all applicable State laws and regulations.

Printed Typed Name | Signature | Date Month Day Year

TRANSPORTER

Transporter 1 Acknowledgement of Receipt of Materials | Printed Typed Name | Signature | Date Month Day Year

Transporter 2 Acknowledgement of Receipt of Materials | Printed Typed Name | Signature | Date Month Day Year

FACILITY

Discrepancy Indication Space

Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.

Printed Typed Name | Signature

EPA Form 8700-22 (3-84)

1 – TSD MAIL TO – TSD'S STATE

AR301026

THEY WILL SEND YOU A SUPPLY.

YOU MAY CALL NJDEP - 609/292-5189

State of New Jersey
Department of Enviromental Protection
Division of Waste Management
CN 028, Trenton, NJ 08625

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2000-0404. Expires 7-31-86

# FORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. PAD002242475 Manifest Document No. 45193
2. Page 1 of 1

Information in the shaded areas is not required by Federal law *

3. Generator's Name and Mailing Address: Ametek, 1 Spring Avenue, Hatfield, Pennsylvania 19440
4. Generator's Phone (215) 822-2971

A. State Manifest Document Number: NJA0045193
B. State Gen. ID: SAME

5. Transporter 1 Company Name: MARISOL INC
6. US EPA ID Number: NJD004454544
C. State Transporter's ID: N.J. DEP 280931

7. Transporter 2 Company Name:
8. US EPA ID Number:
D. Transporter's Phone: 201-469-5100

9. Designated Facility Name and Site Address: Marisol, Inc., 125 Factory Lane, Middlesex, New Jersey 08846
10. US EPA ID Number: NJD002454544
E. State Transporter's ID:
F. Transporter's Phone:
G. State Facility's ID:
H. Facility's Phone: 201/469-5100

| 11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number) | 12. Containers No. | Type | 13. Total Quantity | 14. Unit Wt/Vol | I. Waste No. |
|---|---|---|---|---|---|
| a. Waste Trichloroethylene OBM-A UN 1780 | 018 | DM | 00990 | G | F001 |
| b. | | | | | |
| c. | | | | | |
| d. | | | | | |

J. Additional Descriptions for Materials Listed Above
a. T, L
b.
d.

K. Handling codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations, and all applicable State laws and regulations.

Printed/Typed Name: [illegible] Signature: [illegible] Date: Month Day Year

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Joe E Holdren Signature: [illegible] Date: Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: Signature: Date: Month Day Year

19. Discrepancy Indication Space

Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name: Signature: Date: Month Day Year

GENERATOR

TRANSPORTER

FACILITY

EPA Form 8700-22 (3-84)

7 GENERATOR MAIL TO — GENERATOR STATE

3/25/85

SHIPPING PAPER

FROM D.Cassel

**AMETEK / Hunter Spring**

1 SPRING AVENUE, HATFIELD, PENNSYLVANIA 19440

MARISOL INC.
125 Factory Lane
Middlesex, NJ 08846

**POSTMASTER:** CONTENTS MERCHANDISE. THIS PARCEL MAY BE OPENED FOR POSTAL INSPECTION IF NECESSARY. RETURN POSTAGE GUARANTEED.

TERMS 30 DAYS NET
½ OF 1% DISCOUNT ON INVOICES DATED THE 1ST TO THE 15TH OF THE MONTH, IF PAID ON THE 25TH OF THE SAME MONTH. ON INVOICES DATED THE 16TH TO THE 31ST OF THE MONTH, IF PAID ON THE 10TH OF THE FOLLOWING MONTH.

| YOUR ORDER NO. | OUR ORDER NO. |
|---|---|
| DATE RECEIVED | DATE WANTED |
| DATE SHIPPED | QUOTATION NO. |
| STYLE PACKAGE | CHARGES |

CHARGE TO

SHIP VIA

**Quantity Ordered**

| BACK ORDERED | QUANTITY ORDERED | QUANTITY SHIPPED | PART NO. & DESCRIPTION | GROSS WEIGHT | NET WEIGHT | UNIT PRICE | AMOUNT |
|---|---|---|---|---|---|---|---|
| | 18 | | 55 gallon Used Degreaser to be recleaned | | | | |

Return copy 4 to Purchasing

FORM 113 C

ACCOUNTING

AR301028

REFERENCE 8
Hazardous Waste Manifests
dates 11/11/85, 1/20/86, 4/30/86
Generator: Ametek, TSD Facility: Chemclene Corp.

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES
Division of Hazardous Waste Management
P. O. Box 2063
Harrisburg, PA 17120

ER-SWM-51:Rev.5/84 Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2000-0404. Expires 7-31-86

# UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. PAD002342475 | Manifest Document No. 93038 | 2. Page 1 of 1 | Information in the shaded areas is not required by Federal law.

A. State Manifest Document Number: PAB 00893034

3. Generator's Name and Mailing Address
AMETEK INC, HUNTER SPRING DIVISION
1 SPRING AVE., HATFIELD, PA. 19440

B. State Gen. ID

4. Generator's Phone ( 215 ) 822 2971

5. Transporter 1 Company Name: CHEMCLENE CORP | 6. US EPA ID Number: PADO[illegible] | C. State Trans. ID: PA-AH 0150

7. Transporter 2 Company Name | 8. US EPA ID Number | D. Transporter's Phone ( 215 ) 644 2966

E. State Trans. ID: PA-AH

9. Designated Facility Name and Site Address
CHEMCLENE CORP
258 N. PHOENIXVILLE PIKE
WALVERN, PA. 19355

10. US EPA ID Number: PADO[illegible]

F. Transporter's Phone ( )

G. State Facility's ID: Not Required

H. Facility's Phone ( 215 ) 644 2966

| 11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number) | 12. Containers No. | Type | 13. Total Quantity | Unit Wt/Vol | Waste No. |
|---|---|---|---|---|---|
| a. WASTE TRICHLORETHYLENE ORM-A UN 1710 | 17. | DM | 10200 | P | [illegible] |
| b. WASTE 1,1,1 TRICHLOROETHANE ORM-A UN 2831 | 2. | DM | 60. | P | [illegible] |
| c. WASTE PERCHLORETHYLENE ORM-A UN 1897 | 1. | DM | 30. | P | [illegible] |
| d. | | | | | |

J. Additional Descriptions for Materials Listed Above (Include physical state and hazard code)
a. LIQUID T
b. LIQUID T
c. LIQUID T
d.

K. Handling Codes for Wastes Listed Above
a.
b.
c.
d.

15. Special Handling Instructions and Additional Information
~~WASTE MINIMIZATION STATEMENT:~~ Unless I am a small quantity generator who has been exempted by statute or regulation from Section 3002(b) of RCRA, I also certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and I have selected the method of treatment, storage or disposal currently available to me which minimizes the present and future threat to ~~human health and the environment.~~

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations; and all applicable State laws/regulations.

| Printed/Typed Name | Signature | Date (Month Day Year) |
|---|---|---|
| BERNARD EICHHART | Bernard Eichhart | 1 1 1 8 5 |

17. Transporter 1 Acknowledgement of Receipt of Materials

| Printed/Typed Name | Signature | Date (Month Day Year) |
|---|---|---|
| GEORGE DIPPELL | George Dippell | 1 1 1 8 5 |

18. Transporter 2 Acknowledgement of Receipt of Materials

| Printed/Typed Name | Signature | Date (Month Day Year) |
|---|---|---|
| | | |

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as

| Printed/Typed Name | Signature | Date (Month Day Year) |
|---|---|---|
| | | |

GENERATOR | TRANSPORTER | FACILITY

In case of an emergency or spill immediately call the National Response Center (800) 4-8802 and the PA DER (717) 787-4343

EPA Form 8700-22 (3-84) COPY 8 - Generator - Retained by Generator

AR301030

# SHIPPING PAPERS

11/8/85 FROM R.Askin

**AMETEK / Hunter Spring**

1 SPRING AVENUE, HATFIELD, PENNSYLVANIA 19440

CHEMCLENE CORP
258 N. Phoenixville Pike
Malvern, PA 19355
644-2986

**POSTMASTER:** CONTENTS MERCHANDISE. THIS PARCEL MAY BE OPENED FOR POSTAL INSPECTION IF NECESSARY. RETURN POSTAGE GUARANTEED.

TERMS 30 DAYS NET
1 OF 1% DISCOUNT ON INVOICES DATED THE 1ST TO THE 15TH OF THE MONTH, IF PAID ON THE 25TH OF THE SAME MONTH. ON INVOICES DATED THE 16TH TO THE 31ST OF THE MONTH, IF PAID ON THE 10TH OF THE FOLLOWING MONTH.

| YOUR ORDER NO. | OUR ORDER NO. |
|---|---|
| DATE RECEIVED | DATE WANTED |
| DATE SHIPPED 11/11/85 | QUOTATION NO. |
| STYLE PACKAGE | CHARGES |

CHARGE TO

SHIP VIA Pick UP

Quantity Ordered

| BACK ORDERED | QUANTITY ORDERED | QUANTITY SHIPPED | PART NO. & DESCRIPTION | GROSS WEIGHT | NET WEIGHT | UNIT PRICE | AMOUNT |
|---|---|---|---|---|---|---|---|
| | | 17 Drums 17 DRUMS | Waste Trichloroethylene for recycling. | | | | |
| | | | See our P.O. 59617 | | | | |
| | | 1 | | | | | |
| | | 2 | | | | | |

G. Dyell

Return copy 4 to Purchasing

FORM 113 C

ORIGINATOR

AR301031

MANIFEST

CHEMCLENE CORPORATION

1531

MALVERN, PA.

(215) 644-2986

DATE 11-11-85

GENERATOR Hunter Spring CODE

| WASTE DESCRIPTION | QUANTITY | REMARKS |
|---|---|---|
| Waste Trichlorethylene | 17 | drums. |
| | | |
| | | |
| | | |
| | | |

CHEMCLENE EMPLOYEE R. Dysell

AUTHORIZED SIGNATURE FOR GENERATOR B. E. S. Rank

DISPOSAL TREATMENT FACILITY Chemclene C-p

DATE RECEIVED

FACILITY EMPLOYEE

WHITE – OFFICE
YELLOW – GENERATOR

PINK – INVOICE
GOLD – PLANT

DO NOT WRITE BELOW THIS LINE

AR301032

MANIFEST

**CHEMCLENE CORPORATION**

**MALVERN, PA.**

**(215) 644-2986**

1532

DATE 11-11-85

GENERATOR Hunter Spring CODE

| WASTE DESCRIPTION | QUANTITY | REMARKS |
|---|---|---|
| Waste 1-1-1 Trichloroethane | 2 (5 gal) | cans |
| | | |
| | | |
| | | |
| | | |

CHEMCLENE EMPLOYEE G. Diggell

AUTHORIZED SIGNATURE FOR GENERATOR B. E. Schaal

DISPOSAL TREATMENT FACILITY Chemclene Corp

DATE RECEIVED

FACILITY EMPLOYEE

WHITE – OFFICE
YELLOW – GENERATOR

PINK – INVOICE
GOLD – PLANT

DO NOT WRITE BELOW THIS LINE

AR301033

MANIFEST

**CHEMCLENE CORPORATION** 1533

MALVERN, PA.

(215) 644-2986

DATE 11-11-83

GENERATOR Hunter Spring CODE

| WASTE DESCRIPTION | QUANTITY | REMARKS |
|---|---|---|
| Waste Perchlorethylene | 1 (5 gal) can | |
| | | |
| | | |
| | | |
| | | |

CHEMCLENE EMPLOYEE N. Dippell

AUTHORIZED SIGNATURE FOR GENERATOR B. E. Brant

DISPOSAL TREATMENT FACILITY Chemclene Corp

DATE RECEIVED

FACILITY EMPLOYEE

WHITE – OFFICE
YELLOW – GENERATOR

PINK – INVOICE
GOLD – PLANT

DO NOT WRITE BELOW THIS LINE

AR301034

CBI

AR301035

NSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES
Division of Hazardous Waste Management
P. O. Box 2063
Harrisburg, PA 17120

ER-S... Rev. 5/84

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2000-0404. Expires 7-31-86

| UNIFORM HAZARDOUS WASTE MANIFEST | 1. Generator's US EPA ID No. PAD002342475 | Manifest Document No. 9349 | 2. Page 1 of 1 | Information in the shaded areas is not required by Federal law. |
|---|---|---|---|---|

3. Generator's Name and Mailing Address
AMETEK INC., HUNTER SPRING DIVISION
1 SPRING AVE., HATFIELD, PA. 19440

4. Generator's Phone ( 215 ) 822 2971

A. State Manifest Document Number: PAB 00893491
B. State Gen. ID:

5. Transporter 1 Company Name: CHEMCLENE CORP
6. US EPA ID Number: PAD014355345
C. State Trans. ID: PA-AH 0150

7. Transporter 2 Company Name:
8. US EPA ID Number:
D. Transporter's Phone: 215 [illegible] 2986

9. Designated Facility Name and Site Address
CHEMCLENE CORP
258 N. PHOENIXVILLE PIKE
MALVERN, PA. 19355

10. US EPA ID Number: PAD014355345
E. State Trans. ID: PA-AH
F. Transporter's Phone:
G. State Facility's ID: Not Required
H. Facility's Phone: 215 [illegible] 2986

| 11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number) | 12. Containers No. | Type | 13. Total Quantity | 14. Unit Wt/Vol | Waste No. |
|---|---|---|---|---|---|
| a. WASTE TRICHLORETHYLENE ORM-A UN 1710 | 6 | DM | 3600 | P | F001 |
| b. HAZARDOUS WASTE LIQUID, N.O.S. (TRICHLORETHYLENE & PAINT) ORM-E NA 9189 | 4 | DM | 2400 | P | |
| c. HAZARDOUS WASTE LIQUID, N.O.S. (METHYLENE CHLORIDE & METHANOL) ORM-E NA 9189 | 1 | DM | 500 | P | |
| d. | | | | | |

J. Additional Descriptions for Materials Listed Above (Include physical state and hazard code)
a. LIQUID T
c. LIQUID T
b. LIQUID T
d.

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
[illegible]: Unless I am a small quantity generator who has been exempted by statute or regulation from Section 3002(b) of RCRA, I also certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and I have selected the method of treatment, storage or disposal currently available to me which minimizes the present and future threat to human health and the environment.

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations, and all applicable State laws/regulations.

| Printed/Typed Name | Signature | Date (Month Day Year) |
|---|---|---|
| B EckHART | B Eckhart | 01 10 86 |

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

| Printed/Typed Name | Signature | Date (Month Day Year) |
|---|---|---|
| | Barry Dysell | 01 10 86 |

18. Transporter 2 Acknowledgement of Receipt of Materials

| Printed/Typed Name | Signature | Date (Month Day Year) |
|---|---|---|
| GEORGE DINELL | | |

FACILITY

19. Discrepancy Indication Space

Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in

| Printed/Typed Name | Signature | Date (Month Day Year) |
|---|---|---|
| | | |

AR301036

In case of an emergency or spill immediately call the National Response Center (800) 424-8802 and the PA DER (717) 787-43[illegible]3

EPA Form 8700-22 (3-84)

COPY 8 - Generator - Retained by Generator

FAD C[illegible]

MANIFEST

# CHEMCLENE CORPORATION

1593

MALVERN, PA.

(215) 644-2986

DATE Jan 20 1984

GENERATOR Hunter Spring CODE

| WASTE DESCRIPTION | QUANTITY | REMARKS |
|---|---|---|
| Waste Methylene Chloride + Methanol | 1 | drum |
| | | |
| | | |
| | | |
| | | |

CHEMCLENE EMPLOYEE George Dysell

AUTHORIZED SIGNATURE FOR GENERATOR B. E. Shank

DISPOSAL TREATMENT FACILITY Chemclene Co.

DATE RECEIVED

FACILITY EMPLOYEE

WHITE – OFFICE
YELLOW – GENERATOR

PINK – INVOICE
GOLD – PLANT

DO NOT WRITE BELOW THIS LINE

**AMETEK**

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA 19440

No. 107967

RECEIVING REPORT

REC'D FROM CHEMCLENE DATE 11/20/85

ADDRESS MALVERN PA DEPT. [illegible]

| P. O. NUMBER | COLLECT ☐ CHARGES | VIA | NO. OF PACKAGES |
|---|---|---|---|
| [illegible] | PREPAID ☑ | DLVD | |

SHIPMENT PARTIAL ☑ COMPLETE ☐

CONDITION OF CONTAINER: GOOD ☑ POOR ☐ CRUSHED ☐ OPEN ☐

| QUAN. REC'D. | PART NO. | DESCRIPTION |
|---|---|---|
| 7 | | DRUMS |
| | | RECLAIMED |
| | | TRICHLORETHYLENE |
| | | |
| | | |
| | | |
| | | |
| | | |

| Q. C. INSPECTION | DELIVER TO | WEIGHT |
|---|---|---|
| ☐ YES ☑ NO | PR | |

DESCRIPTION OF DEFECT:

REC'D BY [signature]

FORM NO 138 B

5

AR301038

RESOURCE TECHNOLOGY SERVICES, INC.

Six Berkeley Road, Devon, Pennsylvania 19333 Main Office: 215-687-4592

May 2, 1986

Ametek Inc.
Hunter Spring Division
1 Spring Avenue
Hatfield, PA 19440
Attn: B. Eckhart

RE: PA Hazardous Waste Manifest
Number PAB 2263391

Dear Mr. Eckhart,

Enclosed please find the generator's copy of the above referenced manifest. Please retain on file as proof of the legal disposal of your wastes.

If you should have any questions, please contact me.

Thank you.

Sincerely,

Madeline Zollo

Madeline Zollo
Scheduler

MZ/bj

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES
Bureau of Waste Management
P. O. Box 2063
Harrisburg, PA 17120

ER-SWM-51:REV. 10/84

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)
Form Approved. OMB No. 2000-0404. Expires 7-31-86

**UNIFORM HAZARDOUS WASTE MANIFEST**

1. Generator's US EPA ID No.: PAD002342475 | Manifest Document No.: 6339

2. Page 1 of | Information in the shaded areas is not required by Federal law but is required by State law.

3. Generator's Name and Mailing Address
AMETEK INC. HUNTER SPRING DIVISION
1 SPRING AVE., HATFIELD, PA. 19440

A. State Manifest Document Number: PAB 2263391

B. State Gen. ID:

4. Generator's Phone ( 215 ) 822 2871

5. Transporter 1 Company Name: CHEMCLENE CORP
6. US EPA ID Number: PAD014353445

C. State Trans. ID: PA-AH | 0150

7. Transporter 2 Company Name:
8. US EPA ID Number:

D. Transporter's Phone ( 215 ) 644 2986
E. State Trans. ID: PA-AH

9. Designated Facility Name and Site Address
RESOURCE TECHNOLOGY SERVICE
10 OAK STREET
CONSHOHOCKEN, PA. 19428

10. US EPA ID Number: PAD980550479

F. Transporter's Phone ( )
G. State Facility's ID: Not Required
H. Facility's Phone (215) 828 1525

| 11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number) | 12. Containers No. | Type | 13. Total Quantity | Unit Wt/Vol | Waste No. |
|---|---|---|---|---|---|
| a. HAZARDOUS WASTE LIQUID, N.O.S. (LEAD & CHROMIUM) ORM-E NA 9189 | 16 | DM | 8000 | P | D007 D008 |
| b. | | | | | |
| c. | | | | | |
| d. | | | | | |

J. Additional Descriptions for Materials Listed Above (Include physical state and hazard code)

| | Haz. Code | Physical State | | Haz. Code | Physical State |
|---|---|---|---|---|---|
| a. | E | L | c. | | |
| b. | | | d. | | |

K. Handling Codes for Wastes Listed Above
a. 50
b.
c.
d.

15. Special Handling Instructions and Additional Information
MCS CODE # 76-2-A585 JOB # 76-7-86

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.
Unless I am a small quantity generator who has been exempted by statute or regulation from the duty to make a waste minimization certification under Section 3002 (b) of RCRA, I also certify that I have a program in place to reduce volume and toxicity of waste generated to the degree I have determined to be economically practicable and I have selected the method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment.

| Printed/Typed Name | Signature | Month | Day | Year |
|---|---|---|---|---|
| B. ECKHART | B. Eckhart | 10 | 30 | 86 |

**TRANSPORTER**

17. Transporter 1 Acknowledgement of Receipt of Materials

| Printed/Typed Name | Signature | Month | Day | Year |
|---|---|---|---|---|
| GEORGE DIPPELL | George Dippell | 10 | 30 | 86 |

18. Transporter 2 Acknowledgement of Receipt of Materials

| Printed/Typed Name | Signature | Month | Day | Year |
|---|---|---|---|---|
| | | | | |

**FACILITY**

19. Discrepancy Indication Space
9)16-LTL (#1-16)

Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

| Printed/Typed Name | Signature | Month | Day | Year |
|---|---|---|---|---|
| Robert C Miller | Robert C. Miller | 10 | 30 | 86 |

ARRIVED

PAB 2263391

EPA Form 8700-22 (3-84)

COPY 3 - Generator - Mailed by TSD Facility

REFERENCE 9
Ametek Interhouse correspondence
dated June 14, 1979

AMETEK

Inter - House Correspondence

517

TO: W. C. Schulze OFFICE Mfg./Engrg. FROM: W. J. Panzeter

JECT: Toxic Materials DATE: June 14, 1979

Per your request of evaluation of memos dated 15 May 1979 and 4 June 1979 from Corporate, please note the following information.

1. The yearly usage of toxic materials we use at Hunter is as follows:

   A. Cyanide - 8,000 lbs.
   B. Sodium Bichromate - 9,600 lbs.
   C. Cadmium - 5,663 lbs.
   D. Cadmium Oxide - 1,200 lbs.
   E. Tri-Chlor - 5,000 lbs.

2. The disposal of the aforenoted chemicals is accomplished as noted below:

   A. Cyanide is neutralized with sodium hypo chloride, fed to our automatic plating sludge room, and fed to sewer in a diluted state. The parts per million meet Hatfield Sewer Authority criteria.

   B. Sodium bichromate is rarely disposed of as it is used as a molten coating. When we clean the tank, we insert solium bichromate in a 55 gal. drum (in molten state) and call a solid waste disposal dealer to pick up the drum.

   C. Cadmium and cadmium oxide are disposed into the sewer in diluted particulates within Hatfield Sewer Authority criteria.

   D. Tri-chlor is set up on a two month cleaning schedule. The tank is boiled out and refuse tri-chlor is put into 55 gal. drums. These drums are returned to original vendor who distills the tri-chlor and returns to us for reuse.

3. The control, in plant, of these toxic chemical is accomplished as follows:

   A. Cyanide is checked, in solution, on a regular basis (4 hrs.). Containers and tanks are checked for structural stability by maintenance and replaced as needed. The tanks are fully vented and equipped with splash guards. The material is stored in a separate building, above ground and in a temperature controlled room.

   B. Sodium bichromate is used in a molten state and is

and fully covered. Any possibility of splashing is contained and readily rinsed with water. The operator is required to wear protective apparel. This apparel is supplied by the company, i.e., heat treat gloves and apron, and a full visor face shield. This material is received in chrystaline condition and stored on pallets in a chemical room.

C. Cadmium is purchased in ball form for plating and is stored above floor in drums. The plating tanks are checked daily for balance of chemical and physical condition.

E. Tri-chlor is stored in a 1,500 gal. tank. The degreasers are equipped with splash guards and chiller coils. The tri-chor parts per million leaching into the air is checked by our vendor on a bi-yearly basis.

W. J. Panzeter

W. J. Panzeter

AR301043

REFERENCE 10
Site Visit Trip Report
Ametek, Inc., Hunter Springs Division
Zone of Contamination No. 2

AR301044

# SITE VISIT TRIP REPORT

WORK ASSIGNMENT NO. 330
EPA CONTRACT NO. 68-01-7331
DOC. NO. 2067Y

## TECHNICAL EVALUATION OF ZONE OF CONTAMINATION 2
(AMETEK INC. SITE)
MONTGOMERY COUNTY, PENNSYLVANIA

SUBMITTED TO:

CDM FEDERAL PROGRAMS CORPORATION
13135 LEE JACKSON MEMORIAL HIGHWAY
SUITE 200
FAIRFAX, VIRGINIA 22033

SUBMITTED BY:

VERSAR INC.
6850 VERSAR CENTER
SPRINGFIELD, VIRGINIA 22151

AUGUST 26, 1988

AR301045

TABLE OF CONTENTS


| | | Page |
|---|---|---|
| 1.0 | INTRODUCTION | 1 |
| 2.0 | SUMMARY OF SITE ACTIVITIES | 1 |
| 3.0 | PROBLEMS AND RESOLUTIONS | 2 |
| 4.0 | RECOMMENDATIONS | 2 |


ATTACHMENTS


A. Zone of Contamination No. 2 Versar Field Notes for Site Visit (Ametek, Inc.)

B. Zone of Contamination No. 2, Ametek, Inc., A. Steiert and Sons, Inc., Waste Conversions, Site Visit Pictures


AR301046

## 1.0 INTRODUCTION

On Friday, May 8, 1987, Jeri Bulley, James DiClementi, Alicia Fleitas, and Patricia Watterson of Versar Inc. traveled to Hatfield, Montgomery County, Pennsylvania, to visit Zone of Contamination No. 2. The purpose of the visit was to obtain additional site background information to assist Versar in evaluating available contamination assessment and site characterization of this zone. The potentially responsible parties (PRPs) currently identified for this zone are Ametek Inc. - Hunter Spring Division, Waste Conversion, Inc., A. Steiert and Son, Inc., B&G Manufacturing Inc., and SPS Technologies Inc. Arrangements were made to visit the Ametek facility to gain firsthand knowledge of the facility layout and surroundings. The site visit was coordinated with U.S. EPA Region III and Ametek. In addition to visiting Ametek, a quick drive-by inspection of the other facilities in this zone was planned to familiarize Versar with these PRPs and verify their locations.

## 2.0 SUMMARY OF SITE ACTIVITIES

At approximately 10:00 a.m., Versar and EPA officials were met at the Ametek facility by the company officials and their consultants. Individuals present during the site visit included:

| | |
|---|---|
| Humane Zia | U.S. EPA Region III, CERCLA Remedial Enforcement |
| Kate Siftar | U.S. EPA Region III, CERCLA Remedial Enforcement |
| William H. Spencer | Vice President, Ametek, Inc. |
| Keith Choper | EnviroClean, Inc. of Pennsylvania |
| Alan C. Funk | Environmental Resources Management, Inc. |
| Val Britton | Environmental Resources Management, Inc. |
| Jeri Bulley | Versar Inc. |
| James DiClementi | Versar Inc. |
| Alicia Fleitas | Versar Inc. |
| Patricia Watterson | Versar Inc. |

A site inspection was conducted of the paint storage area, the trichloroethylene (TCE) storage area, the wooded area (along the stream), the stream, and the manufacturing building. In addition the locations of the backfilled lagoons, the settling basin, and the monitoring and



AR301047

production wells were verified. The facility personnel and their consultants were interviewed concurrently with the site inspection.

The presence of stressed and dead vegetation in the vicinity of the paint storage shed area, the TCE storage area, and the wooded area, which was described in the consultants (ERM) study, was confirmed. The two areas of most concern were the paint storage shed area and the TCE storage area. William Spencer informed Versar and EPA Region III that the dead vegetation near the TCE storage area was a result of spillage when the tank was being refilled.

The manufacturing building is now gutted. All equipment, including the Integrated Lancy wastewater treatment system was transported off-site for use at another Ametek facility. Mr. Spencer informed Versar and EPA Region III of his intent to sell the property. Interviews with Ametek's consultants were informative and provided Versar with details on the well monitoring system, contaminant concentrations and locations, and Ametek's ideas for remedial action.

After the site inspection and interviews with Ametek and ERM, Versar and EPA Region III drove around the Hatfield area to verify the locations of the remaining PRPs for Zone of Contamination No. 2. A. Steiert and Son is located approximately 1/4 of a mile north of the Ametek facility. It was evident from the drive through of the site that it had been burned severely enough to close down its operations. B&G Manufacturing, Inc. and Waste Conversion, Inc. are both located in the Line Lexington Industrial Park close to the NPWA well NP-15.

A summary of the information obtained during the site visit will be presented in Section 2.3 of the Evaluation Report.

## 3.0 PROBLEMS AND RESOLUTIONS

There were no major problems associated with this inspection.



AR301048

## 4.0 RECOMMENDATIONS

The site visit was useful in providing firsthand knowledge of the facility layout, features, and surroundings. Developing a clear picture of the site is valuable for completing subsequent tasks under this work assignment. It is recommended, therefore, that site visits continue to be part of the scope of work for technical review of documents. Due to the valuable information which was obtained in speaking directly with the facility representatives, it is also recommended that, in the future tasks which require the evaluation of multiple facilities, attempts be made to visit each facility individually.



AR301049

ATTACHMENT A
ZONE OF CONTAMINATION NO. 2
AMETEK, INC.
VERSAR FIELD NOTES FOR SITE VISIT

Ametek - May 8, 1987 USI

William H. Spencer, VP, Ametek
Keith Choper, EnviroClean, Inc. of Pennsylvania
Alan C. Funk, ERM
Val Britton, ERM
Humane Zia, US EPA Region III, CERCLA Remedial Enforce
Kate Sitlar, US EPA Region III, CERCLA Remedial Enforcement
Jim Diciementis, Versar
Patty Watterson, Versar
Jerri Bulley, Versar
Alicia Fleitas, Versar


WILLIAM H. SPENCER
*Vice President – Market Development*

AMETEK
OPERATIONS HEADQUARTERS
Station Square Two, Paoli, PA 19301

Tel (215) 647-2121

(215) 696-9110

**Alan C. Funk, P.G.**

**Environmental Resources Management, Inc.**
999 West Chester Pike • West Chester, Pennsylvania, 19382

Ametek

EnviroClean

**EnviroClean, Inc.**
**of Pennsylvania**

**Keith Choper, P.E.**
General Manager

999 West Chester Pike
Post Office Box 333
West Chester, Pennsylvania 19381
(215) 431-3802


AR301051

Ametek Site 10:00

- 2 on-site active water supply wells. Not NPWA wells!

- 85-acre site; inactive since last Fall (86). Ametek has found a buyer for site; lawyers now are drawing up sale agreements.

- not by ERM Consultants.

- plans to proceed w/ a Soil Remediation Program to sell the property.

- Drum Storage Tanks
  → contained waste solvents from plating operations. Hauled off site

- Water Supplies
  ⇒ from 2 on-site Ametek wells.
  → last year, Ametek tied in to NPWA line in front of plant
  → provided process water, air conditioning water, drinking water

Settling Basin
→ 10' diameter
→ system not used since 72-73
→ sludge taken out elsewhere.

- JACA Study
  ⇒ determined cones of depression of 3 supply wells
  ⇒ Results → depths of 6 ft. for a 3-week period

Tile Fields
→ one for process wastewater
  one for raw sewage sludge
→ sample/analyze process wastewater in the holding tank.
→ from pt. of use, underground pipe flow to holding tank. Then to tile field. Tile field is underground (percolate).
→ Mr. Johnson

→ Freon used as a degreasing solvent.

Ametek

10:15

5/8/87

Film Roll #2

Val Britton - site geologist.

Prod. well.

#1 Prod well #1 in Guardhouse.

Monitored on Irreg basis
NP.WA & then sampled in end of October 86
~ 130 - 200 ppb levels consistent
w/previous occurrences.

Pumping at 18 - 22 gpm ?
~ 20 - 45% capacity.

# 2 Mon well #1 flagpole
& entrance.

{small wells - Bristol pipe PVC 2"
- percolat. test wells put in 1st.}

# 3 MW # 2 & Cl tank stor.
# 4 "

noted several filled boreholes - cement-sealed.

AR301054

Ameter

5/8

~~#5~~

Will proceed w/ soil remed program pre-ACO - mtg at end of month.

Want to sell property.

want to dig up soil & aerate & replace. ("in-situ")

Conductivities above & below fragipan are same - so frag. not interference

#5 paint storage area.
Concrete floor w/ shed galv -
2 permeab. wells in front

Bedrock high at side (Rt side)

#6 Behind paint stor area.
No grass!!!

Line of wells MW & Piez behind fence -

#7 Wells ↗

AR301055

Mmetca.

#8 Hummock area - "Disturbed ground

Soil bay grid -

#9 & 10 Drums & spools adj to hummocky area.

Hit bedrock at ~2½'
Outcrops of Brunswick.

#10 ↗ outcrops. & stream. (spl.)

Stream Runs on top of Brunswick

12 & Brunswick fault upstream from shot (behind me)

#13 & 14 Settling basin for sludge

15 & 16 - ~~Settling basin~~
Lagoons - filled in
Behind Plant

17. Plant from Lagoon area

AMETEK

Near lagoon area lots reeds,
Standing water lots reeds.

#18 Back Production Well
& MW #7

#19 ~~MW #7 Stands~~
adj (Behind) paint stor area
Note No grass!
Tank Stor.?

#20 AMetek Bldg.

---

#21 A. Stiert & Sons.
Brush makers. Burned down.

(across Street from AMETEK

#22 & 23 Then Lagoons.

AR301057

Ameter

Where was waste stored after lagoons were shut down? Storage shed

How was the settling basin incorporated into the wastewater treatment system?

Was the settling basin + lagoons used at the same time?

Where did the water go after the settling basin?

AR301058.

Ametek

Britton ?
from ERM

113 Cl

AR301059

Ametek
1015

production
Wells work on cycles, 1 might be on at a time
Water is currently being pumped to a POTW
pump rates at 15-20% of capacity

Below contamination came from spills when tank was loaded and unloaded (Spencer)

soil borings to depths where auger would go
used OVA to screen where to take samples

Soil remediation program to eventually occur

Ametek is attempting to sell the facility, might have a buyer (Spencer)

Plant Storage Area - soil borings here no HNu readings

Stream - lots of algal growth, slight foaming
drain from property

Runoff runs thru northern edge of site

No HNu readings around stream, swampy areas, standing water, dead vegetation, settling pond

7 during Ametek studies methane readings were noted in several areas around stream & ponds

property S of building leased out for farmland (corn), field currently looks unused

large grey tank near production well 2-fire water

ATTACHMENT B
ZONE OF CONTAMINATION NO. 2
AMETEK, INC., A. STEIERT AND SONS, WASTE CONVERSIONS
SITE VISIT PICTURES

Zone of Contamination No. 2
Ametek, Inc.

| Picture Number | Description |
|---|---|
| 1 | Looking northeast from Richmond Road gatehouse and production well 1 (inside gatehouse). |
| 2 | Looking north from gatehouse. Monitoring well 1. |
| 3 | Monitoring well 2, located along the southwest corner of the manufacturing building. |
| 4 | Looking southeast from gatehouse, former location of above ground TCE storage tank. Also monitoring well 2. |
| 5 | Looking east from southeast corner of manufacturing building. Paint storage sheds currently empty. |
| 6 | Back of largest paint storage shed. Note: Stressed vegetation adjacent to shed. Versar personnel did not detect organic vapor concentrations above background. |
| 7 | Looking southeast from paint storage area. Monitoring well 3 and piezometers. |
| 8 | East of manufacturing building. Two piezometers. |
| 9 | Looking northwest at manufacturing building and water tank. Note: rusted drums in grass. |
| 10 | Wooded area east of manufacturing building. Debris consisting of wood spools and wire. |
| 11 | Looking north. Creek that transects Ametek's property. Val Britton (ESC) describing condition of the creek. |
| 12 | Looking south. Creek that transects Ametek's property. |
| 13 | East of manufacturing building and along creek. Former settling basin. |
| 14 | East of manufacturing building and along creek. Former settling basin. Currently contains rainwater with algae. |
| 15 | Looking east from behind paint storage shed. Monitoring well 3 and former lagoon area. |

AR301063

| | |
|---|---|
| 16 | Looking southeast from behind paint storage area. Monitoring well 3. |
| 17 | Looking northwest from lagoon area. Main manufacturing building. Also, ERM, Versar, and EPA personnel. |
| 18 | Looking south. Production well 2. |
| 19 | Paint storage area. Former location of small paint storage shed. |
| 20 | From Richmond Road, Ametek facility. |

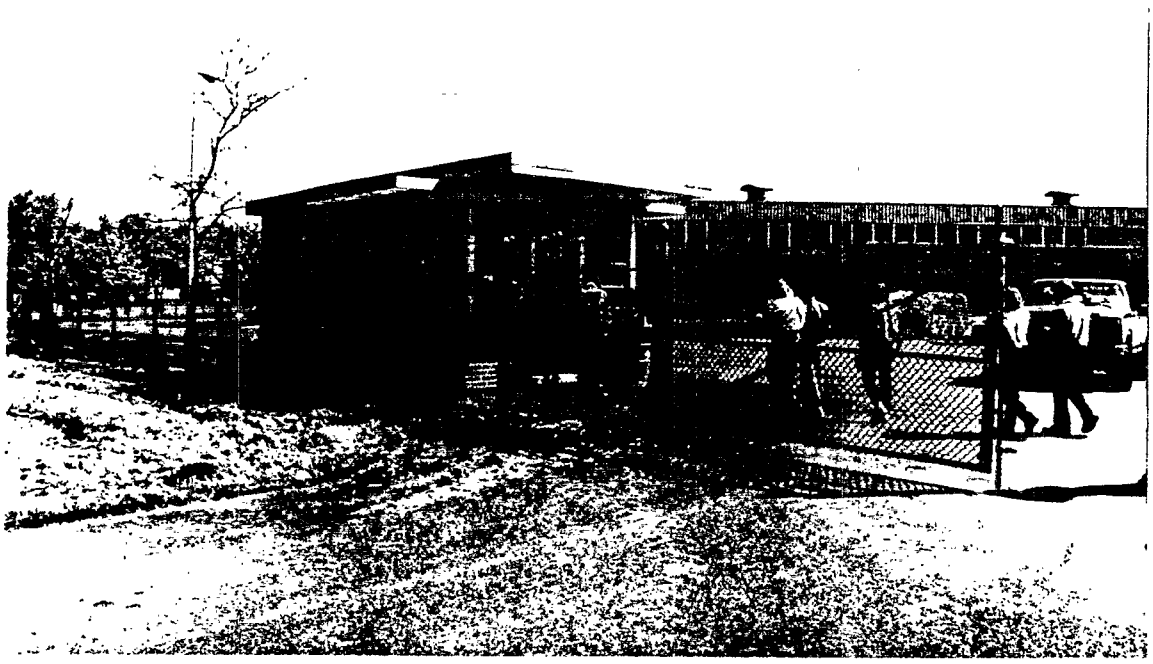
Zone of Contamination No. 2
A. Steiert and Son, Inc.

| Picture Number | Description |
|---|---|
| 1 | Looking from entrance road. Gutted manufacturing building. |
| 2 | Looking from entrance road. Onsite lagoon/pond 1. |
| 3 | Lagoon/pond 2. |

Zone of Contamination No. 2
Waste Conversion

| Picture Number | Description |
|---|---|
| 1 | Looking northeast from Sandstone Road. Front of Waste Conversion building. |
| 2 | Looking southwest from Coldesac. Northside of building. |

AR301064

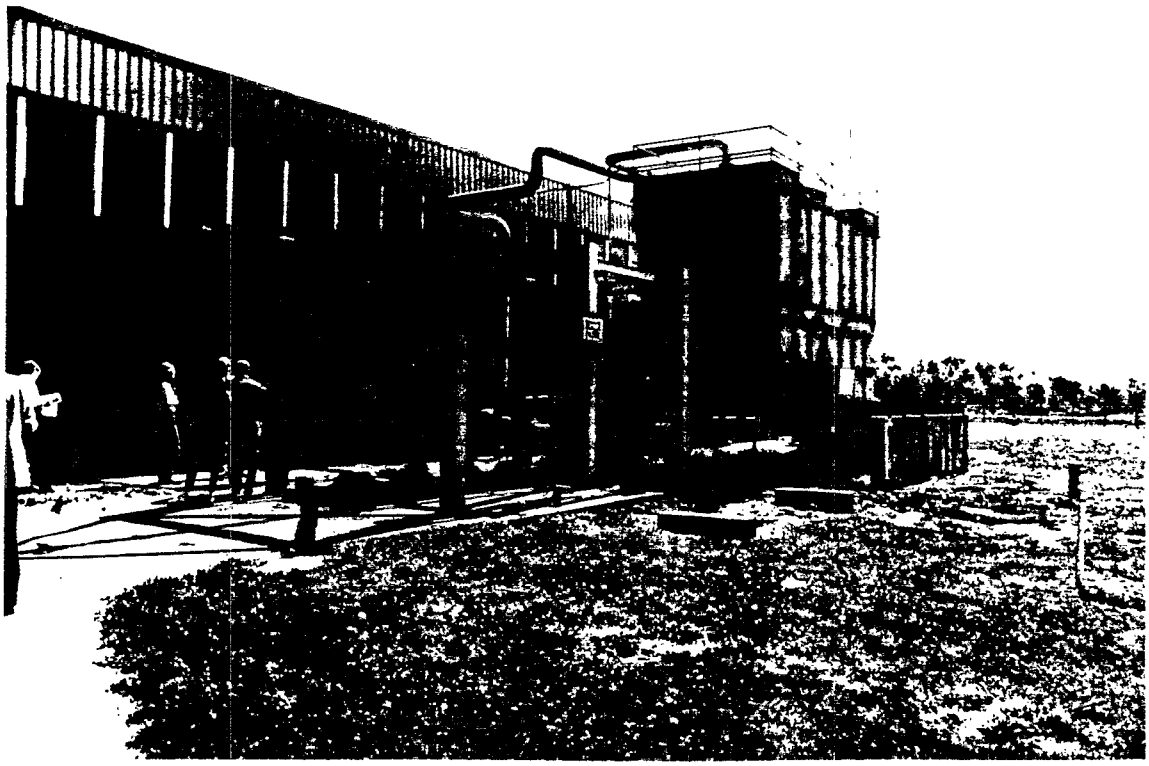


"AMETEK - 1"

"AMETEK - 2"

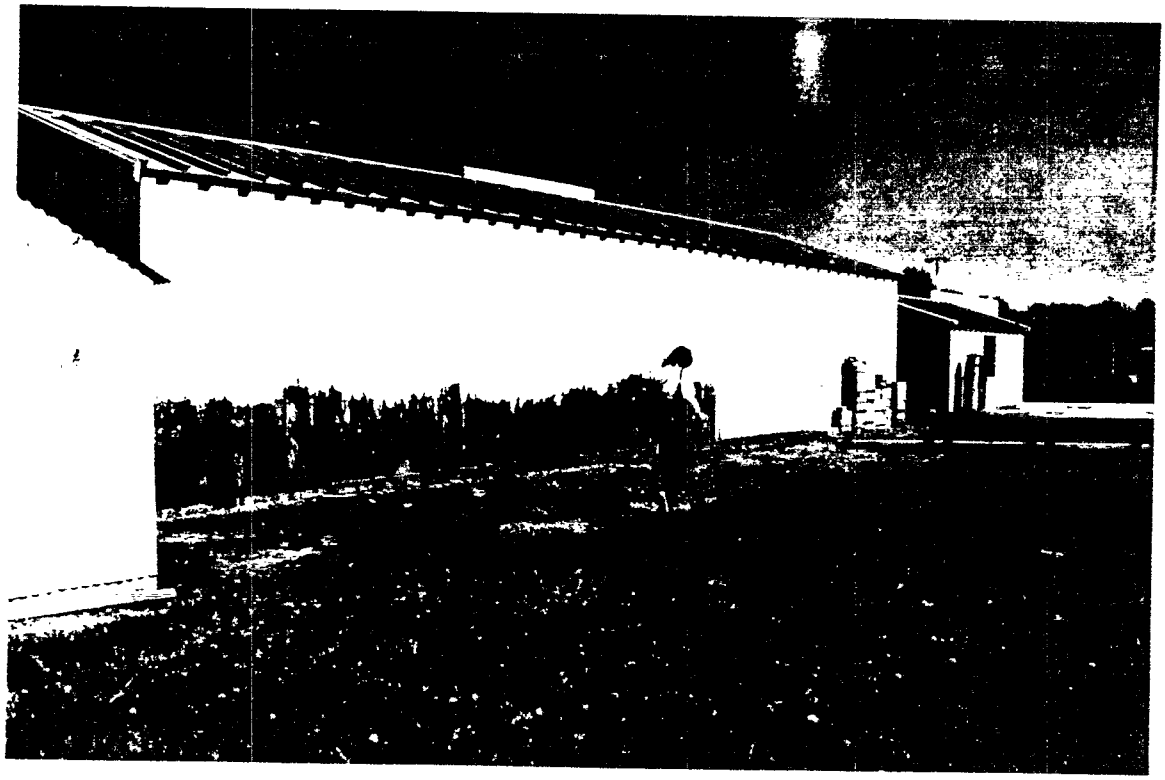
AR301065

"AMETEK - 3"

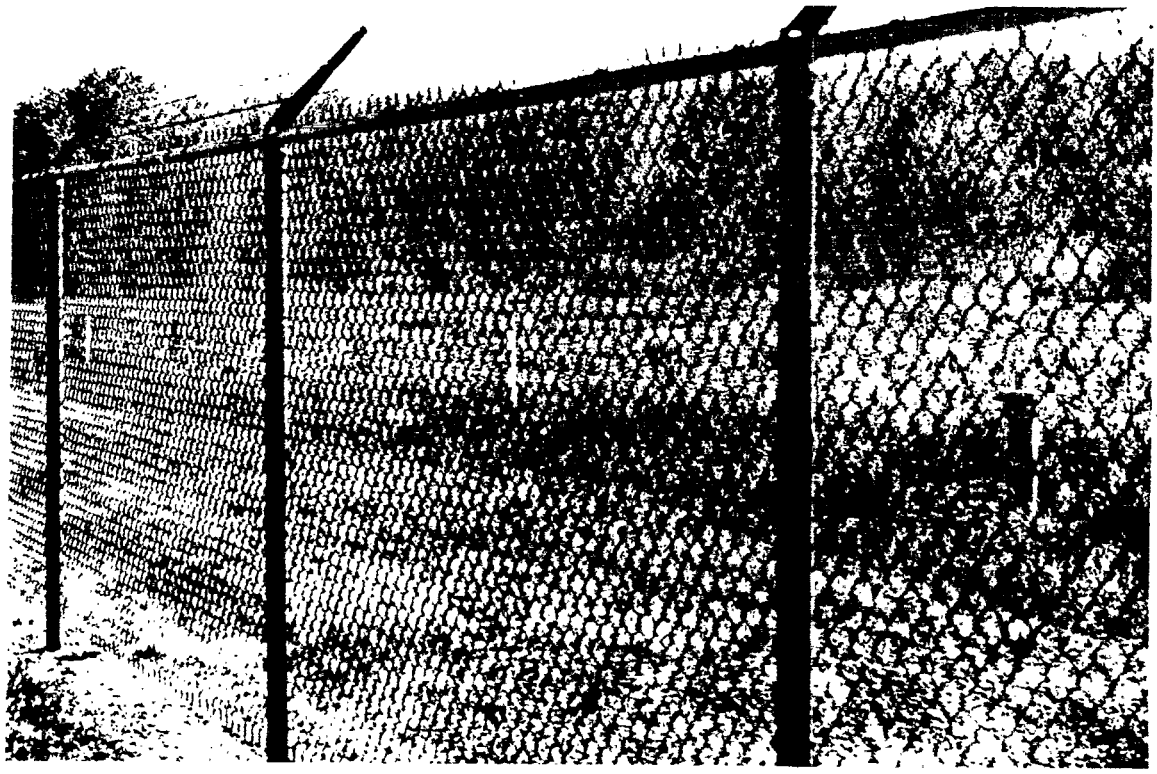


"AMETEK - 4"

"AMETEK - 5"



"AMETEK - 6"



"AMETEK - 7"

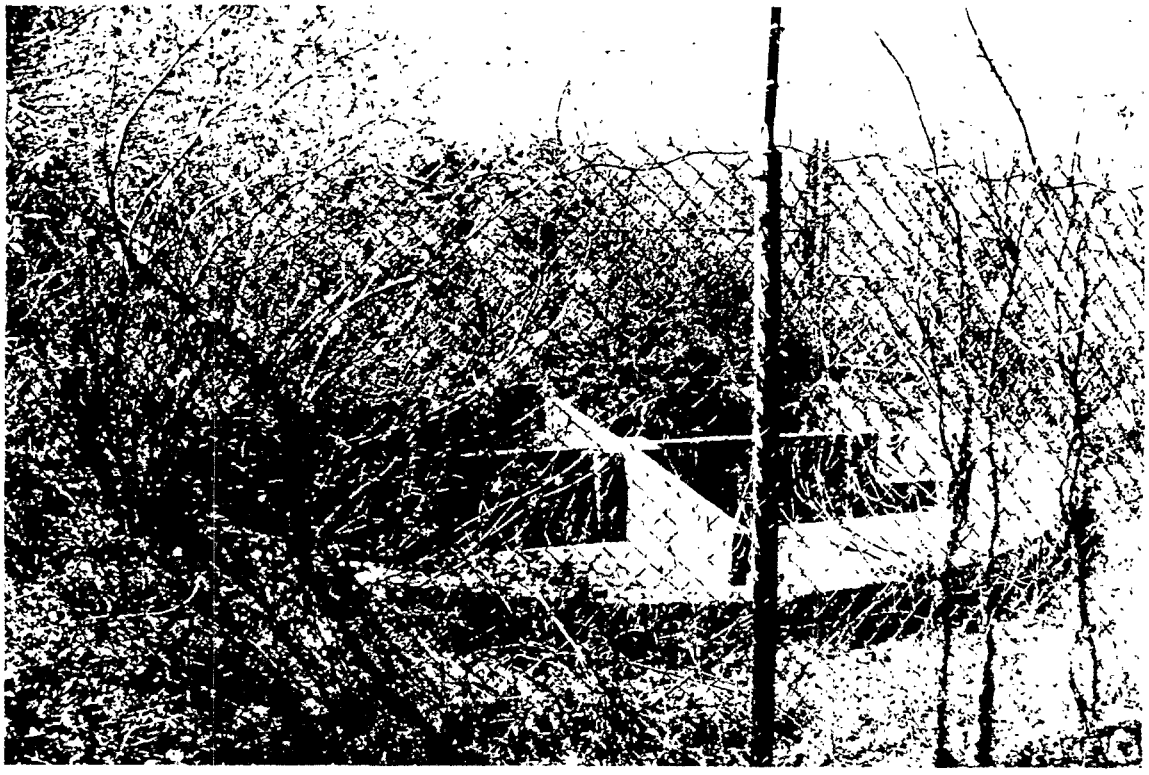
"AMETEK - 8"

"AMETEK - 9"

"AMETEK - 10"

"AMETEK - 11"

"AMETEK - 12"

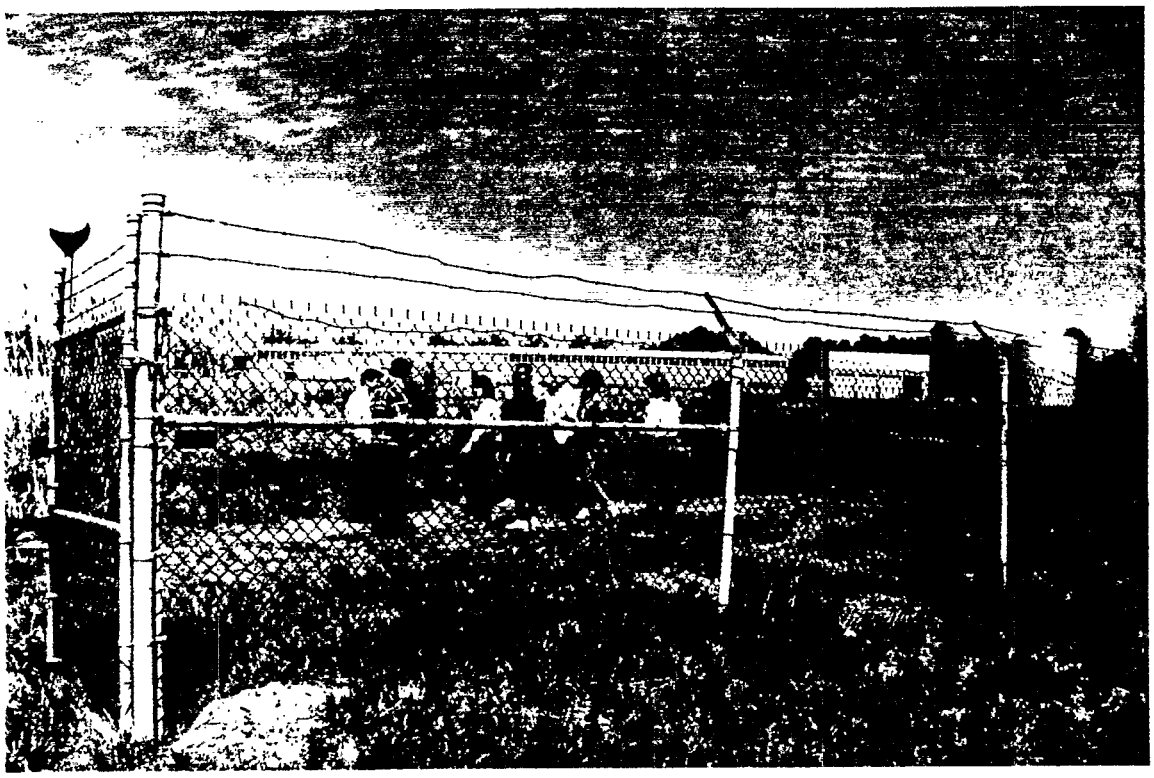


"AMETEK - 13"

"AMETEK - 14"

"AMETEK - 15"

"AMETEK - 16"



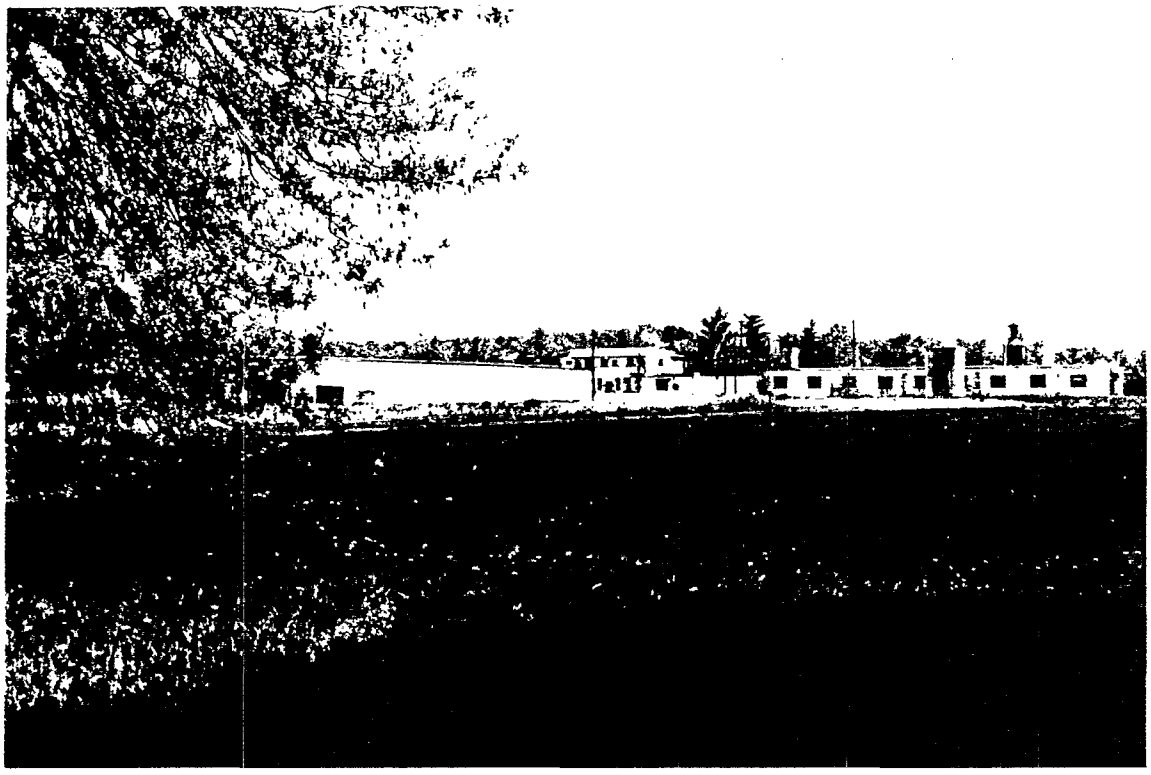
"AMETEK - 17"

"AMETEK - 18"

"AMETEK - 19"

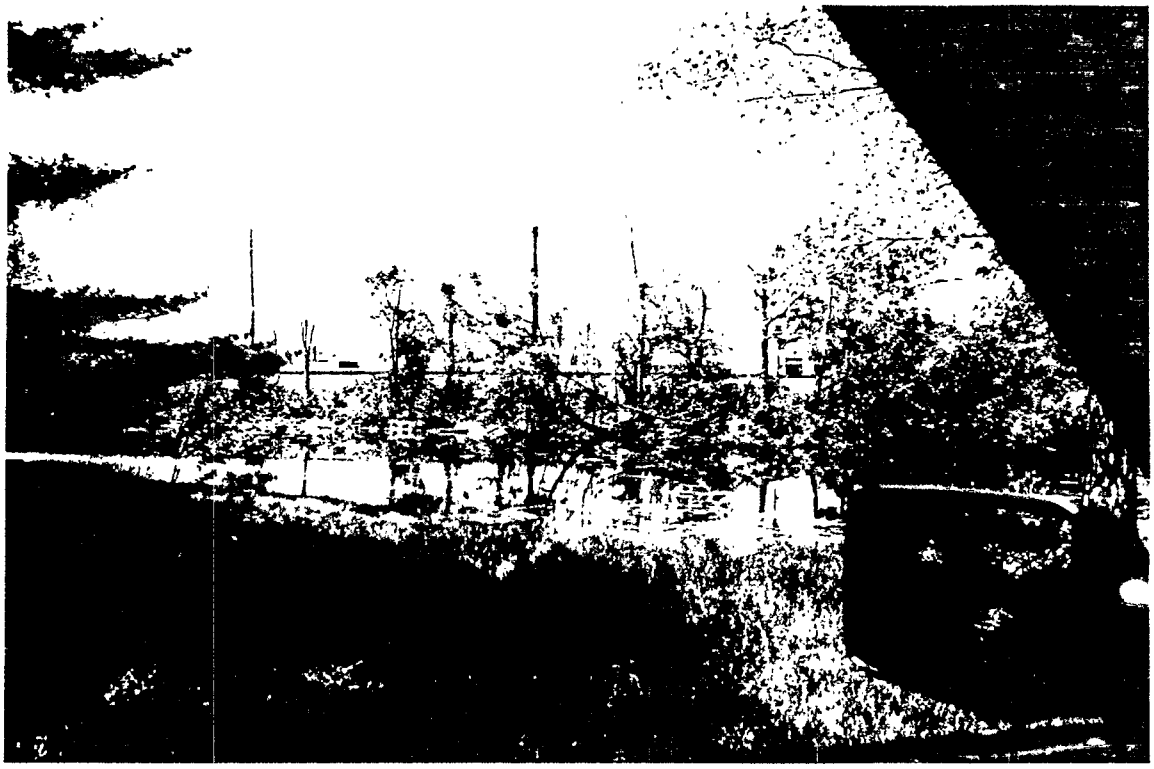
"AMETEK - 20"

AR301074

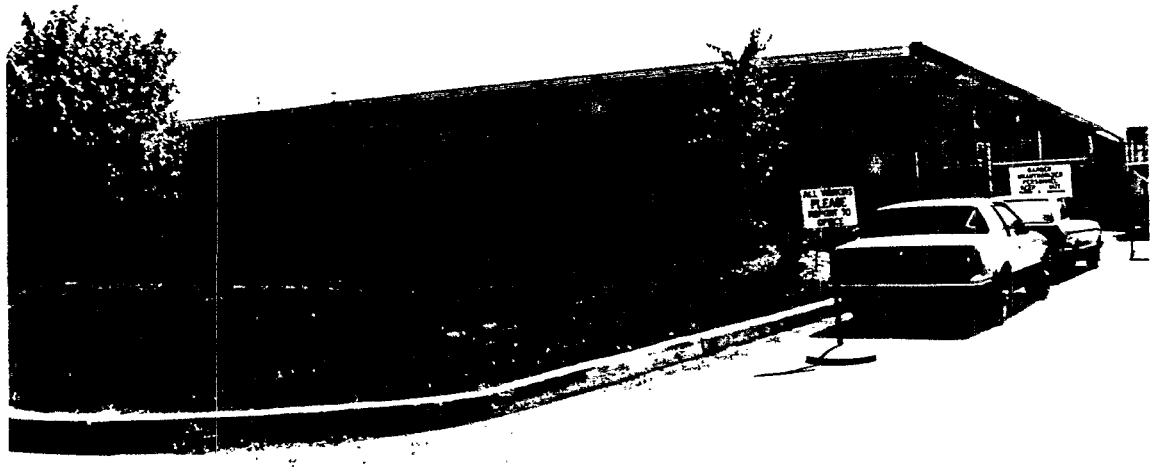


"Steiert and Son - 1"

"Steiert and Son - 2"



"Steiert and Son - 3"



"Waste Conversion - 1"

"Waste Conversion - 2"

AR301077

REFERENCE 11
Ametek, Hunter Springs Division
Purchase order for compact housing
cartridge water filters, 4/1/80

# AMETEK

597 D

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA 19440 TELEPHONE: (215) 822-2971

## PURCHASE ORDER

No. 41096 2

SHOW THIS NUMBER ON ALL PACKAGES: INVOICES AND REFERENCES TO THIS ORDER

TO:

AMETEK/Plymouth Products Div.
502 Indiana Avenue
Sheboygan, WI 53081

DATE 4/3/90

CONFIRMING ORDER IF X'D ☐

TO YOUR DATE

X Chas. to Pam 4/1/90

| ☐ UNLESS X'D PA. STATE TAX EXEMPT UNDER LICENSE NO. 46-04776 | FOR S.O. OR W.O. | REQ. NO. | REQUESTED BY | ACCOUNT NO. | MATERIAL REQUIRED AT OUR PLANT |
|---|---|---|---|---|---|
| | 69092 | 36475 | E.P. | | ASAP |

| ITEM | QUANTITY | PART NO. | REV. | DESCRIPTION | PRICE |
|---|---|---|---|---|---|
| | | Proj. ~~ESM~~ 597 | | ☐ TEST REPORTS REQUIRED IF X'D. | |
| | 24 | | | PS - C2 Compact Housing Cartridge Water Filters | $9.45/ea. |
| | 120 | | | Cartridges FC2 for PS-C2 [redacted] Filters | $1.95/ea. |

EXPEDITING RECORD

| ITEM | DATE | C | P | W | PERSON CONTACTED | DEL. PROM. | INT. | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
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| | | | | | | | | |

AR301079

REQUISITIONER

REFERENCE 12
Letter dated September 11, 1981

AR301080

GEORGE W NEFF
& SON, ASSOCIATES

Land Planning & Development
Project Management

GWYNEDD PLAZA • SPRING HOUSE PENNSYLVANIA 19477 • (215) 643-4600

September 11, 1981

Honorable Bert C. Daikeler
P.O. Box 159, Room 20 Capital Annex
Harrisburg, PA 17120
And
Century Plaza, Room 101, 100 W. Main St.
Lansdale, PA 19446

Honorable Edwin G. Holl
Senate Post Office, Main Capitol Building
Harrisburg, PA 17120
And
331 N. Broad Street
Lansdale, PA 19446

Honorable Richard Thornburgh
Governor of the State of Pennsylvania
Room 225, Main Capitol
Harrisburg, PA 17120

Honorable Richard T. Schulze
Two East Lancaster Avenue
Paoli, PA 19301
And
432 Cannon House Office Building
Washington, DC 20515

Honorable John Heinz, III
443 Russell Office Building
Washington, DC 20510
And
600 Arch Street, Room 9456
Philadelphia, PA 19106

Honorable Arlen Specter
253 Senate Office Building
Washington, DC 20510
And
600 Arch Street, Room 9256
Philadelphia, PA 19106

Clifford L. Jones, Secretary
Commonwealth of Pennsylvania
Department of Environmental Resources
9th Floor, Fulton Building
P.O. Box 2063
Harrisburg, PA 17120

Geoffrey Stengel, Jr., Secretary
Department of Commerce
Harrisburg, PA 17120

Honorable LeRoy S. Zimmerman
Attorney General, Commonwealth of Penna.
16th Floor, Strawberry Square
Harrisburg, PA 17120

A. Russell Parkhouse, Chairman
Montgomery County Commissioners
Court House
Norristown, PA 19404

Peter N. Bibko, Regional Director
U.S. Environmental Protection Agency
Curtis Building, 6th and Walnut Sts.
Philadelphia, PA 19106

Reference: Complaint of Regulatory Violations-- Waste Conversion, Inc.
2869 Sandstone Drive, Line Lexington Industrial Park
Hatfield Township, Montgomery County, Pennsylvania
Emissions to the Air; Handling of Treated Sludge Byproducts

Dear Representative Daikeler, Senator Holl, Governor Thornburgh, Representative Schulze, Senator Heinz, Senator Specter, Secretary Jones, Secretary Stengel, Attorney General Zimmerman, Commissioner Parkhouse, and Mr. Bibko:

I seek your involvement and advice in a matter pertaining to the improper treatment and handling of corrosive chemical waste products by a company, trading

Conversion, Inc., situated on a two-acre lot in the middle of a highly populated light Industrial Park. I serve as the Park Administrator, as well as the principal Owner and Developer, and represent many of the companies which have invested in new offices and plants there, hired and trained many new employees from the area, and have become immediately affected by the activities of this company.

Background:

Waste Conversion started operating a few years ago as a Lessee in approximately 8,000 square feet of a 24,000 square foot building owned and utilized by a garden equipment distributor, the Ronconi Equipment Company, Inc. When the building Owner, Carl Ronconi, died in late 1979, his Estate moved his business out of the building and tried unsuccessfully to rent its space.

In the meantime, facing the threat of litigation over abuse to the part of the structure and premises occupied by Waste Conversion, Inc., its Owner managed to sell the business, and the new Owner procured from the Ronconi Estate a Lease-Purchase Agreement for the entire building. Since then, Waste Conversion, Inc. has expanded its activities manifold, and what used to be a random or occasional problem has turned into a daily and obnoxious nuisance, representing a clear violation of the Commonwealth's law pertaining to public malodors.

Complaints:

One serious problem pertains to the manner in which Waste Conversion, Inc. handles and disposes of the concentrated waste byproducts, or sludge, of its treatment process. Presently, the sludge is dumped out one of the loading doors onto the macadam driveway apron and accumulated over several days into a sizable heap. Eventually, it is scooped up with a front-end loader and placed in a dump truck for off-site disposal. In the interim, however, this concentrated pile remains largely unprotected from the weather-- gases and odors escaping-- and when it rains portions of the pile wash down the driveway into a storm sewer, which conducts this potentially highly contaminating material into a drainage swale leading to the Neshaminy Creek.

The second problem is the acute and unceasing fumes and odors emitted from the plant, primarily through a vent pipe on the roof but also through the loading doors, windows and other openings in the building walls. The gaseous effluent seems to be heavier than air, and has a tendency to drift in clouds directly at adjacent buildings-- such that employees of those buildings often cannot breathe normally out of doors or open their office windows for fresh air. Construction and maintenance workmen have also reported sickening effects of prolonged exposure to the air in the vicinity of the Waste Conversion plant.

Worst of all, these fumes and odors are sufficiently concentrated that they get sucked into the fresh air intakes and circulated through the heating and air conditioning systems of other buildings-- reportedly causing eye irritations, dizziness, nausea and headaches to various employees, some of whom had to go home in order to escape the vapors, and resulting in lost production time to their employers. Relief is contingent only upon the vagaries of atmospheric conditions.

Contrary to State Air Quality Regulations, one section of which requires that:

> "No person shall cause, suffer, or permit the emission into the outdoor atmosphere of any malodorous air contaminants from any source whatsoever, including those in compliance with the provisions of subsection (a) of this section, in such a manner that the malodors are detectable beyond the property of the person,"[1]

the odors from Waste Conversion are often so pungent as to be routinely detectable from distances of 500 feet or more from the source. Employees of the buildings at the periphery of the Industrial Park, delivery personnel, visitors, even residents living two blocks away have observed and reported the repulsive smell.

The emissions from Waste Conversion, Inc. continue virtually without interruption around the clock, every day of the week. The color of the vapors and the odor is nearly always the same, except when the plume changes from white to orange, at which time, according to knowledgable observers, an acid mist of toxic nitrous oxide is being vented to the atmosphere. Recently, the worst occurrences have been observed late at night or very early in the morning when, apparently, the emissions can best be comouflaged.

Efforts toward Remedial Action:

We have met with municipal officials from Hatfield Township and, although their cooperation has been excellent, we have found their jurisdiction limited in this specific area of the law, and have been advised to direct our efforts to the State level. Accordingly, we have had a number of meetings and other communications with personnel of the Pennsylvania Department of Environmental Resources, at its Norristown office and at the Industrial Park, and provided information and photographs on numerous observations and incidents at the Waste Conversion plant. [2]

The personnel at D.E.R. acknowledge that Waste Conversion is "probably" violating the Air Quality Regulations, that Waste Conversion is operating without an Air Emissions Permit, and that the question is less whether the company should be fined than how much of a fine should be imposed. Yet, there seems to be a curious reluctance on the part of the Department to impose sanctions or, at the very least, to mandate a reduction in the level of activity, if not a shutdown, until the company can demonstrate compliance with the Regulations.

Despite an overwhelming preponderance of eyewitness testimony, the Department seems to be hiding behind the "complexity of the chemistry involved" as an excuse for doing nothing. The Department also cites a lack of manpower (e.g., four inspectors to cover 1,200 plants in a two county area) as the reason it cannot schedule more surveillance, on-site inspections and analyses to endeavor to identify the precise cause of these fumes and odors. Such a posture does not instill confidence that the Department is really serving to protect the public health.

Some representatives from neighboring companies and myself have met with the Owner of Waste Conversion recently and, after hearing his plans, there remains great skepticism that the company will ever be able to comply with the law-- because of the limitations of the facility it is occupying compared with the volume of business it is attempting to conduct. The Owner has conceded that this location is not particularly conducive, but a principal impediment to relocating is that it would take at least two years to procure the necessary permits at another location.

We are not sure how Waste Conversion came into operation in the first place, except perhaps under a Solid Waste Disposal Permit issued by the U.S. Environmental Protection Agency and/or the Pennsylvania Department of Environmental Resources.

Summation:

I believe the Pennsylvania Department of Environmental Resources has given far too much latitude to Waste Conversion, Inc., which has dramatically expanded its operations without all the necessary permits, and with a shameful disregard for the rights of other people working and living in the immediate community. I believe the Owner of Waste Conversion undertook a business risk, and should be required to raise the necessary capital by borrowing or other means in order to procure the treatment equipment which would solve these problems and to subsidize a reduced level or interruption of activity until he can demonstrate compliance with the Air Quality Regulations.

There is no equation, in my opinion, in which any presumed benefits to the Commonwealth can justify the social costs of this operation in terms of the threatened health of the employees at surrounding plants as well as the potentially ruinous effect the prolonging of this condition could have on the employment and tax base of the local economy.[3]

Many of the buildings in the Industrial Park have been financed through the Commonwealth's Industrial Development Authority mechanism, the sole purpose of which has been to promote jobs and economic stability in communities such as Hatfield Township. Yet, because of the irresponsible acts of one company, several of these companies are threatened, first, with the loss of key personnel who will not tolerate these continuous emissions and who fear for their health, second, with a real impediment to growth at this location because prospective employees balk at a work environment rendered unappealing or dangerous by the adjacent activities of Waste Conversion and, finally, with contamination of their products, some of which must be processed or manufactured under ultra-clean conditions.

Conclusion:

I believe a reasonable enforcement approach should take the following form:

1. Cite and fine Waste Conversion, Inc. at lease for recent violations which can be documentated by copious eyewitness testimony of lay persons and professional engineers with chemical backgrounds.

2. Mandate a reduction in the level of activity at the plant while the Operator pursues a specific and approved plan of remedy and until strict compliance with all appropriate regulations can be demonstrated.

3. Require Waste Conversion to provide independently conducted and verifiable stack emissions analyses, in order to assure that no toxic contaminants are being released into the atmosphere and that the public health is secure.

4. Require periodic, warningless inspections by qualified chemists or engineers who can corroborate the accuracy of manifests and reports filed by the Operator with D.E.R. and E.P.A. and who can also knowledgeably investigate complaints from inside of the plant.

5. If, after a reasonable period of time, the Operator cannot demonstrate compliance with the laws, any existing Permits should be revoked, the plant should be shut down, and the business allowed to fail.

On behalf of the many people who have expressed to me their extreme concern over this matter, I implore you to question the reasons for the vague and dilatory response of the Department of Environmental Resources to these problems and, wherever possible, to provoke and support swift and unequivocal enforcement of the laws it is charged to uphold.

Thank you very much for your consideration of this information and for any advice and assistance you are able to provide.

Sincerely yours,

Manny J. Neff

MJN:bjd
Enclosures: Photographs

cc: Board of Commissioners of Hatfield Township, John R. Greene, Chairman
Marc B. Davis, Esq., Township Solicitor

Footnotes:

1. Title 25, Rule and Regulations; Part I, Pennsylvania Department of Environmental Resources; Subpart C, Protection of Natural Resources; Article III, Air Resources; Paragraph 123.31, Odor Emissions, Limitations; Subparagraph (b).

2. D.E.R. personnel we have met with are Rao Kona, Thomas McGinley and John Petrella, Air Pollution Control Engineers, Bureau of Air Quality, Norris[illegible]

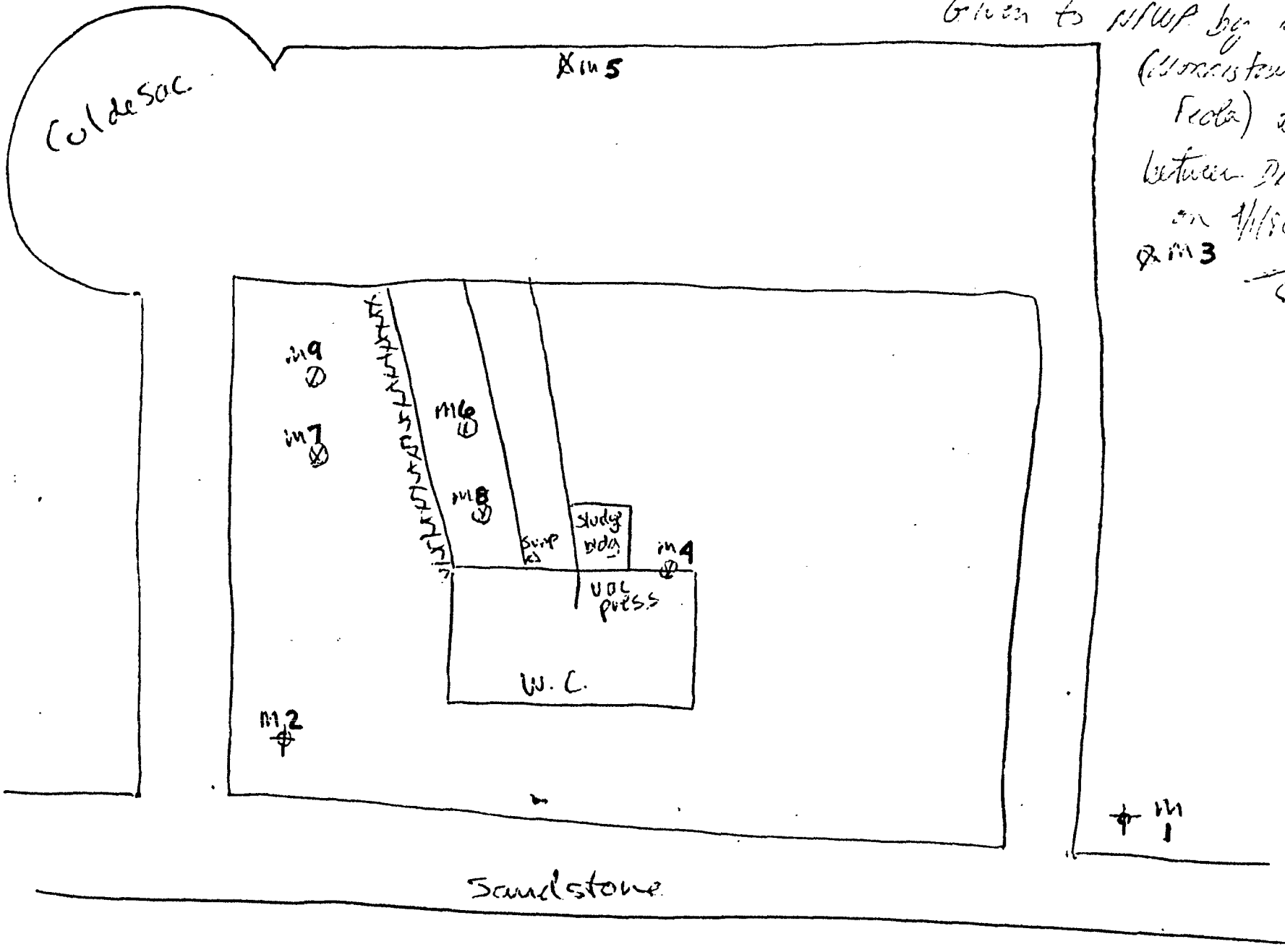
3. Our concern extends not only to employees at surrounding plants; we notified Mr. Bernard Dillon, Jr., Area Director, of the U.S. Dept. of Labor, Occupational Safety and Health Administration, Philadelphia, PA requesting an investigation of conditions inside the Waste Conversion, Inc. plant.

APR 20 1085

Ref 13

REFERENCE 13
Hand drawn sketch of site features

Given to NPWP by DER (Morristown - J Feola) at me between DER & NPWA on 1/1/86




AR301088

NP 15

# MONTHLY MONITORING WELL REPORT — M 1

| PARAMETERS 1984 | Jan | Feb | Mar | Apr | June | May not sampled | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | 208 | 294 | 320 | | 282 | — | 260 | 234 | | 274 |
| T.S.S., mg/L | | | <10 | 40.4 | 2 | | 8.8 | — | 3.2 | 12 | | 2.00 |
| T.O.C., mg/L | | | 3.7 | 2.8 | 4.26 | | 7.2 | 2.5 | 7.1 | 1.7 | | 14.6* |
| Cl⁻, mg/L | | | 21 | 34 | 28.0 | | 24 | — | 13 | 13 | | 12.5 |
| Fe, mg/L | | | <0.01 | <.1 | <.001 | | .102 | — | <0.001 | 0.24 | | 0.1 |
| Zn, mg/L | | | 0.15 | 0.17 | 0.114 | | .07 | — | <0.001 | 0.18 | | 0.16 |
| $NH_3$⁻N, mg/L | | | <1 | 0.14 | 0.98 | | <0.14 | .56* | <0.14 | <0.14 | | <0.14 |
| Dichloromethane, mg/L | | | ND | ND | ND | | ND | ND | ND | ND | | |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | ND | ND | ND | | | | | | | |
| Phenol, mg/L | | | <1 | 0.32 | <0.05 | | <005 | <0.001 | <0.01 | <0.05 | | <0.01 |
| Tox | | | | | | | | | | | | <0.05 |
| | | | | | | | | | | | | |

AR301088

M 1

MONTHLY MONITORING WELL REPORT m1

| PARAMETERS (1985) | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | 17.5 | 267 | 543 | 254.5 | 483 | | 311.0 | 229.0 | 326.0 | 287.0 | 201.0 | 2.0 |
| T.S.S., mg/L | 2.0 | 2 | <0.1 | 11.5 | 44 | | 2.0 | 2.0 | 1.0 | 1.0 | 2.0 | 175 |
| T.O.C., mg/L | 20.7 | 12.41 | 2.097 | 1.95 | 11.6 | | 9.25 | 7.02 | 3.75 | 1.764 | 2.614 | 2.98 |
| Cl⁻, mg/L | <0.25 | 11.23 | 107 | 13.9 | 17.6 | | 15.5 | 13.49 | 16.99 | 10.33 | 10.72 | 15.8 |
| Fe, mg/L | <0.01 | 0.13 | 0.016 | <0.001 | <0.01 | | <0.05 | 0.109 | <0.01 | <0.01 | 0.009 | 0.045 |
| Mn, mg/L | 0.02 | 0.23 | 0.155 | 0.11 | 0.09 | | 0.129 | 0.23 | 0.149 | 1.208 | 0.351 | 0.11 |
| $NH_3$⁻N, mg/L | <0.05 | 0.05 | <0.01 | <0.1 | <0.1 | | <0.05 | <0.05 | <0.05 | <0.05 | <0.01 | <0.01 |
| Dichloromethane, mg/L | ND | ND | ND | ND | ND | | ND | ND | ND | ND | ND | ND |
| 1,1,1 Trichloroethane, mg/L | ↓ | ↓ | ↓ | ↓ | ↓ | | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | <0.01 | <0.01 | <0.01 | <0.1 | <0.01 | | <0.01 | <0.01 | <0.01 | <0.01 | <0.05 | <0.05 |
| TOX | | | | <0.05 | | | | | | | | |
| | | | | | | | | | | | | |

AR301090

MW-1.

MONTHLY MONITOR WELL REPORT M1

| PARAMETERS 1986 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | 252 | | | | | | | | | | | |
| T.S.S., mg/L | 1.0 | | | | | | | | | | | |
| T.O.C., mg/L | 2.4 | | | | | | | | | | | |
| $Cl^-$, mg/L | 15.15 | | | | | | | | | | | |
| Fe, mg/L | <0.001 | | | | | | | | | | | |
| Zn, mg/L | 0.156 | | | | | | | | | | | |
| $NH_3$ N, mg/L | <0.05 | | | | | | | | | | | |
| Dichloromethane, mg/L | ND | | | | | | | | | | | |
| 1,1,1 Trichloroethane, mg/L | | " | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | " | | | | | | | | | | |
| Ethyl benzene, mg/L | | " | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | <0.05 | | | | | | | | | | | |
| TOX | <0.05 | " | | | | | | | | | | |
| | | | | | | | | | | | | |

AR301091

'86

M-1

# MONTHLY MONITORING WELL REPORT M 2

| PARAMETERS 1984 | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | 219 | 248 | 327.6 | not sampled | 303 | 288 | 288 | 240 | | 247 |
| T.S.S., mg/L | | | 40 | <4 | 1.6 | | 16 | .13 | <0.5 | 8.4 | | 6.4 |
| T.O.C., mg/L | | | 3.8 | 4.8 | 3.5 | | 8.1 | 6.2 | 7.1 | 1.7 | | 6.7* |
| Cl⁻, mg/L | | | 35 | 36 | 56.44 | | 47 | 40 | 38 | 14 | | 20.5 |
| Fe, mg/L | | | <0.01 | <0.1 | <0.001 | | .132 | 09 | 0.16 | 0.16 | | 8.5 |
| Zn, mg/L | | | 0.308 | 0.41 | 0.51 | | .251 | 0.4 | 0.004 | 0.15 | | 0.07 |
| $NH_3$-N, mg/L | | | <1 | <0.14 | 0.84 | | .14 | <0.14 | <0.14 | <0.14 | | <0.14 |
| Dichloromethane, mg/L | | | ND | ND | ND | | ND | ND | ND | ND | | ND |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | ND | ND | | | | | | | | |
| Phenol, mg/L | | | 2 | <0.025 | <0.05 | | <0.05 | <0.001 | <0.01 | <0.05 | | <0.01 |
| Tox | | | | | | | | | | | | <0.05 |

AR301092

M 2

# MONTHLY MONITOR WELL REPORT

| PARAMETERS 1985 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | 357 | 487 | 293 | 427 | | DRY | DRY | | | 196.0 | 8.0 |
| T.S.S., mg/L | | 4 | <0.1 | 3 | 36 | | | | | | 4.0 | 176 |
| T.O.C., mg/L | | 10.78 | 4.58 | 3.74 | 14.15 | | | | | | 3.319 | 3.5 |
| $Cl^-$, mg/L | | 32.99 | 190 | 37 | 34.2 | | | | | | 34.67 | 41.22 |
| Fe, mg/L | | 1.105 | 0.028 | <0.001 | <0.001 | | | | | | 0.028 | 0.133 |
| Zn, mg/L | | 0.566 | 0.128 | 0.12 | 0.09 | | | | | | 0.304 | 0.232 |
| $NH_3^-N$, mg/L | | <0.05 | <0.01 | <0.01 | <0.1 | | | | | | <0.10 | <0.01 |
| Dichloromethane, mg/L | | ND | ND | ND | ND | | | | | | ND | ND |
| 1,1,1 Trichloroethane, mg/L | DRY | " | " | " | " | | | | DRY | DRY | " | " |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | " | " | " | " | | | | | | " | " |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | | <0.01 | <0.01 | <0.10 | <0.01 | | | | | | <0.05 | <0.05 |
| | | " | | | | | | | | | | |
| | | | | | | | | | | | | |

AR301093

MW-2

MONTHLY MONITORING WELL REPORT

| PARAMETERS 1986 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | | | | | | | | | |
| T.S.S., mg/L | | | | | | | | | | | |
| T.O.C., mg/L | | | | | | | | | | | |
| $Cl^-$, mg/L | | | | | | | | | | | |
| Fe, mg/L | | | | | | | | | | | |
| Zn, mg/L | | | | | | | | | | | |
| $NH_3^-N$, mg/L | | | | | | | | | | | |
| Dichloromethane, mg/L | | | | | | | | | | | |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | |
| Phenol, mg/L | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

AR301094

AR301095

# MONTHLY MONITORING WELL REPORT - M 3

| PARAMETERS 1984 | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | 146 | 254 | 208.8 | not sampled | 230 | 238 | 243 | 241 | | 257 |
| T.S.S., mg/L | | | <10 | <0.4 | 2.6 | | 32 | .18 | <0.5 | 12 | | 10.40 |
| T.O.C., mg/L | | | 2.7 | 1.4 | 31 | | 4.0 | 11 | 10.1 | 2.7 | | 7 3 |
| $Cl^-$, mg/L | | | 15 | 13 | 12.9 | | 15.2 | 12 | 11.3 | 14 | | 13 5 |
| Fe, mg/L | | | <0.01 | <0.1 | 1.05 | | .284 | 10 | <0.001 | .12 | | 0.06 |
| Mn, mg/L | | | 0.065 | <0.18 | 0.338 | | .121 | <0.14 | <0.001 | .14 | | 0.10 |
| $NH_3$-N, mg/L | | | <1 | <0.14 | <0.14 | | <0.14 | 1 | 0.6 | <0.14 | | <0.14 |
| Dichloromethane, mg/L | | | ND | ND | ND | | ND | ND | ND | ND | | ND |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | ND | ND | | | | | | | | |
| Phenol, mg/L | | | (1) | <0.025 | <.05 | | <.005 | <0.09 | <0.01 | <0.05 | | <0.01 |
| TOX | | | | | | | | | | | | <0.05 |

M 3

MONTHLY MONITOR[illegible] WELL REPORT

| PARAMETERS 1985 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | 258 | 289 | 480 | 220 | 437 | | 270 | 224 | 340 | 378 | | |
| T.S.S., mg/L | 6 | 4 | <0.01 | 4.0 | 34 | | 2.0 | 1.0 | 3.0 | 2.0 | | |
| T.O.C., mg/L | 17.07 | 8.2 | ~~4.58~~ 10.08 | 2.48 | 3.9 | | 8.4 | 1.636 | 3.657 | 2.376 | | |
| $Cl^-$, mg/L | <0.25 | 15.6 | ~~190~~ 112 | 15.9 | 12.1 | | 14.5 | 12.99 | 14.49 | 9.08 | | |
| Fe, mg/L | 0.006 | 0.587 | 0.009 | <0.001 | <0.001 | | <0.05 | 0.044 | <0.001 | 0.018 | | |
| Zn, mg/L | 0.067 | 0.12 | 0.128 | 0.43 | 0.218 | | 0.181 | 1.74 | 0.015 | 0.168 | | |
| $NH_3^-N$, mg/L | <0.05 | <0.05 | <0.01 | <0.1 | <0.1 | | <0.05 | <0.05 | <0.05 | <0.05 | | |
| Dichloromethane, mg/L | ND | ND | ND | ND | ND | | ND | ND | ND | ND | NO DATA AVAILABLE | NO DATA |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | <0.01 | <0.01 | <0.01 | <0.1 | <0.01 | | <0.01 | <0.01 | <0.01 | <0.01 | | |
| TOX | | | | <0.05 | | | | | | | | |

AR301096

MW-3

MONTHLY MONITORING WELL REPORT

| PARAMETERS 198 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | | | | | | | | | | |
| T.S.S., mg/L | | | | | | | | | | | | |
| T.O.C., mg/L | | | | | | | | | | | | |
| $Cl^-$, mg/L | | | | | | | | | | | | |
| Fe, mg/L | | | | | | | | | | | | |
| Zn, mg/L | | | | | | | | | | | | |
| $NH_3$-N, mg/L | | | | | | | | | | | | |
| Dichloromethane, mg/L | DATA | | | | | | | | | | | |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | NO | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

AR301097

# MONTHLY MONITORING WELL REPORT M4

AR301098

| PARAMETERS 1984 | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .D.S., mg/L | | | 52 | 297 | 264 | not sampled | 261 | 259 | 276 | 293 | | 289 |
| .S.S., mg/L | | | 30 | <0.4 | 2.5 | | 18 | 260 | 3.2 | 6 | | 2.4 |
| .O.C., mg/L | | | 3.4 | 1.22 | 1.64 | | 31 | 4.2 | 9.3 | 2.8 | | 20.1 |
| $Cl^-$, mg/L | | | 15 | 24.2 | 21.2 | | 22.3 | 25 | 23 | 13 | | 235 |
| , mg/L | | | <0.01 | <0.1 | .03 | | .371 | 0.8 | <0.001 | 0.1 | | 0.04 |
| , mg/L | | | 0.052 | 0.07 | .02 | | <0.001 | 0.03 | <0.001 | 0.14 | | 0.40 |
| $NO_3^-N$, mg/L | | | <1 | 0.14 | .28 | | 0.14 | <0.14 | <0.14 | <0.14 | | <0.14 |
| chloromethane, mg/L | | | ND | ND | ND | | ND | ND | ND | ND | | ND |
| 1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| nzene, mg/L | | | | | | | | | | | | |
| ichloroethylene, mg/L | | | | | | | | | | | | |
| hyl benzene, mg/L | | | | | | | | | | | | |
| luene, mg/L | | | ND | ND | | | | | | | | |
| enol, mg/L | | | <1 | <0.025 | .35 | | 23 | <0.001 | <0.01 | <0.05 | | <0.01 |
| TOX | | | | | | | | | | | | <0.05 |
| | | | | | | | | | | | | |

MONTHLY MONITOR WELL REPORT

AR301099

| PARAMETERS 1985 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | 270 | 367 | 571 | 230 | 427 | | 289 | 257 | 362 | 214 | 211.0 | 18 |
| T.S.S., mg/L | 3 | 2 | <0.1 | 5.0 | 1.0 | | 1.0 | 1.0 | 2.0 | 1.0 | 2.0 | 132 |
| T.O.C., mg/L | 29.51 | 11.7 | 10.6 | 3.53 | 12.3 | | 14.6 | 1.78 | 2.53 | 1.866 ~~23~~ | 2.214 | 3.5 |
| $Cl^-$, mg/L | 14.24 | 28.99 | 213 | 32.4 | 32.7 | | 27.5 | 27.99 | 24.49 | 18.16 | 26.58 | 40.6 |
| Fe, mg/L | 0.011 | 0.28 | <0.001 | 0.017 | 0.021 | | 0.01 | 0.063 | 0.016 | <0.01 | <0.001 | <0.001 |
| Zn, mg/L | 0.108 | 0.365 | 0.237 | 0.041 | 0.127 | | 0.014 | 0.21 | 0.024 | 0.002 | <0.001 | 0.021 |
| $NH_3$-N, mg/L | <0.5 | <0.05 | <0.01 | <0.1 | <0.1 | | <0.05 | <0.05 | <0.05 | <0.05 | <0.1 | <0.01 |
| Dichloromethane, mg/L | ND | ND | ND | ND | ND | | ND | ND | ND | ND | ND | ND |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | <0.01 | <0.01 | <0.01 | <0.1 | <0.01 | | <0.01 | <0.01 | <0.01 | <0.01 | <0.05 | <0.05 |
| TOX | | | | <0.05 | | | | | | | | |

MW-4

MONTHLY MONITORING WELL REPORT

| PARAMETERS 1986 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | 316 | | | | | | | | | | | |
| T.S.S., mg/L | 5.0 | | | | | | | | | | | |
| T.O.C., mg/L | 1.7 | | | | | | | | | | | |
| $Cl^-$, mg/L | 37.8 | | | | | | | | | | | |
| Fe, mg/L | 0.227 | | | | | | | | | | | |
| Zn, mg/L | 0.056 | | | | | | | | | | | |
| $NH_3$-N, mg/L | <0.05 | | | | | | | | | | | |
| Dichloromethane, mg/L | ND | | | | | | | | | | | |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | <0.05 | | | | | | | | | | | |
| TOX | <0.05 | | | | | | | | | | | |
| | | | | | | | | | | | | |

AR301100

# MONTHLY MONITORING WELL REPORT M5

| PARAMETERS 1984 | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .D.S., mg/L | | | 61 | 300 | ~~Dry~~ not sampled | Dry | 735 | 1020 | 1526 | 234 | | |
| .S.S., mg/L | | | 20 | <4 | | | 30 | 28 | 14.8 | 5.2 | | |
| .O.C., mg/L | | | 5.4 | 4.2 | | | 12.3 | 16 | 24.7* | 4.1 | | |
| $Cl^-$, mg/L | | | 88 | 25.4 | | | 164 | 374 | 548 | 14 | | |
| e, mg/L | | | <0.01 | <0.1 | | | .217 | .25 | 0.07 | 0.12 | | |
| n, mg/L | | | 0.09 | 0.07 | | | 1.4 | 1.7 | 4.5 | 0.16 | | |
| $NO_3^-N$, mg/L | | | <1 | <0.14 | | | <0.14 | 0.28 | <0.14 | <0.14 | | |
| ichloromethane, mg/L | | | ND | ND | | | ND | ND | ND | ND | | |
| 1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| nzene, mg/L | | | | | | | | | | | | |
| ichloroethylene, mg/L | | | | | | | | | | | | |
| hyl benzene, mg/L | | | | | | | | | | | | |
| luene, mg/L | | | ND | ND | | | | | | | | |
| enol, mg/L | | | (<1) | <0.025 | | | <0.005 | <0.001 | <0.01 | <0.05 | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

Sept sample suspected to be not representative? [illegible]

AR301101

M5

MONTHLY MONITORING WELL REPORT

| PARAMETERS 1985 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | 1163 | 336 | 829 | | 1096 | 1683 | 344.5 | 1297 | | DRY |
| T.S.S., mg/L | | | 26 | 24 | 131 | | 8 | 12 | 3.0 | 133 | | |
| T.O.C., mg/L | | | 14.28 | 7.95 | 7.6 | | 15.03 | 11.4 | 5.392 | 9.377 | | |
| $Cl^-$, mg/L | | | 328 | 149.8 | 381.6 | | 632.8 | 514.8 | 16.69 | 488.76 | | |
| Fe, mg/L | | | 0.836 | 0.23 | 0.189 | | 0.05 | 0.27 | 0.008 | 1.07 | | |
| Zn, mg/L | | | 3.382 | 1.168 | 0.976 | | 0.79 | 2.64 | 0.016 | 0.088 | | |
| $NH_3$-N, mg/L | | | <0.01 | <0.1 | <0.1 | | <0.05 | <0.05 | <0.05 | <0.05 | | |
| Dichloromethane, mg/L | FROZEN | RAN DRY | N.D | ND | ND | | ND | ND | ND | ND | RAN DRY | |
| 1,1,1 Trichloroethane, mg/L | | | ↓ | ↓ | ↓ | | ↓ | ↓ | ↓ | ↓ | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | | | <0.01 | <0.1 | <0.01 | | <0.01 | <0.01 | <0.01 | 0.01 | | |
| TOX | | | | <0.05 | | | | | | | | |
| | | | | | | | | | | | | |

AR301102

MW1-5

WELL REPORT

| APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

REPORT M6

| ...e | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|
| ...y | Dry | Dry | Dry | Dry | | |

M-

M6

AR301103

MONTHLY MONITOR[illegible] WELL REPORT

AR301104

| PARAMETERS 1985 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | | | | | DRY | DRY | | | | |
| T.S.S., mg/L | | | | | | | \| | \| | | | | |
| T.O.C., mg/L | | | | | | | \| | \| | | | | |
| $Cl^-$, mg/L | | | | | | | \| | \| | | | | |
| Fe, mg/L | | | | | | | \| | \| | | | | |
| Zn, mg/L | | | | | | | \| | \| | | | | DRY |
| $NH_3$-N, mg/L | | | | | | | \| | \| | | | | |
| Dichloromethane, mg/L | | | | | | | \| | \| | | | | DATA |
| 1,1,1 Trichloroethane, mg/L | DRY | DRY | DRY | DRY | DRY | | \| | \| | DRY | DRY | DRY | | |
| Benzene, mg/L | | | | | | | \| | \| | | | | NO |
| Trichloroethylene, mg/L | | | | | | | \| | \| | | | | |
| Ethyl benzene, mg/L | | | | | | | \| | \| | | | | |
| Toluene, mg/L | | | | | | | \| | \| | | | | |
| Phenol, mg/L | | | | | | | \| | \| | | | | |
| | | | | | | | \| | \| | | | | |
| | | | | | | | \| | \| | | | | |

MONTHLY MONITORING WELL REPORT

| PARAMETERS 1986 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | | | | | | | | | | |
| T.S.S., mg/L | | | | | | | | | | | | |
| T.O.C., mg/L | | | | | | | | | | | | |
| $Cl^-$, mg/L | | | | | | | | | | | | |
| Fe, mg/L | | | | | | | | | | | | |
| Zn, mg/L | | | | | | | | | | | | |
| $NH_3$-N, mg/L | | | | | | | | | | | | |
| Dichloromethane, mg/L | | | | | | | | | | | | |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

NO DATA - DRY WELL

AR301105

# MONTHLY MONITORING WELL REPORT M7

| PARAMETERS 1984 | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | <10 | 721 | Dry | Dry | 1162 | 952 | Dry | Dry | | 816 |
| T.S.S., mg/L | | | <10 | 6.8 | | | 26 | 24 | | | | 15 6 |
| T.O.C., mg/L | | | 11 | 7.11 | | | 14 | 24 | | | | 43.9 |
| Cl⁻, mg/L | | | 312 | 250 | | | 324 | 313 | | | | 41.4 |
| Fe, mg/L | | | 2.74 | 0.61 | | | 2.2 | 3.1 | | | | 3 7 |
| Zn, mg/L | | | 0.754 | 1.00 | | | .54 | 0.8 | | | | 0.96 |
| $NH_3$⁻N, mg/L | | | 3.1 | 1.12 | | | 2.4 | 3 2 | | | | <0.14 |
| Dichloromethane, mg/L | | | ND | ND | | | ND | ND | | | | ND |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | ND | ND | | | | | | | | |
| Phenol, mg/L | | | (2) | 0.215 | | | <0.005 | <0.001 | | | | <0.01 |
| TOX | | | | | | | | | | | | <0.05 |
| | | | | | | | | | | | | |

M7

MONITHLY MONITOR WELL REPORT

| PARAMETERS 1985 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | 720 | 817 | 1203 | 424 | 444 | | 1316 1361 | 1557 | 1155 | 1449 | 932.0 | 35 |
| T.S.S., mg/L | 6 | 20 | 17 | 3.0 | 27 | | 3.0 | 19 | 16 | 127 | 5.0 | 839.0 |
| T.O.C., mg/L | 51.34 | 28.28 | 52.45 | 11.25 | 6.85 | | 7.6 | 8.64 | 16.03 | 13.55 | 8.494 | 8.3 |
| Cl⁻, mg/L | 196.94 | 42.42 | 431 | 255.8 | 107.8 | | 361.9 | 414.9 | 139.83 | 382.75 | 306.2 | 497 |
| Fe, mg/L | 0.521 | 3.268 | 3.189 | 1,843 | 2.745 | | 2.1 | 3.87 | 1.349 | 1.132 | <0.001 | 6.06 |
| Zn, mg/L | 0.376 | 0.88 | 0.65 | 1.9 | 0.865 | | 0.75 | 1.74 | 2.614 | 1.477 | 1.375 | 6.1 |
| $NH_3$-N, mg/L | <0.05 | 3.92 | <0.01 | <0.1 | <0.1 | | <0.05 | <0.05 | <0.05 | 0.685 | <0.1 | 0.56 |
| Dichloromethane, mg/L | ND | ND | ND | ND | ND | | ND | ND | ND | ND | ND | ND |
| 1,1,1 Trichloroethane, mg/L | ↓ | ↓ | ↓ | ↓ | ↓ | | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | <0.01 | <0.01 | <0.01 | <0.1 | <0.01 | | <0.01 | <0.01 | <0.01 | 0.01 | <0.05 | <0.05 |
| | | | | <0.05 | | | | | | | | |
| | | | | | | | | | | | | |

AR301107

Mw17

MONTHLY MONITORING WELL REPORT

| PARAMETERS 1986 | JAN | FEB | MAR | APR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | 1315 | | | | | | | | | | | |
| T.S.S., mg/L | 19 | | | | | | | | | | | |
| T.O.C., mg/L | 11.84 | | | | | | | | | | | |
| $Cl^-$, mg/L | 533.5 | | | | | | | | | | | |
| Fe, mg/L | 3.218 | | | | | | | | | | | |
| Zn, mg/L | 13.3 | | | | | | | | | | | |
| $NH_3$-N, mg/L | 4.9 | | | | | | | | | | | |
| Dichloromethane, mg/L | ND | | | | | | | | | | | |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | <0.05 | | | | | | | | | | | |
| TOX | <0.05 | | | | | | | | | | | |
| | | | | | | | | | | | | |

AR301108

M-7

MONTHLY MONITORING WELL REPORT MSS

AR301109

| PARAMETERS 1984 | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .D.S., mg/L | | | Dry | 718 | wt sample | Dry | Dry | Dry | Dry | Dry | | |
| .S.S., mg/L | | | | 17 | | | | | | | | |
| .O.C., mg/L | | | | 12.8 | | | | | | | | |
| $l^-$, mg/L | | | | 55 | | | | | | | | |
| e, mg/L | | | | 0.7 | | | | | | | | |
| n, mg/L | | | | 3.5 | | | | | | | | |
| $l_3^-N$, mg/L | | | | <0.14 | | | | | | | | |
| ichloromethane, mg/L | | | | ND | | | | | | | | |
| 1,1 Trichloroethane, mg/L | | " " | | | | | | | | | | |
| enzene, mg/L | | | | | | | | | | | | |
| richloroethylene, mg/L | | " " | | | | | | | | | | |
| hyl benzene, mg/L | | " " | | | | | | | | | | |
| luene, mg/L | | | | | | | | | | | | |
| enol, mg/L | | | | <0.025 | | | | | | | | |
| | | " | | | | | | | | | | |
| | | | | | | | | | | | | |

MONTHLY MONITOR WELL REPORT

| PARAMETERS 1985 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | | | | | DRY | DRY | | | | |
| T.S.S., mg/L | | | | | | | | | | | | |
| T.O.C., mg/L | | | | | | | | | | | | |
| $Cl^-$, mg/L | | | | | | | | | | | | |
| Fe, mg/L | | | | | | | | | | | | |
| Zn, mg/L | | | | | | | | | | | | |
| $NH_3$-N, mg/L | | | | | | | | | | | | |
| Dichloromethane, mg/L | DRY | DRY | DRY | DRY | DRY | | | | | | | NO DATA |
| 1,1,1 Trichloroethane, mg/L | DRY | DRY | DRY | DRY | DRY | | | | DRY | DRY | DRY | NO |
| Benzene, mg/L | | RAN | RAN | | RAN | | | | | | | |
| Trichloroethylene, mg/L | | RAN | | | RAN | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

AR301419

MWR

| PARAMETERS 1986 | JAN | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | | | | | | | | | | | |
| T.S.S., mg/L | | | | | | | | | | | | | |
| T.O.C., mg/L | | | | | | | | | | | | | |
| $Cl^-$, mg/L | | | | | | | | | | | | | |
| Fe, mg/L | | | | | | | | | | | | | |
| Zn, mg/L | | | | | | | | | | | | | |
| $NH_3$-N, mg/L | | | | | | | | | | | | | |
| Dichloromethane, mg/L | | | | | | | | | | | | | |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | | |
| Phenol, mg/L | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

DRY WELL

AR301111

MONTHLY MONITORING WELL REPORT m9

AR301112

| PARAMETERS 1984 | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | <10 | 343 | Not sampled | 4468 | 375 | 351 | 394 | 238 | | 306 |
| T.S.S., mg/L | | | <10 | <0.4 | | 2.8 | 14 | .16 | 10 24 | 8.8 | | 1.6 |
| T.O.C., mg/L | | | 3.3 | 4.07 | | 4.13 | 2.1 | 5.1 | 6 14 | 2.6 | | 16.1 |
| Cl⁻, mg/L | | | 69 | 66 | | 61 | 69 | 64 | 61 | 13 | | 45 |
| Fe, mg/L | | | <0.01 | <.1 | | 0.036 | <0.001 | .014 | <0.001 | 0.05 | | 0.01 |
| Mn, mg/L | | | 0.348 | 0.6 | | .457 | .26 | 0.4 | <0.001 | 0.17 | | 0.42 |
| $NH_3$ N, mg/L | | | <1 | <0.14 | | <0.14 | <0.14 | 0.28 | <0.14 | <0.14 | | <0.14 |
| Dichloromethane, mg/L | | | ND | ND | | ND | ND | ND | ND | ND | | ND |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | ND | ND | | | | | | | | |
| Phenol, mg/L | | | 2 | 0.08 | | 0.05 | <0.005 | <0.001 | <0.001 | <0.05 | | <0.01 |
| TOC | | | | | | | | | | | | <0.05 |
| | | | | | | | | | | | | |

m 9

MONTHLY MONITOR WELL REPORT

AR301113

| PARAMETERS 1985 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | 333 | 456 | 452 | 355 | 552 | | 457 | 422 | 387 | 157.0 | 315.0 | 14 |
| T.S.S., mg/L | 2 | 2 | 7 | 1.0 | 21 | | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 306 |
| T.O.C., mg/L | 12.19 | 11.62 | 2.99 | 1.97 | 2.301 | | 3.22 | 1.473 | 6.161 | 5.932 | 4.187 | 5.3 |
| $Cl^-$, mg/L | 37.99 | 33.98 | 430 | 56 | 62.8 | | 71.98 | 52.98 | 51.48 | 48.44 | 61.83 | 78 |
| Fe, mg/L | <0.001 | 0.31 | 0.011 | <0.001 | 0.047 | | <0.05 | 0.048 | 0.048 | 0.019 | 0.092 | 0.14 |
| Zn, mg/L | 0.344 | 0.528 | 0.275 | 0.166 | 0.271 | | 0.26 | 0.93 | 0.357 | 0.268 | 0.381 | 0.43 |
| $NH_3$-N, mg/L | <0.05 | <0.05 | <0.28 | <0.1 | <0.1 | | <0.05 | <0.05 | <0.05 | <0.05 | <0.1 | <0.01 |
| Dichloromethane, mg/L | ND | ND | ND | ND | ND | | ND | ND | ND | ND | ND | ND |
| 1,1,1 Trichloroethane, mg/L | ↓ | ↓ | ↓ | ↓ | ↓ | | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | 0.01 | <0.001 | <0.01 | <0.1 | <0.01 | | ↓ | ↓ | <0.01 | <0.01 | <0.05 | ↓ |
| TOX | | | | <005 | | | <0.01 | <0.01 | | | | <0.05 |
| | | | | | | | | | | | | |

MW9

| PARAMETERS 1986 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | | | | | | | | | | | |
| T.S.S., mg/L | | | | | | | | | | | | | |
| T.O.C., mg/L | | | | | | | | | | | | | |
| $Cl^-$, mg/L | | | | | | | | | | | | | |
| Fe, mg/L | | | | | | | | | | | | | |
| Zn, mg/L | | | | | | | | | | | | | |
| $NH_3$-N, mg/L | DRY | | | | | | | | | | | | |
| Dichloromethane, mg/L | | | | | | | | | | | | | |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | | |
| Benzene, mg/L | RKD | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | | |
| Ethyl benzene, mg/L | RK | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | | |
| Phenol, mg/L | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

ARBOI-114

# MONTHLY MONITORING WELL REPORT NP 15

| PARAMETERS 1984 | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | Down | out of service | not sampled | 263 | 257 | 246 | 274 | 252 | | 285 |
| T.S.S., mg/L | | | | | | 3.2 | 14 | 0.12 | 24 | 2.8 | | 0.8 |
| T.O.C., mg/L | | | | | | 7 4 | 1.5 | 9.8 | 6 | 10 | | 15.6 |
| $Cl^-$, mg/L | | | | | | 15.3 | 14 | 15 | 15 | 16 | | 15.5 |
| Fe, mg/L | | | | | | .08 | .14 | 0.07 | <0.001 | 0.28 | | 0.04 |
| Mn, mg/L | | | | | | .02 | 1014 | 0.01 | 0.014 | 0.05 | | 0.02 |
| $NH_3$ N, mg/L | | | | | | .14 | <0.14 | 0.14 | 0.28 | <0.14 | | <0.14 |
| Dichloromethane, mg/L | | | | | | ND | ND | ND | ND | ND | | ND |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | | | | | | <.05 | <.005 | <0.001 | <0.01 | <0.05 | | <0.01 |
| TOX | | | | | | | | | | | | <0.05 |
| | | | | | | | | | | | | |

AR301115

NP 15

MONTHLY MONITOR ? WELL REPORT

| PARAMETERS 1985 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | 245 | 316 | 542 | 201 | | | 390 | | | 163 | | 1 |
| T.S.S., mg/L | 0.95 | 2 | <0.1 | <0.01 | | | 1.0 | | | 2.0 | | 23 |
| T.O.C., mg/L | 12.5 | 8.94 | 3.28 | 1.992 | | | 6.5 | | | 4.763 | | 3.5 |
| Cl⁻, mg/L | 17.25 | 13.99 | 103 | 45.1 | | | 19.49 | | | 14.685 | | 15.1 |
| Fe, mg/L | <0.01 | 0.004 | <0.001 | <0.001 | NO DATA AVAILABLE | | <0.05 | NO DATA AVAILABLE | NO DATA AVAILABLE | 0.056 | NO DATA AVAILABLE | <0.001 |
| Zn, mg/L | <0.01 | 0.009 | 0.017 | 0.166 | | | 0.001 | | | 0.325 | | 0.02 |
| $NH_3$⁻N, mg/L | <0.01 | <0.05 | <0.01 | <0.1 | | | <0.05 | | | <0.05 | | <0.01 |
| Dichloromethane, mg/L | ND | ND | ND | ND | | | ND | | | ND | | ND |
| 1,1,1 Trichloroethane, mg/L | ↓ | ↓ | ↓ | ↓ | | | ↓ | | | ↓ | | ↓ |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | <0.01 | <0.01 | <0.01 | <0.1 | | | <0.01 | | | <0.01 | | <0.05 |
| TOX | | | | <0.05 | | | | | | | | |
| | | | | | | | | | | | | |

AR301116

NP15,

MONTHLY MONITOR WELL REPORT

| PARAMETERS 1986 | JAN | FEB | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | 200 | | | | | | | | | | | |
| T.S.S., mg/L | 3.0 | | | | | | | | | | | |
| T.O.C., mg/L | 15.15 | | | | | | | | | | | |
| $Cl^-$, mg/L | 16.3 | | | | | | | | | | | |
| Fe, mg/L | <0.001 | | | | | | | | | | | |
| Zn, mg/L | 0.086 | | | | | | | | | | | |
| $NH_3$-N, mg/L | <0.05 | | | | | | | | | | | |
| Dichloromethane, mg/L | ND | | | | | | | | | | | |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | |
| Phenol, mg/L | <0.05 | | | | | | | | | | | |
| TOX | <0.05 | | | | | | | | | | | |
| | | | | | | | | | | | | |

AR301117

NP-15

# MONTHLY MONITORING WELL REPORT Sump

| PARAMETERS 1984 | Jan | Feb | Mar | Apr. | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | 783 | 6001 | not Sampled | 1094 | 4978 | 5029 | 3194 | 3835 | 1640 → | |
| T.S.S., mg/L | | | 204 | 137 | | 114.4 | 51 | .65 | 8 | 34 | 55.6 | |
| T.O.C., mg/L | | | 192 | 50 | | 165.5 | 44.3 | 67 | 39 | 32 | 34.9 | |
| Cl⁻, mg/L | | | 4065 | 3084 | | 5344 | 1485 | 2573 | 1458 | 1851 | 1510 | |
| Fe, mg/L | | | 3.54 | 21 | | 10.7 | 5.1 | 9.1 | 3.1 | 1.2 | 0.04 | |
| Zn, mg/L | | | 0.329 | 0.121 | | .128 | .01 | 0.08 | 1.9 | 0.14 | 0.26 | |
| $NH_3$⁻N, mg/L | | | 118 | 34 | | 84 | 21 | 32 | 10 | 13 | <0.14 | |
| Dichloromethane, mg/L | | | ND | ND | | ND | ND | ND | ND | ND | ND | |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | ND | ND | | | | | | | | |
| Phenol, mg/L | | | 4 | 0.025 | | 0.30 | <0.005 | 0.05 | <0.01 | 0.45 | <0.01 | |
| TOX | | | | | | | | | | | <0.05 | |
| | | | | | | | | | | | | |

AR301118

Sump

MONTHLY MONITOR ' WELL REPORT

AR301119

| PARAMETERS 1985 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | 1150 | 2901 | 3515 | 8335 | 2215 | | | | 2055.5 | 13807.0 | 5102.2 | 205.0 |
| T.S.S., mg/L | 26 | 118 | 63 | 616 | 619 | | | | 171.0 | 1815.0 | 138.0 | 1025.0 |
| T.O.C., mg/L | 47.2 | 87.81 | 180.15 | 166.4 | 25.44 | | | | 102.5 | 149.0 | 51.82 | 65.5 |
| $Cl^-$, mg/L | 317.9 | 1263.1 | 3945 | 3625 | 2822 | | | | 192.4 | 298.0 | 3131.8 | 1006.9 |
| Fe, mg/L | 0.827 | 2.446 | 8.06 | 14.8 | 21.6 | | | | 3.459 | 742.9 | 2.281 | 24.7 |
| Zn, mg/L | 0.095 | 1.137 | 0.051 | 0.087 | 0.109 | | | | 0.941 | 22.41 | 0.12 | 10.3 |
| $NH_3$-N, mg/L | 3.64 | 1.92 | 5.2 | 451.6 | 42 | | | | 9.22 | 10.58 | 1.385 | 1.36 |
| Dichloromethane, mg/L | ND | ND | 0.087 | ND | ND | | | | ND | ND | ND | ND |
| 1,1,1 Trichloroethane, mg/L | ↓ | ↓ | ND | ↓ | ↓ | | | | ↓ | ↓ | ↓ | ↓ |
| Benzene, mg/L | | | ↓ | | | | | | | | | |
| Trichlproethylene, mg/L | | | | | | | | | | ↓ | ↓ | |
| Ethyl benzene, mg/L | | | | | | | | | | 0.0361 | 0.0685 | |
| Toluene, mg/L | | | | | | | | | ↓ | 0.451 | 0.5789 | |
| Phenol, mg/L | <0.01 | <0.06 | 0.2 | 3.075 ~~<0.1~~ | 0.4 | | | | 0.632 | 0.932 | 0.845 | 1.04 |
| TOX | | | | <0.05 | | | | | | | | |
| | | | | | | | | | | | | |

MS2

MONTHLY MONITOR WELL REPORT

AR301120

| PARAMETERS 1986 | JAN | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | 8583 | | | | | | | | | | | | |
| T.S.S., mg/L | 658 | | | | | | | | | | | | |
| T.O.C., mg/L | 122.4 | | | | | | | | | | | | |
| $Cl^-$, mg/L | 3810.7 | | | | | | | | | | | | |
| Fe, mg/L | 3.37 | | | | | | | | | | | | |
| Zn, mg/L | 19.9 | | | | | | | | | | | | |
| $NH_3$-N, mg/L | 42 | | | | | | | | | | | | |
| Dichloromethane, mg/L | ND | | | | | | | | | | | | |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | | |
| Phenol, mg/L | 0.56 | | | | | | | | | | | | |
| TOX | <0.05 | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

1P

# MONTHLY MONITORING WELL REPORT Swale

AR301121

| PARAMETERS 1984 | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | <40 | 403 | not sampled | 491 | 774 | 1236 | 367 | 915 | | 1750 |
| T.S.S., mg/L | | | <10 | 1.0 | | 22.6 | 2.0 | 0.5 | 21 | 53 | | 66 |
| T.O.C., mg/L | | | 11.6 | 6.04 | | 17.3 | 17 | 121 | 24 | 39 | | 74.6 |
| $Cl^-$, mg/L | | | 182 | 108 | | 89 | 142 | 307 | 73 | 277 | | 534.3 |
| Fe, mg/L | | | <0.01 | 0.4 | | 1.5 | .23 | 1.3 | 0.5 | 1.3 | | 1.44 |
| Zn, mg/L | | | 0.118 | 0.136 | | 0.22 | .07 | 0.4 | <0.001 | 0.3 | | 0.42 |
| $NH_3$ N, mg/L | | | <1 | 0.98 | | <0.14 | <0.14 | <0.14 | <0.14 | 1.4 | | <0.14 |
| Dichloromethane, mg/L | | | ND | ND | | ND | ND | ND | ND | ND | | ND |
| 1,1,1 Trichloroethane, mg/L | | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | ND | ND | | | | | | | | |
| Phenol, mg/L | | | 1 | 0.35 | | <0.05 | <.23 | 0.2 | <0.01 | <0.05 | | <0.01 |
| TOX | | | | | | | | | | | | <0.05 |
| | | | | | | | | | | | | |

Swale

# MONTHLY MONITOR WELL REPORT

| PARAMETERS 198 | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | 1047 | 2332 | | 1715.0 | 5961.0 | | 5485 | | 1511.0 | 1048.0 | 2900.0 | |
| T.S.S., mg/L | 41 | 118 | | 211.0 | 61.0 | | 49 | | 113.0 | 1343.5 | 1.0 | |
| T.O.C., mg/L | 62.63 | 85.7 | | 114 | 69.8 | | 53.4 | | 91.98 | 74.0 | 6-817 | |
| $Cl^-$, mg/L | 291.9 | 946.7 | | 195.6 | 397.7 | | 2839 | | 179.9 | 298.42 | 190.7 | |
| Fe, mg/L | 0.269 | 4.3 | | 5.85 | 7.263 | | 0.3 | | 1.742 | 2.065 | 2.149 | |
| Zn, mg/L | 0.609 | 0.43 | | 4.577 | 3.218 | | 0.189 | | 1.613 | 0.72 | 0.319 | |
| $NH_3$-N, mg/L | <0.05 | 3.05 | Q | 70 | 19.6 | | 23.5 | | 8.62 | 8.69 | 0.923 | FROZEN |
| Dichloromethane, mg/L | ND | ND | Q | ND | ND | | ND | | ND | ND | ND | |
| 1,1,1 Trichloroethane, mg/L | ↓ | ↓ | | ↓ | ↓ | | ↓ | | ↓ | ↓ | ↓ | |
| Benzene, mg/L | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | | | | | | | | | | | |
| Ethyl benzene, mg/L | | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | DRY | | | | |
| Phenol, mg/L | <0.01 | <0.01 | | 0.102 | 0.5 | | 2.33 | | 0.329 | 0.154 | <0.05 | |
| TOX | | | | <0.05 | | | | | | | | |
| | | | | | | | | | | | | |

AR301122

MONTHLY MONITOR WELL REPORT

| PARAMETERS 1984 | JAN | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.D.S., mg/L | | | | | | | | | | | | | |
| T.S.S., mg/L | | | | | | | | | | | | | |
| T.O.C., mg/L | | | | | | | | | | | | | |
| $Cl^-$, mg/L | | | | | | | | | | | | | |
| Fe, mg/L | | | | | | | | | | | | | |
| Zn, mg/L | | | | | | | | | | | | | |
| $NH_3$ N, mg/L | | | | | | | | | | | | | |
| Dichloromethane, mg/L | | | | | | | | | | | | | |
| 1,1,1 Trichloroethane, mg/L | FROZEN | " | | | | | | | | | | | |
| Benzene, mg/L | | | | | | | | | | | | | |
| Trichloroethylene, mg/L | | " | | | | | | | | | | | |
| Ethyl benzene, mg/L | | " | | | | | | | | | | | |
| Toluene, mg/L | | | | | | | | | | | | | |
| Phenol, mg/L | | | | | | | | | | | | | |
| | | " | | | | | | | | | | | |
| | | | | | | | | | | | | | |

AR301123

SWALE

Waste Conversion INC.
2869 Sandstone Drive / Hatfield, Pennsylvania 19440 / 215-822-8996

March 11, 1985

Michigan Disposal, Inc.
P. O. Box 5116
Dearborn, Michigan 48128

Gentlemen:

As per our letter of January 17, 1985, we have not received our signed receipt for Manifest #MI0452053, dated October 10, 1984. Please forward same at your earliest convenience so that we may close our fourth quarter file.

Thank you in advance for your prompt attention to the above, we remain,

Very truly yours,

WASTE CONVERSION, INC.

Anita Nice

Mrs. Anita Nice

aln

REFERENCE 14
Selected Generator Quarterly
Hazardous Waste Reports
(January 1984 through June 1986)..

R-SWM-55A:REV:7/83
Please Type or Print in Ink

COMMONWEALTH OF PENNSYL
DEPARTMENT OF ENVIRONMENTAL R ICES
BUREAU OF SOLID WASTE MANAG. ENT

# 55 A

## GENERATOR QUARTERLY HAZARDOUS WASTE REPORT

I. Generator's EPA I.D. No. PAD085690592
TSD Facility's EPA I.D. No. MID000724831
TSD Facility's Name Michigan Disposal
Address 49350 N. Service DRive Belleville Mi 48111

### III. WASTE SHIPPED OFF-SITE

| LINE NO. | A. US DOT Proper Shipping Name of Waste and Manifest Document Number (Include State Abbreviation) | B. Hazardous Waste Number | C. Weight of Shipment KEY PUNCHER UNIT IS P | D. PA. Hazardous Waste Transporter License No. |
|---|---|---|---|---|
| 1 | Hazardous waste solid nos<br>Manifest Document Number - M1 0759590 | D006<br>D006 | 240 P. | AH0139 |
| 2 | waste calcium nitrate<br>Manifest Document Number - M1 0759590 | D001 | 250 P. | AH0139 |
| 3 | waste flammable liquid nos<br>Manifest Document Number - M1 0759590 | D001 | 75 GO | AH0139 |
| 4 | waste flammable solid nos<br>Manifest Document Number - M1 0759590 | D001 | 1500 P. | AH0139 |
| 5 | WASTE Alkaline corrosive liquid<br>Manifest Document Number - M1 0759592 | D002 | 5415 | AH0139 |
| 6 | WASTE PAINT<br>Manifest Document Number - M1 0759592 | D001 | 14000 | AH0639 |
| 7 | WASTE Flammable Sol. & NOS<br>Manifest Document Number - M1 0759592 | D001 | 5700 | AH0139 |
| 8 | WASTE Alkaline Corrosive Liquid NOS<br>Manifest Document Number - M1 0759592 | F006<br>D006<br>D002 | 990 | AH0139 |
| 9 | WASTE Sodium Hydroxide Solution<br>Manifest Document Number - M1 0775755 | D002 | 195 | AH0139 |
| 10 | WASTE Chromic Acid Mix Only<br>Manifest Document Number - M1 0775755 | D001<br>D007 | 600 | AH0139 |

Comments:

R-SWM-55A:REV:7/83
Please Type or Print in Ink

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

# GENERATOR QUARTERLY HAZARDOUS WASTE REPORT

# 55 A

I. Generator's EPA I.D. No. PAD085690592
TSD Facility's EPA I.D. No. MID000724831
TSD Facility's Name Michigan Disposal
Address 49350 N. Service Drive Belleville, MI 48111

## III. WASTE SHIPPED OFF-SITE

| LINE NO. | A. US DOT Proper Shipping Name of Waste and Manifest Document Number (Include State Abbreviation) | B. Hazardous Waste Number | C. Weight of Shipment (RE LAUNCHER UNIT IS P) | D. PA. Hazardous Waste Transporter License No. |
|---|---|---|---|---|
| 1 | WASTE OXIDIZER NOS<br>Manifest Document Number - MI 0759558 | D001 | 550 | AH013 9 |
| 2 | WASTE FLAMMABLE SOLID<br>Manifest Document Number - MI 0759560 | F005 | 100 | AH013 9 |
| 3 | HAZARDOUS WASTE SOLID<br>Manifest Document Number - MI 0759570 | F006 | 16000 | AH013 9 |
| 4 | waste paint related material<br>Manifest Document Number - MI 0759589 | D008 | 990 | AH013 9 |
| 5 | waste bleaching powder nos<br>Manifest Document Number - MI 0759589 | D001 | 800 | AH013 9 |
| 6 | waste dodecylbenzene sulfonic acid<br>Manifest Document Number - MI 0759589 | D002 | 1485 | AH013 9 |
| 7 | waste flammable solid nos<br>Manifest Document Number - MI 0759589 | D001 | 200 | AH013 9 |
| 8 | waste alkaline liquid nos<br>Manifest Document Number - MI 0759593 | D002 | 10485 | AH013 9 |
| 9 | hazardous waste liquid nos<br>Manifest Document Number - MI 0759593 | D006 | 900 | AH013 9 |
| 10 | waste corrosive liquid nos<br>Manifest Document Number - MI 0759593 | D007<br>D006<br>D002 | 900 | AH013 9 |

Comments:

:R-SWM-55A:REV:7/83
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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

# 55 A

## GENERATOR QUARTERLY HAZARDOUS WASTE REPORT

Generator's EPA I.D. No. PAD085690592

II. TSD Facility's EPA I.D. No. MIR000724831

TSD Facility's Name MICHIGAN DISPOSAL

Address 49350 N. SERVICE DRIVE, BELLEVILLE, MI 48111

### III. WASTE SHIPPED OFF—SITE

| LINE NO. | A. US DOT Proper Shipping Name of Waste and Manifest Document Number (Include State Abbreviation) | B. Hazardous Waste Number | C. Weight of Shipment KILOGRAM ER UNIT IS P. | D. PA. Hazardous Waste Transporter License No. |
|---|---|---|---|---|
| 1 | Dodecyl Benzene Sulfonic Acid<br>Manifest Document Number - MI 0820252 | D002 | 2475 | AH0139 |
| 2 | Chromic Acid Solution<br>Manifest Document Number - MI 0820252 | D002 | 15345 | AH0139 |
| 3 | Calcium Hypochlorite Mixture Dry<br>Manifest Document Number - MI 0820252 | D001 | 4000 | AH013T |
| 4 | Hazardous waste Liquid<br>Manifest Document Number - MI 0820252 | D007<br>D008 | 15345 | AH0139 |
| 5 | Bleaching Powder<br>Manifest Document Number - MI0823161 | D001 | 750 | AH0135 |
| 6 | Sodium Chromate<br>Manifest Document Number - MI0823161 | D007 | 450 | AH0135 |
| 7 | Chromic Acid Solid<br>Manifest Document Number - MI0823161 | D001<br>D002<br>D007 | 1000 | AH0135 |
| 8 | Dodecylbenzene Sulfonic Acid<br>Manifest Document Number - MI0823161 | D002 | 2475 | AH0135 |
| 9 | Oxidizer NOS<br>Manifest Document Number - MI 0823158 | D001 | 600 | AH0135 |
| 10 | Bleaching Powder<br>Manifest Document Number - MI0823158 | D001 | 75 | AH0139 |

Comments:

DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

55B

# TSD FACILITY QUARTERLY HAZARDOUS WASTE REPORT

TSD Facility's EPA I.D. No. PAD085690592

Generator's EPA I.D. No. PAD042263574

Generator's Name B & G Manufacturing Co. Inc, Unionville Pike

Address Hatfield, PA 19440

## WASTE SHIPPED OFF-SITE

| A. US DOT Proper Shipping Name of Waste and Manifest Document Number (include State Abbreviation) | B. Hazardous Waste Number | C. Handling Method and Date | D. Weight of Shipment KEYPUNCHER UNIT IS P | E. PA. Hazardous Waste Transporter License No. |
|---|---|---|---|---|
| waste coolant waste hazardous | D008 | SO2 | 6672 | AH0138 |
| Manifest Document Number - PA3018 19473 | | Date 02-03-86 | | |
| Ditto | D008 | SO2 | 5741 | AH0138 |
| Manifest Document Number - PA3018 19451 | | Date 03-11-86 | | |
| | | | | AH |
| Manifest Document Number - | | Date -- | | |
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| Manifest Document Number - | | Date -- | | |
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Comments:



AR301129

DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

# TSD FACILITY QUARTERLY HAZARDOUS WASTE REPORT

55B

TSD Facility's EPA I.D. No. PAD085690592

Generator's EPA I.D. No. PAD002346088

Generator's Name AJAX STAMPING + MANUFACTURING

Address 3930 GERMANTOWN PIKE, COLLEGEVILLE, PA 19429

## III. WASTE SHIPPED OFF-SITE

| | A. US DOT Proper Shipping Name of Waste and Manifest Document Number (Include State Abbreviation) | B. Hazardous Waste Number | C. Handling Method and Date | D. Weight of Shipment | E. PA. Hazardous Waste Transporter License No. |
|---|---|---|---|---|---|
| 1 | WASTE LIQUID, N.O.S. OIL SLUDGE<br>Manifest Document Number - PAA2706455 | F006 | S02<br>Date 06-14-84 | 55,000 | A H 0139 |
| 2 | DITTO<br>Manifest Document Number - PAA2706981 | F006 | S02<br>Date 06-18-84 | 55,000 | A H 0139 |
| 3 | DITTO<br>Manifest Document Number - PAA2706992 | F006 | S02<br>Date 06-28-84 | 52,751 | A H 0139 |
| 4 | Manifest Document Number - | | Date - - | | A H |
| 5 | Manifest Document Number - | | Date | | A H |
| 6 | Manifest Document Number - | | Date - - | | A H |
| 7 | Manifest Document Number - | | Date - - | | A H |
| 8 | Manifest Document Number - | | Date - - | | A H |
| 9 | Manifest Document Number - | | Date - - | | A H |
| 10 | Manifest Document Number - | | Date | | A H |

F Comments:



AR301130

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DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

# TSD FACILITY QUARTERLY HAZARDOUS WASTE REPORT

**55B**

TSD Facility's EPA I.D. No. PAD085690592

Generator's EPA I.D. No. PAD003053709

Generator's Name Avco Lycoming

Address 652 Oliver St., Williamsport, PA 17701

## WASTE SHIPPED OFF-SITE

| A. US DOT Proper Shipping Name of Waste and Manifest Document Number (Include State Abbreviation) | B. Hazardous Waste Number | C. Handling Method and Date | D. Weight of Shipment | E. PA. Hazardous Waste Transporter License No. |
|---|---|---|---|---|
| Hazardous Waste Liquid, n.o.s. Neutralized Chrome Waste<br>Manifest Document Number - PAA2592461 | F006 | S02<br>Date 04-26-84 | 54.293 | AH 01148 |
| DITTO<br>Manifest Document Number - PAA2592450 | F006 | S02<br>Date 04-26-84 | 54.293 | AH 01148 |
| Manifest Document Number - | | Date - - | | AH |
| Manifest Document Number - | | Date - - | | AH |
| Manifest Document Number - | | Date | | AH |
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Comments:



AR201131

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

**55B**

# TSD FACILITY QUARTERLY HAZARDOUS WASTE REPORT

TSD Facility's EPA I.D. No. PAD085690592

Generator's EPA I.D. No. PAD000053758

Generator's Name Bethlehem Steel Corp.

Address P.O Box 3188, Williamsport, PA 17701

## WASTE SHIPPED OFF-SITE

| A. US DOT Proper Shipping Name of Waste and Manifest Document Number (include State Abbreviation) | B. Hazardous Waste Number | C. Handling Method and Date | D. Weight of Shipment | E. PA. Hazardous Waste Transporter License No. |
|---|---|---|---|---|
| Waste ferrous Chloride Solution RQ (Approx. 12% $FeCl_2$)<br>Manifest Document Number - PAA5655565 | K062 | S02<br>Date 04-19-84 | 42,200 | AH 0139 |
| DITTO<br>Manifest Document Number - PAA5655661 | K062 | S02<br>Date 05-07-84 | 38.823 | AH 0015 |
| DITTO<br>Manifest Document Number - PAA5655484 | K062 | S02<br>Date 05-22-84 | 51,599 | AH 0139 |
| DITTO<br>Manifest Document Number - PAA5655742 | K062 | S02<br>Date 05-23-84 | 53.168 | AH 0139 |
| DITTO<br>Manifest Document Number - PAA5655753 | K062 | S02<br>Date 05 24 84 | 51.442 | AH 0139 |
| DITTO<br>Manifest Document Number - PAA5684140 | K062 | S02<br>Date 05-29-84 | 39.194 | AH 0015 |
| DITTO<br>Manifest Document Number - PAA5684206 | K062 | S02<br>Date 06-18-84 | 35.028 | AH 0015 |
| Manifest Document Number - | | Date - - | | AH |
| Manifest Document Number - | | Date - - | | AH |
| Manifest Document Number - | | Date | | AH |

Comments:

# TSD FACILITY QUARTERLY HAZARDOUS WASTE REPORT

TSD Facility's EPA I.D. No. PAD087690592

Generator's EPA I.D. No. PAD002327708

Generator's Name AT&T TECHNOLOGIES

Address READING WORKS, 2525 N. 12TH STREET, READING PA. 19604

## III. WASTE SHIPPED OFF-SITE

| A. US DOT Proper Shipping Name of Waste and Manifest Document Number (include State Abbreviation) | B. Hazardous Waste Number | C. Handling Method and Date | D. Weight of Shipment | E. PA. Hazardous Waste Transporter License No. |
|---|---|---|---|---|
| DICHLOROBENZENE, ORTHO, LIQUID, RQ. | F002 | S01 | 600 | AH 01139 |
| Manifest Document Number - PAA1595123 | | Date | 04-24-84 | |
| DITTO | F002 | S01 | 75 | AH 01139 |
| Manifest Document Number - PAA1595145 | | Date | 04-28-84 | |
| DITTO | F002 | S01 | 1500 | AH 01139 |
| Manifest Document Number - PAA1595171 | | Date | 05-11-84 | |
| DITTO | F002 | S01 | 1500 | AH 01139 |
| Manifest Document Number - PAA1596162 | | Date | 06-22-84 | |
| Manifest Document Number - | | Date | | AH |
| Manifest Document Number - | | Date | | AH |
| Manifest Document Number - | | Date | | AH |
| Manifest Document Number - | | Date | | AH |
| Manifest Document Number - | | Date | | AH |

Comments:

55A

Generator's EPA I.D. No. PAD085690592

TSD Facility's EPA I.D. No. PAD014353445

TSD Facility's Name CHEMCLENE

Address BOX 26, RD#1, 258 N. PHOENIXVILLE PK., MALVERN, PA 19440

III WASTE SHIPPED OFF—SITE

| A. US DOT Proper Shipping Name of Waste and Manifest Document Number (Include State Abbreviation) | B. Hazardous Waste Number | C. Weight of Shipment | D. PA. Hazardous W Transporter License No. |
|---|---|---|---|
| WASTE PETROLEUM NAPTHA. | D001 | | AH0139 |
| Manifest Document Number - PAB0076882 1 | | 1760 | |
| WASTE TOLVENE | D001 | | AH0139 |
| Manifes. Document Number - PAB0076882 1 | | 440 | |
| WASTE TRICHLOROETHYLENE | F002 | | AH0139 |
| Manifest Document Number - PAB0076882 1 | | 4950 | |
| WASTE XYLENE (XYLOL) | D001 | | AH0139 |
| Manifest Document Number - PAB0076882 1 | | 2304 | |
| WASTE PETROLEUM NAPTHA | D001 | | AH013 |
| Manifest Document Number - PAB0076882 1 | | 1760 | |
| WASTE TOLVENE | D001 | | AH013 |
| Manifest Document Number - PAB0076882 1 | | 440 | |
| WASTE TRICHLOROETHYLENE | F002 | | AH013 |
| Manifest Document Number - PAB0076882 1 | | 5445 | |
| WASTE XLYENE (XYLOL) | D001 | | AH013 |
| Manifest Document Number - PAB0076882 1 | | 2304 | |
| WASTE PETROLEUM NAPTHA | D001 | | AH013 |
| Manifest Document Number - PAB0076882 1 | | 1760 | |
| WASTE TOLVENE | D001 | | AH013 |
| Manifest Document Number - PAB0076882 1 | | 440 | |

Comments:

GENERATOR CONTAINER

55A

I Generator's EPA I.D. No. PAD085690592

II TSD Facility's EPA I.D. No. PAD064375470

TSD Facility's Name DELAWARE CONTAINER

Address WEST 11TH AVE & VALLEY ROAD, COATESVILLE, PA. 19370

III WASTE SHIPPED OFF—SITE

| A. US DOT Proper Shipping Name of Waste and Manifest Document Number (Include State Abbreviation) | B. Hazardous Waste Number | C. Weight of Shipment | D. PA. Hazardous Waste Transporter License No. |
|---|---|---|---|
| WASTE VARNISH, N.O.S.<br>Manifest Document Number - PAB00770803 | D001 | 3465 | AH 01139 |
| WASTE PAINT<br>Manifest Document Number - PAB00770991 | D001 | 3465 | AH 0139 |
| WASTE FLAMMABLE LIQUID.<br>Manifest Document Number - PAB00770991 | D001 | 14,080 | AH 0139 |
| WASTE PETROLEUM NAPTHA MIXTURE (USES PAINT THINNER + MINERAL OIL)<br>Manifest Document Number - PAB00771175 | D001 | 5720 | AH 013 |
| WASTE PAINT RELATED MATERIAL<br>Manifest Document Number - PAB00771175 | D001 | 14,520 | AH 013 |
| Manifest Document Number - | | | AH |
| WASTE PETROLEUM NAPTHA MIXTURE<br>Manifest Document Number - PAB00771175 | D001 | 5720 | AH 013 |
| WASTE PAINT RELATED MATERIAL<br>Manifest Document Number - PAB00771175 | D001 | 14520 | AH 013 |
| WASTE FLAMMABLE LIQUID, NOS<br>Manifest Document Number - PAB00769742 | D001 | 17 616 | AH 013 |
| WASTE FLAMMABLE LIQUID, NOS<br>Manifest Document Number - PAB00769720 | D001 | 880 | AH 013 |

Comments:

Page ___ of ___

AR301135

Generator's EPA I.D. No.

TSD Facility's EPA I.D. No. PAD064375470

TSD Facility's Name DELAWARE CONTAINER

Address W. 11TH AVE & VALLEY RD., COATESVILLE, PA. 19320

55A

WASTE SHIPPED OFF-SITE

| A. U.S DOT Proper Shipping Name of Waste and Manifest Document Number (Include State Abbreviation) | B. Hazardous Waste Number | C. Weight of Shipment | D. PA. Hazardous Waste Transporter License No. |
|---|---|---|---|
| WASTE PAINT<br>Manifest Document Number - PAB00769720 | D001 | [illegible] | AH0139 |
| WASTE PETROLEUM NAPTHA MIXTURE<br>Manifest Document Number - PAB00769720 | D001 | [illegible] | AH0139 |
| WASTE TRICHLOROETHANE<br>Manifest Document Number - PAB00769731 | F002 | [illegible] | AH0139 |
| WASTE ORMA, NOS<br>Manifest Document Number - PAB00779122 | F001 | [illegible] | AH0139 |
| WASTE PAINT.<br>Manifest Document Number - PAB00681144 | D001 | [illegible] | AH0139 |
| WASTE CEMENT LIQUID, NOS<br>Manifest Document Number - PAB00681144 | D001 | [illegible] | AH0139 |
| WASTE COMBUSTIBLE LIQUID, NOS.<br>Manifest Document Number - PAB00768810 | D001 | [illegible] | AH0139 |
| WASTE FLAMMABLE LIQUID, NOS<br>Manifest Document Number - PAB00768806 | D001 | [illegible] | AH0139 |
| WASTE FLAMMABLE LIQUID, NOS<br>Manifest Document Number - PAB00768806 | F003<br>F005 | [illegible] | AH0139 |
| WASTE PAINT RELATED MATERIAL<br>Manifest Document Number - PAB00768806 | D001 | [illegible] | AH0139 |

Comments WASTE FLAMMABLE LIQUID, N.O.S. D001 20drm - 1100 gal - AH00139

Page ___ of ___

SSA:REV:7/83
Type or Print in Ink

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

# 55 A

## GENERATOR QUARTERLY HAZARDOUS WASTE REPORT

I. Generator's EPA I.D. No. PAD085690592

II. TSD Facility's EPA I.D. No. MID000724831

TSD Facility's Name MICHIGAN DISPOSAL

Address 49350 N. SERVICE DRIVE, BELLEVILLE, MI 48111

III. WASTE SHIPPED OFF—SITE

| A. US DOT Proper Shipping Name of Waste and Manifest Document Number (Include State Abbreviation) | B. Hazardous Waste Number | C. Weight of Shipment | D. PA. Hazardous Waste Transporter License No. |
|---|---|---|---|
| Ceramic Acid Solution<br>Manifest Document Number - MI 0821815 | D002<br>D007 | 10395 | AH0139 |
| Hydrochloric Acid NOS<br>Manifest Document Number - MI 0811682 | D002 | 495 | AH0139 |
| Dodecy/Benzene Sulfonic Acid<br>Manifest Document Number - MI 0634139 | D002 | 990 | AH0139 |
| Hazardous waste Liquid<br>Manifest Document Number - MI 0634139 | D010 | 990 | AH0139 |
| Alkaline Corrosive Liquid<br>Manifest Document Number - MI 0634144 | D002 | 2363 | AH0139 |
| Corrosive Liquid<br>Manifest Document Number - MI 0634144 | D002 | 9183 | AH0139 |
| Manifest Document Number - | | | AH |
| Manifest Document Number - | | | AH |
| Manifest Document Number - | | | AH |
| Manifest Document Number - | | | AH |

Comments:

AR301137

Page ___ of ___

55B

# TSD FACILITY QUARTERLY HAZARDOUS WASTE REPORT

TSD Facility's EPA I.D. No. PAD085690592

Generator's EPA I.D. No. PAD042263574

Generator's Name B & G MANUFACTURING Co. INC.

Address P.O. BOX 269, UNIONVILLE PIKE, HATFIELD, PA. 19440

## WASTE SHIPPED OFF—SITE

| US DOT Proper Shipping Name of Waste and Manifest Document Number (Include State Abbreviation) | B. Hazardous Waste Number | C. Handling Method and Date | D. Weight of Shipment KEYPUNCHER UNIT IS P | E. PA. Hazardous Waste Transporter License No |
|---|---|---|---|---|
| ...ARDOUS WASTE LIQUID, N.O.S. ...STE COOLANT | 1008 | S02 | 3,828 | AH 2139 |
| Manifest Document Number - PAB00840184 | | Date C | 1-11-85 | |
| | | | | AH |
| Manifest Document Number - | | Date | - - | |
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| Manifest Document Number - | | Date | - - | |
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| Manifest Document Number - | | Date | | |

Comments:

Page ___ of

AR301138

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BUREAU OF SOLID WASTE MANAGEMENT

55B

# TSD FACILITY QUARTERLY HAZARDOUS WASTE REPORT

TSD Facility's EPA I.D. No. PAD085690592

Generator's EPA I.D. No. NJD011635745

Generator's Name ESSEX CHEMICAL

Address 100 THOMAS LANE, PAULSBORO, NJ. 08066

## WASTE SHIPPED OFF—SITE

| U.S DOT Proper Shipping Name of Waste and Manifest Document Number (Include State Abbreviation) | B. Hazardous Waste Number | C. Handling Method and Date | D. Weight of Shipment KEYPUNCHER UNIT IS P | E. PA. Hazardous Waste Transporter License No |
|---|---|---|---|---|
| HAZARDOUS WASTE SOLIDS, NOS. OIL EMULSION FROM THE PETROLEUM MINING INDUSTRY | K049 | S01 | 3200 | AH0214 |
| Manifest Document Number - PAB00770066 | | Date 03-19-85 | | |
| | | | | AH |
| Manifest Document Number - | | Date - - | | |
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| Manifest Document Number - | | Date - - | | |
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| | | | | AH |
| Manifest Document Number - | | Date | | |

Comments:



AR301139

# TSD FACILITY QUARTERLY HAZARDOUS WASTE REPORT

Facility's EPA I.D. No. PAW85690592

ator's EPA I.D. No. PAD061075529

r's Name GAS SPRING COMPANY

ess 92 COUNTY LINE ROAD, COLMAR, PA. 18915

## WASTE SHIPPED OFF-SITE

| S DOT Proper Shipping Name of Waste and Manifest Document Number (Include State Abbreviation) | B. Hazardous Waste Number | C. Handling Method and Date | D. Weight of Shipment | E. PA. Hazardous Waste Transporter License No |
|---|---|---|---|---|
| TE CYANIDE MIXTURE, DRY FROM HEAT TREATING PROCESS | F010 | S01 | 5700 | AH0139 |
| ifest Document Number - PAB00827470 | | Date 02-18-85 | | |
| | | | | AH |
| ifest Document Number - | | Date - - | | |
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| ifest Document Number - | | Date | | |

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Page

AR301140

REFERENCE 15
Letter dated July 9, 1986

AR301141

SPS TECHNOLOGIES

July 9, 1986

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Ms. Lorie Acker
U.S. Environmental Protection Agency, Region III
Site Investigation and Support Section (3HW23)
841 Chestnut Building, 6th Floor
Philadelphia, PA 19107

Re: North Penn Water Authority Municipal Well Contamination

Dear Ms. Acker:

This letter is in response to your June 23, 1986 letter to Mr. William McDonald, SPS Technologies Inc., Hatfield, PA 19440, regarding municipal well water contamination in the North Penn area.

Please be advised that the SPS Technologies manufacturing plant in Hatfield does not purchase trichloroethylene or perchloroethylene and does not use these solvents or any other vapor degreasing agents in the manufacturing process. In addition, the waste materials generated at the Hatfield plant are not classified as hazardous.

Several of the chemicals used by the maintenance department do contain some chlorinated organic constituents. These products are listed, along with the quantities purchased in 1985, in the enclosed Attachment A. It should be noted that these products are essentially consumed in their entirety when used, and no hazardous waste is generated.

I am also enclosing a copy of a soil contamination survey of the Hatfield plant site conducted by the North Penn Water Resources Association (Attachment B). As you can see from the survey results, only one small area on the west side of the facility showed a response above background level. That particular location has been identified as the area where members of a model airplane flying club refuel their planes. In the opinion of the surveyor, this area did not present any threat to the local groundwater.

VERSAR DOCUMENT

CONTROL NO. V5031-005

Corporate Offices
Newtown
Pennsylvania 18940

(215) 860-3000

AR301142

ATTACHMENT A

## PROPRIETARY PRODUCTS CONTAINING CHLORINATED ORGANIC COMPOUNDS USED IN SPS HATFIELD MANUFACTURING PLANT

Mobiltac "E" - Mobil Oil Company. Contains 15% trichloroethylene. Used as machine lubricant. None purchased in 1985.

LUBRIPLATE - Fiske Brothers Refining Company. Aerosol lubricant containing 47% 1,1,1-trichloroethane as solvent and 20% propane as propellant. Used as machine lubricant. Twenty four 16 ounce cans purchased in 1985.

ZEP 45 - Zep Manufacturing Company. Lubricant containing 20-25% methylene chloride, 20-25% 1,1,1-trichloroethane, 5-10% 1,1,2-trichloro-1,2,2-trifluoroethane and 5-10% amyl acetate. Used as a machine lubricant. Forty eight 21 ounce cans purchased in 1985.

XL-98 - Bullen Chemical Co. Parts cleaning fluid containing 40% or more mineral spirits and 40% or more 1,1,1-trichloroethane (methyl chloroform). Used in parts wash tank in maintenance area to clean parts. Reportedly, it is never discarded. As the level in the wash tank drops, fresh fluid is added. Two 55 gallon drums purchased in 1985.

TENANT 510 REMOVER - Tenant Company. Contains 70-80% methylene chloride, 1-5% toluene, 10-15% isopropyl alcohol, 1-5% methanol and 5-10% hydroxyacetic acid. A small quantity of this material was purchased and used in 1986 to remove aisle marking lines.

We believe that this information should be sufficient to demonstrate that SPS's Hatfield plant is not a source of groundwater contamination.

Please do not hesitate to contact me if you have further questions regarding this matter.

Sincerely,

John W. Benz, Jr.
Manager, Environmental Affairs

JWB/js
7414C

cc: W. McDonald

AR301144

REFERENCE 16
Letter dated July 6, 1971

AR301145

1875 New Hope Street
Norristown, PA 19401
(215) 277-3210

Certified Mail

July 6, 1971

Subject: Industrial waste
Hunter Spring - Division of Amtek Inc.
Hatfield Township
Montgomery County

Michael A. Pignataro, Plant Engineer
Hunter Spring - Division of Amtek Inc.
Spring Avenue
Hatfield, Pa.

Dear Mr. Pignataro:

An inspection conducted on June 4, 1971, by Joseph A. Feola and Richard A. Pfaehler, environmental protection specialists, revealed that your industrial waste treatment facility is not being operated in accordance with Board requirements. The rinse water is being contaminated with cyanide and discharged to a tributary to Unami Creek.

This is to notify you that you are in violation of your Industrial Waste permit Number 7621d Standard Condition Number 13, and Special Conditions A, B, and D. For further details, please refer to your permit.

Corrective measures must be taken promptly and we expect a clear-cut statement from you by July 20, 1971, describing the action being taken to accomplish compliance. The statement must include the date by which compliance will be accomplished and the manner in which you intend to accomplish it in order to prevent a recurrence of the violation.

Compliance with this directive will not preclude present or future legal action.

Very truly yours,

E. W. Bayer
Chief, Enforcement and Administrative Section

EWB/ar

AR301146

REFERENCE 17
Letter dated July 16, 1971

AMETEK Hunter Spring
1 SPRING AVENUE HATFIELD, PENNSYLVANIA 19440 • HATFIELD 215-822 2871 PHILADELPHIA CH 8-4600 TWX 510-661 4000

July 16, 1971

JUL 19 1971

Mr. E. W. Sayer
Chief, Enforcement and Administrative Section
Department of Environmental Resources
Commonwealth of Pennsylvania
1875 New Hope Street
Norristown, Pennsylvania 19401

Dear Mr. Sayer:

Your letter of 6 July 1971 advised that the AMETEK/Hunter Spring Division industrial waste treatment facility is not being operated in accordance with Board requirements, rinse water is being contaminated with cyanide and discharged, and that we are violating our industrial waste permit. Further, a clear-cut statement describing the action being taken to accomplish compliance was requested by 20 July 1971.

This is to notify you that a thorough investigation of our industrial waste treatment facility has been conducted and the following facts determined:

1. The facility is intact and all equipment is functioning as intended.

2. In view of (1) above, the only source of rinse water contamination could be carry over from the integrated treatment tanks into the fresh water rinse tanks.

Accordingly the following corrective action in operating the facility has been taken:

1. The operation has been changed to promote a more effective ion exchange in the treatment tank by increasing the chlorine content and the flow rate of the neutralizing solution.

2. The method of immersing the drum into the treatment tank has been changed from a dip and soak to a dip, raise, drain, redip, raise and drain sequence which should also greatly improve the ion exchange in the treatment tank.

3. Prior to transferring the barrel to the fresh water rinse, the barrel will be tested for the presence of chlorine.

4. New test equipment has been purchased which will permit the detection of minute quantities of cyanide. Also, to further increase the sensitivity of these tests, they will be performed at the rinse tanks as well as at the fresh water plant discharge.



AR301148

The changes in operating the facility have been instituted. The new test equipment should be delivered early in August and will be placed into operation immediately.

I trust the corrective action taken will preclude further contamination due to cyanide carry over.

Very truly yours,

AMETEK/Hunter Spring

C. R. Brandt
Manager of Manufacturing

CRB/k

AMETEK Hunter Spring
ONE SPRING AVE. HATFIELD PENNSYLVANIA 19440 TELEPHONE (215) 822-2[illegible] PHILA. 248-4000 TWX 510-661-4000

October 17, 1973

RECEIVED
OCT 1973

Mr. C. T. Beechwood
Regional Sanitary Engineer
1875 New Hope Street
Norristown, Pennsylvania 19401

Re: Industrial Waste
Hatfield Township, Montgomery Co.

Dear Mr. Beechwood:

In reply to your letter dated September 28th, reference Industrial Waste - Hatfield Township, it states that the Consent Order must be signed, notarized and returned to your office by November 1, 1973.

AMETEK/Hunter Spring Division on September 4, 1973 started operating its new pumping station, which pumps all industrial waste, including rinse waters into Hatfield Township Municipal Sewer Authority. We also have removed all liquid waste from the lagoons, are presently removing all sludge, and in the near future will eliminate the lagoons by filling with dirt and bring the land back to its natural terrain.

AMETEK/Hunter Spring Division requests that our Industrial Waste Permit #76218 be canceled, since the facilities are no longer in operation. In view of the action taken by us, we feel the requirements of the Consent Order does not affect us since we no longer discharge any waste into the stream.

Very truly yours,

AMETEK/Hunter Spring

R. C. Allen
Plant Engineer

RCA/k
CC: Mr. John F. Daly, Bureau of Water Quality Management
Mr. Roy B. Love, Hatfield Township Municipal Authority
Mr. William H. Spencer
Mr. Stanley L. Albright

AR301150

AMETEK Hunter Spring

INTRA-OFFICE CORRESPONDENCE..... September 1, 1970

TO: W. H. Spencer

Subject: DISPOSAL LAGOON INVENTORY QUESTIONAIRE

1. AMETEK/Hunter Spring

2. Same

3. See Robert E. Lamb Dwg. # P-1
   Location of Plant - 75° 18' Latitute
   40° 17' Longitude

4. See Robert E. Lamb Dwg. # P-1

5. See Lancy Labs Dwg. # HSD-102

6. Red rock beginning at approximately 12' below grade at sludge beds.

7. Unknown

8. Visually looking at bottom and sides, opinion is that said bottom and sides are virtually impervious to drainage and filtration.

9. See Lancy Labs Dwg. # HSD-102

10. Never, to date.

11. See Lancy Labs Dwg. # HSD-102

12. Varying ½ to full.

13. 2,700 gallons pumped once weekly.

14. Waste acids and alkalis, neutralized cyanides, neutralized chromates, inert metallic oxides, metallic hydroxides and tumbling sludges, maintained at PH 6.5 to 9.0

15. All wastes originate in the Plating Dept of the plant, resulting from metal finishing processes.

16. a. Lancy System - integrated cyanide treatment.

    b. Larcy System - integrated chromium treatment.

    c. Cyanide containing waste batches - neutralize cyanide with Chlorine, adjust PH, and pump to sludge beds.

INTRA-OFFICE CORRESPONDENCE..... September 14, 1970.

TO: W. H. Spencer

Subject: DISPOSAL LAGOON INVENTORY QUESTIONAIRE

17. Once a year, liquid is pumped and sprayed onto owner's property: once every 3 or 4 years sludge is removed by mechanical means and used as fill on owner's property.

18. Anticipate connecting into regionalized sewage treatment plant for all wastes. This will probably be Hatfield Twp.

S. J. Feldi

S. J. Feldi

AR301152

REFERENCE 18
Letter dated March 15, 1972

AR301153

1875 New Hope Street
Norristown, Pa.

CERTIFIED MAIL
Subject: Violation Notice
Amotek/ Hunter Spring
Hatfield Township
Montgomery County

March 15, 1972

Mr. Henry Schalder, Manager of Manufacturing
Amotek/ Hunter Spring
1 Spring Avenue
Hatfield, Pa. 19440

Dear Mr. Schalder:

An inspection conducted on February 23, 1972 by Messrs. [illegible], John Smith, and Bryon Johnson, Environmental Protection Specialists revealed that your Industrial waste treatment plant is not being operated in accordance with Departmental requirements.

Samples analysed by our laboratory showed a cyanide concentration of 0.22ppm parts per million in the rinse water of discharge.

This is to notify you that you are in violation of your Industrail Waste permit #7h218 special condition D. For further details, please refer to your permit.

Corrective measures must be taken and we will expect a reply in seven days of receipt of this letter describing the action that was taken to accomplish compliance.

Very truly yours,

JFD/be

John F. Daly, Jr.
Chief, Compliance and Administration

cc. Division of Industrial Waste

AR301154

REFERENCE 19
Letter dated March 24, 1972

MAR AMETEK Hunter Spring
1 SPRING AVENUE, HATFIELD, PENNSYLVANIA 19440 HATFIELD [illegible] PHILADELPHIA [illegible] TWX [illegible]

March 24, 1972

CERTIFIED MAIL #558431

Mr. John F. Daly, Jr.
Chief, Compliance and Administration
Department of Environmental Resources
1875 New Hope Street
Norristown, Pennsylvania 19401

Dear Mr. Daly:

Your letter of March 15, 1972 advised that AMETEK/Hunter Spring was in violation of their Industrial Waste Permit #76218 - special condition "D". It further stated your laboratory showed a cyanide concentration of 0.22 ppm in the rinse water of our discharge.

This is to notify you that a thorough investigation of our industrial waste treatment facility has been conducted and the following facts determined:

1. The facility and all equipment are functioning as intended.
2. No trace of cyanide in our rinse water above 0.05 ppm can be detected using our test procedure WCN-512 (see attached procedure).
3. A sample of our rinse water was sent to Quality Control Laboratory for analysis and no cyanide above 0.01 mg/l was detected (see attached report).

In view of the results of our test, which are taken each hour, and the results of the Quality Control Laboratory tests, we are at a loss to understand your findings of 0.22 ppm.

To safeguard against any cyanide getting into the stream, we will use all present precautions plus using new reagents every month in our test procedure WCN-512. We will send a sample of our rinse water to Quality Control Laboratory for analysis each month as a double check. I trust the corrective action taken will preclude further contamination of the stream.

Very truly yours,

AMETEK/Hunter Spring

R. C. Allen
Plant Engineer

RCA/k
cc: Mr. Henry Schladen
Mgr. Manufacturing

SPRINGS • STAMPINGS AND ASSEMBLIES • [illegible] • WIRE FORMS

[illegible]

AR301156

TEST: CYANIDE SPOT TEST

TEST PROCEDURE WCN-ST 2

Specifications:

Type..... Qualitative
Limit of Identification..... 0.05 ppm CN
Color..... Pink to Red

Reagents:

1. Barbituric Acid Solution. Place 3 grams of Barbituric Acid in a 50 ml volumetric flask and wet with water. Add 15 ml Pyridine and mix. Add 3 ml conc. Hydrochloric Acid and mix, cool and dilute to the mark with water. Shake until the Barbituric Acid is dissolved. The solution is stable for several months.

2. Chloramine-T Solution. Dissolve 1 gram Chloramine-T in water and dilute to 100 ml. The solution should be prepared fresh weekly.

NOTE: Distilled or deionized water should be used for reagent preparation.

Procedure:

1. Place 3 drops of sample and 3 drops of distilled or deionized water (for a blank) on a white spot plate.

2. To each cavity, add one drop Chloramine-T and mix with a clean stirring rod.

3. Add one drop Barbituric Acid Solution [illegible] and again mix with a stirring rod.

4. After one minute, the sample spot will turn [illegible] pink to red if 0.05 ppm CN or more are present. The blank spot will be faint yellow due to the color of the reagents.

NOTE: If the solution to be checked is alkaline, pH greater than 10, neutralize a portion of the solution using Procedure WCN-STM attached.

March 1968
September, [illegible]

REFERENCE 20
Letter dated October 23, 1985

Oct. 23, 1985

Ron Askin
Ametek - Hunter Spring Division
One Spring Avenue
Hatfield, PA 19440

Dear Ron:

I have completed the drawing of the results of the HNU "sniffing" of your site. I have enclosed a copy of the drawings. Please note that there are two blow-ups of areas that were sampled extensively. These blow-ups are on the second page. The third page is a copy of the raw data.

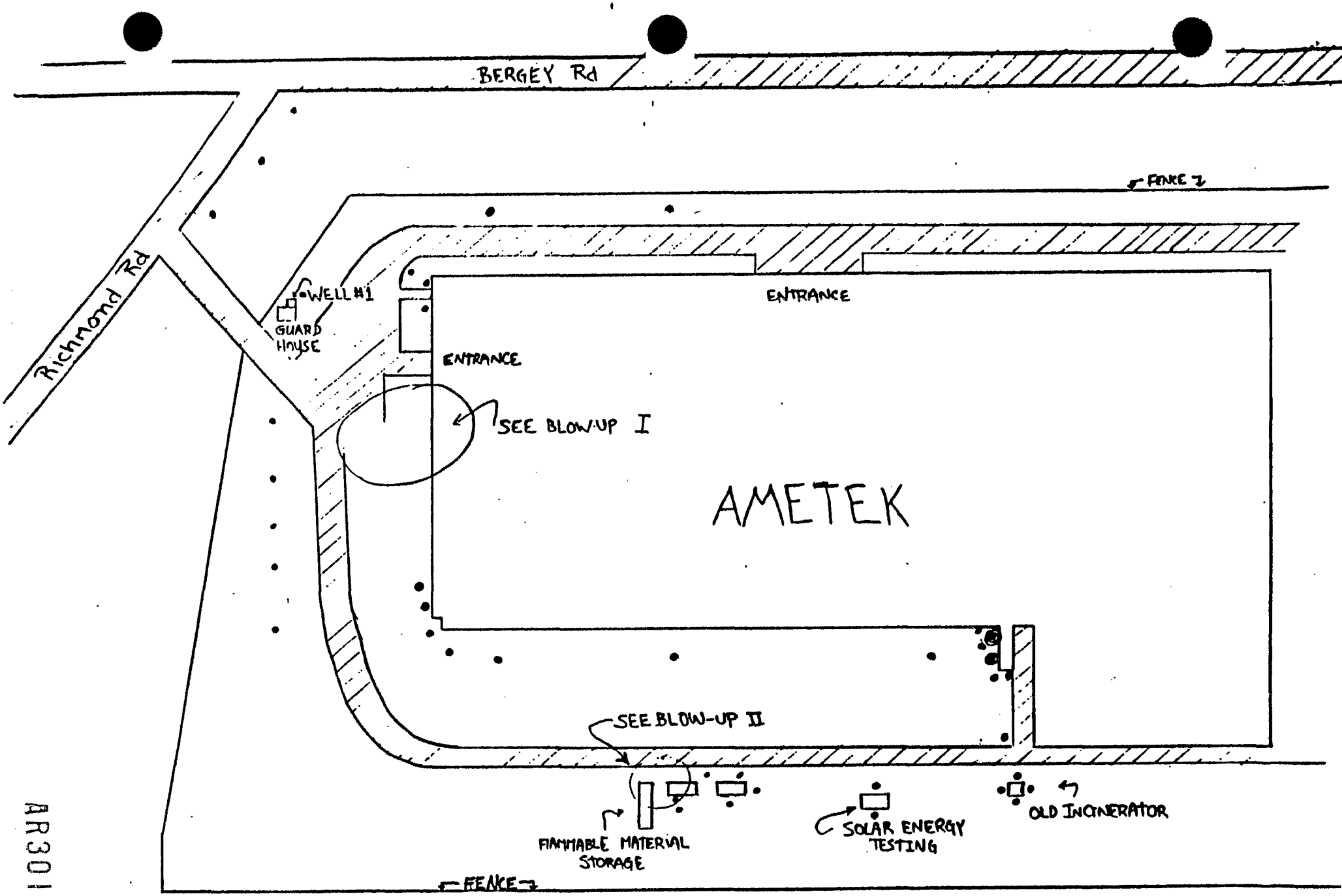
As I had mentioned to you the day I was at you facility, I think that there are two areas of concern. The first area is shown in blow-up number II. This area is where empty drums are being stored (temporarily). The readings shown in blow-up were very high and confined to a small area. I suspect that this represents a recent, small spill. If drums are to be kept here for extended periods, I suggest that you build a cement, curbed pad on which to store the drums. This would contain any spilled material for eventual disposal or would allow for evaporative loss.

The second area of concern is near your TCE storage container (shown in blow-up I). The soil near this area gives extremely high readings on the HNU. As we discussed, I feel that this contamination is due to losses during filling of your TCE storage container. I recommend that you remove this soil, and any other soil in the area that registers as contaminated and renovate it by appropriate means. The method of renovation is your choice. An inexpensive way is simple aeration of the removed soil. It would be wise to eliminate any grassy area near the TCE storage area by paving it over. In addition, I recommend that you curb the present TCE storage tank pad.

Please let me know if I can be of assistance to you during these activities. Thank you for your cooperation.

Sincerely,

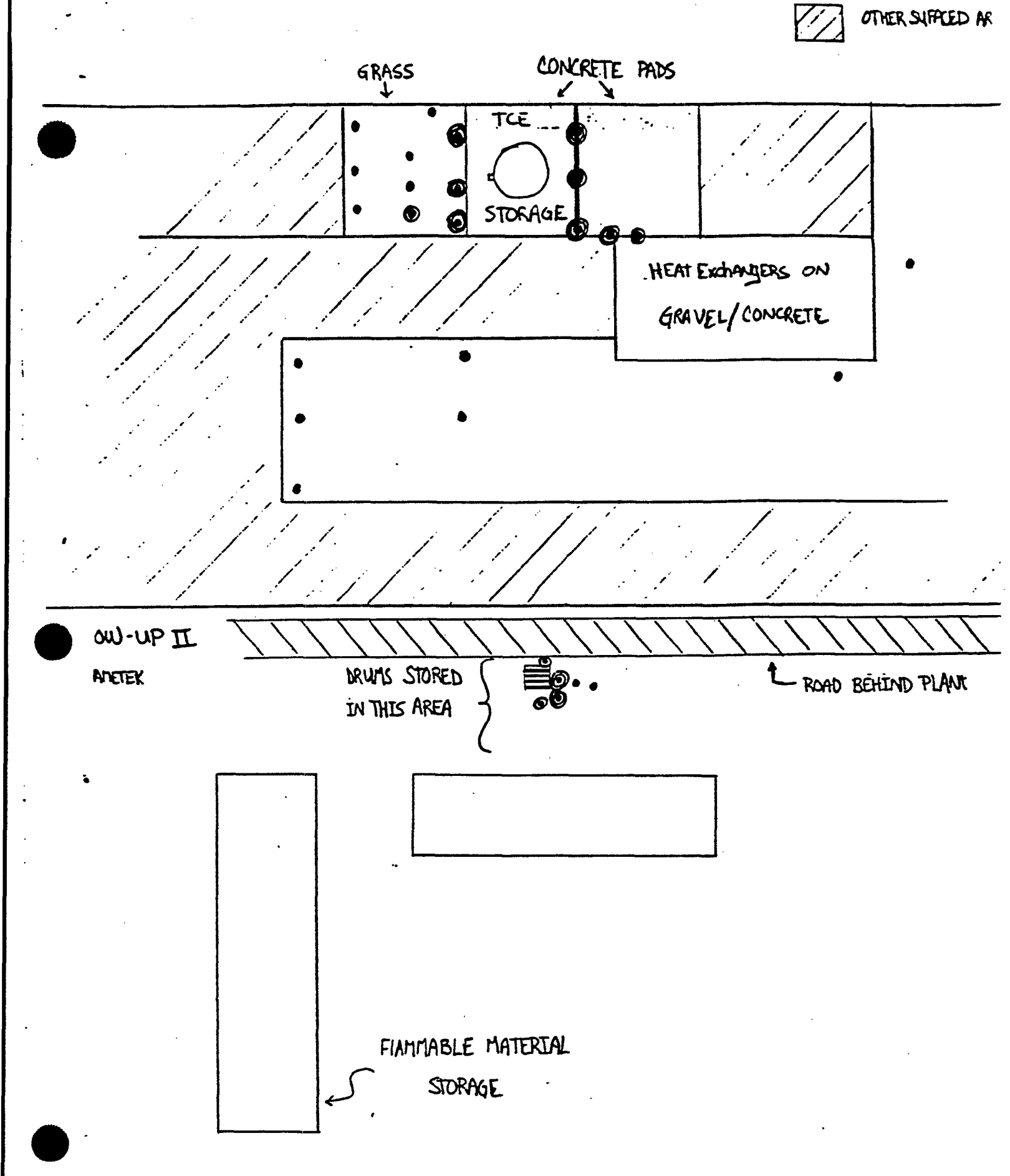
Jerry Coyle
NPWRA Representative




- < 1
- ≥ 1.0 < 5.0
- ≥ 5.0 < 20

As measured on

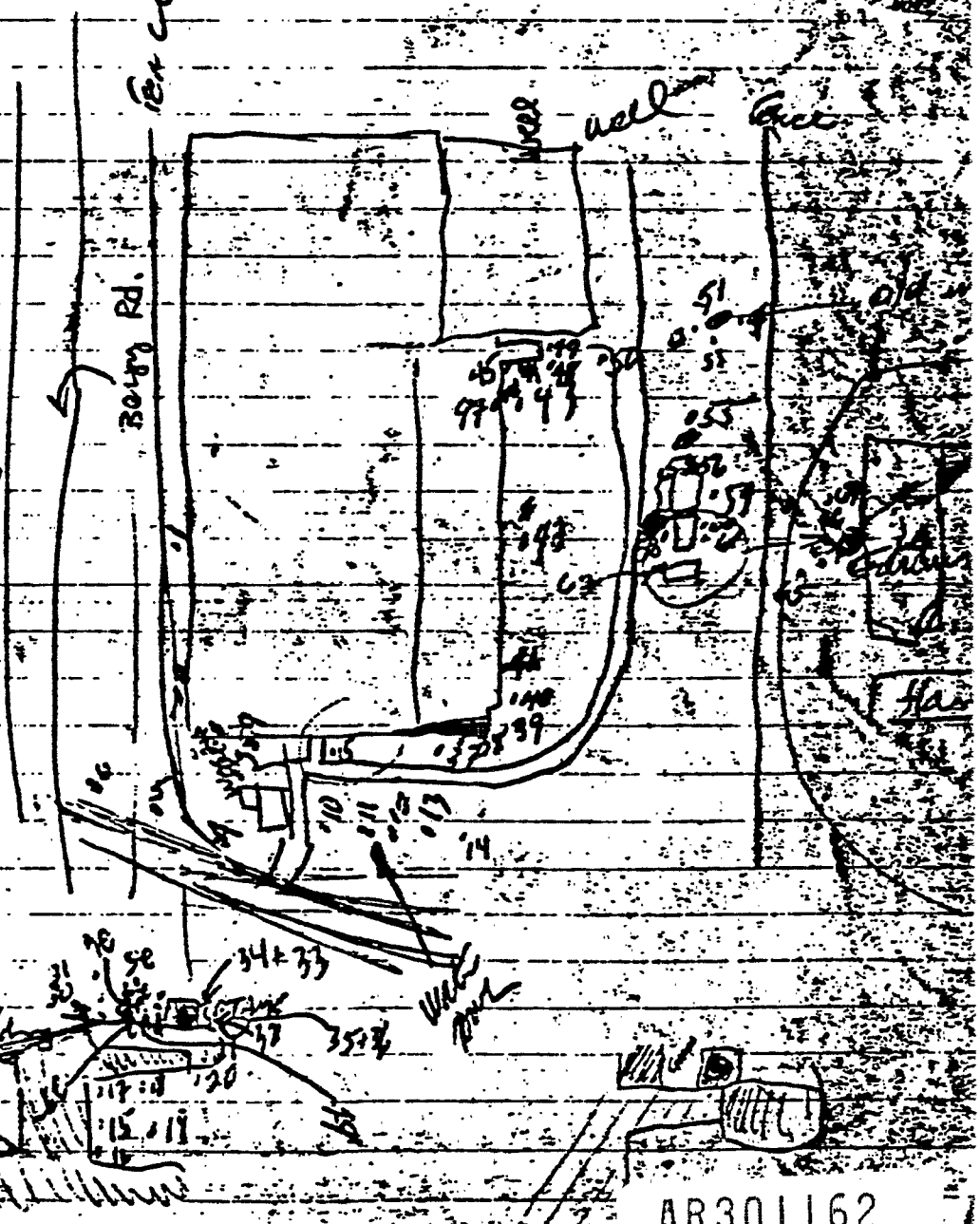
AR301160


OTHER SURFACED AR
GRASS
CONCRETE PADS
TCE
STORAGE
HEAT EXCHANGERS ON
GRAVEL/CONCRETE
OU-UP II
AMETEK
DRUMS STORED
IN THIS AREA
ROAD BEHIND PLANT
FLAMMABLE MATERIAL
STORAGE

AMETEK 10/16/85

| | | | | | |
|---|---|---|---|---|---|
| 1. | 0.0 | 39. | 0.3 | 50 | 0.0 |
| 2. | 0.0 | 40 | 0.6 | 51. | 0.0 |
| 3. | 0.3 | 41 | 0.0 | 52 | 0.4 |
| 4 | 0.0 | 42 | 0.1 | 53 | 0.5 |
| 5 | 0.4 | 43 | 0.0 | 54 | 0.1 |
| 6 | 0.0 | 44 | 5.2 0-200 | 55 | 0.2 |
| 7 | 0.0 | 45 | 0.4 0-2000 | 56 | 0.1 |
| 8 | 0.0 | 46 | 2.4 0-20 | 57 | 0.0 |
| 9 | 0.0 | 47 | 0.1 | 58 | 0.[illegible] |
| 10 | 0.0 | 48 | 5.6 0-00 | 59 | 0.1 |
| 11 | 0.0 | 49 | 1.0 " | 60 | 0.2 |
| 12 | 0.0 | | | | |
| 13 | 0.0 | | | | |
| 14 | 0.0 | | | | |
| 15 | 15.8 1-00 | | | | |
| 16 | 0.4 | | | | |
| 17 | 14.7 | | | | |
| 18 | 5.6 | | | | |
| 19 | 5.7 | | | | |
| 20 | 0.0 | | | | |
| 21 | 0.5 | | | | |
| 22 | Offscale 0-00 2-200 3-4 | | | | |
| 23 | 6.4 0-2000 | | | | |
| 24 | 6.8 0-2000 | | | | |
| 25 | 11.2 0-20 | | | | |
| 26 | 15 0-20 | | | | |
| 27 | 7.8 " | | | | |
| 28 | 12.5 0-200 | | | | |
| 29 | 11.7 0-20 | | | | |
| 30 | 18.0 " | | | | |
| 31 | 10.0 " | | | | |
| 32 | 5.2 0-2000 | | | | |
| 33 | 3.2 0-200 | | | | |
| 34 | 2.0 0-200 | | | | |
| 35 | 0.5 0-200 | | | | |
| 36 | 5.0 0-200 | | | | |
| 37 | 3.0 0-20 | | | | |
| 38 | 5.4 | | | | |

getting some attempted response




AR301162

REFERENCE 21
Water and Waste Quality Reports
for Waste Conversion
December 22, 1981 (five reports)

AR301163

FACILITY SAMPLE

STREAM/UNKNOWN SAMPLE

1 2 METHODS SAMPLE

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT
WATER OR WASTE QUALITY REPORT — SPECIAL ANALYSES

Lab Number 27307

Date Received 12/22/81

| | | | | | |
|---|---|---|---|---|---|
| Basin 4 Conemaugh | Case | Facility | | | Cell Number 101253 |
| Major Monitor | Minor Hatfield | Stream No. T-1 | Cell Name Fesler | Type Sp | STO Analysis 507 |

| Sample ID | No. (Code) Hall Cards 4-10 | Latitude 11-16 | Longitude 17-24 | Date 25-30 | Time 31-34 | Kind 35 |
|---|---|---|---|---|---|---|
| 1 | | | 0 | 12 21 81 | 12 45 | |

| Source 36-38 | Facility 39-41 | Sample Number 42-47 | Stream Name 48-53 | Relative Point 54 |
|---|---|---|---|---|
| | 201 | 010 12563 | | |

Primary Use

Brief Description of Sample Taken — Category 100

Groundwater from groundwater sample

Sample shipped Penn Dot Date 12/21/81

Lab Book No. 82668 + 82669

Analyzed by MH

Lab Test Conditions Typical (24hr)

Additional Lab Analyses

VOA scan

+ high temp

## QUALITATIVE REPORT

GC/MS VOA [redacted] DETECTED [redacted] (EST. 2 PPM); ALSO DETECTED (MH 12-30-81) 2-[redacted]; TETRAHYDROFURAN, XYLENE, AND SEVERAL [redacted] UNIDENTIFIED COMPOUNDS. (MH 12-30-81) THE FOLLOWING COMPOUNDS WERE QUANTITATED - DICHLOROMETHANE (EST 430 PPB); TETRACHLOROMETHANE (20 PPB); BROMODICHLOROMETHANE (21 PPB); CHLOROMETHANE (EST. 80 PPB)

## QUANTITATIVE RESULTS

| Analysis | Units | Analysis Code | Results (Show decimal points on lines) |
|---|---|---|---|
| Tetrachloromethane | mg/L | | EST 160 |
| 1,1,1 Trichloroethane | mg/L | | EST 200 |
| Benzene | mg/L | | EST 940 |
| Trichloroethene | mg/L | | EST 180 |
| Tetrachloroethene | mg/L | | 18 |
| [redacted] 1,2 Dichloroethane | mg/L | | EST. 110 |
| Ethyl Benzene | mg/L | | EST 180 |
| Chlorobenzene | mg/L | | 2 |
| 1,1 Dichloroethane | mg/L | | 6 |
| 1,2 Dichloroethene | mg/L | | 1 |
| Toluene | mg/L | | 3 |

Analyst _____ Date _____
Signature

CENTRAL OFFICE

AR301161

DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT
WATER OR WASTE QUALITY REPORT – SPECIAL ANALYSIS

Date Received 12/22/81

Ref. to Conversion
Ia Hatfield JW Fiala

| TRANSACTION | DR CODE (MO, DAY, YR) | LATITUDE | LONGITUDE | DATE | TIME | KIND |
|---|---|---|---|---|---|---|
| 1 | | | 0 | 12 21 81 | 12 15 | |

| AGENCY | SAMPLE NUMBER | STREAM NAME | RELATIVE HUMIDITY |
|---|---|---|---|
| 7011 | 01012513 | | |

CUSTODY LOG
Now Shipped Date
Lapel Seal No.
Received by
Lapel Seal Condition

## QUALITATIVE REPORT

Echos HP also tentative: phenanthrene; 2,3-Dihydro-1,1,3-Trimethyl-3-phenyl-1H-Indene; Ethyl benzene acetonitrile; 2-methyl-6-methylene-7-octen-2-ol; N,N-Dimethyl benzenamine; methyl phenol; Pentanoic acid; Dimethyl benzonitrile; Ethion; Caffeine; Trimethyl naphthalene's; Dimethyl naphthalenes; methyl naphthalenes; Xylene; Toluene; Styrene; 3,7-Dimethyl-1,7-octadiol; 4-(1-Dimethylethyl)-phenol; 4-(1,1-Dimethylethyl)-cyclohexanol; N-Alkanes; unknown aromatic compounds

## QUANTITATIVE RESULTS

| ANALYTES | UNITS | ANALYSIS CODE | | RESULTS (SHOW DECIMAL POINTS ON LINES) |
|---|---|---|---|---|
| phenol | ug/l | | est | 3600 |
| Di (ethyl hexyl) phthalate | | | est. | 3300 |
| o-dichlorobenzene | | | | 50 |
| 4-chloro-3-methyl phenol | | | | 25 |
| Trichloro phenol | | | est. | 4 |
| Diethyl phthalate | | | | 65 |
| Fluorene | | | | 9 |
| Phenanthrene | | | | 57 |
| Anthracene | | | | 54 |
| Isophorone | | | est | 150 |
| Naphthalene | | | | 60 |

ANALYST Mike Wade SIGNATURE DATE 1/22/82

CENTRAL OFFICE

AR301165

REV 9-73

W | E STREAM RANDOM SAMPLE

1 2 NETWORK SAMPLE

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT
WATER OR WASTE QUALITY REPORT - SPECIAL ANALYSES

Job Number 25009

Date Received 12/22/81

| Stream Current | Case | Facility | Coll Number |
|---|---|---|---|
| Waste Conversions Inc. | | Storm Sewer. | |

| Outfall | Municipality | Program | Coll Name | Type Tr | Std Analysis |
|---|---|---|---|---|---|
| Outfall | Hatfield | IW | Feola + Knorr | 0 | |

| Card 1/2 | ID Code (All Cards) 4-16 (City, Mun, Y, Est, Case, Fac) | Latitude 4-10 | Longitude 11-18 | Date 19-24 (M D Y) | Time 25-28 (Hr Min) | Kind 29 |
|---|---|---|---|---|---|---|
| | | | 0 | 12 21 81 | 12 50 | 6 |

| Code 30-34 | Agency 35-37 | Sample Number 38-43 | Stream Name 44-67 | Relative Point 68 |
|---|---|---|---|---|
| | 701 | 101254 | STORM SEWER | |

Tributary to: Neshaminy Ck. (1 1/2 Gallon + 1 VOA vial)

Full Description Where Sample Taken: Taken in open channel below storm sewer outfall, flow of waste water originated on Waste Conversions, Inc. Yard.

Additional Lab Analyses: VOA scan plus high temperature

Custody Log

Raw Shipped: Purolator Date: 12/21/81

Legal Seal No.: 82670 & 82671 (VOA)

Received by: MH

Legal Seal Condition: Intact (82671)

## QUALITATIVE REPORT

GC/MS VOA DETECTED DICHLOROMETHANE (EST. 2 PPM); ALSO DETECTED 2-PROPANONE; (MH 12-30-81) TETRAHYDROFURAN; XYLENE AND SEVERAL UNIDENTIFIED COMPOUN

## QUANTITATIVE RESULTS

| Analysis | Units | Analysis Code | Results (Show Decimal Points on Lines) |
|---|---|---|---|
| TRICHLOROMETHANE | ug/L | | 2 |
| 1,1,1 TRICHLOROETHANE | ug/L | | 3 |
| BENZENE | ug/L | | 7 |
| TRICHLOROETHENE | ug/L | | 8 |
| TETRACHLOROETHENE | ug/L | | 13 |
| TOLUENE | ug/L | | EST 130 |
| ETHYL BENZENE | ug/L | | 8 |

ANALYST _____ SIGNATURE _____ DATE _____

CENTRAL OFFICE

AR301166

FORM 3541 (REV 6-79) SAMPLE

1 STREAM/RANDOM SAMPLE

2 3 INDUSTRY SAMPLE

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT
WATER OR WASTE QUALITY REPORT — SPECIAL ANALYSES

Lab Number BL-27006

Date Received 12/22/81

| STREAM/INDUSTRY | CODE | FACILITY | COLL NUMBER |
|---|---|---|---|
| Ft. Cronin Prod. Inc. Hamlin | | | |

| MUNICIPALITY | PROGRAM | COLL NAME | TYPE IR | STD ANALYSIS |
|---|---|---|---|---|
| Hatfield | IW | Feola & Knaus | O | |

| CARD 1 | 10 LATITUDE (TRAIL CARD) 4-10 | LATITUDE 4-10 | LONGITUDE 11-18 | DATE 19-24 (M D Y) | TIME 25-28 | AMD 29 |
|---|---|---|---|---|---|---|
| 1 | Deg Min T Sec Cnty Par | | 0 | 12 21 81 | 12 50 | |

| CARD 2 | AGENCY 38-37 | SAMPLE NUMBER 38-43 | STREAM NAME 44-67 | RELATIVE POINT 68 |
|---|---|---|---|---|
| 1 | 7101 | 010 11254 | | |

TRIBUTARY TO Neshaminy Creek

POINT DESCRIPTION WHERE SAMPLE TAKEN

ADDITIONAL LAB ANALYSES

CUSTODY LOG

Name Released Date

Local Seal No.

Received by:

Local Seal Condition

## QUALITATIVE REPORT

Extract NT also detected: Ethion; N-Alkanes; methyl phenols; 2,3-dihydro-1,1,3-Trimethyl-3-phenyl-1H-Indene; 1,2,4-Trichlorobenzene; 2-Methyl-6-methylene-2-octen-2-ol; N,N-Dimethyl benzenamine; Limonene; 4-ethyl morpholine; 2-propoxy-ethanol; 1-Butanol; N,N-Dimethyl formamide; N,N-diethyl ethanamine; N,N-diethyl-ethanamide; Phenobarbital; also possible: Octahydro-3,6,8,8-Tetramethyl-[3R-(3 ALPHA, 3A, Beta, 6, ALPHA, 7, Beta, 8A, ALPHA,)]-(9CI) - 1H-3A, 7-Methanoazulene (N.I.: CAS #1356-59-

## QUANTITATIVE RESULTS

| ANALYSIS | UNITS | ANALYSIS CODE | | RESULTS (SHOW DECIMAL POINTS ON LINES) |
|---|---|---|---|---|
| Phenol | ug/l | | est. | 2200 |
| Di (ethylhexyl) phthalate | ↓ | | est. | 2800 |
| o-Di Chlorobenzene | ↓ | | | 77 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

ANALYST Bill T. Wright
SIGNATURE

2

CENTRAL OFFICE

AR301167

REFERENCE 22
Letter dated January 25, 1982

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
CENTRAL REGIONAL LABORATORY
839 BESTGATE ROAD
ANNAPOLIS, MARYLAND 21401

(301) 224-2740
FTS 922-2740

DATE : January 25, 1982

SUBJECT: GC/MS Analysis of Hatfield Samples
820108-01-05

FROM: : John Austin JA
Chemist

Joseph L. Slayton JLS
Chemist

TO: : Daniel K. Donnelly
Acting Chief, Lab Section

Samples were examined for the presence of organic compounds listed as "Base/Neutral" and "Acid" extractable priority pollutants using gas chromatography/mass spectrometry. Concentrations of these compounds were determined using the relative response of authentic standards to the internal standard.

Samples were also examined for the presence of compounds in addition to those on the priority pollutant list. Tentative identification of these compounds was made on the comparison of sample spectra to the EPA/NIH Mass Spectral Library. Concentrations for these compounds were estimated based on the response of the internal standard.

cc: Patricia J. Krantz
QA Officer

JA/JLS/bwl

Sample Description

Laboratory Number:

| | |
|---|---|
| 820108-01 | Hatfield Borough Well #6 |
| 820108-02 | Waste Conversion Inc., Effluent to Sewer System |
| 820108-03 | Hatfield Township STP Final |
| 820108-04 | Philadelphia Suburban Water Co., Raw Intake Water |
| 820108-05 | Field Blank |

Traces of a highly toxic pesticide Chlormephos CA Reg. No. 24934-91-6 (s-chloromethyl-O, O-diethlphosphorodithicate) were noted in samples 820108-02 and 820108-03. A product description is attached.

820108-01 Hatfield Borough Well #6

Acid Extract:

Priority Pollutants

None detected

Other Compounds

None detected

Base/Neutral Extract:

Priority Pollutants

None detected

| Other Compounds | ppb |
|---|---|
| triethylphosphoric acid ester | 1-10 |
| Three unidentifiable compounds best matching methyl and methyl ethyl substituted benzenesulfonamide | 10-100<br>1-10<br>10-100 |

Acid Extract:

| Priority Pollutants | ppm |
|---|---|
| phenol | 1.24 |
| 2-chloro-3-methylphenol | .13 |

| Other Compounds | ppm |
|---|---|
| 4-hydroxy-4-methyl-2-pentanone | 1-10 |
| 2-methylbutanoic acid | .1-1 |
| pentanoic acid | 1-10 |
| 3-methyl-2-butenoic acid | .1-1 |
| 2-butoxyethanol | .1-1 |
| 4-methylpentanoic acid | .1-1 |
| hexanoic acid | 1-10 |
| 2-hydroxy-3-meth1-2-cyclopenten-1-one | .1-1 |
| benzenemethanol | .1-1 |
| heptanoic or hexanoic acid | .1-1 |
| methylphenol isomer | .1-1 |
| benzeneethanol | 1-10 |
| 2-meth1-6-methylene-7-octen-2-ol | .1-1 |
| cyclohexanecarboxylic acid | .1-1 |
| trimeth1hexanoic acid isomer | .1-1 |
| benzoic acid | .1-1 |
| octanoic acid | 1-10 |
| benzeneacetic acid | 1-10 |
| benzenepropanoic acid | .1-1 |
| methoxypropenylphenol | .1-1 |
| .alpha.ethylbenzene acetic acid | .1-1 |
| hydroxymethoxybenzaldenyde isomer | .1-1 |
| (hydroxymethoxyphenyl) ethanone isomer | .1-1 |
| 2,4-dihydroxy-3,6-dimethylbenzoic acid methyl ester | .1-1 |
| ethyl (methylbutyl)-2,4,6-(1H,3H,5H)-pyrimidinetrione isomer | .1-1 |
| 3,7-dihydro-1,3,7-trimethyl-1H-purine | 10-100 |
| ethyl-phenyl-2,4,6(1H,3H,5H)pyrimidinetrione isomer | .1-1 |
| Six unidentified compounds (best matched substituted phosphorodithioic acid ester) | .1-1 |
| Twenty unidentifiable compounds | .1-10 |
| One compound best matched chloromephos at the same retention time as noted in sample 820108-03 | 0.01-0.1 |

Base/Neutral Extract:

| Priority Pollutants | ppm |
|---|---|
| 1,4-dichlorobenzene | .18 |
| diethylphthalate | .13 |
| N-phenylbenzenamine decomposition product of N-nitrosodiphenylamine | .03 |

| Other Compounds | ppm |
|---|---|
| 4-hydroxy-4-methyl-2-pentanone | .1-1 |
| cyclohexanone | .1-1 |
| 2-butoxyethanol | .1-1 |
| benzaldehyde | .1-1 |
| 6-methyl-5-hepten-2-one | .1-1 |
| 7-methyl-3-methylene-1,6-octadiene | 1-10 |
| benzenemethanol | 1-10 |
| 3,7-dimethyl-1,7-octanediol | 1-10 |
| N,N-dimethylbenzenamine | 1-10 |
| 3,7-dimethyl-3-octanol | 1-10 |
| benzene ethanol | 10-100 |
| 2-methyl-6-methylene-7-octen-2-ol | 10-100 |
| 1,7,7-trimethyl-bicyclo[2.2.1]heptan-2-one | .1-1 |
| trimethyl-3-cyclohexene-1-methanol isomer | 1-10 |
| dimethylethylcyclohexanol isomer | 1-10 |
| methoxypropenylphenol | .1-1 |
| tributylphosphoric acid ester | .1-1 |
| Thirty five other sample components were not identifiable | .1-10 |

Quality Control

1. Each day before acquisition of any samples the mass spectrometer is calibrated using FC43.

2. The calibration is verified by obtaining the spectra of a known compound (DFTPP). All mass assignments and relative abundances are found to be in acceptable ranges or the instrument is adjusted until suitable spectra of the known are obtained.

3. Immediately before analysis each sample is spiked with an internal standard D10-anthracene. All quantitation or estimates of concentration are made in comparison to the internal standard.

4. Mixed standards of extractable priority pollutants are analyzed before each group of samples. The relative response of each compound versus the internal standard is determined for use in quantitation.

5. For each group of samples extracted a method blank is prepared and examined for laboratory introduced contamination.

6. Organic free water accompanies the samplers from the laboratory to the field and is returned and stored with the samples. Such field blanks are examined for contamination.

7. Before taking samples with submersible pumps, organic free water is first pumped through the lines. These pump blanks are examined for contamination.

8. Method, field, and pump blanks may be examined by GC-FID prior to GC/MS analysis. In the absence of any contamination GC/MS analysis is not performed.

12/9, 12/16 and 12/21 1981

D.E.R. Info

| | Hatfield INF | Hatfield EFF | Phila Sub inf | Phila Sub eff | Waste Conv. Comp | Waste Conv. Comp | Well 6 | Waste Conv well | Stress |
|---|---|---|---|---|---|---|---|---|---|
| dichloromethane | 18 | est 1 | | | >300 est >300 | | est 420 | est 2 |
| 1,1,1-Trichloroethane 18,000 H | 16 | | | | 4 - | | est 200 | 3 |
| Trichloroethene 2.7 CRL • | 12 | trace | | | 4 | | est 180 | 8 |
| tetrachloroethene | 73 | | | | 5 | | 18 | 13 |
| 2-butanone | X | | | | X | | | |
| 2 propanone | X | | | | X | | | X |
| 2 propanol | X | | | | X | | X | |
| tetrahydrofuran | X | X | | | X | X | X | X |
| diethyl ether | X | | | | X | | | |
| oxirane | X | | | | X | | | |
| trichloromethane | 11 | | 19 | est >900 | | 2 | est 160 | 2 |
| [illegible]gen chloride | X | | X | | | | | |
| dichlorobromo methane 0.17 CRL | | | 14 | 14 | | | | |
| chlorodibromo methane 0.17 (CRL) | | | 5 | | | | | |
| 2 dichloroethane (? CRL) | | | | 25 | | est 140 | | |
| chloromethane | | | | est >300 | | est 80 | | |
| benzene 0.66 (CRL) • | | | | est >100 | | est 940 | | 7 |
| toluene 14,300 H | | | | est >200 | | est 62 | | est 130 |
| ethyl benzene | | | | 25 | | est 180 | | 8 |
| ethanol | | | | X | | | | |
| methyl-2-propanol | | | | X | | | | |
| butanol | | | | X | | | | |
| pentane | | | | X | | | | |
| [illegible]tanol | | | | X | | | | |
| methyl-2-butanol | | | | X | | | | |
| 2'-oxy bis propane | | | | X | | | | |

NO SAMPLE COLLECTED

AR301174

| | Hatfield INF | Hatfield eff | Phila sub inf | Phila sub eff | Waste Conv Comp | Waste Conv well | Well 6 | Waste Conv well | Other |
|---|---|---|---|---|---|---|---|---|---|
| methyl-2-pentanone | | | | | X | | | | |
| ethyl-3-pentanol | | | | | X | | | | |
| romomethane | | | | | | | 2 | | |
| 1 dichloroethene | (? CRL) | | | | | | 6 | | |
| 2 dichloroethene | 0.94 (CRL) | | | | | | 1 | | |
| hlorobenzene | 20 (TIO) | | | | | | 3 | | |
| xylene | | | | | | | X | X | |
| etrachloromethane | | | | | | | 20 | | |
| romodichloromethane | | | | | | | 21 | | |

Area #2

AR301175

| | Hatfield inf | Hatfield eff | Phila Sub inf | Phila sub eff | Waste Conv comp | Waste conv grab | Well 6 | Waste Conv well stream |
|---|---|---|---|---|---|---|---|---|
| Cholest-5-en-3-ol | X | | | | | | | |
| coffeine | X | | | | X | X | X | |
| hexadecanol | X | | | | | | | |
| tetradecanoic acid | X | | | | | | | |
| butyl cellosolve | X | | | | | | | |
| dichlorobenzene | 11 | | | | | | | |
| dimethyl PAE | 7 | | | | | | | |
| diethyl PAE | 34 | | | | | | | |
| di iso octyl PAE | est 350 | 7.6 | est 5700 | 41 | | | | |
| phenol | 13 | | | | est 7000 | est 4 | est 3600 | est 2200 |
| eta dichlorobenzene | | 4 | | | | | | |
| [illegible] chlorobenzene | | 8 | | | | | | |
| ttho dichlorobenzene | | 8 | | | | | 50 | 79 |
| dibutyl PAE | | | | 12 | | | | |
| ethyl-6-methylene-7-octen-2-ol | | X | X | X | X | X | X | |
| -α-dimethyl benzenethanol | | X | | | | | | |
| (1,1-dimethylethyl)cyclohexanone | | X | | | | | | |
| iphenyl phosphine oxide | | X | | | | | | |
| -[2-(2-methoxy-1-methylethoxy)-methylethoxy]-2-propanol | | X | | | | | | |
| chlorophenol | 5.0 T90 | | | | est 1500 | | | |
| 5-dimethyl phenol | 400 (T90) | | | | est 700 | | | |
| -nitrophenol | 5.0 (T90) | | | | est 2500 | | | |
| ophorone | 5200 (H) | | | | est 600 | | est | |
| [illegible] rofuran | | | | | X | | | |
| -butanol | | | | | X | X | | X |
| -butoxy ethanol | | | | | X | X | | |

Area #2

AR301176

| | Hatfield INF | Hatfield eff | Phila sub inf | Phila sub eff | Waste Conv. comp | Waste conv grab | well 6 | Waste conv well | Stream |
|---|---|---|---|---|---|---|---|---|---|
| 1-methyl-2-pentanone | | | | | X | X | | | |
| yclohexanone | | | | | X | | | | |
| -ethyl-1-hexanol | | | | | X | | | | |
| methyl phenols | | | | | X | | | X | X |
| -,N, dimethyl benzenamine | | | | | X | | | X | X |
| benobarbital | | | | | X | X | | X | X |
| propanoic acid | | | | | X | | | | |
| hexanoic acid | | | | | X | X | | | |
| -thyl hexanoic acid | | | | | X | | | | |
| octanoic acid | | | | | X | X | | | |
| benzoic acid | | | | | X | X | | | |
| [illegible]ne acetic acid | | | | | X | | | | |
| -methyl-2-~~phen~~ pentanol | | | | | | X | | | |
| -,N, dimethyl formamide | | | | | | X | | | |
| 1-hydroxy-4-methyl-2 pentanone | | | | | | X | | | |
| -ethyl-1-hexanol | | | | | | X | | | |
| 7-dimethyl-3-octanol | | | | | | X | | | |
| -[2-butoxy ethoxy]-ethanol | | | | | | X | | | |
| ,N 4-trimethyl benzene sulfonamide | | | | | | X | | | |
| butanoic acid | | | | | | X | | | |
| pentanoic acid | | | | | | X | | X | |
| decanoic acid | | | | | | X | | | |
| -3-dimethyl opetane | | | | | | | X | | |
| [illegible]yl propane | | | | | | | X | | |
| -(1,1-dimethylethyl) formamide | | | | | | | X | | |
| trimethyloctane | | | | | | | X | | |

Area #2

AR301177

| | | | waste conc wet | stream |
|---|---|---|---|---|
| ...(ethylhexyl) phthalate | 3 AQ life | | est 3300 | est 2800 |
| ~~[illegible]~~ | | | ~~[illegible]~~ | |
| 1-chloro-3-methyl phenol | | | 25 | |
| trichlorophenol | | | est 4 | |
| ...ethyl phthalate | 3 AQ life • | | 65 | |
| fluorene | 0.0028 (CRL) • | | 9 | |
| phenanthrene | 0.0028 (CRL) • | | 57 | |
| anthracene | 0.0028 (CRL) • | | 34 | |
| naphthalene | 620 AQ life | | 60 | |
| 3-dihydro-1,1,3-trimethyl-3-phenyl-1H-Indene | | | X | X |
| ...ethyl benzene acetamide | | | X | |
| ...yl butanoic acid | | | X | |
| ethion | | | X | X |
| trimethyl naphthalene | | | X | |
| dimethyl naphthalene | | | X | |
| methyl naphthalene | | | X | |
| xylene | | | X | |
| toluene | | | X | |
| styrene | | | X | |
| 3,7-dimethyl-1,7-octadiol | | | X | |
| 4-(1,1-dimethylethyl)-phenol | | | X | |
| 4-(1,1-dimethyl ethyl)-cyclohexanol | | | X | |
| n-alkanes | | | X | X |
| ...thiolane | | | | X |
| ...-methyl-6-methylene-7-octen-2-OL | | | | X |
| limonene | | | | X |



AR301178

| | Jstream |
|---|---|
| )-propoxy-ethanol | X |
| ,N-dimethyl formamide | X |
| ,N-diethyl ethanamine | X |
| ,N-diethyl ethanamide | X |

octahydro-3,6,8,8-tetramethyl-[3R-(3.alpha.,3A.beta.,6.alpha.,7.X beta.,8A.alpha.)]-(9CI)-1H-3A,7-methanoazulene

Area #2

REFERENCE 23
Letter dated December 10, 1981

# COUNTY OF BUCKS

DEPARTMENT OF HEALTH

Neshaminy Manor Center, Doylestown, Pa. 18901 – 215-343-2200

FIELD OFFICES

410 Bath Road, Bristol, Pa. 19007 – 788-0491

515 West End Blvd., County North Annex Bldg., Quakertown Pa. 18951 – 536-6500

*County Commissioners*

ELAINE P. ZETTICK, *Chairman*
ANDREW L. WARREN
CARL F. FONASH

Edmund K. Lindenmuth, M.D., M.P.H.
*Director*

Board of Health

Paul W. McBvaine, M.D., *Chairman*
John L. Jacoby, *Vice Chairman*
Mrs. Charles Benhayon
Francis L. Rickards, Jr., D.O.
Joseph J. Ryan

December 10, 1981

TO: Walt Stanley, Operations Chief - DER - Region I

FROM: Peter G. Noll, EPS - B.C.D.H. *P.G.N.*

THROUGH: Al Wills, Chief, Division of Environmental Engineering, B.C.D.H. *A.G.W.*

SUBJECT: Odor Investigation - Neshaminy Creek

The following is a report concerning my recent investigation of odor complaints from consumers of Philadelphia Suburban Water Company.

On December 1, 1981, our Department received a report from the Pennsylvania Department of Environmental Resources concerning taste and odor complaints received from customers of the Philadelphia Suburban Water Company. I inspected the Neshaminy Water Plant the same day and found a paint odor in the water entering the plant. No odors or unusual conditions were observed in the creek at the plant intake.

I interviewed Mr. Gene Guthan of the company's Bryn Mawr lab and learned the following:

On November 27, bromine entered the plant forming tromoforms and causing taste and odor in heated water. Marginal chlorine and increased carbon feed were used to solve the problem. On November 30, an epoxy paint odor was found in the water. Mr. Guthan was working on the best treatment to handle this. Neither discharge was traceable.

On December 3rd and 4th our Department investigated a report by the water company of odors in the West Branch of the Neshaminy. We traced these odors to the Hatfield Township Authority Sewage Treatment Plant. They were noticeable throughout the plant and in the plant effluent and in the chlorinated overflow from the surge tanks.

Joe Crocco, plant operator, showed me through the treatment facility and explained that the odors are due to pretreated industrial wastes discharged to the plant by Waste Conversion Company. He said that the odors were actually less than normal and were always evident at the plant. He indicated that the overflow of sewage began after the heavy rain on December 1st and happened routinely during and after substantial rain.

Mr. Crocco advised us that, with the exception of increased ferric chloride feed to keep down a rising secondary sludge blanket, nothing unusual had happened at the facility.

AR201181

Richard Mattingly, waterways patrolman for the Philadelphia Suburban Water Company, arrived at the plant after tracing the odor in the creek from the waterworks intake to the Hatfield Sewage Treatment Plant. Samples were collected by us and the water company of chlorinated effluent, chlorinated overflow, and the waste stream from Waste Conversion Company. The Department of Environmental Resources office in Norristown was advised.

The State Laboratory analysed the samples on December 8 and reported that the effluent contained an organic acid and appeared by UV scan to be different from the overflow and the waste conversion discharge. The latter had a high pH. No further information was found. The results were phoned to Walt Stanley. Joe Feola and Rob Alan of DER will continue the investigation on December 9.

Our Department checked the West Branch of the Neshaminy on December 9 and found the odor still existed at County Line Road. It was faintly noticeable in the Neshaminy Creek at Upper State Road. Ken Shull of the Water Company was contacted and reported the problem was much improved at the plant.

It appears that organic testing of the pretreated discharge from Waste Conversion Company is needed to adequately monitor and control taste and odor producing discharge from the Hatfield Township Authority Sewage Treatment Plant.

Waste Conversion Company or the Hatfield Township's Authority should be required to routinely conduct the appropriate tests.

PGN/mc

REFERENCE 24
Letter dated February 3, 1982

AR301183

Norristown, PA 19401

215 631-2409

February 3, 1982

Mr. August C. Schultes, President
Waste Conversion, Inc.
3869 Sandstone Drive
Hatfield, PA 19440

Re: Industrial Waste
Waste Conversion, Inc.
Hatfield Township
Montgomery County

Dear Mr. Schultes:

This is to confirm the results of my inspection conducted on December 21, 1981 which revealed the following:

1. Discharges of waste material to the ground surface have contaminated the groundwater, as evidenced by the enclosed sample results.

2. Tank trucks were being unloaded into the collection pit.

3. Waste liquids were being allowed to accumulate in the collection pit.

The unpermitted discharge of industrial waste, item 1, to waters of the Commonwealth (including groundwater) is a violation of Section 307 of the Clean



AR301184

Section 316 of the Clean Streams Law requires that landowners or occupiers correct conditions which are causing or have the potential to cause pollution.

In addition, such conditions, items 2 and 3, are in violation of Title 25, Chapter 101, Section 101.3 of the Rules and Regulations of the Department of Environmental Resources regarding special water pollution regulations.

We are requesting that Waste Conversion, Inc. take the following actions to correct and mitigate the effects of this groundwater pollution problem:

No later than February 18, 1982, to retain a qualified hydrogeologist and submit to the Department for approval, a work plan describing the scope and methods of a hydrogeologic study to determine the extent and impact of soil and groundwater contamination at and in the vicinity of the subject site. The work plan should include target dates for completion of the various tasks comprising the study, including a final report and recommendations. The scope of the study should include as a minimum:

Definition of the present extent of soil and groundwater pollution.

Evaluation of the potential for further spread of soil and groundwater pollution.

Definition of all sources of the pollution and a description of the means and methods proposed or used for the elimination of said sources.

Evaluation of alternatives available to abate the soil and groundwater pollution.

A groundwater quality monitoring program which will allow for evaluation of long-term groundwater quality conditions and which will



AR301185

ensure the protection of public health.

Conclusions and proposed actions to abate the soil and groundwater pollution and a schedule for accomplishing such actions.

If you have any questions, please feel free to contact me.

Very truly yours,

JOSEPH A. FEOLA
Water Quality Specialist

cc: Len Perrone, Borough Manager
Sidney Briton, Township Manager
Leon Gonshor
Wayne Lynn
Lewis Luchie
Re 30 DC611

ENCLOSURE



AR301186

REFERENCE 25
Letter dated November 5, 1985

ATTACHMENT B

# NORTH PENN WATER RESOURCES ASSOCIATION

Nov. 5, 1985

William McDonald
SPS Technologies
Township Line Road
Hatfield, PA 19440

Dear Bill:

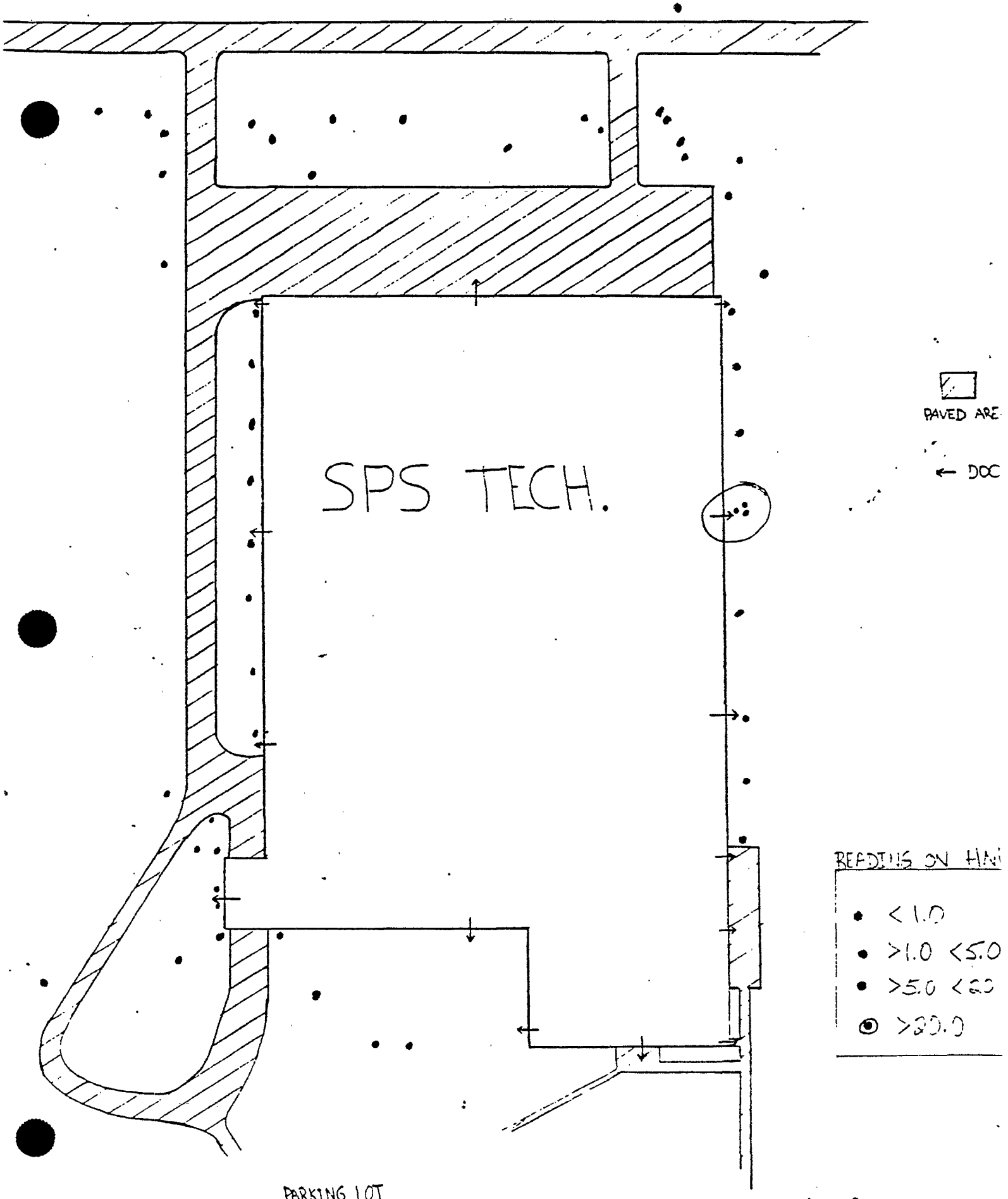
I have completed the drawing of the results of the HNU "sniffing" at your site. I have enclosed a copy of the drawing and the raw data. It can be seen from the drawing that your site had no major areas of concern. The green dots indicate background levels of organics. One small area on the west side of your facility (adjacent to a door) showed response above background. This is a very small area and presents no threat to the local groundwater. Any response to this area of contamination is left up to you. Thank you for your cooperation.

Sincerely,

Jerry Coyle

Jerry Coyle
NPWRA Representative

encl




AR301189

STC

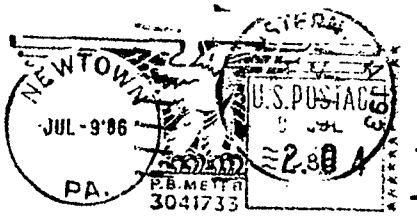
10/22/85 SPS Technology HNK Sniffing

Bill McDonald

| | | | | | |
|---|---|---|---|---|---|
| 1 | 0.1 | 6in | 29 | 0.0 | 6in |
| 2 | 0.2 | 1.5ft | 30 | 0.0 | 6in |
| 3 | 0.2 | 2ft | 31 | 0.0 | 8in |
| 4 | 0.0 | 2ft | 32 | 0.1 | 1.5ft |
| 5 | 0.4 | 1.5ft | 33 | 0.9 | 1 ft |
| 6 | 0.3 | 1 ft | 34 | 0.1 | 1.5 ft |
| 7 | 0.2 | 2ft | 35 | 0.3 | 2ft |
| 8 | 0.1 | 2ft | 36 | 0.1 | 1.5 ft |
| 9 | 0.0 | 1.5ft | 37 | 0.1 | 1 ft |
| 10 | 0.2 | 1ft | 38 | 1.4 | 1ft |
| 11 | 0.2 | 8in | 39 | 0.5 | 1ft |
| 12 | 0.0 | 1ft | 40 | 0.2 | 1.5ft |
| 13 | 0.1 | 2ft | 41 | 0.8 | 1.5ft |
| 14 | 0.0 | 1.5ft | 42 | 0.1 | 8in |
| 15 | 0.0 | 1 ft | 43 | 0.3 | 6in |
| 16 | 0.1 | 1.5ft | 44 | 0.3 | 6in |
| 17 | 0.5 | 1.5ft | 45 | 0.2 | 8in |
| 18 | 0.4 | 1.5ft | 46 | 5.2 | 6in |
| 19 | 0.3 | ~2ft | 47 | 5.4 | 1.5ft |
| 20 | 0.4 | 1.5ft | 48 | 15.4 | 1.5ft |
| 21 | 0.3 | 2ft | 49 | 0.6 | 1ft |
| 22 | 0.6 | 2ft | 50 | 0.7 | 1ft |
| 23 | 0.2 | 6in | 51 | 0.2 | 1.5ft |
| 24 | 0.4 | 6in | 52 | 0.1 | 1ft |
| 25 | 0.6 | 1ft | 53 | 0.5 | 8in |
| 26 | 0.4 | 8in | 54 | 0.4 | 1.5ft |
| 27 | 0.2 | 6in | 55 | | |
| 28 | 0.5 | 1ft | 56 | | |

AR301190

SPS TECHNOLOGIES




CERTIFIED MAIL
RETURN RECEIPT REQ.

3HW23

Corporate Offices
Newtown
Pennsylvania 18940

CERTIFIED
P 442 835 697
MAIL

Ms. Lorie Acker
U.S. EPA, Region III
Site Investigation and Support
Section (3HW23)
841 Chestnut Building, 6th Floor
Phila., PA 19107

AR301191

REFERENCE 26
Purchase orders for trichloroethylene
between Ametek, Inc., Hatfield, Pennsylvania
and Pioneer Salt and Chemical Company
Philadelphia, Pennsylvania
Dates February 1980 through June 1982

ORIGINAL INVOICE

**PIONEER SALT & CHEMICAL CO.**
N. DELAWARE AVE., PHILA., PA. 19123

| | |
|---|---|
| BILL OF LADING # | [illegible]410 |
| INVOICE # | 14004 |
| DATE ORDERED | 2/19/80 |
| DATE DELIVERED | 2/21/80 |

PLEASE INDICATE THE INVOICE NUMBER WHEN REMITTING, AND INDICATE THE ABOVE ON ALL CORRESPONDENCE CONCERNING THIS DOCUMENT.

SHIP TO:
AMETEK HUNTER SPRINGS DI
1 SPRING AVE
HATFIELD PA PA 19440

BILL TO:
AMETEK HUNTER SPRINGS DI
1 SPRING AVE
HATFIELD PA PA 19440

02

CUSTOMER SERVICE REPRESENTATIVE: HAROLD MOLINA

| CUSTOMER ORDER # | CARRIER | CUSTOMER CODE | MODE OF DEL. | FREIGHT | TRACTOR/TRAILER | TERMS | AREA | SLM. # |
|---|---|---|---|---|---|---|---|---|
| 40532 | PIONEER | 043801-00 | | | | NET 30 DAYS | P11 | 20 |

| NO. OF UNITS ORDERED | DESCRIPTION | NO. OF UNITS RECEIVED | LBS. OR GALS. RECEIVED | PRICE | DOLLAR AMOUNT |
|---|---|---|---|---|---|
| 1 | TRICHLOROETHYLENE<br>TANK WAGON 1,000 GAL-1,999 GAL<br>PRODUCT NUMBER 23110-T30-BAH-DB<br><br>WEIGHT SLIP<br><br>PAST DUE INVOICES ARE SUBJECT TO A 1.5% PER MONTH INTEREST CHARGE<br>ANNUAL EFFECTIVE RATE 18% | 1 | 12,200 | 24.000 CWT | 2,928.00 |

30071
P495
4-07
2-21
2928.00
2928.00
28-421
DISTRIBUTION AMOUNT
AMOUNT NO.

APR 9 1980

FEB 29 9 31 AM '80
HUNTER SPRING
A DIV. OF AMETEK, INC.
HATFIELD, PA.

AR301193

PAGE

PLEASE INCLUDE INVOICE NUMBER ON ALL CHECKS

PLEASE NOTE

Your order, the terms, conditions and certification on the back hereof, has been invoiced as shown herein, if this covers only a portion of buyer's order, then the terms and conditions herein shall apply also to all subsequent shipments [illegible] and all subsequent shipments shall be subject to delivery when available at seller's prices in effect at date of shipment - if incorrect in any detail, please notify the sales office serving you, mentioning above invoice number and name of first product listed. We thank you for your order.

80/02/22 80/02/25

2/21/80

2,928.00

**AMETEK**

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA 19440

No. 65147

RECEIVING REPORT

REC'D FROM Pioneer Salt & Chemical DATE 2/21/80

ADDRESS Phila Pa. DEPT. 28-421

| P O NUMBER | COLLECT ☐ CHARGES | VIA | NO OF PACKAGES |
|---|---|---|---|
| 405327 | PREPAID ☐ | Del. | |

SHIPMENT PARTIAL ☐ COMPLETE ☒

CONDITION OF CONTAINER GOOD ☒ POOR ☐ CRUSHED ☐ OPEN ☐

| QUAN. REC'D. | PART NO. | DESCRIPTION |
|---|---|---|
| 1000 | Gals | Trichloroethylene |

Q. C. INSPECTION ☐ YES ☒ NO

DELIVER TO DC

WEIGHT

DESCRIPTION OF DEFECT:

APR 9 1980

REC'D BY Bud

FORM NO 138 B

1

AR301194

**AMETEK**
HUNTER SPRING DIVISION
1 SPRING AVENUE, HATFIELD, PENNSYLVANIA 19440

REMITTANCE STATEMENT

| INVOICE DATE | GROSS AMOUNT | DISCOUNT | NET AMOUNT |
|---|---|---|---|
| 2/21/0 | 2,928.00 | | 2,928.00 |
| | 2,928.00 | | 2,928.00 |

DETACH BEFORE
DEPOSITING CHECK

**AMETEK**
HUNTER SPRING DIVISION • 1 SPRING AVE., HATFIELD, PENNSYLVANIA 19440

1-103
210

94061

No. 94061

| DATE | | |
|---|---|---|
| MO. | DAY | YR. |
| 4 | 09 | 80 |

BANKERS TRUST COMPANY
16 WALL STREET, NEW YORK, N.Y.

PAY EXACTLY THE SUM OF

| AMOUNT | |
|---|---|
| DOLLARS | CENTS |
| $**2,928.00 | |

FACTORY ACCOUNT

TO THE ORDER OF

PIONEER SALT CO
940 N DELAWARE AVE
PHILADELPHIA PA 19123

**AMETEK**
HUNTER SPRING DIVISION

1 NON-NEGOTIABLE
AUTHORIZED SIGNATURES

⑈0009406 1⑈ ⑆0210⑉0103⑆01⑉00011674⑈

L4-87562

AR301195

CUSTOMER'S COPY

**PIONEER SALT & CHEMICAL CO.**
[redacted] DELAWARE AVE., PHILA., PA. 19123
(215) 574-8500

| | |
|---|---|
| Bill of Lad[redacted] | 42410 |
| Date Ord[redacted] | |
| Desired Del[redacted]y Date | 2/21/80 |

Subject to Section 7 of conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement.

If charges are to be prepaid, write or stamp here, "To be Prepaid."

Received $_____ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

The [redacted] not make delivery of this ship[redacted] without payment of freight and all ot[redacted] charges.

(Signature of Consignor)

Per_____
(The signature here acknowledges only the amount prepaid)

Charges Advanced:
$_____

SHIP TO
AMETEK
15 SPRING AVE.
HATFIELD, PA

BILL TO

| Customer Order # | Carrier | Customer Code | Mode of Delivery | Freight | Tractor/Trailer | Travel Time 940 D.C. | Area | Salesman# |
|---|---|---|---|---|---|---|---|---|
| | PIONEER | | | | | | | |

| Quantity | Description | Product Code # | Weight |
|---|---|---|---|
| 1000 gals. | TRICHLOROETHYLENE COMPT. #2 | | 12,200 |

Gross 37340
Tare 25140
net 12200

1980
APR

745

| Arrived AM PM | Departed AM PM | Mat'l. Rec'd By | Date | Driver's Signature | The agreed or declared value of the property is hereby specifically stated by the shipper to be |
|---|---|---|---|---|---|
| | | | | | |

*If th[redacted] moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."

NOTI[redacted] the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The fibre boxes [redacted] hipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of UNIFORM FREIGHT CLAS[redacted] ON.

The pro[redacted] d below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned and destined as indicated below, which said carrier (the word carrier being u[redacted] ughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliv[redacted] carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in [redacted] said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classification [redacted] date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

This [redacted] g Order
RECE[redacted] ject to the classifications and tariffs in effect on the date of the issue of this Shipping Order, from PIONEER SALT AND CHEMICAL COMPANY

Must be legibly filled in, in Ink, in Indelible Pencil, or in Carbon, and retained by the Agent.

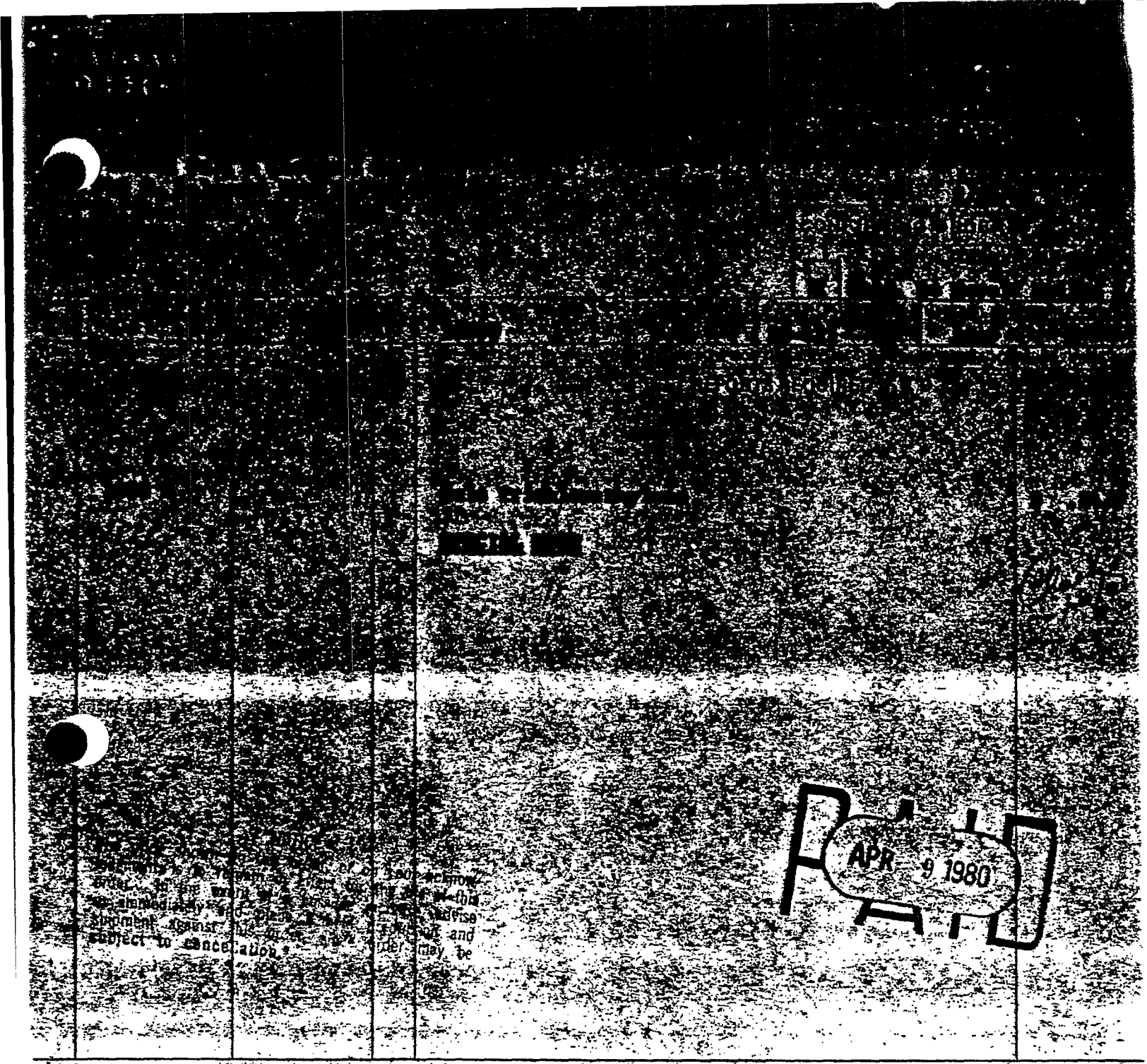
PER_____

NOT EXCEEDING_____ PER _____
"Shipper's imprint in lieu of stamp; not a part of bill of lading approved by the Interstate Commerce Commission." †This is to certify that the above articles are properly described by name, and are packed and marked and are in proper condition for transportation according to the applicable regulations prescribed by the Interstate Commerce Commission and the Secretary of Commerce.

Agent must detach and retain this Shipping Order

**EMERGENCY**

FOR HELP IN CHEMICAL EMERGENCIES INVOLVING SPILL, LEAK, FIRE OR EXPOSURE, CALL THIS TOLL FREE NUMBER
1-800-424-9300
NIGHT OR DAY




## EXPEDITING RECORD

| ITEM | DATE | C | P | W | PERSON CONTACTED | DEL. PROM. | INT. | REMARKS |
|---|---|---|---|---|---|---|---|---|
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AR3U1497

EDP AND ACCOUNTING

# PURCHASE REQUISITION

**AMETEK**
HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA. 19440

№ 3559
# 35599

DEPT. FOR ACCOUNT 28-421

TOMER JOB ORDER SR#

| QUANTITY | PRIORITY RATING | CONTRACT NO. |
|---|---|---|
| 1000 | GALS TRICHLORETHYLENE ~~(METAL)~~ | |
| | .22/# | |
| | SPECIAL DUST | |

APR 9 1980

REQ. BY DATE 2-19-80 SUG. SUPL. Pioneer Salt Co

ADDRESS

APPROVED DEL. REQ.

101 B

AR301198

**PIONEER SALT & CHEMICAL CO.**
940 N. DELAWARE AVE., PHILA., PA. 19123

| | |
|---|---|
| BILL OF LAD | 43581 |
| DATE ORDE | |
| DATE DELIVE | 5/28/80 |

INVOICE # 19764

PLEASE INDICATE INVOICE NUMBER WHEN REMITTING AND INDICATE THE ABOVE ON ALL CORRESPONDENCE CONCERNING THIS DOCUMENT.

SHIP TO
AMETEK HUNTER SPRINGS DI
1 SPRING AVE
HATFIELD PA PA 19440

BILL TO
AMETEK HUNTER SPRINGS DI
1 SPRING AVE
HATFIELD PA PA 19440

02

CUSTOMER SERVICE REPRESENTATIVE
HAROLD MOLINA

| CUSTOMER ORDER # | CARRIER | CUSTOMER CODE | MODE OF DEL. | FREIGHT | TRACTOR/TRAILER | TERMS | AREA | SLM. # |
|---|---|---|---|---|---|---|---|---|
| 41623 | PIONEER | 043801-00 | | | | NET 30 DAYS | P11 | 20 |

| NO. OF UNITS ORDERED | DESCRIPTION | NO. OF UNITS RECEIVED | LBS. OR GALS. RECEIVED | PRICE | DOLLAR AMOUNT |
|---|---|---|---|---|---|
| 1 | TRICHLOROETHYLENE<br>TANK WAGON 1,000 GAL-1,999 GAL<br>PRODUCT NUMBER 23110-T10-PAH-DB | 1 | 12,100 | 24.000 CWT | 2,904.00 |
| | WEIGHT SLIP | | | | |
| | PAST DUE INVOICES ARE SUBJECT TO A 1.5% PER MONTH INTEREST CHARGE<br>ANNUAL EFFECTIVE RATE 18% | | | | |
| 1 | PLEASE INCLUDE INVOICE NUMBER ON ALL CHECKS | | | | |

VENDOR NO. P495 60107
DUE DATE 7-14
2904.00
DISTRIBUTION AMOUNT 2904.00
ACCOUNT NO. 28-421
5-28
APPROVED
MATERIAL

JUL 15 1980
10 00 AM '80
AMETEK
HATFIELD, PA.

AR301199

PLEASE NOTE

Your order, subject to the terms, conditions and certification on the back hereof, has been invoiced as shown herein, if this invoice covers only a portion of buyer's order, then the terms and conditions herein shall apply also to all subsequent shipments [illegible] all subsequent shipments shall be subject to delivery when available at seller's prices in effect at date of shipment - if incorrect in any detail, please notify the sales office serving you, mentioning above invoice number and name of first product listed. We thank you for your order.

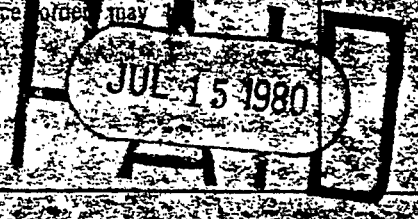
5/28/80

2,904.00

NOTICE

The price shown on this order, or on your acknowledgement, is remain in effect for the life of this [illegible] of a possible increase, advise [illegible] and [illegible] hold [illegible] and shipment against this order, since order may be subject to cancellation.

JUL 15 1980



EXPEDITING RECORD

| ITEM | DATE | C | P | W | PERSON CONTACTED | DEL. PROM. | INT. | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
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| | | | | | | | | |

AR 301200

**AMETEK**

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA 19440

No. 67498

RECEIVING REPORT

REC'D FROM Pioneer Salt & Chemical Co. DATE 5/29/8C

ADDRESS Phila., Pa. DEPT. 28-421

| P O. NUMBER | COLLECT ☐ CHARGES | VIA | NO OF PACKAGES |
|---|---|---|---|
| 41623 | PREPAID ☑ | Del. | |

SHIPMENT PARTIAL ☐ COMPLETE ☑

CONDITION OF CONTAINER: GOOD ☑ POOR ☐ CRUSHED ☐ OPEN ☐

| QUAN. REC'D | PART NO. | DESCRIPTION |
|---|---|---|
| 1 M | | Hals Trichloroethylene |

Q. C. INSPECTION ☐ YES ☑ NO

DELIVER TO DC

WEIGHT

DESCRIPTION OF DEFECT:

JUL 15 1980

REC'D BY Bob

FORM NO 138 B

1

AR301201

**PURCHASE REQUISITION**

**AMETEK**

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA. 19440

№ 34529

FROM _____ DEPT. _____ FOR ACCOUNT _____

CUSTOMER _____ JOB ORDER _____ SR# _____

| QUANTITY | PRIORITY RATING | CONTRACT NO. |
|---|---|---|
| 1050 | GALS. TRICHLOROETHYLENE | .24/# |

OUT

JUL 15 1980

REQ. BY _____ DATE _____ SUG. SUPL. _____

APPROVED _____ ADDRESS _____

FORM 101 B DEL. REQ. _____

AR301202

**WEIGHT CORDED BY**

Number ..... Date 5/29/82

H e Rich dson

IDENTIFICATION

Corpt # 2

WEIGHT

0432 00 lbs. GR

0311 00 lbs. TA

12100 lbs. N

Commodity Trichloroethylene @ ..... pe

Remarks: ..... Driver On [ ] Off [ ]

..... Load No. .....

..... Weigher .....

Shipper PPG

Seller

Buyer ~~[illegible]~~ CPC Chemical

Address Warminster Pa

TR-200-3 Printed in U.S.A.
PT #209-06880

AR301203

**PIONEER SALT & CHEMICAL CO.**
40 N. DELAWARE AVE., PHILA., PA. 19123
(215) 574-8500

| | |
|---|---|
| Bill of Lading # | 43581 |
| Delivered | |
| Delivery Date | 5/29/80 |

Subject to Section 7 of conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement.

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor)

If charges are to be prepaid, write or stamp here, "To be Prepaid."

Received $ _____ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per _____ (The signature here acknowledges only the amount prepaid)

Charges Advanced

$ _____

**SHIP TO**
AMETEK HUNTER SPRINGS
1 SPRING AVE.
HATFIELD, ~~PA~~ Pa

**BILL TO**

| Customer Order # | Carrier | Customer Code | Mode of Delivery | Freight | Placard Req'd. | Travel Time 940 D.C. | Area | Salesma |
|---|---|---|---|---|---|---|---|---|
| 41623 | PIONEER | | | | | | | |

| Qty. Ordered | Qty. Shipped | Description | Product Code # | Weight |
|---|---|---|---|---|
| | 1000 gals. | TRICHLOROETHYLENE<br>ORM-A<br>CMPT. #1 & 2<br>43260<br>31160<br>12100 | | 12100 |

JUL 15 1980

| Arrived AM PM | Departed AM PM | Mat'l. Rec'd By | Date | Warehouseman Signature |
|---|---|---|---|---|
| | | Jack Logan | | |

The agreed or declared value of the property is hereby specifically stated by the shipper to be

...hipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight"

**Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The fibre ... this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of UNIFORM FREIGHT ...ICATION.**

...scribed below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned and destined as indicated below, which said carrier (the word carrier ...d throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise ...ther carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time inter... of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifica... the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.

...certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which ...rtation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his ...

**This ... g Order** Must be legibly filled in, in Ink, in Indelible Pencil, or in Carbon, and retained by the Agent.

**RECEIVE, subject to the classifications and tariffs in effect on the date of the issue of this Shipping Order, from PIONEER SALT AND CHEMICAL COMPANY**

PER

**"This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Trans-**

**EMERGENCY**

**FOR HELP IN CHEMICAL EMERGENCIES INVOLVIN... SPILL, LEAK, FIRE OR EXPOSURE, CALL THIS TOLL FREE NUMBER 1-800-424-9300 NIGHT OR DAY**

AR301204

# ORIGINAL INVOICE

**PIONEER SALT & CHEMICAL CO.**
940 N. DELAWARE AVE., PHILA., PA. 19123
215 - 925-6500

| | |
|---|---|
| BILL OF LAD | 52760 |
| DATE ORD | |
| DATE DELIVERED | |
| INVOICE # | 26693 |
| | 8/28/80 |
| | 9/09/80 |

PLEASE INDICATE INVOICE NUMBER WHEN REMITTING AND INDICATE THE ABOVE ON ALL CORRESPONDENCE CONCERNING THIS DOCUMENT.

SHIP TO
AMETEK HUNTER SPRINGS DV
1 SPRING AVE
HATFIELD PA 19440

BILL TO
AMETEK HUNTER SPRINGS DV
1 SPRING AVE
HATFIELD PA 19440

02

CUSTOMER SERVICE REPRESENTATIVE: BOB BOGADEK

| CUSTOMER ORDER # | CARRIER | CUSTOMER CODE | MODE OF DEL. | FREIGHT | TRACTOR/TRAILER | TERMS | AREA | SLM. # |
|---|---|---|---|---|---|---|---|---|
| 42316 | PIONEER | 043801-00 | | | | NET 30 DAYS | P11 | 09 |

| NO. OF UNITS ORDERED | DESCRIPTION | NO. OF UNITS RECEIVED | LBS. OR GALS. RECEIVED | PRICE | DOLLAR AMOUNT |
|---|---|---|---|---|---|
| 1 | TRICHLOROETHYLENE<br>TANK TRUCK 1,000 GAL-1,999 GAL<br>PRODUCT NUMBER 23110-T23-BAH-DB | 1 | 12,120 | 24.000 CWT | 2,908.80 |

PAST DUE INVOICES ARE SUBJECT TO A 1.5% PER MONTH INTEREST CHARGE
ANNUAL EFFECTIVE RATE 18%

| | | |
|---|---|---|
| VENDOR NO. P495 | VOUCHER NO. 100255 | INVOICE DATE 9-09 |
| DUE DATE 11-03 | RECEIVING RECORD NO. — | WORK ORDER NO. |
| DISCOUNT — | VOUCHER AMOUNT 2908.80 | APPROVED |
| DISTRIBUTION AMOUNT 2908.80 | ACCOUNT NO. 28-421 | MATERIAL |
| DISTRIBUTION AMOUNT | ACCOUNT NO. | MATERIAL |

NOV 3 1980

RECEIVED
SEP 17 11 02 AM '80
AMETEK HUNTER SPRING DIV. OF AMETEK, INC. HATFIELD, PA.

PAGE 1

PLEASE INCLUDE INVOICE NUMBER ON ALL CHECKS

800915 800915

PLEASE NOTE

our order, subject to the terms, conditions and certification on the back hereof, has been invoiced as shown erein, if this invoice covers only a portion of buyer's order, then the terms and conditions herein shall apply also o all subsequent shipments thereunder, and all subsequent shipments shall be subject to delivery when available t seller's prices in effect at date of shipment - if incorrect in any detail, please notify the sales office serving you, ientioning above invoice number and name of first product listed. We thank you for your order.

| DUE DATE |
|---|
| 10/09/80 |

I.K. J.R. 2,908.80

AR301205

# ROLLINS TERMINALS, INC.

EAST SECOND STREET

BAYONNE, NEW JERSEY 07002

| | |
|---|---|
| | 9/9/80 |

| CONSIGNEE | |
|---|---|
| PIONEER SALT & CHEM /CUST TRK/ | |
| STREET ADDRESS | CITY, TOWN, BORO |
| PHILA | PA. |

42720 LBS. GROSS

30600 LBS. TARE

12120 LBS. NET

| SHIPPER | |
|---|---|
| DOW CHEMICAL CO /5883037/ | |
| STREET ADDRESS | CITY, TOWN, BORO |
| | |

VEHICLE LICENSE NO. 482/123

TRAILER LICENSE NO.

COMMODITY & REMARKS

NEU TRI /COMPT NO 1/

| WEIGHMASTER'S SIGNATURE | WEIGHMASTER'S LICENSE NO. | DRIVER ON ☐ OFF ☐ |
|---|---|---|
| | | |

NOV 8 1980

ORIGINAL - CUSTOMER COPY

AR301206

**PIONEER SALT & CHEMICAL CO.**
940 N. DELAWARE AVE., PHILA., PA 19123
(215) 574-8500

| | |
|---|---|
| Bill of Lading # | 52760 |
| Ordered | |
| Delivery Date | 9/8/80 |

Subject to Section 7 of conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement.

If charges are to be prepaid, write or stamp here, "To be Prepaid."

Received $ _____ to apply in prepayment of the charges on the property described hereon.

_____ Agent or Carrier

The carrier shall not make deli this shipment without payment of all other lawful charges.

_____ (Signature of Consignor)

Per _____ (The signature here acknowledges the amount prepaid)

Charges Advanced:

$ _____

BILL TO

AMETEK HUNTER SPRINGS DV
1 SPRING AVE.
HATFIELD, PA

| Customer Order # | Carrier | Customer Code | Customer Service Representative | Freight | Placard Req'd. | Brd. No. | Area | Salesm |
|---|---|---|---|---|---|---|---|---|
| 42316 | PIONEER | | | | | | | |

| Shipped | Description | Line # | Del. Mode | Product Code # | Weight |
|---|---|---|---|---|---|
| [illegible] | [illegible] TRICHLOROETHYLENE ORM-A | | | | 12/20 |

NOV 3 1980

51-47

| Arrived AM PM | Departed AM PM | Mat'l. Rec'd By | Date | Warehouseman Signature | The agreed or declared value of the property hereby specifically stated by the shipper to b |
|---|---|---|---|---|---|

*If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight"

**OTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The fibre xes for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of UNIFORM FREIGHT ASSIFICATION.**

property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned and destined as indicated below, which said carrier (the word carrier understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise iver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time inter- in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifica- n effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.

pper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his

**Shipping Order** Must be legibly filled in, in Ink, in Indelible Pencil, or in Carbon, and retained by the Agent.

IVE, subject to the classifications and tariffs in effect on the date of the issue of ipping Order, from PIONEER SALT AND CHEMICAL COMPANY

PER _____

"This is to certify that the above named materials aare properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regularions of the Department of Transportation."

**EMERGENCY**

**FOR HELP IN CHEMICAL EMERGENCIES INVOLVING SPILL, LEAK, FIRE OR EXPOSURE, CALL THIS TOLL FREE NUMBER 1-800-424-9300 NIGHT OR DAY**

AR301207

EXPEDITING RECORD

| ITEM | DATE | C | P | W | PERSON CONTACTED | DEL. PROM. | REMARKS |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
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EDP AND ACCOUNTING

**AMETEK**

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA 19440

No. 70194

**RECEIVING REPORT**

REC'D FROM Pioneer Salt & Chemical DATE 10/2/89

ADDRESS Phila, Pa. DEPT. 28-421

| P. O. NUMBER | COLLECT ☐ CHARGES | VIA | NO. OF PACKAGES |
|---|---|---|---|
| 423162 | PREPAID ☒ | Rail | |

SHIPMENT PARTIAL ☐ COMPLETE ☒

CONDITION OF CONTAINER. GOOD ☒ POOR ☐ CRUSHED ☐ OPEN ☐

| QUAN. REC'D. | PART NO. | DESCRIPTION |
|---|---|---|
| 1000 gals. | | Trichlorethylene |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

| Q. C. INSPECTION | DELIVER TO | WEIGHT |
|---|---|---|
| ☐ YES ☒ NO | D.C. | 12,120# |

DESCRIPTION OF DEFECT:

NOV 3 1989

REC'D BY Bob

FORM NO 138 B

1

AR301209

# PURCHASE REQUISITION

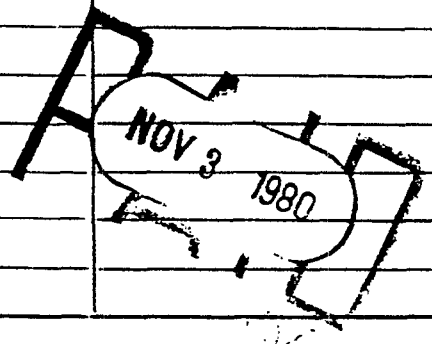
**AMETEK**

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA. 19440

FROM _____ DEPT. _____ FOR ACCOUNT _____

CUSTOMER _____ JOB ORDER _____ SR# _____

| QUANTITY | PRIORITY RATING | CONTRACT NO. |
|---|---|---|
| | | 24/90 |




REQ. BY _____ DATE _____ SUG. SUPL. _____

APPROVED _____ ADDRESS _____

DEL. REQ. _____

FORM 101C

AR301210

**AMETEK**
HUNTER SPRING DIVISION
1 SPRING AVENUE, HATFIELD, PENNSYLVANIA 19440

REMITTANCE STATEMENT

| INVOICE DATE | GROSS AMOUNT | DISCOUNT | NET AMOUNT |
|---|---|---|---|
| 9/09/0 | 2,908.80 | | 2,908.80 |
| | 2,908.80 | | 2,908.80 |

DETACH BEFORE
DEPOSITING CHECK

**AMETEK**
HUNTER SPRING DIVISION • 1 SPRING AVE., HATFIELD, PENNSYLVANIA 19440

1-103
210

96997

No. 96997

| DATE | | |
|---|---|---|
| MO. | DAY | YR. |
| 11 | 03 | 80 |

BANKERS TRUST COMPANY
16 WALL STREET, NEW YORK, N.Y.

PAY EXACTLY THE SUM OF

| AMOUNT | |
|---|---|
| DOLLARS | CENTS |
| $***2,908. | 80 |

FACTORY ACCOUNT

TO THE ORDER OF

PIONEER SALT CO
940 N DELAWARE AVE
PHILADELPHIA PA 19123

**AMETEK**
HUNTER SPRING DIVISION

1 **NON-NEGOTIABLE**
AUTHORIZED SIGNATURES

⑈00096997⑈ ⑆0210⑆0103⑆01⑈000116 74⑈

L4-87562

AR301211

## EXPEDITING RECORD

| ITEM | DATE | C | P | W | PERSON CONTACTED | DEL. PROM. | INT. | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
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| | | | | | | | | |

ORIGINAL INVOICE

**PIONEER SALT & CHEMICAL CO.**
440 N. DELAWARE AVE., PHILA., PA. 19123
215 - 925-6500

| | |
|---|---|
| BILL OF LADING | 14435 |
| INVOICE # | 30556 |
| DATE ORDERED | 11/12/80 |
| DATE DELIVERED | 11/14/80 |

PLEASE INDICATE THE INVOICE NUMBER WHEN REMITTING. INDICATE THE ABOVE ON ALL CORRESPONDENCE CONCERNING THIS SHIPMENT.

SHIP TO
AMETEK HUNTER SPRINGS DV
1 SPRING AVE
HATFIELD PA 19440

BILL TO
AMETEK HUNTER SPRINGS DV
1 SPRING AVE
HATFIELD PA 19440

02

CUSTOMER SERVICE REPRESENTATIVE
IRENE OLKOWSKI

| CUSTOMER ORDER # | CARRIER | CUSTOMER CODE | MODE OF DEL. | FREIGHT | TRACTOR/TRAILER | TERMS | AREA | SLM. # |
|---|---|---|---|---|---|---|---|---|
| 42945 | KRAJACK | 043801-00 | | | | NET 30 DAYS | P11 | 09 |

| NO. OF UNITS ORDERED | DESCRIPTION | NO. OF UNITS RECEIVED | LBS. OR GALS. RECEIVED | PRICE | DOLLAR AMOUNT |
|---|---|---|---|---|---|
| 1 | TRICHLOROETHYLENE<br>TANK TRUCK 1,000 GAL-1,999 GAL<br>PRODUCT NUMBER 23110-T23-BAH-DD | 1 | 10,680<br>÷ 12.1 = 882-gals | 26.000 CWT | 2,776.80 |

PAST DUE INVOICES ARE SUBJECT TO A 1.5% PER MONTH INTEREST CHARGE
ANNUAL EFFECTIVE RATE 18%

P.O. NO. P495
DUE DATE 1-05
DISCOUNT
RECEIVING 10598
VOUCHER AMOUNT 2,776.80
ACCOUNT NO. 28-421
WORK ORDER NO. 11-14
APPROVED
MATERIAL
MATERIAL
2776.80

RECEIVED
NOV 26 9 38 AM '80
HUNTER SPRING
A DIV. OF AMETEK, INC.
HATFIELD, PA.

JAN 5 1981

AR301223

PAGE 1
80112

PLEASE INCLUDE INVOICE NUMBER ON ALL CHECKS
801124

PLEASE NOTE

Your order, su... the terms, conditions and certification on the back hereof, has been invoiced as sho... herein, if this in... vers only a portion of buyer's order, then the terms and conditions herein shall apply also to all subsequer... shipments thereunder, and all subsequent shipments shall be subject to delivery when available at seller's prices in effect at date of shipment - if incorrect in any detail, please notify the sales office serving yo... mentioning above invoice number and name of first product listed. We thank you for your order.

DUE DATE
12/14/80

2,7...

FOR YOUR CONVI...

**AMETEK**

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA 19440

No. 70951

**RECEIVING REPORT**

REC'D FROM Pioneer Salt & Chemical DATE 11/14/82

ADDRESS Rhula, Pa. DEPT 27-28-42

| P O NUMBER | COLLECT ☐ CHARGES | VIA | NO. OF PACKAGES |
|---|---|---|---|
| 429452 | PREPAID ☐ | Krajack Tank Lines | |

SHIPMENT PARTIAL ☐ COMPLETE ☒

CONDITION OF CONTAINER: GOOD ☒ POOR ☐ CRUSHED ☐ OPEN ☐

| QUAN. REC'D. | PART NO. | DESCRIPTION |
|---|---|---|
| 876 | | Gals. Trichloroethylene |

| Q. C. INSPECTION | DELIVER TO | WEIGHT |
|---|---|---|
| ☐ YES ☒ NO | D.C. | |

DESCRIPTION OF DEFECT:

JAN 5 REC'D

REC'D BY Bob

FORM NO 138 B

1

AR301214

**PURCHASE REQUISITION**

**AMETEK**

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA. 19440

DEPT. FOR ACCOUNT 27-22-421

CUSTOMER JOB ORDER SR#

| QUANTITY | PRIORITY RATING | CONTRACT NO. |
|---|---|---|
| 1 CA. | TRICHLORETHYLENE .26/# | |
| | * #1 | |
| | SEND SAFETY DATA SHEETS | |

JAN

REQ. BY DATE SUG. SUPL.

APPROVED ADDRESS

101C DEL. REQ.

AR301215

480 WESTFIELD AVE. Phone: 352-2093-4 Carrier Agent's No.

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading.

From

at

the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown) marked, consigned and destined as shown below, which said company (the word company being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its own railroad, water line, highway route or route, or within the territory of its highway operations, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the conditions not prohibited by law, whether printed or written, herein contained, including the conditions on back hereof, which are hereby agreed to by the shipper and accepted for himself and his assigns.

PICK-UP DRIVER James Morris TRACTOR NO. 196 TANK NO. 204

SHIPPER Pioneer Seed & Chem. DATE 11-14-1980

ADDRESS Bayonne, N.J. 42945Z ORDER NO. 27948

PICK-UP TIME IN: OUT: LOADING - TRUCK PUMP ☐ CUST. PUMP ☐ GRAV. ☐ DRUM JOB ☐ OUTSIDE SCALE ☐

SPECIAL SERVICES ON PICK-UP:

PICK UP ONLY | SPEEDOMETER: START FINISH

| Gallons | Comp. Nos. | H/M | Description of Articles Marks & Exceptions | Class | Wt. |
|---|---|---|---|---|---|
| 1000 | 2 | | TRICHLOROETHYLENE | 46180 | |
| | | | | 33880 | |
| | | | | 12300 | |
| | | | 1st Stop of | | |

C.O.D. charge to be paid by { Shipper ☐ Consignee ☐

Subject to Section 7 of Conditions applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor.)

If charges are to be prepaid, write or stamp here, "to be Prepaid."

Received $ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per (The signature here acknowledges receipt of the amount prepaid.)

Charges Advanced:

$

*If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or Shipper's Weight."

NOTE-Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding

per

THE CARRIER CERTIFIES THAT CARGO TANK SUPPLIED FOR THIS SHIPMENT IS A PROPER CONTAINER FOR THE TRANSPORTATION OF THE COMMODITY AS SUPPLIED BY THE SHIPPER.

DEL. DRIVER James Morris TRACTOR NO. 196 TANK NO. 204

CONSIGNEE Amitek C. Hunter DATE 11-14-19 8

ADDRESS Hatfield Pa. ORDER NO.

DELIVERY TIME IN: OUT: UNLOAD TRUCK PUMP ☐ CUST. PUMP ☐ GRAV. ☐ DRUM JOB ☐ OUTSIDE SCALE ☐

SPECIAL SERVICES ON DELIVERY:

DELIVERY ONLY | SPEEDOMETER: START FINISH

MILEAGE ON BILL OF LADING MUST CORRESPOND WITH MILEAGE ON LOG

| STATES | N.Y. | N.J. | DEL. | MD. | CONN. | R.I. | MASS | PA. | OTHERS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

Shipper, Per Agent, Per

Consignee address of shipper.

AN EQUAL OPPORTUNITY EMPLOYER

AR301216

[illegible] TANK LINES INC. RUSSELLE PARK, N.J. 07204

480 WESTFIELD AVE. Phone: 352-2093-4 Carrier Agent's No.

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading.

From

at

the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown) marked, consigned and destined as shown below, which said [illegible] (the word company being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its own railroad, water line, highway route or route, or within the territory of its highway operations, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the conditions not prohibited by law, whether printed or written, herein contained, including the conditions on back hereof, which are hereby agreed to by the shipper and accepted for himself and his assigns.

PICK-UP DRIVER JAMES MORRIS TRACTOR NO. 196 TANK NO. 204

SHIPPER AMIDE HUNTER DATE 11-14 19 8

ADDRESS HATFIELD PA. ORDER NO.

PICK-UP TIME IN: OUT: LOADING - TRUCK PUMP ☐ CUST. PUMP ☐ GRAV. ☐ DRUM JOB ☐ OUTSIDE SCALE ☐

SPECIAL SERVICES ON PICK-UP:

PICK UP ONLY SPEEDOMETER: START FINISH

| Gallons | Comp. No. | H/M | Description of Articles Marks & Exceptions | Class. | Wt. |
|---|---|---|---|---|---|
| 124 | 2 | | TRICHLOROETHYLENE | | |
| | | | RETURNED TO PIONEER SALT [illegible] | | |

JAN 5 1981

C.O.D. charge to be paid by } Shipper ☐ Consignee ☐

Subject to Section 7 of Conditions applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor.)

If charges are to be prepaid, write or stamp here, "to be Prepaid."

Received $ to in prepayment of the charges on property described hereon.

Agent or Cashier

Per (The signature here acknowledges the amount prepaid.)

Charges Advanced:

$

If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or Shipper's Weight."

NOTE-Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding

per

THE CARRIER CERTIFIES THAT CARGO TANK SUPPLIED FOR THIS SHIPMENT IS A PROPER CONTAINER FOR THE TRANSPORTATION OF THE COMMODITY AS SUPPLIED BY THE SHIPPER

DEL. DRIVER JAMES MORRIS TRACTOR NO. 196 TANK NO. 204

CONSIGNEE PIONEER SALT & CHEM DATE 11-4 19 8

ADDRESS PHILA PA ORDER NO.

DELIVERY TIME IN: OUT: UNLOAD TRUCK PUMP ☐ CUST. PUMP ☐ GRAV. ☐ DRUM JOB ☐ OUTSIDE SCALE ☐

SPECIAL SERVICES ON DELIVERY:

DELIVERY ONLY SPEEDOMETER: START FINISH

MILEAGE ON BILL OF LADING MUST CORRESPOND WITH MILEAGE ON LOG

| STATES | N.Y. | N.J. | DEL. | MD. | CONN. | R.I. | MASS | PA. | OTHERS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| E | | | | | | | | | | | |

Shipper, Per

Agent must detach and must sign the [illegible]

permanent address of shipper.

AN EQUAL OPPORTUNITY EMPLO

AR301217

DELAY
REPORT

30143

# KRAJACK Tank Lines, Inc.

SOLVENT AND CHEMICAL TRANSPORTATION

480 EAST WESTFIELD AVE. • ROSELLE PARK, N. J. • PHONE: (201) 352-2093

ORDER NO.

SHIPPER [illegible] CONSIGNEE [illegible] B/L NO. [illegible]

ADDRESS [illegible] NJ ADDRESS HATFIELD PA DATE 11-14-80

| ARRIVED | LEFT | TRACTOR NO. | TRAILER NO. | THIS REPORT COVERS TIME AT |
|---|---|---|---|---|
| 7:30 AM | [illegible] AM | [illegible] | [illegible] | SHIPPERS PLANT / CONSIGNEES PLANT |

| REASON FOR DELAY | FROM | TO | TOTAL HR. | TOTAL MIN. | | FROM | TO | TOTAL HR. | TOTAL MIN. |
|---|---|---|---|---|---|---|---|---|---|
| WAITING FOR ESCORT-IN | | | | | DRUMMING | | | | |
| WAITING FOR INSTRUCTIONS TO LOAD | | | | | WAITING FOR DRUMS | | | | |
| WAITING FOR INSTRUCTIONS TO UNLOAD | 9:30 | 10:00 | | 30 | STEAMING | | | | |
| WAITING FOR LABORATORY TEST | | | | | STUCK VALVES | | | | |
| WAITING FOR OTHER TRUCK OR CARS | | | | | IMPROPER FITTINGS | | | | |
| WEIGHING IN | | | | | INSUFFICIENT HOSE | | | | |
| NO LOADER AVAILABLE | | | | | LEAKING HOSE | | | | |
| NO UNLOADER AVAILABLE | | | | | PUMP FAILURE | | | | |
| LOADING FROM DRUMS | | | | | WEIGHING OUT | | | | |
| LOW LOADING | | | | | WAITING FOR BILLS | | | | |
| LOW UNLOADING | | | | | OTHER | | | | |
| NORMAL LOADING | | | | | | | | | |
| NORMAL UNLOADING | [illegible] | [illegible] | 1 | | | | | | |

OTHER

Stop off
TCE

JAN 5 1981

AUTHORIZED SIGNATURE

DRIVER

TRUCK PUMP ☑ DRIVER: CHECK ONE
TRUCK COMPRESSOR ☐ CUSTOMER'S COMPRESSOR ☐
CUSTOMER'S PUMP ☐ GRAVITY ☐

This memo is being furnished at the request of and in cooperation with your Company to substantiate arrival and departure time, reason for delay, etc., and must be certified accurately as to arrival and departure on your premises and not loading or unloading point.

LEAVE AT POINT OF DELAY

GAF BUSINESS FORMS, SHELB

AR301218

**AMETEK**
HUNTER SPRING DIVISION
1 SPRING AVENUE, HATFIELD, PENNSYLVANIA 19440

REMITTANCE STATEMENT

| INVOICE DATE | GROSS AMOUNT | DISCOUNT | NET AMOUNT |
|---|---|---|---|
| 11/14/70 | 2,776.80 | | 2,776.80 C |
| | 2,776.80 | | 2,776.80 |

DETACH BEFORE
DEPOSITING CHECK

**AMETEK**
HUNTER SPRING DIVISION • 1 SPRING AVE., HATFIELD, PENNSYLVANIA 19440

1-103
210

97820

No. 97820

| DATE | | |
|---|---|---|
| MO. | DAY | YR. |
| 1 | 05 | 81 |

BANKERS TRUST COMPANY
16 WALL STREET, NEW YORK, N.Y.

PAY EXACTLY THE SUM OF

| AMOUNT | |
|---|---|
| DOLLARS | CENTS |
| $***2,776. | 80 |

FACTORY ACCOUNT

TO THE ORDER OF

PIONEER SALT CO
940 N DELAWARE AVE
PHILADELPHIA PA 19123

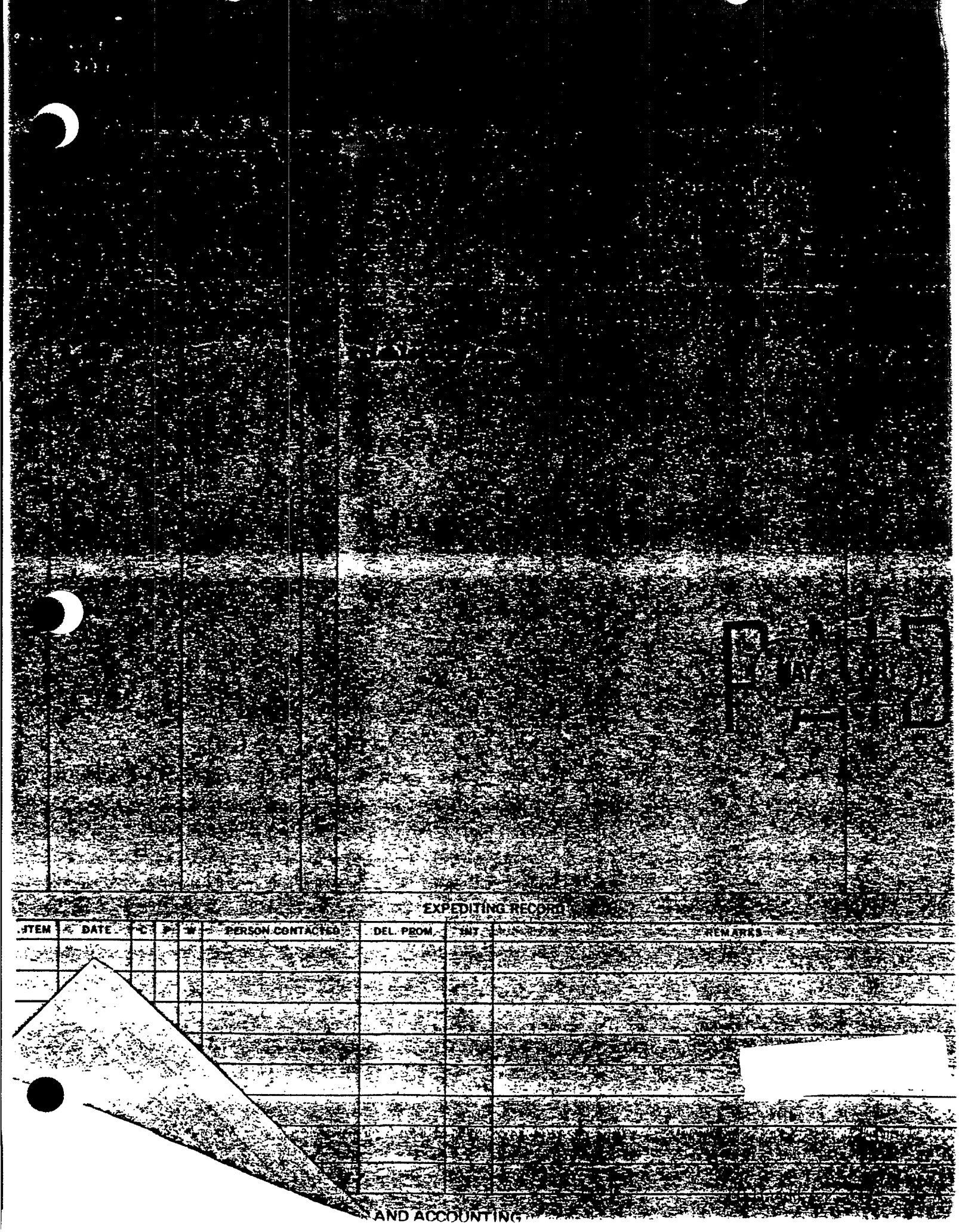
**AMETEK**
HUNTER SPRING DIVISION

1 NON-NEGOTIABLE
AUTHORIZED SIGNATURES

L4-87562

⑈000978 20⑈ ⑆0 2 1 0⑆0 1 0 3⑆0 1⑈000 1 1 6 7 4⑈

AR301219


EXPEDITING RECORD
ITEM
DATE
C
P
W
PERSON CONTACTED
DEL. PROM
INT
REMARKS
AND ACCOUNTING

# ORIGINAL INVOICE

**PIONEER SALT & CHEMICAL CO.**
940 N. DELAWARE AVE., PHILA., PA. 19123
215 - 925-6500

| | | | |
|---|---|---|---|
| BILL OF LAD | 21948 | INVOICE # | 38170 |
| DATE ORDEF | | | 3/10/81 |
| DATE DELIVERED | | | 3/10/81 |

PLEASE INDICAT[redacted]'NVOICE NUMBER WHEN REMITTIN[redacted]) INDICATE THE ABOVE ON ALL [redacted]ESPONDENCE CONCERNING THIS DOCUMENT.

SHIP TO
AMETEK HUNTER SPRINGS DV
1 SPRING AVE
HATFIELD PA 19440

BILL TO
AMETEK HUNTER SPRINGS DV
1 SPRING AVE
HATFIELD PA 19440

02
CUSTOMER SERVICE REPRESENTATIVE
PAUL DEVINE

| CUSTOMER ORDER # | CARRIER | CUSTOMER CODE | MODE OF DEL. | FREIGHT | TRACTOR/TRAILER | TERMS | AREA | SLM. # |
|---|---|---|---|---|---|---|---|---|
| 43971 | PIONEER | 043801-00 | | | | NET 30 DAYS | P11 | 09 |

| NO. OF UNITS ORDERED | DESCRIPTION | NO. OF UNITS RECEIVED | LBS. OR GALS. RECEIVED | PRICE | DOLLAR AMOUNT |
|---|---|---|---|---|---|
| 1 | TRICHLOROETHYLENE<br>TANK WAGON 1,000 GAL-1,999 GAL<br>PRODUCT NUMBER 23110-T30-BAH-CC | 1 | 12,660 | 27.000 CWT | 3,418.20 |
| | RECEIVING UNTIL 4:45 PM | | | | |
| | PAST DUE INVOICES ARE SUBJECT TO A 1.5% PER MONTH INTEREST CHARGE<br>ANNUAL EFFECTIVE RATE 18% | | | | |

RECEIVED
APR 9 10 00 AM '81
HUNTER SPRING
A DIV. OF AMETEK, INC.
HATFIELD, PA.

VOUCHER NO. 11.1.1
VENDOR NO. P 495
INVOICE DATE 3-10
DUE D 5-04
D NO. WORK ORDER NO.
DISC
APPROVED
AMOUNT 3418.20
MATERIAL
DISTRIBUTION AMOUNT 3418.20
T NO. 51-421
MATERIAL
DISTRIBUTION AMOUNT
ACCOUNT NO.

MAY

PAGE 1
PLEASE INCLUDE INVOICE NUMBER ON ALL CHECKS

| | |
|---|---|
| 810407 | 810407 |

PLEASE NOTE

Your order, subject to the terms,conditions and certification on the back hereof,has been invoiced as shown herein, if this invoice covers only a portion of buyer's order, then the terms and conditions herein shall apply also to all subsequent shipments thereunder, and all subsequent shipments shall be subject to delivery when available at seller's prices in effect at date of shipment - if incorrect in any detail, please notify the sales office serving you, mentioning above invoice number and name of first product listed. We thank you for your order.

| DUE DATE |
|---|
| 04/09/81 |

3,418.20

AR301221

No. 73309

# AMETEK

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA 19440

## RECEIVING REPORT

REC'D FROM Pioneer Salt & Chemical DATE 3/10/81

ADDRESS Phila, Pa DEPT. 51-421

| P. O. NUMBER | COLLECT ☐ CHARGES | VIA | NO. OF PACKAGES |
|---|---|---|---|
| 439712 | PREPAID ☒ | Del. | |

SHIPMENT PARTIAL ☐ COMPLETE ☒ CONDITION OF CONTAINER. GOOD ☒ POOR ☐ CRUSHED ☐ OPEN ☐

| QUAN. REC'D. | PART NO. | DESCRIPTION |
|---|---|---|
| 1,000 gals | | Trichlorethylene |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

| Q. C. INSPECTION | DELIVER TO | WEIGHT |
|---|---|---|
| ☐ YES ☒ NO | D.C | 12,660# |

DESCRIPTION OF DEFECT:

Called 4-3 for copy of invoice

925-6500

REC'D BY Bak

FORM NO 138 B

1

AR301222

# PURCHASE REQUISITION

**AMETEK / Hunter Spring**
1 SPRING AVENUE, HATFIELD, PENNSYLVANIA 19440

№ 23057

FROM _____ DEPT. _____ FOR ACCOUNT _____

OMER _____ JOB ORDER _____ SR# _____

| QUANTITY | PRIORITY RATING | CONTRACT NO. |
|---|---|---|
| | | 2700/A-KIT |

MAY 1981

REQ. BY _____ DATE _____ SUG. SUPL. PIONEER

APPROVED _____ ADDRESS _____

FOR _____ DEL. REQ. _____

AR301223

ROLLINS TERMINALS, INC.
EAST SECOND STREET
BAYONNE, NEW JERSEY
07002

Number 0009331 Date 3/10/81

MAR 10 PM 12:05 00 071020 ± Gross

MAR 10 AM 11:35 00 058360 ± Tare

12660 Net

Commodity NEU TRI / COMP 1/ @ Per

From DOW CHEMICAL CO Driver On ( ) Off ( )

To PIONEER SALT & CHEM

Address PHILA PA

Carrier CUST TRK

Tractor No. 482 Trailer No. 376

MAR 1981

Weighmaster's Signature Rose Spano

RTB-30

AR301224

**This Memorandum** is an acknowledgment that a Bill of Lading has been issued and is not the Original Bill of Lading, nor a copy or duplicate, covering the property named herein, and is intended solely for filing or record. Shipper's No. #482-3

PIONEER [redacted] 3-10-81

(Name of Carrier) Carrier's No.

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading,

947 North Delaware Ave. • Philadelphia, PA. 19123 From PIONEER SALT & CHEMICAL CO.

[illegible] rty described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said [illegible] ord carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery [illegible] nation, if on its own route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property [illegible] e to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions [illegible] Uniform Domestic Straight Bill of Lading set forth (1) in Official, Southern, Western and Illinois Freight Classification in effect on the date thereof, if this is a rail or rail-water shipment, or (2) [illegible] applicable motor carrier classification or tariff if this is a motor carrier shipment.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consigned to [redacted] AMETEK - HUNTER SPRING D

(Mail or street address of consignee—for purposes of notification o

Destination HATFIELD State PA Zip County Delivery Address ★

(★ To be filled in only when shipper desires and governing tariffs provide for delivery there

Route

Delivering Carrier Car or Vehicle Initials P.O. 43971 No.

| No. Packages | Kind of Package, Description of Articles, Special Marks, and Exceptions | *WEIGHT (Subject to Correction) | Class or Rate | Check Column |
|---|---|---|---|---|
| [redacted] | | | | |
| 1000 gals. | TRICHLOROETHYLENE #1 COMPT. | 12660# | | |
| | | | | |
| | [signature] | | MAY | 1981 |
| | | | | |

Subject to Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor)

If charges are to be prepaid, write or stamp here; "To be Prepaid."

Received $ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per (The signature here acknowledges the amount prepaid.)

Charges Advanced:

$

†Shipper's imprint in lieu of stamp is a part of Bill of Lading approved by Interstate Commerce Commission.

[illegible] shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is carrier's or shipper's [illegible]

NOTE—Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. [illegible] ed or declared value of the property is hereby specifically stated by the shipper to be not exceeding per

†The fibre boxes used for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of the Consolidated Freight Classification.

PIONEER SALT & CHEMICAL CO. Shipper, Per Agent, Per

Permanent post-office address of shipper, 947 North Delaware Ave. • Philadelphia, PA. 19123

© 1975 • PRINTED IN U.S.A. BY
WilsonJones
GRAYLINE FORM 44-302 4-PART

AR301225

**AMETEK**
HUNTER SPRING DIVISION
1 SPRING AVENUE, HATFIELD, PENNSYLVANIA 19440

REMITTANCE STATEMENT

| INVOICE DATE | GROSS AMOUNT | DISCOUNT | NET AMOUNT |
|---|---|---|---|
| 3/10/1 | 3,418.20 | | 3,418.20 |
| | 3,418.20 | | 3,418.20 |

DETACH BEFORE
DEPOSITING CHECK

**AMETEK**
HUNTER SPRING DIVISION • 1 SPRING AVE., HATFIELD, PENNSYLVANIA 19440

1-103
210
99589

No. 99589

| DATE | | |
|---|---|---|
| MO. | DAY | YR. |
| 5 | 06 | 81 |

BANKERS TRUST COMPANY
16 WALL STREET, NEW YORK, N.Y.

PAY EXACTLY THE SUM OF

| AMOUNT | |
|---|---|
| DOLLARS | CENTS |
| $***3,418.20 | |

FACTORY ACCOUNT

TO THE ORDER OF

PIONEER SALT CO
940 N DELAWARE AVE
PHILADELPHIA PA 19123

**AMETEK**
HUNTER SPRING DIVISION

1 NON-NEGOTIABLE
AUTHORIZED SIGNATURES

L4-87862

⑈00099589⑈ ⑆0210⑆0103⑆01⑈000116 74⑈

AR301226

## EXPEDITING RECORD

| ITEM | DATE | C | P | W | PERSON CONTACTED | DEL. PROM. | INT. | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |

**PIONEER SALT & CHEMICAL CO.**
940 N. DELAWARE AVE., PHILA., PA. 19123
215 - 925-6500

| | |
|---|---|
| BILL OF LADING | 54147 |
| DATE ORDERED | |
| DATE DELIVER | 6/19/81 |
| INVOICE # | 42424 |
| | 6/17/81 |

PLEASE INDICATE THE INVOICE NUMBER WHEN REMITTING. INDICATE THE ABOVE ON ALL CORRESPONDENCE CONCERNING THIS SHIPMENT.

SHIP TO
AMETEK HUNTER SPRINGS DV
1 SPRING AVE
HATFIELD PA 19440

BILL TO
AMETEK HUNTER SPRINGS DV
1 SPRING AVE
HATFIELD PA 19440

02

CUSTOMER SERVICE REPRESENTATIVE
KAREN ROSALES

| CUSTOMER ORDER # | CARRIER | CUSTOMER CODE | MODE OF DEL. | FREIGHT | TRACTOR/TRAILER | TERMS | AREA | SLM. # |
|---|---|---|---|---|---|---|---|---|
| 44729 | PIONEER | 043801-00 | | | | NET 30 DAYS | P11 | 09 |

| NO. OF UNITS ORDERED | DESCRIPTION | NO. OF UNITS RECEIVED | LBS. OR GALS. RECEIVED | PRICE | DOLLAR AMOUNT |
|---|---|---|---|---|---|
| 1 | TRICHLORDETHYLENE<br>TANK WAGON 1,000 GAL-1,999 GAL<br>PRODUCT NUMBER 23110-T30-BAH-CC<br><br>RECEIVING COSES 4:45 PM<br><br>PAST DUE INVOICES ARE SUBJECT TO A 1.5% PER MONTH INTEREST CHARGE<br>ANNUAL EFFECTIVE RATE 18% | 1 | 12,280 | 27.000 CWT | 3,315.60 |

| | | |
|---|---|---|
| VENDOR NO. 495 | VOUCHER NO. 60760 | INVOICE DATE 6-17 |
| DUE DATE 8-03 | RECEIVING-RECORD NO. | WORK ORDER NO. |
| DISCOUNT | VOUCHER AMOUNT 3315.60 | APPROVED |
| DISTRIBUTION AMOUNT 3315.60 | ACCOUNT NO. 51-421 | MATERIAL |
| DISTRIBUTION AMOUNT | ACCOUNT NO. | MATERIAL |

RECEIVED
JUN 26 11 15 AM '81
HUNTER SPRING
A DIV. OF AMETEK, INC.
HATFIELD, PA.

AUG 3 1981

E 1
10624

PLEASE INCLUDE INVOICE NUMBER ON ALL CHECKS
810624

PLEASE NOTE

rder, subject to the terms,conditions and certification on the back hereof,has been invoiced as shown if this invoice covers only a portion of buyer's order, then the terms and conditions herein shall apply also bsequent shipments thereunder, and all subsequent shipments shall be subject to delivery when available 's prices in effect at date of shipment - if incorrect in any detail, please notify the sales office serving you, ing above invoice number and name of first product listed. We thank you for your order.

| DUE DATE |
|---|
| 07/19/81 |

3,315.60

FOR YOUR CONVENIENCE

AR301228

**AMETEK**

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA 19440

No. 75542

RECEIVING REPORT

REC'D FROM Pioneer Salt & Chemical DATE 6/22/81

ADDRESS Phila, Pa DEPT. 51-421

| P. O NUMBER | COLLECT ☐ CHARGES | VIA | NO OF PACKAGES |
|---|---|---|---|
| 44729z | PREPAID ☒ | Del. | |

SHIPMENT PARTIAL ☐ COMPLETE ☒

CONDITION OF CONTAINER. GOOD ☒ POOR ☐ CRUSHED ☐ OPEN ☐

| QUAN. REC'D. | PART NO. | DESCRIPTION |
|---|---|---|
| 1000 Gal. | | Trichloroethylene |

| Q. C. INSPECTION | DELIVER TO | WEIGHT |
|---|---|---|
| ☐ YES ☒ NO | D.C. | 12,280# |

DESCRIPTION OF DEFECT:

AUG 3 1981

REC'D BY Bob

FORM NO 138 B

1

AR301229

**AMETEK**

# PURCHASE REQUISITION

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA. 19440

FROM _____ DEPT. _____ FOR ACCOUNT 51-[illegible]

CUSTOMER _____ JOB ORDER _____ SR# _____

| QUANTITY | PRIORITY RATING | CONTRACT NO. |
|---|---|---|
| [illegible] | [illegible] | HYLENE |
| | | LAST ORDER [illegible] |
| | | 27.00/C |

PAID AUG 3 1981

REQ. BY [illegible] DATE [illegible] SUG. SUPL. [illegible]

ADDRESS [illegible] AWARE AVE.

APPROVED [illegible] DEL. REQ. PHILADELPHIA, PA. 19122

'01C

AR301230

ROLLINS TERMINALS, INC.
EAST SECOND STREET
BAYONNE, NEW JERSEY
07002

Number 6449481 Date 6/22/81

| | | | |
|---|---|---|---|
| 22 AM 7:38 | 00 | 042840 ± | Gross |
| 22 AM 6:16 | 00 | 030560 ± | Tare |
| | | 12280 | Net |

Commodity NEU TRI /COMPT NO 1/ @ Per

From DOW CHEMICAL CO Driver On ( ) Off ( ✓)

To PIONEER SALT & CHEM

Address PHILA PA

Carrier CUST TRUCK

Tractor No. 483 Trailer No. 123

AUG 3 1981

Weighmaster's Signature

RTB-30

AR301231

**PIONEER SALT & CHEMICAL CO.**
940 N. DELAWARE AVE., PHILA., PA 19123
(215) 574-8500

| | |
|---|---|
| Bill of Lading # | 54147 |
| Date Ordered | |
| Desired Delivery Date | 6/22/81 |

SHIP TO
AMETEK-HUNTER SPRINGS DIV.
1 SPRING AVE.
HATFIELD, PA

BILL TO

Subject to Section 7 of conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement.

If charges are to be prepaid, write or stamp here, "To be Prepaid."

Received $ _____ to apply in prepayment of the charges on the property described hereon.

_____ Agent or Carrier

...rrier shall not make delivery of th... without payment of freight ar... wful charges.

_____ (Signature of Consignor)

Per _____ (The signature here acknowledges only the amount prepaid)

Charges Advanced

$ _____

| Customer Order # | Carrier | Customer Code | Customer Service Representative | Freight | Placard Req'd. | Brd. No. | Area | Salesman # |
|---|---|---|---|---|---|---|---|---|
| 44729 | PIONEER | | | | | | | |

| Qty. Ord. | Qty. Shipped | Description | Line # | Del. Mode | Product Code # | Weight |
|---|---|---|---|---|---|---|
| | 1000 gals. | TRICHLORETHYLENE | | | | 12,280 |
| | | RECEIVING CLOSES 4:45PM | | | | |

42840
30560
12,280

AUG 3 1981

| Arrived | Departed | Mat'l. Rec'd By | Date | Warehouseman Signature |
|---|---|---|---|---|
| AM PM | AM PM | Arthur Louder | | |

The agreed or declared value of the property is hereby specifically stated by the shipper to be

the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight"

**TE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The fibre es for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of UNIFORM FREIGHT ASSIFICATION.**

roperty described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned and destined as indicated below, which said carrier (the word carrier understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise liver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time inter- in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifica- in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.

ipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which ns the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his s.

**is Shipping Order** — **Must be legibly filled in, in Ink, in Indelible Pencil, or in Carbon, and retained by the Agent.**

**ECEIVE, subject to the classifications and tariffs in effect on the date of the issue of this Shipping Order, from PIONEER SALT AND CHEMICAL COMPANY**

"This is to certify that the above named materials aare properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regular-

**EMERGENCY**

**FOR HELP IN CHEMICAL EMERGENCIES INVOLVING SPILL, LEAK, FIRE OR EXPOSURE, CALL THIS TOLL FREE NUMBER 1-800-424-9300 NIGHT OR DAY**

AR301232

CP

**AMETEK**
HUNTER SPRING DIVISION
1 SPRING AVENUE, HATFIELD, PENNSYLVANIA 19440

REMITTANCE STATEMENT

| INVOICE DATE | GROSS AMOUNT | DISCOUNT | NET AMOUNT |
|---|---|---|---|
| 6/17/1 | 3,315.60 | | 3,315.60 |
| | 3,315.60 | | 3,315.60 |

DETACH BEFORE
DEPOSITING CHECK

**AMETEK**
HUNTER SPRING DIVISION • 1 SPRING AVE., HATFIELD, PENNSYLVANIA 19440

1-103
210
857

No. 00857

| DATE | | |
|---|---|---|
| MO. | DAY | YR. |
| 8 | 03 | 81 |

BANKERS TRUST COMPANY
16 WALL STREET, NEW YORK, N.Y.

| AMOUNT | |
|---|---|
| DOLLARS | CENTS |
| $***3,315.60 | |

PAY EXACTLY THE SUM OF

FACTORY ACCOUNT

TO THE ORDER OF

PIONEER SALT CO
940 N DELAWARE AVE
PHILADELPHIA PA 19123

**AMETEK**
HUNTER SPRING DIVISION

1 NON-NEGOTIABLE
AUTHORIZED SIGNATURES

L4-87862

⑈00000857⑈ ⑆0210⑆0103⑆01⑈000116714⑈

AR301233

ORIGINAL INVOICE

**[illegible]ONEER SALT & CHEMICAL CO.**
[illegible] N. DELAWARE AVE., PHILA., PA. 19123
215 - 925-6500

| | |
|---|---|
| BILL OF LADING # [illegible]5157 | INVOICE # 50845 |
| DATE ORDERED | 1/05/82 |
| DATE DELIVERED | 1/08/82 |

PLEASE INDICATE TH[illegible]OICE NUMBER WHEN REMITTING, A[illegible]DICATE THE ABOVE ON ALL CO[illegible]ONDENCE CONCERNING THIS DO[illegible]NT.

SHIP TO
AMETEK HUNTER SPRINGS DV
1 SPRING AVE
HATFIELD PA 19440

BILL TO
AMETEK HUNTER SPRINGS DV
1 SPRING AVE
HATFIELD PA 19440

X130

02

CUSTOMER SERVICE REPRESENTATIVE: KAREN ROSALES

| CUSTOMER ORDER # | CARRIER | CUSTOMER CODE | MODE OF DEL. | FREIGHT | TRACTOR/TRAILER | TERMS | AREA | SLM. # |
|---|---|---|---|---|---|---|---|---|
| 46305 | | 043801-00 | | | | NET 30 DAYS | P11 | 32 |

| NO. OF UNITS ORDERED | DESCRIPTION | NO. OF UNITS RECEIVED | LBS. OR GALS. RECEIVED | PRICE | DOLLAR AMOUNT |
|---|---|---|---|---|---|
| 1 | TRICHLOROETHYLENE<br>TANK WAGON 1,000 GAL-1,999 GAL<br>PRODUCT NUMBER 23110-T30-BAH-DD | 1 | 12,320 | 27.000 CWT | 3,326.40 |

PAST DUE INVOICES ARE SUBJECT TO A 1.5% PER MONTH INTEREST CHARGE
ANNUAL EFFECTIVE RATE 18%

VOUCHER NO. 10451
INVOICE DATE 1-05
FOR NO. 495
2-15 3-01
AMOUNT 3326.40
ACCOUNT NO. 51-421
AMOUNT 3326.40
2/22

JAN 18 12 14 PM '82
HUNTER [illegible]
A DIV. OF [illegible]
HATFIELD, PA

PAID FEB 22 1982

AR301234

PAGE 820114 PLEASE INCLUDE INVOICE NUMBER ON ALL CHECKS 820114

OKK.n.

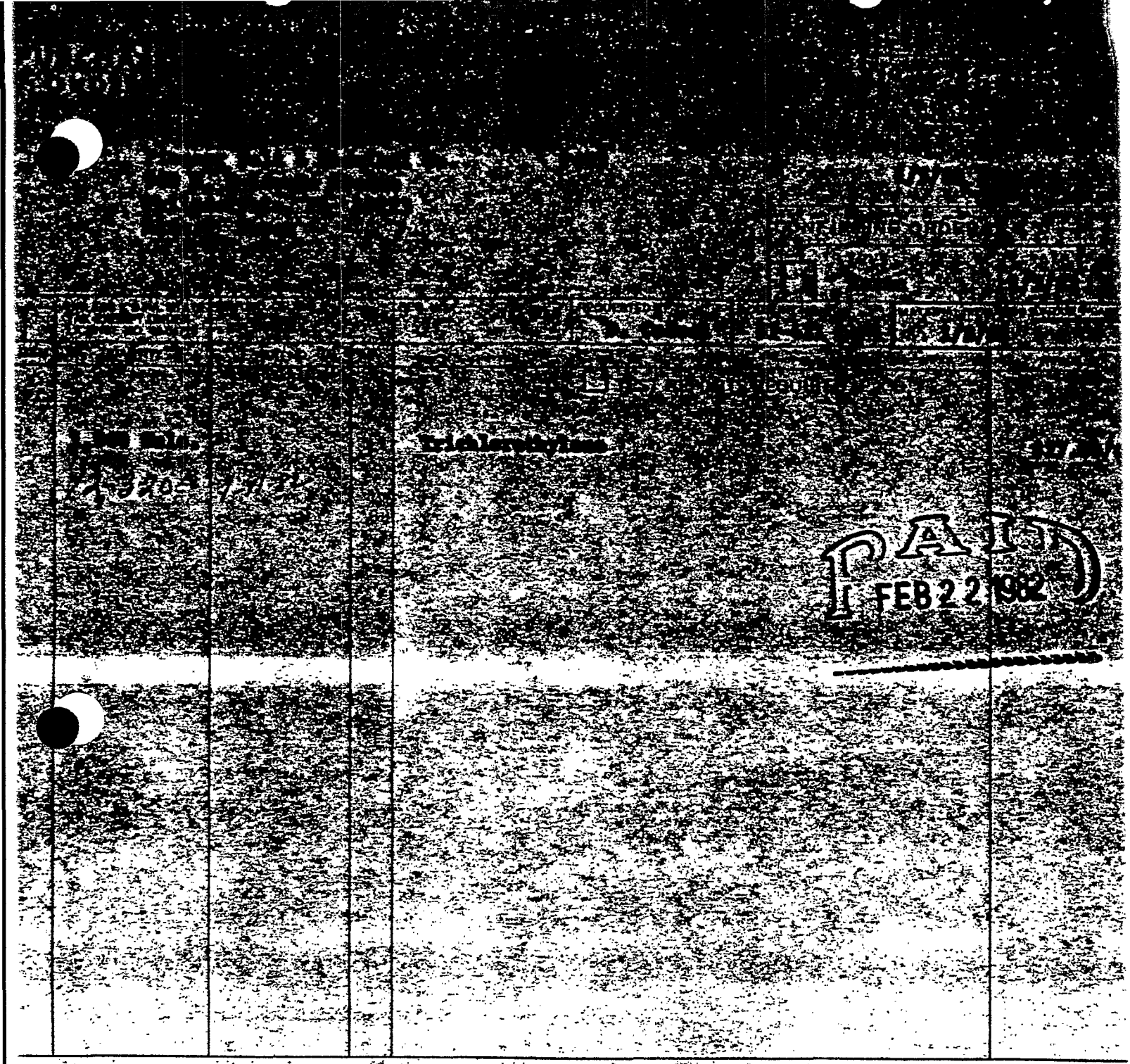
PLEASE NOTE

Your order, subject to the terms, conditions and certification on the back hereof, has been invoiced as shown herein, if this invoice covers only a portion of buyer's order, then the terms and conditions herein shall apply also to all subsequent shipments thereunder, and all subsequent shipments shall be subject to delivery when available at seller's prices in effect at date of shipment - if incorrect in any detail, please notify the sales office serving you, mentioning above invoice number and name of first product listed. We thank you for your order.

DUE DATE 02/07/82

3,326.40

FOR YOUR CONVENIENCE




EXPEDITING RECORD

| ITEM | DATE | C | P | W | PERSON CONTACTED | DEL. PROM. | INT. | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
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| | | | | | | | | |

**AMETEK**

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA 19440

No. 18967

**RECEIVING REPORT**

REC'D FROM Pioneer Salt & Chemical DATE 1/11/82

ADDRESS Phila, Pa. DEPT. 51-421

| P. O. NUMBER | COLLECT ☐ CHARGES | VIA | NO OF PACKAGES |
|---|---|---|---|
| 463052 | PREPAID ☒ | Del | |

SHIPMENT PARTIAL ☐ COMPLETE ☒

CONDITION OF CONTAINER: GOOD ☐ POOR ☐ CRUSHED ☐ OPEN ☐

| QUAN. REC'D. | PART NO. | DESCRIPTION |
|---|---|---|
| 12,320 # | | Trichlorethylene |

AIR FEB 22 1982

Q. C. INSPECTION ☐ YES ☒ NO

DELIVER TO D. C.

WEIGHT

DESCRIPTION OF DEFECT:

REC'D BY Bob

FORM NO 1368

1

AR301236

# PURCHASE REQUISITION

**AMETEK**

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA. 19440

FROM _____ DEPT. _____ FOR ACCOUNT _____

CUSTOMER _____ JOB ORDER _____ SR# _____

| QUANTITY | PRIORITY RATING | CONTRACT NO. |
|---|---|---|
| | | 27.00/cwt |

FEB 22 1982

REQ. BY _____ DATE _____ SUG. SUPL. [redacted]

APPROVED _____

ADDRESS _____

DEL. REQ. _____

FORM 101C

AR301237

**This Shipping Order** must be legibly filled in, in Ink, in Indelible Pencil, on ... Carbon, and retained by the Agent.

Shipper's No. 13320

(Name of Carrier)

Carrier's No.

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading,

at Bayonne NJ 1-31 1982 From Pioneer Salt + Chem

the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its own route, otherwise to deliver to another carrier on the route to said destination. It is agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the conditions not prohibited by law, whether printed or written, herein contained, including the conditions in the Uniform Domestic Straight Bill of Lading set forth (1) in Official, Southern, Western and Illinois Freight Classification in effect on the date hereof, if this is a rail or rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.

**Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back hereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.**

Consigned to Amatex Hunter - Spring Division

(Mail or street address of consignee—for purposes of identification only.)

Destination Hatfield State Pa Zip County Delivery Address * Spring Ave

* To be filled in only when shipper desires and governing tariffs provide for delivery there.

Route

Delivering Carrier Chem Truck Car or Vehicle Initials 501 No. 123

| No. Packages | HM | Kind of Packages, Description of Articles, Special Marks, and Exceptions (If Hazardous Materials—Proper Shipping Name and Class Only) | | *Weight (Subject to Correction) | Class or Rate | Check Column |
|---|---|---|---|---|---|---|
| | | Trichloroethylene | G | 44040 | | |
| | | UN 2831 | T | 3720 | | |
| | | Comp 2 | N | 12,320 | | |
| | | 46305 | | | | |

FEB 2 1982

Subject to Section 7 of conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of consignor)

If charges are to be prepaid, write or stamp here, "To be Prepaid."

Received $ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per (The signature here acknowledges the amount prepaid.)

Charges Advanced: $

*Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.

The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding per

*Shipper's imprint in lieu of stamp; not a part of Bill of Lading approved by Interstate Commerce Commission.

The fibre boxes used for this shipment conform to the specifications set forth in the box maker's certificate thereon and all other requirements of the Consolidated Freight Classification.

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

I hereby certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the department of transportation.

Shipper, Per

Agent must detach and retain this Shipping Order and must sign its Original Bill of Lading.

Permanent post-office address of shipper,

© 1978 • PRINTED IN U.S.A. BY
Wilson Jones Company
GAYLINE FORM 44-3021, 4-PART

cp

**AMETEK**
HUNTER SPRING DIVISION
1 SPRING AVENUE, HATFIELD, PENNSYLVANIA 19440

REMITTANCE STATEMENT

| INVOICE DATE | GROSS AMOUNT | DISCOUNT | NET AMOUNT |
|---|---|---|---|
| 1/05/2 | 3,326.40 | | 3,326.40 |
| | 3,326.40 | | 3,326.40 |

DETACH BEFORE
DEPOSITING CHECK

**AMETEK**
HUNTER SPRING DIVISION • 1 SPRING AVE., HATFIELD, PENNSYLVANIA 19440

1-103
210

3623

No. 03623

| DATE | | |
|---|---|---|
| MO. | DAY | YR. |
| 2 | 24 | 82 |

BANKERS TRUST COMPANY
16 WALL STREET, NEW YORK, N.Y.

PAY EXACTLY THE SUM OF

| AMOUNT | |
|---|---|
| DOLLARS | CENTS |
| $***3,326.40 | |

FACTORY ACCOUNT

AMETEK
HUNTER SPRING DIVISION

TO THE ORDER OF

PIONEER SALT CO
940 N DELAWARE AVE
PHILADELPHIA PA 19123

1 NON-NEGOTIABLE
AUTHORIZED SIGNATURES

⑈00003623⑈ ⑆021001033⑆ 01⑈000116 74⑈

AR301239

ORIGINAL INVOICE

**[illegible]NEER SALT & CHEMICAL CO.**
[illegible]N. DELAWARE AVE., PHILA., PA. 19123
215 - 925-6500

| | |
|---|---|
| BILL OF LADING # [illegible]444 | INVOICE # 55511 |
| DATE ORDERED | 4/30/82 |
| DATE DELIVERED | 5/04/82 |

PLEASE INDICATE THE I[illegible]ICE NUMBER WHEN REMITTING, AN[illegible]DICATE THE ABOVE ON ALL COR[illegible]ONDENCE CONCERNING THIS DO[illegible]T.

SHIP TO
AMETEK HUNTER SPRINGS DV
1 SPRING AVE
HATFIELD PA 19440

BILL TO
AMETEK HUNTER SPRINGS DV
1 SPRING AVE
HATFIELD PA 19440

02

CUSTOMER SERVICE REPRESENTATIVE: SUE WOLKOWICZ

| CUSTOMER ORDER # | CARRIER | CUSTOMER CODE | MODE OF DEL. | FREIGHT | TRACTOR/TRAILER | TERMS | AREA | SLM. # |
|---|---|---|---|---|---|---|---|---|
| 04371 | CHEM TRUCK | 043801-00 | | | | NET 30 DAYS | P11 | 32 |

| NO. OF UNITS ORDERED | DESCRIPTION | NO. OF UNITS RECEIVED | LBS. OR GALS. RECEIVED | PRICE | DOLLAR AMOUNT |
|---|---|---|---|---|---|
| 1 | TRICHLOROETHYLENE<br>TANK WAGON 1,000 GAL-1,999 GAL<br>PRODUCT NUMBER 23110-T30-BAH-CD | 1 | 12,040 | 28.950 CWT | 3,485.58 |

PAST DUE INVOICES ARE SUBJECT TO A 1.5% PER MONTH INTEREST CHARGE
ANNUAL EFFECTIVE RATE 18%

PAID
JUN 16 1982

MAY 13 9 55 AM '82
HUNTER SPRING
A DIV. OF AMETEK, INC.
HATFIELD, PA.

| | | |
|---|---|---|
| P 495 | 50375 | INVOICE DATE 5-04 |
| 6-14 | | |
| | 3485.58 | |
| 3485.58 | 28-421 | |
| | ACCOUNT NO. | MATERIAL |

PAC[illegible] PLEASE INCLUDE INVOICE NUMBER ON ALL CHECKS
8[illegible] 1 820511

AR30 P240

PLEASE NOTE

Your [illegible] bject to the terms, conditions and certification on the back hereof, has been invoiced as shown herein [illegible] nvoice covers only a portion of buyer's order, then the terms and conditions herein shall apply also to all [illegible] ent shipments thereunder, and all subsequent shipments shall be subject to delivery when available at se[illegible] es in effect at date of shipment - if incorrect in any detail, please notify the sales office serving you, mentioning above invoice number and name of first product listed. We thank you for your order.

| DUE DATE |
|---|
| 06/03/82 |

3,485.58

FOR YOUR CONVENIENCE

**AMETEK**

WATER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA 19440

No. 81530

RECEIVING REPORT

REC'D FROM Pioneer Salt + Chemical DATE 5/4/82

ADDRESS DEPT 28-421

| P O NUMBER | COLLECT ☐ CHARGES | VIA | NO. OF PACKAGES |
|---|---|---|---|
| 04371 | PREPAID ☐ | KRA Jack | |

SHIPMENT PARTIAL ☐ COMPLETE ☒ CONDITION OF CONTAINER: GOOD ☒ POOR ☐ CRUSHED ☐ OPEN ☐

| QUAN. REC'D. | PART NO. | DESCRIPTION |
|---|---|---|
| 1000 | Gal | Trichloroethylene |

Q. C. INSPECTION ☐ YES ☒ NO

DELIVER TO ~~[illegible]~~ Cassel

WEIGHT 12040 #

DESCRIPTION OF DEFECT:

RECEIVED JUN 10 1982

REC'D BY

FORM NO 138 B

1

AR301241

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA 19440 TELEPHONE: (215) 822-2971

Pioneer Salt and Chem

No. 04371 M

SHOW THIS NUMBER ON ALL PACKAGES, INVOICES AND REFERENCES TO THIS ORDER

DATE 4/28/82

VENDOR CODE

CONFIRMING ORDER IF X'D

TO YOUR [X] Gene DATE 4/28

| UNLESS X'D PA. STATE TAX EXEMPT UNDER LICENSE NO. 46-04776 | FOR S.O. OR W.O. | REQ. NO. | REQUESTED BY | ACCOUNT NO. | DELIVERY REQUIRED AT OUR PLANT |
|---|---|---|---|---|---|
| | | | D.C. | 28-421 | 5-3-82 |

| ITEM | QUANTITY | PART NO. | DESCRIPTION | PRICE |
|---|---|---|---|---|
| | | | DIA. / TOL. / TYPE / COATING | |
| | | | COILS / SPEC. NO. / TENSILE — PIONEER SALT & CHEM | |
| | | | SPECIAL INSTRUCTIONS | |
| | | | SIZE / TYPE | |
| | | | TEMPER / TENSILE | |
| | | | EDGE / CAMBER ☐ ½"-8' MAX. ☐ ¼"-8' MAX. / COILS | |
| | 1000 GAL 12.11/# per gal | | TRICHLORETHYLENE | 28.95/ |

5-4-82

PAID JUN 16 1982

EXPEDITING RECORD

| ITEM | DATE | C | P | W | PERSON CONTACTED | DEL. PROM. | INT. | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

EC. ☐ RECEIVER—WEIGH MATERIAL AND VERIFY QUAN. SPECIFIED ON PKG. SLIP

ISP. ☐ REFER MATERIAL TO INCOMING INSPECTOR BEFORE PLACING ON SHELF

BY C. B. McDonald

R. P. Clark. AR301242

ORM 158-4/81

EDP & ACCOUNTING

# PURCHASE REQUISITION

**AMETEK**

HUNTER SPRING DIVISION • ONE SPRING AVENUE, HATFIELD, PA. 19440

FROM _____ DEPT. _____ FOR ACCOUNT _____

MER _____ JOB ORDER _____ SR# _____

| QUANTITY | PRIORITY RATING | CONTRACT NO. |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

REQ. BY _____ DATE _____ SUG. SUPL. PIONEER SALT & CHEM

ADDRESS _____

APPROVED _____ TEL. REQ. _____

FC 101C

AR301243

**KRAJACK TANK LINES INC.** ROSELLE PARK, N.J. 07204 Shipper's No. 10010

480 WESTFIELD AVE. Phone: 352-2093-4 Carrier _____ Agent's No. _____

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading.

From _____

[illegible] described below, in apparent good order, except as noted (contents and condition of contents of packages unknown) marked, consigned and destined as shown below, which said company (the [illegible] being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of deliv[illegible] at [illegible], if on its own railroad, water line, highway route or routes, or within the territory of its highway operations, otherwise to deliver to another carrier on the route to [illegible] destination, as mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or [illegible] of [illegible], that every service to be performed hereunder shall be subject to all the conditions not prohibited by law, whether printed or written, herein contained, including the conditi[illegible] on back hereof, which are hereby agreed to by the shipper and accepted for himself and his assigns.

PICK-UP DRIVER GARY WEISS TRACTOR NO. 36 TANK NO. 6993

SHIPPER PIONEER SALT + CHEMICAL DATE 5/3 19 8[illegible]

ADDRESS ORDER NO. 10010

PICK-UP TIME IN: OUT: LOADING - TRUCK PUMP ☐ CUST. PUMP ☑ GRAV. ☐ DRUM JOB ☐ OUTSIDE SCALE ☐

SPECIAL SERVICES ON PICK-UP:

PICK UP ONLY SPEEDOMETER: START FINISH

| Gallons | Comp. Nos. | H/M | Description of Articles Marks & Exceptions | Class. | Wt. |
|---|---|---|---|---|---|
| 1000 | 1 | | TRICHLOROETHYLENE | | 12040# |

C.O.D. charge to be paid by { Shipper ☐ Consignee ☐

Subject to Section 7 of Conditions applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and other lawful charges.

(Signature of Consignor.)

If charges are to be prepaid, write or stamp here, "to be Prepaid."

Received $ _____ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per _____ (The signature here acknowledges only the amount prepaid.)

Charges Advanced:

$ _____

*If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or Shipper's Weight."

NOTE-Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____

THE CARRIER CERTIFIES THAT THE CARGO TANK SUPPLIED FOR THIS SHIPMENT IS A PROPER CONTAINER FOR THE TRANSPORTATION OF THE COMMODITY AS SUPPLIED BY THE SHIPPER

DEL. DRIVER GARY WEISS TRACTOR NO. 36 TANK NO. 6993

CONSIGNEE AMETEK HUNTER DATE 5/4 19 8[illegible]

ADDRESS 1 SPRING AVE HATFIELD PA. ORDER NO.

DELIVERY TIME IN: OUT: UNLOAD TRUCK PUMP ☐ CUST. PUMP ☐ GRAV. ☐ DRUM JOB ☐ OUTSIDE SCALE ☐

SPECIAL SERVICES ON DELIVERY:

DELIVERY ONLY SPEEDOMETER: START FINISH

MILEAGE ON BILL OF LADING MUST CORRESPOND WITH MILEAGE ON LOG

| | N.Y. | N.J. | DEL. | MD. | CONN. | R.I. | MASS | PA. | OTHERS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MILEAGE | | — | | | | | | | | | |

_____ Shipper, Per _____

Agent must detach and r[illegible] must sign the Original [illegible]

Permanent address of shipper.

AR301211

AN EQUAL OPPORTUNITY EMPLO[illegible]

**AMETEK**
HUNTER SPRING DIVISION
1 SPRING AVENUE, HATFIELD, PENNSYLVANIA 19440

REMITTANCE STATEMENT

DETACH BEFORE
DEPOSITING CHECK

| INVOICE DATE | GROSS AMOUNT | DISCOUNT | NET AMOUN |
|---|---|---|---|
| 570472 | 3,485.58 | | 3,485.5 |
| | 3,485.58 | | 3,485.5 |

**AMETEK**
HUNTER SPRING DIVISION • 1 SPRING AVE., HATFIELD, PENNSYLVANIA 19440

1-103
210
5346

No. 05346

| DATE | | |
|---|---|---|
| MO. | DAY | YR. |
| 6 | 16 | 82 |

BANKERS TRUST COMPANY
16 WALL STREET, NEW YORK, N.Y.

PAY EXACTLY THE SUM OF

| AMOUNT | |
|---|---|
| DOLLARS | CENTS |
| $***3,485.58 | |

FACTORY ACCOUNT

**AMETEK**
HUNTER SPRING DIVISION

TO THE ORDER OF

PIONEER SALT CO
940 N DELAWARE AVE
PHILADELPHIA PA 19123

1 NON-NEGOTIABLE
AUTHORIZED SIGNATURES

⑈00005346⑈ ⑆021001033⑆ 01⑈000116 74⑈

AR301245

REFERENCE 27
Guidance on Remedial Investigations Under CERCLA

REFERENCE 28
Guidance on Feasibility Studies Under CERCLA

AR301247

REFERENCE 29
Geology and Mineral Resources of
Bucks County Pennsylvania

AR301248

REFERENCE 30
Ametek Interhouse correspondence

AR301249

**AMETEK**

WHS

## Inter - House Correspondence

TO: P. J. Giepen OFFICE Mfg. Engineering FROM: W. J. Panzeter

SUBJECT: Decertification Inspection by Commonwealth of PA Dept. of Environmental Resources (D.E.R.) DATE: April 2, 1984

Per our request, a decertification inspection was made of the Hunter Spring facility Thursday, March 22, 1984.

The inspector was Mr. Robert J. Allen, Solid Waste Specialist for D.E.R.

We toured the plant and then met with Durrell Cassel to review our manifest system and our chemical control system.

We will probably be listed as a small generator, not a treater, storer or large generator, as we are registered now with part 'A' and 'B' for both E.P.A. and D.E.R.

The only problem we have is transporting our degreaser to U. S. Gauge. We do not use a manifest system, and U. S. Gauge is not an approved transporter and/or treatment plant. I indicated to the inspector that, if we could not send it to the Gauge, we would burn it in our oil. Mr. Allen will get back to us with an answer.

All in all, the inspector was here for two hours, and I believe we will be decertified. We failed to discuss the treatment and disposal of our sodium bi-chromate.

The inspector concurred with our thinking of building evaporative drying trays to eliminate the water in our plating sludge.

W. J. Panzeter

WJP/al

REFERENCE 31
Analytical Results of samples taken
from Ametek wells 1 and 2 and drinking water fountain.

AR301251

$H_2O$ TESTING CHART

| | TCE | PCE | TRI-CHLOR |
|---|---|---|---|
| EPA STDS | 4.5 | 3.55 | |
| 12/80 QC LABS | | | |
| WELL #1 | 440 | 12.2 | 694 |
| #2 | 175 | 13.0 | 48.2 |
| DRINK FOUNTAIN | 469 | 15.6 | 887 |
| 2/17 - 3/28/80 | | | |
| FILTERS INSTALLED | | | |
| = HAFIELD PET | | | |
| WELL | 649 | 27.9 | |
| FOUNTAIN | 15.9 | < 1.0 | |
| 10/16/80 QC LABS | | | |
| WELL | 281 | 8.9 | 601 |
| FOUNTAIN | 15.7 | < .5 | 671 |
| 2/24/81 QC LABS | | | |
| WELL #1 | 294 | 8.5 | 648 |
| #2 | 11.7 | 8.7 | 143 |
| FOUNTAIN | 160 | .5 | 499 |
| 2/19/81 QC LABS | | | |
| LOBBY FOUNTAIN | 9.3 | < .5 | 7.4 |
| EMP. " | 10.0 | < .5 | |

METHANE

| | | | |
|---|---|---|---|
| 6/18/81 | | | |
| WELL #1 | 116 | 3.3 | 251 |
| #2 | 220 | 19.1 | 311 |
| 10/22/80 | | | |
| WELL #1 | 259 | 7.4 | 472 |
| #2 | 370 | 13.3 | 75.2 |
| LOBBY FOUNTAIN | 38.1 | .6 | 316. |
| 3/17/82 | | | |
| LOBBY FOUNTAIN | 22.3 | <0.5 | 269 |
| FOUNT. #5 | 40.1 | <0.5 | 294 |
| 3/[redacted]/82 | | | |
| WELL #1 | 144 | 4.9 | 207 |
| #2 | 245 | 42.7 | 210 |
| DR. FNT. | <~~20~~ | <0.5 | 162 |
| 1/4/82 | | | |
| DR. FNT | 3.6 | 0.8 | 137 |
| 2/1/82 | ~~265.5~~ | | |
| WELL #1 | 265.5 | 12.0 | 525 |
| #2 | 187 | 25.9 | 136 |
| DR. FNT. | <10.0 | <0.5 | 422 |
| 1/6/83 | | | |
| DR. FNT. | 65.3 | <0.5 | 475 |

| | | | | |
|---|---|---|---|---|
| 2/11/83 | | | | |
| [redacted] #1 | 436 | 11.8 | 522 | |
| #2 | 207 | 6.1 | 468 | |
| DR. FNT | 81 | < 0.5 | 289 | |
| 5/5/83 DF | | | | |
| 4/21/83 | | | | OK |
| WELL #1 | 520 | 13.4 | 970 | |
| #2 | ~~140~~ 233 | 18.5 | 190 | |
| DF | 99.1 | 2.5 | 287 | |
| 6/2/83 | | | | |
| WELL #1 | 818 | 13.4 | 492 | |
| #2 | 477 | 16.3 | 248 | |
| [redacted] | 296 | 6.4 | 201 | |
| 6/1/83 ~~#2~~ DF | | | | OK |
| 1/6/83 " | | | | OK |
| 3/3/83 " | 228 | 31.7 | 134 | |
| 3/3/83 DF | | | | OK |
| 10/6/88 | | | | |
| DF | ~~227~~ 140 | 5.4 | 227 | |
| WELL #1 | 3.1 | < 0.5 | 137 | |
| [redacted] DF | | | | OK |
| 1/5/84 | | | | |
| DF | 2.5 | < 0.5 | 90.6 | |
| WELL #1 | 369 | 10.3 | ~~338~~ 538 | |
| " #2 | 478 | 29.4 | 769 | |

AR301254

# WATER SAMPLE ANALYSIS

| | WELL #1 PPB | | | | WELL #2 PPB | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 111-TRI | 2 TCE | 3 PCE | 4 | 5 | 6 111-TRI | 7 TCE | 8 PCE | 9 |
| 1/15/80 1 | 671. | 15.7 | <0.5 | | | 601. | 281. | 8.9 | |
| 2 | | | | | | | | | |
| 3/23/81 3 | 648. | 294 | 8.5 | | | 143.0 | 117. | 8.7 | |
| 4 | | | | | | | | | |
| 1/17/81 5 | 251. | 116. | 3.3 | | | 311. | 220. | 19.1 | |
| 6 | | | | | | | | | |
| 4/14/81 7 | 472. | 259. | 7.4 | | | 75.2 | 370. | 13.3 | |
| 8 | | | | | | | | | |
| 5/82 9 | 207. | 144. | 4.9 | | | 210 | 245 | 42.7 | |
| 10 | | | | | | | | | |
| 01/82 11 | 525. | 265.5 | 12.0 | | | 136.0 | 187.0 | 25.9 | |
| 12 | | | | | | | | | |
| 1/83 13 | 522. | 436 | 11.8 | | | 468. | 207. | 6.1 | |
| 14 | | | | | | | | | |
| 02/83 15 | 818. | 492. | 13.4 | | | 477. | 248. | 16.3 | |
| 16 | | | | | | | | | |
| 06/83 17 | 137.0 | 3-1 | <0.5 | | | — | — | — | |
| 18 | | | | | | | | | |
| 05/84 19 | 538.0 | 369. | 10.3 | | | 769.0 | 478.0 | 29.4 | |
| 20 | | | | | | | | | |
| 08/84 21 | 632.0 | 325.0 | 8.0 | | | 529.0 | 201.0 | 19.9 | |
| 22 | | | | | | | | | |
| 23 | 379.0 | 289.0 | 13.3 | | | 314.0 | 183.0 | 30.0 | |
| 24 | | | | | | | | | |
| 6/25/85 25 | 61.9 | 22.3 | <0.5 | | | 1076. | 384-0 | 28.5 | |
| 26 | | | | | | | | | |
| 8/16/85 27 | 198. | 183. | 5.3 | | | — | — | — | |
| 28 | | | | | | | | | |
| 10/02/85 29 | 59.7 | 26.9 | <0.5 | | | — | — | — | |
| 30 | | | | | | | | | |
| 12/04/85 31 | 377. | 297. | 9.2 | | | 546. | 329. | 11.1 | |
| 32 | | | | | | | | | |
| 1/20/86 33 | 433.0 | 419.0 | 9.3 | | | — | — | — | |
| 34 | | | | | | | | | |
| 2/2/86 35 | 339.0 | 341. | 7.6 | | | 539.0 | 220.0 | 24.8 | |
| 36 | | | | | | | | | |
| 37 | | | | | | | | | |
| 10/86 38 | 92.6 | 93.2 | 4.9 | | | 867. | 452. | 33.7 | |
| 39 | | | | | | | | | |
| 40 | | | | | | | | | |
| 41 | | | | | | | | | |
| 42 | | | | | | | | | |
| 43 | | | | | | | | | |
| 44 | | | | | | | | | |
| 5 | | | | | | | | | |
| 46 | | | | | | | | | |
| 47 | | | | | | | | | |
| 48 | | | | | | | | | |
| 49 | | | | | | | | | |
| 50 | | | | | | | | | |



FORM 2618 LITHO IN U.S.A.

QUALITY CONTROL LABORATORY DIVISION
1205 Industrial Highway, Southampton, PA 18966
(215) 673-4900
355-3900
E. W. Cook, V.M.D.
A. F. Zimmermann

RECD
MAR 10 9 42 AM '80
A DIV. OF [illegible] CREEK, INC.
HATFIELD, PA.

Hunter Spring Division
1 Spring Avenue
Hatfield, Pa. 19440

## BACTERIOLOGICAL WATER ANALYSIS REPORT

| | |
|---|---|
| date sampled | March 12, 1980 |
| date tested | March 13, 1980 |
| date reported | March 18, 1980 |
| sampled by | DH |
| frequency | |
| copies to | |

1,1,1

| SAMPLE | Standard Plate Count per ml | Total Coliform Count per 100 ml MPN | Fecal Coliform Count per 100 ml MPN | TCE ppb | PCE ppb | Trichloro-ethane ppb | |
|---|---|---|---|---|---|---|---|
| Well #1 (guardhouse) (QC #3565) | | | | 440 | 12.2 | 694 | |
| ll #2 C #3566) | | | | 175 | 13.0 | 48.2 | |
| Employee's Drinking Ftn. (QC #3567) | | | | 469 | 15.6 | 887 | |
| | | | | | | | |
| | | | | | | | |

EPA standards:
4.5 - TCE
3.55 - PCE

Q C INC.

Albert F. Zimmermann

All analyses conform to the current edition of "Standard Methods for the Examination of Water and Wastewater"
Approved for the bacteriological examination of water by the Pennsylvania Department of Health, Certificate I-388

APR 30 1980

QC INC

OCT 28 1980

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QUALITY CONTROL LABORATORY

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A. F. Zimmermann

•Hunter Spring Division
1 Spring Avenue
Hatfield, Pa. 19440

OCT 28 1980

## • BACTERIOLOGICAL WATER ANALYSIS REPORT

| | |
|---|---|
| date sampled | Oct. 15, 1980 |
| date tested | Oct. 16, 1980 |
| date reported | Oct. 24, 1980 |
| sampled by | CFB |
| frequency | |
| copies to | |

| SAMPLE | Standard Plate Count per ml | Total Coliform Count per 100 ml MPN | Fecal Coliform Count per 100 ml MPN | 1,1,1 Trichloro-ethane ppb | TCE ppb | PCE ppb | |
|---|---|---|---|---|---|---|---|
| Employees end Drinking Fountain (QC #768) | | | | 671. | 15.7 | <0.5 | |
| 11 Water (QC #769) | | | | 601. | 281. | 8.9 | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

EPA standards:

4.5 ppb - TCE
3.55 ppb - PCE

Q C INC.

OCT 28 1980

jsl

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1 Spring Ave.
Hatfield, Pa. 19440

BACTERIOLOGICAL WATER ANALYSIS REPORT

date sampled 2-23-81
date tested 2-24-81
date reported 3-5-81
sampled by CFB
frequency
copies to

P.O.#43289-Z

| SAMPLE | Standard Plate Count per ml | Total Coliform Count per 100 ml MPN | Fecal Coliform Count per 100 ml MPN | 1,1,1 Trichloroethane | TCE ppb | PCE ppb | |
|---|---|---|---|---|---|---|---|
| Well#1 (QC#157) | | | | 648. | 294. | 8.5 | |
| Well#2 (QC#1576) | | | | 143. | 117. | 8.7 | |
| Drinking Fountain(QC# 1577) | | | | 499. | 160. | 0.5 | |
| | | | | | | | |
| | | | | | | | |

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CUSTOMER'S REPORT

QUALITY CONTROL LABORATORY
1205 INDUSTRIAL HIGHWAY • P.O. BOX 514 • SOUTHAMPTON, PENNSYLVANIA 18966
PHONE (215) 355-3900 OR (215) 673-4900

# WASTEWATER REPORT

ALL METHODS ARE E.P.A. APPROVED

| SAMPLED | DATE REC'D. | DATE TESTED | DATE REPORTED | SAMPLED BY | NO. WW |
|---|---|---|---|---|---|
| 3/18/81 | 3/18/81 | 3/19/81 | 3/25/81 | CFB | 05627 |

Hunter Spring Division
1 Spring Ave.
Hatfield, PA 19440

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HUNTER SPRING, INC.
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HATFIELD, PA.

| SAMPLE | | TOTAL COLIFORM COUNT per 100 ml MPN | FECAL COLIFORM COUNT per 100 ml MPN | 1,1,1 Trichloroethane ppb | TCE ppb | PCE ppb | |
|---|---|---|---|---|---|---|---|
| P.O. #43289-Z | | | | | | | |
| INFLUENT | | | | | | | |
| EFFLUENT | | | | | | | |
| Lobby Fountain (QC #1729) | | | | 7.4 | 9.3 | <0.5 | |
| Employee's Entrance Fountain (QC #1730) | | | | 8.1 | 10.0 | <0.5 | |

REMARKS:

According to EPA regulations, the TCE samples are above standards of safety, while the PCE are within.

TCE 4.5 ppb
PCE 3.55 ppb Standards of Safety

COPIES TO:

Q.C. INC. Albert F Zimmermann

| PREVIOUS ITEMS: | | | PREVIOUS ITEMS: | | |
|---|---|---|---|---|---|
| DATE | INVOICE | AMOUNT | DATE | INVOICE | AMOUNT |
| | | | | | |

2- TCE/PCE/Trichlor. Water Analyses for Lobby and Emp. Fountain @ $35.00 each

| | |
|---|---|
| AMOUNT THIS INVOICE | $70.00 |
| BALANCE BROUGHT FORWARD | |
| TOTAL AMOUNT DUE | $70.00 |

TERMS: NET 30 DAYS PLEASE RETURN ONE COPY WITH YOUR PAYMENT

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E. W. Cook, V.M.D.
A. F. Zimmermann

• Hunter Spring Division
1 Spring Avenue
Hatfield, Penna. 19440

• BACTERIOLOGICAL WATER ANALYSIS REPORT

| | |
|---|---|
| date sampled | 5-20-81 |
| date tested | 5-21-81 |
| date reported | 6-3-81 |
| sampled by | Burt |
| frequency | every other month |
| copies to | |

| SAMPLE | Standard Plate Count per ml | Total Coliform Count per 100 ml MPN | Fecal Coliform Count per 100 ml MPN | 1,1,1 Trichloroethane ppb | TCE ppb | PCE ppb | |
|---|---|---|---|---|---|---|---|
| Well #1 (QC#2087) | | | | 468. | 196. | 5.4 | |
| Well #2 (QC#2088) | | | | 157. | 256. | 22.5 | |
| Office Fountain (QC#2089) | | | | 732 | 138 | < .5 | |
| | | | | | | | |
| | | | | | | | |

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A DIV. OF AMETEK, INC.
HATFIELD, PA.

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QUALITY CONTROL LABORATORY
1205 Industrial Highway, P.O. Box 514, Southampton, PA 18966

E. W. Cook, V.M.D.
A. F. Zimmermann

Hunter Spring Division
1 Spring Avenue
Hatfield, PA 19440

BACTERIOLOGICAL WATER ANALYSIS REPORT

| | |
|---|---|
| date sampled | June 17, 1981 |
| date tested | June 18, 1981 |
| date reported | July 1, 1981 |
| sampled by | Burt |
| frequency | |
| copies to | |

| SAMPLE | Standard Plate Count per ml | Total Coliform Count per 100 ml MPN | Fecal Coliform Count per 100 ml MPN | TCE ppb | PCE ppb | 1,1,1 Trichloroethane ppb | |
|---|---|---|---|---|---|---|---|
| Well #1 | | | | 116. | 3.3 | 251. | |
| Well #2 | | | | 220. | 19.1 | 311. | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

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Not within safe drinking water guidelines of 4.5 ppb for TCE and 3.55 ppb for PCE, according to EPA regulations. Trichloroethane should be under 35.

QC INC.

Albert F Zimmermann

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A DIV. OF AMET
HATFIELD, PA

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E. W. Cook, V.M.D.
A. F. Zimmermann

Hunter Spring Division
1 Spring Avenue
Hatfield, Penna. 19440

BACTERIOLOGICAL WATER ANALYSIS REPORT

date sampled Oct. 14, 1981
date tested Oct. 22, 1981
date reported Oct. 23, 1981
sampled by CFB
frequency every other wk.
copies to

| SAMPLE | Standard Plate Count per ml | Total Coliform Count per 100 ml MPN | Fecal Coliform Count per 100 ml MPN | TCE | PCE | 1,1,1 Trichloroethane | |
|---|---|---|---|---|---|---|---|
| | | | | ppb | ppb | ppb | |
| Well #1 (QC#2909) | | | | 259. | 7.4 | 472. | |
| Well #2 (QC#2910) | | | | 370. | 13.3 | 75.2 | |
| Employee's entrance fountain (QC#2911) | | | | 38.1 | 0.6 | 316. | |
| | | | | | | | |
| | | | | | | | |

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Approved for the bacteriological examination of water by the Pennsylvania Department of Health, Certificate I-388

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HUNTER SPRING
A DIV. OF AMETEK, INC.
HATFIELD, PA.

Hunter Spring Division
1 Spring Ave.
Hatfield, Penna. 19440

# BACTERIOLOGICAL WATER ANALYSIS REPORT

| | |
|---|---|
| date sampled | 1-26-82 |
| date tested | 1-27-82 |
| date reported | 2-2-3-82 |
| sampled by | CFB |
| frequency | every other Mon. |
| copies to | |

| SAMPLE | Standard Plate Count per ml | Total Coliform Count per 100 ml MPN | Fecal Coliform Count per 100 ml MPN | 1,1,1 Trichloroethane | TCE | PCE | |
|---|---|---|---|---|---|---|---|
| Well 1 (QC#3521) | | | | ppb 689.3 | ppb 330.7 | ppb 10.2 | |
| Well 2 (QC#3522) | | | | 762.9 | 360. | 9.8 | |
| Drinking Fountain employees's entrance (QC#3523) | | | | 707.2 | 131.7 | 0.5 | |
| | | | | | | | |
| | | | | | | | |

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DUPLICATE REPORT

QUALITY CONTROL LABORATORY
1205 INDUSTRIAL HIGHWAY • P.O. BOX 514 • SOUTHAMPTON, PENNSYLVANIA 18966
PHONE (215) 355-3900 OR (215) 673-4900

# WASTEWATER REPORT

ALL METHODS ARE E.P.A. APPROVED

| [redacted]LED | DATE REC'D. | DATE TESTED | DATE REPORTED | SAMPLED BY | NO. WW 05839 |
|---|---|---|---|---|---|
| 03/[illegible]/82 | 03/18/82 | 03/18/82 | 03/30/82 | BG | |

• Hunter Spring Division
1 Spring Avenue
Hatfield, Pa. 19440

| SAMPLE | | TOTAL COLIFORM COUNT per 100 ml MPN | FECAL COLIFORM COUNT per 100 ml MPN | 1,1,1 Trichloro-ethane ppb | TCE ppb | PCE ppb | |
|---|---|---|---|---|---|---|---|
| ~~[redacted]~~ | | | | | | | |
| ~~[redacted]~~ | | | | | | | |
| Drinking Ftn. - Entrance (QC #3869) | | | | 269. | 22.3 | <0.5 | |
| Drinking Ftn. - #5 (QC #3870) | | | | 294. | 40.1 | <0.5 | |

REMARKS:

[redacted]

COPIES TO:
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Q.C. INC.

[redacted]

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HATFIELD, PA

RESULTS OF LABORATORY ANALYSIS - WATER SERVICE -TYPE 20 PAGE 1 QC0071

DATE RECD 8/04/82 PWS ID DATE TESTED 8/05/82
REPORT DATE - 8/20/82 -BY-RAY

TESTED FOR
06490 HUNTER SPRING DIVISION

1 SPRING AVENUE
HATFIELD PA 19440

* * * * *

SAMPLE--POINT-WELL 1 --I-D NUMBER 4761 DATE SAMPLED 8/04/82

| RESULTS | | ANALYSIS | TIME 9 00 AM |
|---|---|---|---|
| 207. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 144. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 4.9 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

* * * * *

SAMPLE--POINT-WELL 2 --I-D NUMBER 4762 DATE SAMPLED 8/04/82

| RESULTS | | ANALYSIS | TIME 9 00 AM |
|---|---|---|---|
| 210. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 245. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 42.7 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

* * * * *

SAMPLE--POINT-DR FTN --I-D NUMBER 4763 DATE SAMPLED 8/04/82

| RESULTS | | ANALYSIS | TIME 9 00 AM |
|---|---|---|---|
| 162. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| LT 20. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| LT 0.5 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
LT = LESS THAN
GT = GREATER THAN
EQ = EQUAL TO

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ESULTS OF LABORATORY ANALYSIS - WATER SERVICE - TYPE 70 PAGE 1 QC0071

DATE RECD 11/04/82 PWS ID DATE TESTED 11/04/82
REPORT DATE -11/29/82 -BY-CFB

TESTED FOR
06490 HUNTER SPRING DIVISION

1 SPRING AVENUE
HATFIELD PA 19440

.....

SAMPLE--POINT-EMP ENTER FOUNT --I-D NUMBER 5180 DATE SAMPLED 11/03/82
RESULTS ANALYSIS TIME 1 20 PM

| RESULTS | | ANALYSIS |
|---|---|---|
| 137. | MCG/L | 1,1,1 TRICHLORDETHANE |
| 3.6 | MCG/L | TRICHLORDETHYLENE /TCE/ |
| 0.8 | MCG/L | PERCHLORDETHYLENE /PCE/ |

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
LT = LESS THAN
GT = GREATER THAN
EQ = EQUAL TO

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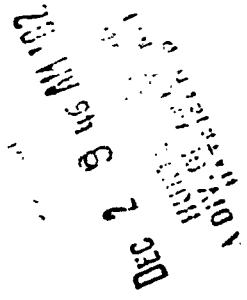

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RESULTS OF LABORATORY ANALYSIS - WATER SERVICE -TYPE 70 PAGE 1 QC0071

DATE RECD 12/01/82 PWS ID DATE TESTED 12/01/82
REPORT DATE -12/21/82 -BY-RAY

TESTED FOR
06490 HUNTER SPRING DIVISION

1 SPRING AVENUE
HATFIELD PA 19440

.....

SAMPLE--POINT-WELL 1 --I-D NUMBER 5288 DATE SAMPLED 12/01/82

| RESULTS | | ANALYSIS | TIME N/A |
|---|---|---|---|
| 525. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 265.5 | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 12.0 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

.....

SAMPLE--POINT-WELL 2 --I-D NUMBER 5289 DATE SAMPLED 12/01/82

| RESULTS | | ANALYSIS | TIME N/A |
|---|---|---|---|
| 136. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 187. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 25.9 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

.....

SAMPLE--POINT-DR FOUNTAIN --I-D NUMBER 5290 DATE SAMPLED 12/01/82

| RESULTS | | ANALYSIS | TIME N/A |
|---|---|---|---|
| 422. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| LT 10. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| LT 0.5 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
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RESULTS OF LABORATORY ANALYSIS - WATER SERVICE -TYPE 70 PAGE 1 QC0071

DATE RECD 1/06/83 PWS ID DATE TESTED 1/06/83
REPORT DATE - 1/17/83 -BY-DEL

TESTED FOR
06490 HUNTER SPRING DIVISION

1 SPRING AVENUE
HATFIELD PA 19440

.....

SAMPLE--POINT-EMPLOYEE FOUNT --I-D NUMBER 5432 DATE SAMPLED 1/06/83
RESULTS ANALYSIS TIME N/A

| RESULTS | | ANALYSIS |
|---|---|---|
| 475. | MCG/L | 1,1,1 TRICHLOROETHANE |
| 65.3 | MCG/L | TRICHLOROETHYLENE /TCE/ |
| LT 0.5 | MCG/L | PERCHLOROETHYLENE /PCE/ |

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
LT = LESS THAN
GT = GREATER THAN
EQ = EQUAL TO

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RESULTS OF LABORATORY ANALYSIS -- WATER SERVICE -TYPE 70 PAGE 1 QC0071

DATE RECD 2/11/83 PWS ID DATE TESTED 2/11/83
REPORT DATE - 3/02/83 -BY-CFB

TESTED FOR
06490 HUNTER SPRING DIVISION

1 SPRING AVENUE
HATFIELD PA 19440

.....

SAMPLE--POINT-WELL 1 --I-D NUMBER 5689 DATE SAMPLED 2/10/83

| RESULTS | | ANALYSIS | TIME 2 30 PM |
|---|---|---|---|
| 522. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 436. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 11.8 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

.....

SAMPLE--POINT-WELL 2 --I-D NUMBER 5690 DATE SAMPLED 2/10/83

| RESULTS | | ANALYSIS | TIME 2 30 PM |
|---|---|---|---|
| 468. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 207. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 6.1 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

.....

SAMPLE--POINT-EMPL ENT FOUNT --I-D NUMBER 5691 DATE SAMPLED 2/10/83

| RESULTS | | ANALYSIS | TIME 2 30 PM |
|---|---|---|---|
| 289. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 81. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| LT 0.5 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
LT = LESS THAN
GT = GREATER THAN
EQ = EQUAL TO

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DIV. OF AMETEK
HATFIELD, PA

MAR 4 10 34 AM '83
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RESULTS OF LABORATORY ANALYSIS - WATER SERVICE -TYPE 70 PAGE 1 QC0071

DATE RECD 4/21/83 PWS ID DATE TESTED 4/21/83
REPORT DATE - 5/16/83 -BW-CFB

TESTED FOR
06490 HUNTER SPRING DIVISION

1 SPRING AVENUE
HATFIELD PA 19440

HUNTER SPRING DIV. OF AMETEK IR

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SAMPLE---POINT-EMP ENT FOUNT --I-D NUMBER 6064 DATE SAMPLED 4/20/83

| RESULTS | | ANALYSIS | TIME 1 40 PM |
|---|---|---|---|
| 287. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 99.1 | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 2.5 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

.....

SAMPLE---POINT-WELL 1 --I-D NUMBER 6065 DATE SAMPLED 4/20/83

| RESULTS | | ANALYSIS | TIME 1 40 PM |
|---|---|---|---|
| 970. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 520. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 13.4 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

.....

SAMPLE---POINT-WELL 2 --I-D NUMBER 6066 DATE SAMPLED 4/20/83

| RESULTS | | ANALYSIS | TIME 1 40 PM |
|---|---|---|---|
| 190. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 233. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 18.5 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
LT = LESS THAN
GT = GREATER THAN
EQ = EQUAL TO

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ESULTS OF LABORATORY ANALYSIS -- WATER SERVICE -TYPE 70 PAGE 1 QC0071

DATE RECD 6/02/83 PWS ID DATE TESTED 6/02/83
REPORT DATE - 6/16/83 -BY-CFB

TESTED FOR
06490 HUNTER SPRING DIVISION

1 SPRING AVENUE
HATFIELD PA 19440

.....

SAMPLE----POINT--WELL 1 ---I-D NUMBER 6373 DATE SAMPLED 6/01/83

| RESULTS | ANALYSIS | | TIME N/A |
|---|---|---|---|
| 818. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 492. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 13.4 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

.....

SAMPLE----POINT--WELL 2 ---I-D NUMBER 6374 DATE SAMPLED 6/01/83

| RESULTS | ANALYSIS | | TIME N/A |
|---|---|---|---|
| 477. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 248. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 16.3 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

.....

SAMPLE--POINT--FOUNT EMP ENT ---I-D NUMBER 6375 DATE SAMPLED 6/01/83

| RESULTS | ANALYSIS | | TIME N/A |
|---|---|---|---|
| 296. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 201. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 6.4 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
LT = LESS THAN
GT = GREATER THAN
EQ = EQUAL TO

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RESULTS OF LABORATORY ANALYSIS - WATER SERVICE -TYPE 70 PAGE 1 QC0071

DATE RECD 8/06/83 PWS ID DATE TESTED 8/06/83
REPORT DATE -- 8/17/83 -BY-CFB

TESTED FOR
06490 HUNTER SPRING DIVISION

1 SPRING AVENUE
HATFIELD PA 19440

.....

SAMPLE---POINT--EMP ENT FOUNT ---I--D NUMBER 6829 DATE SAMPLED 8/03/83
RESULTS ANALYSIS TIME 1 35 PM

| RESULTS | | ANALYSIS |
|---|---|---|
| 228. | MCG/L | 1,1,1 TRICHLOROETHANE |
| 134. | MCG/L | TRICHLOROETHYLENE /TCE/ |
| 31.7 | MCG/L | PERCHLOROETHYLENE /PCE/ |

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
LT = LESS THAN
GT = GREATER THAN
EQ = EQUAL TO

Albert F Zimmermann

Q C INC .....

AUG 19 9 55 AM '83

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RESULTS OF LABORATORY ANALYSIS - WATER SERVICE -TYPE 25 PAGE 1 QC0071

DATE RECD 10/05/83 PWS ID DATE TESTED 10/06/83
REPORT DATE -10/24/83 -BY-JF

TESTED FOR
06490 HUNTER SPRING DIVISION

1 SPRING AVENUE
HATFIELD PA 19440

.....

SAMPLE--POINT-FOUNTAIN --I-D NUMBER 7391 DATE SAMPLED 10/05/83
RESULTS ANALYSIS TIME 3 00 PM
5800 / ML STANDARD PLATE COUNT
LT 2.2 /100ML MPN TOTAL COLIFORM COUNT
227. MCG/L 1,1,1 TRICHLOROETHANE
140. MCG/L TRICHLOROETHYLENE /TCE/
5.4 MCG/L PERCHLOROETHYLENE /PCE/
NO COLIFORM BACTERIA DETECTED
SAFE FOR DRINKING USE.

.....

SAMPLE--POINT-WELL 1 --I-D NUMBER 7390 DATE SAMPLED 10/05/83
RESULTS ANALYSIS TIME 3 00 PM
137. MCG/L 1,1,1 TRICHLOROETHANE
3.1 MCG/L TRICHLOROETHYLENE /TCE/
LT 0.5 MCG/L PERCHLOROETHYLENE /PCE/

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
LT = LESS THAN
GT = GREATER THAN
EQ = EQUAL TO

Albert F Zimmermann
Q C INC .....

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OCT 26 9 47 AM '83
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RESULTS OF LABORATORY ANALYSIS - WATER SERVICE -TYPE 25 PAGE 1 QC0071

DATE RECD 1/04/84 PWS ID DATE TESTED 1/05/84
REPORT DATE - 1/16/84 -BY-CFB

TESTED FOR
06490 HUNTER SPRING DIV PO# 52051

1 SPRING AVENUE
HATFIELD PA 19440

.....

SAMPLE---POINT-EMP ENTR FOUNT --I-D NUMBER 8102 DATE SAMPLED 1/04/84

| RESULTS | | ANALYSIS | TIME 2 00 PM |
|---|---|---|---|
| 460 | / ML | STANDARD PLATE COUNT | |
| LT 2.2 | /100ML | MPN TOTAL COLIFORM COUNT | |
| 0.0 | MG/L | CHLORINE RESIDUAL | |
| 90.6 | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 2.5 | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| LT 0.5 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

NO COLIFORM BACTERIA DETECTED
SAFE FOR DRINKING USE.

.....

SAMPLE---POINT-WELL 1 --I-D NUMBER 8103 DATE SAMPLED 1/04/84

| RESULTS | | ANALYSIS | TIME 2 00 PM |
|---|---|---|---|
| 538. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 369. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 10.3 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

.....

SAMPLE---POINT-WELL 2 --I-D NUMBER 8104 DATE SAMPLED 1/04/84

| RESULTS | | ANALYSIS | TIME 2 00 PM |
|---|---|---|---|
| 769. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 478. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 29.4 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
LT = LESS THAN
GT = GREATER THAN
EQ = EQUAL TO

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JE

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RESULTS OF LABORATORY ANALYSIS -- WATER SERVICE -TYPE 70 PAGE 1 QC0071

DATE RECD 3/08/84 PWS ID DATE TESTED 3/08/84
REPORT DATE - 3/26/84 -BY-JF

TESTED FOR
06490 HUNTER SPRING DIV PO# 52051

1 SPRING AVENUE
HATFIELD PA 19440

*****

SAMPLE---POINT--WELL 1 ---I-D NUMBER 8603 DATE SAMPLED 3/07/84

| RESULTS | | ANALYSIS | TIME N/A |
|---|---|---|---|
| 632. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 325. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 8. | MCG/L | PERCHLOROETHYLENE /PCE/ | |

*****

MPLE---POINT--WELL 2 ---I-D NUMBER 8304 DATE SAMPLED 3/07/84

| RESULTS | | ANALYSIS | TIME N/A |
|---|---|---|---|
| 529. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 201. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 19.9 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

*****

SAMPLE----POINT--NPWR HYDRANT ---I-D NUMBER 8605 DATE SAMPLED 3/07/84

| RESULTS | | ANALYSIS | TIME N/A |
|---|---|---|---|
| LT 0.5 | MCG/L | 1,1,1 TRICHLOROETHANE | |
| LT 0.5 | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| LT 0.5 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
LT = LESS THAN
GT = GREATER THAN
EQ = EQUAL TO

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RESULTS OF LABORATORY ANALYSIS - WATER SERVICE -TYPE 70 PAGE 1 QC0071

DATE RECD 5/03/84 PWS ID DATE TESTED 5/03/84
REPORT DATE - 5/15/84 -BY-JF

TESTED FOR
06490 HUNTER SPRING DIV PO# 52051

1 SPRING AVENUE
HATFIELD PA 19440

.....

SAMPLE--POINT-WELL 2 --I-D NUMBER 9034 DATE SAMPLED 5/02/84

| RESULTS | | ANALYSIS | TIME N/A |
|---|---|---|---|
| 314. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 183. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 30.4 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

.....

SAMPLE---POINT-WELL 1 ---I-D NUMBER 9035 DATE SAMPLED 5/02/84

| RESULTS | | ANALYSIS | TIME N/A |
|---|---|---|---|
| 379. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 289. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 13.3 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
LT = LESS THAN
GT = GREATER THAN
EQ = EQUAL TO

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Q C INC .....

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RESULTS OF LABORATORY ANALYSIS -- WATER SERVICE -TYPE 70 PAGE 1 QC0071

DATE RECD 7/05/84 PWS ID DATE TESTED 7/10/84
REPORT DATE -- 7/16/84 -BY-JF

TESTED FOR
06490 HUNTER SPRING DIV PO# 52051

1 SPRING AVENUE
HATFIELD PA 19440

.....

SAMPLE----POINT--RINSE WATER ---I-D NUMBER 407 DATE SAMPLED 7/05/84

| RESULTS | | ANALYSIS | TIME N/A |
|---|---|---|---|
| 0.27 | MG/L | CYANIDE | |

.....

SAMPLE---POINT--FOUNTAIN --I-D NUMBER 408 DATE SAMPLED 7/05/84

| RESULTS | | ANALYSIS | TIME N/A |
|---|---|---|---|
| 674. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 223. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| LT 0.5 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

.....

SAMPLE----POINT--GUARD HOUSE ----I-D NUMBER 409 DATE SAMPLED 7/05/84

| RESULTS | | ANALYSIS | TIME N/A |
|---|---|---|---|
| 3.1 | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 4.6 | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 12.9 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

.....

SAMPLE----POINT-REAR ---I-D NUMBER 410 DATE SAMPLED 7/05/84

| RESULTS | | ANALYSIS | TIME N/A |
|---|---|---|---|
| 615. | MCG/L | 1,1,1 TRICHLOROETHANE | |
| 249. | MCG/L | TRICHLOROETHYLENE /TCE/ | |
| 20.3 | MCG/L | PERCHLOROETHYLENE /PCE/ | |

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RESULTS OF LABORATORY ANALYSIS - WATER SERVICE -TYPE 70 PAGE 2 QC0071

TESTED FOR
06490 HUNTER SPRING DIV PO# 52051

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
LT = LESS THAN
GT = GREATER THAN
EQ = EQUAL TO

Q C INC Albert F Zimmermann

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JUL 18 11 03 AM '84
A DIV. OF AMETEK, INC.
HATFIELD, PA.

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RESULTS OF LABORATORY ANALYSIS - WATER SERVICE -TYPE 70 PAGE 1 QC0071

DATE RECD 8/20/84 PWS ID DATE TESTED 8/21/84
REPORT DATE - 8/30/84 -BY-CB

TESTED FOR
06490 HUNTER SPRING DIV PO# 52051

1 SPRING AVENUE
HATFIELD PA 19440

.....

SAMPLE--POINT-EMP FOUNTAIN --I-D NUMBER 9737 DATE SAMPLED 8/20/84
RESULTS ANALYSIS TIME 2 00 PM

| RESULTS | | ANALYSIS |
|---|---|---|
| LT 0.5 | MCG/L | 1,1,1 TRICHLOROETHANE |
| 5.4 | MCG/L | TRICHLOROETHYLENE /TCE/ |
| 0.5 | MCG/L | PERCHLOROETHYLENE /PCE/ |

ALL PROCEDURES CONFORM TO CURRENT E-P-A METHODOLOGY
LT = LESS THAN
GT = GREATER THAN
EQ = EQUAL TO

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ACCOUNT NO:W00788

REPORT NUMBER:84015414
REPORT DATE :12/20/84

SAMPLE DATE :12/05/84
SAMPLE TIME :02:00PM
SAMPLE TEMP :NA F
SAMPLED BY :CB
COLLECTED BY :CB
ANALYSIS DATE:12/08/84
P.O. NUMBER :82051

HUNTER SPRING DIVISION
1 SPRING AVENUE
HATFIELD, PA
19440

| SAMPLE/CONTAINER | TEST NUMBER ----> / TEST NAME ----> / UNIT MEASURE----> | W0121-MGL / CYANIDE / MG/L | W0601-UGL / 111-TRI * / UG/L | W0602-UGL / TCE * / UG/L | W0603-UGL / PCE * / UG/L |
|---|---|---|---|---|---|
| RINSE WATER<br>052712 QC SUPPLIED CONTAINER | | 0.027 | | | |
| DRINKING WATER-ENPLOYEES FOUNTAIN<br>052713 QC SUPPLIED CONTAINER | | | <0.5 | 13.0 | <0.5 |
| DRINKING WATER-WELL #1<br>052714 QC SUPPLIED CONTAINER | | | 23.7 | 121. | 3.5 |

* 111-TRI = 1,1,1-TRICHLOROETHANE
* TCE = TRICHLOROETHYLENE
* PCE = PERCHLOROHTHYLENE

SAMPLE# COMMENT NOTE: EACH SAMPLE ABOVE IS GIVEN A UNIQUE ID# (PRINTED JUST BELOW THE SAMPLE)

SAMPLED BY CARL BOSCH
052712 QC#34818
052712 ALL TESTING IS CONDUCTED IN ACCORDANCE WITH E.P.A. METHODOLOGY.
052713 QC#10335
052714 QC#10336
052714 ALL TESTING IS CONDUCTED IN ACCORDANCE WITH E.P.A. METHODOLOGY.

DEC 20

AR301280

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SOUTHAMPTON, PA. 18966 • 215/355-3900

HUNTER SPRING DIVISION
1 SPRING AVENUE
HATFIELD, PA
19440

REPORT DATE :03/01/85
SAMPLE DATE :02/15/85
SAMPLE TIME :02:00PM
SAMPLE TEMP :NA F
SAMPLED BY :JF
COLLECTED BY :JF
ANALYSIS DATE:02/15/85
P.O. NUMBER :56135

| SAMPLE/CONTAINER | TEST NUMBER ——> | W0601-UGL | W0602-UGL | W0603-UGL |
|---|---|---|---|---|
| | TEST NAME ——> | 111-TRI * | TCE * | PCE * |
| | UNIT MEASURE——> | UG/L | UG/L | UG/L |
| DRINKING WATER - FOUNTAIN<br>081169 QC SUPPLIED CONTAINER | | 1326. | 547. | 27.9 |
| DRINKING WATER - GUARD HOUSE<br>081170 QC SUPPLIED CONTAINER | | 108 | 83.7 | 1.8 |
| DRINKING WATER - PUMP HOUSE<br>081171 QC SUPPLIED CONTAINER | | 1541. | 566. | 29.6 |

* 111-TRI = 1,1,1-TRICHLOROETHANE
* TCE = TRICHLOROETHYLENE
* PCE = PERCHLORORTHYLENE

SAMPLE# COMMENT NOTE: EACH SAMPLE ABOVE IS GIVEN A UNIQUE ID# (PRINTED JUST BELOW THE SAMPLE)

SAMPLED BY JAMES FLANAGAN
081169 QC #10776
081169 ALL TESTING IS CONDUCTED IN ACCORDANCE WITH E.P.A. METHODOLOGY.
081170 QC #10777
081170 ALL TESTING IS CONDUCTED IN ACCORDANCE WITH E.P.A. METHODOLOGY.
081171 QC #10778
081171 ALL TESTING IS CONDUCTED IN ACCORDANCE WITH E.P.A. METHODOLOGY.

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HUNTER SPRING DIVISION
1 SPRING AVENUE
HATFIELD, PA
19440

REPORT DATE :07/11/85
SAMPLE DATE :06/25/85
SAMPLE TIME :11:15AM
SAMPLE TEMP :NA F
SAMPLED BY :JC
COLLECTED BY :JC
ANALYSIS DATE:07/08/85
P.O. NUMBER :56135
PWS ID :1460835

| SAMPLE/CONTAINER | TEST NUMBER ——> | W0121-MGL | W0601-UGL | W0602-UGL | W0603-UGL |
|---|---|---|---|---|---|
| | TEST NAME ——> | CYANIDE | 111-TRI * | TCE * | PCE * |
| | UNIT MEASURE——> | MG/L | UG/L | UG/L | UG/L |
| DRINKING WATER - EMPLOYEE'S FOUNTAIN<br>134201 QC SUPPLIED CONTAINER | | <0.5 | 1.1 | <0.5 | |
| DRINKING WATER - WELL 1<br>134202 QC SUPPLIED CONTAINER | | 61.9 | 22.3 | <0.5 | |
| DRINKING WATER - WELL 2<br>134203 QC SUPPLIED CONTAINER | | 1078 | 384 | 28.5 | |

* 111-TRI = 1,1,1-TRICHLOROETHANE
* TCE = TRICHLOROETHYLENE
* PCE = PERCHLORORTHYLENE

SAMPLE# COMMENT NOTE: EACH SAMPLE ABOVE IS GIVEN A UNIQUE ID# (PRINTED JUST BELOW THE SAMPLE)
SAMPLED BY JOAN CUMMINGS
134201 11684
134203 11688

AR301282

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QUALITY CONTROL LABORATORY
1205 INDUSTRIAL HIGHWAY • P.O. BOX 514
SOUTHAMPTON, PA. 18966 • 215/355-3900

HUNTER SPRING DIVISION
1 SPRING AVENUE
HATFIELD, PA
19440

REPORT DATE :08/16/85
SAMP \TE :08/07/85
SAMPL IME :10:00AM
SAMPLE TEMP :NA F
SAMPLED BY :CB
COLLECTED BY :CB
ANALYSIS DATE:08/16/85
P.O. NUMBER :56135

| | TEST NUMBER ——> | W0121-MGL | W0601-UGL | W0602-UGL | W0603-UGL | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | TEST NAME ——> | CYANIDE | 111-TRI * | TCE * | PCE * | | | | | | |
| SAMPLE/CONTAINER | UNIT MEASURE——> | MG/L | UG/L | UG/L | UG/L | | | | | | |
| DRINKING WATER - EMPLOYEES FOUNTAIN<br>156110 QC SUPPLIED CONTAINER | | | <0.5 | 1.9 | 0.5 | | | | | | |
| DRINKING WATER - WELL 1<br>156111 QC SUPPLIED CONTAINER | | | 198. | 183. | 5.3 | | | | | | |

* 111-TRI = 1,1,1-TRICHLOROETHANE
* TCE = TRICHLOROETHYLENE
* PCE = PERCHLORORTHYLENE

SAMPLE# COMMENT NOTE: EACH SAMPLE ABOVE IS GIVEN A UNIQUE ID# (PRINTED JUST BELOW THE SAMPLE)
SAMPLED BY CARL BOSCH
156110 11909
156111 11910

AR301283

ACCOUNT NO:W00/66

QC Inc
QUALITY CONTROL LABORATORY
1205 INDUSTRIAL HIGHWAY • P.O. BOX 514
SOUTHAMPTON, PA. 18966 • 215/355-3900

REPORT NUMBER:850409[illegible]
REP[illegible] DATE :10/18/85

SAM[illegible] DATE :10/02/85
SAMPL[illegible] TIME :02:10PM
SAMPLE TEMP :NA F
SAMPLED BY :RG
COLLECTED BY :RG
ANALYSIS DATE:10/10/85
P.O. NUMBER :58135

HUNTER SPRING DIVISION
1 SPRING AVENUE
HATFIELD, PA
19440

| SAMPLE/CONTAINER | TEST NUMBER ---> | W0001-PML | W0005-MPN | W0121-MGL | W0147-MGL | W0601-UGL | W0602-UGL | W0603-UGL |
|---|---|---|---|---|---|---|---|---|
| | TEST NAME ---> | SPC | COLI | CYANIDE | CHLORINE | 111-TRI * | TCE * | PCE * |
| | UNIT MEASURE---> | /ML | MPN/100ML | MG/L | MG/L | UG/L | UG/L | UG/L |
| DRINKING WATER EMPLOYEES FOUNTAIN | | 46 | <2.2 | | 0.0 | | | |
| 181189 QC SUPPLIED CONTAINER | | | | | | | | |
| RINSE WATER | | | | 1.67 | | | | |
| 181190 QC SUPPLIED CONTAINER | | | | | | | | |
| DRINKING WATER - WELL #1 | | | | | | 59.7 | 26.9 | 0.5 |
| 181191 QC SUPPLIED CONTAINER | | | | | | | | |
| DRINKING WATER - DRINK.FOUNT. | | | | | | 0.9 | 2.2 | 5.8 |
| 181192 QC SUPPLIED CONTAINER | | | | | | | | |

* 111-TRI = 1,1,1-TRICHLOROETHANE
* TCE = TRICHLOROETHYLENE
* PCE = PERCHLORORTHYLENE

SAMPLE# COMMENT NOTE: EACH SAMPLE ABOVE IS GIVEN A UNIQUE ID# (PRINTED JUST BELOW THE SAMPLE)
SAMPLED BY RAYMOND GEORGE
181189 ALL TESTING IS CONDUCTED IN ACCORDANCE WITH E.P.A. METHODOLOGY.
NO COLIFORM BACTERIA WERE DETECTED, THEREFORE THE WATER SUPPLY IS
BACTERIOLOGICALLY SAFE FOR DRINKING.
181190 QC#41300
181190 ALL TESTING IS CONDUCTED IN ACCORDANCE WITH E.P.A. METHODOLOGY.
181191 12079
181192 12080
181192 ALL TESTING IS [illegible]TED IN ACCORDANCE WITH E.P.A. METHODOLOGY.

Allen D. Schopbach
Allen D. Schopbach, President

AR301284

ACCOUNT NO:W00768

QC Inc
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1205 INDUSTRIAL HIGHWAY • P.O. BOX 514
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HUNTER SPRING DIVISION
1 SPRING AVENUE
HATFIELD, PA
19440

REP[redacted] NUMBER:85047737
REP[redacted] DATE :12/18/85

SAM[redacted] DATE :12/04/85
SAMPLE TIME :01:55PM
SAMPLE TEMP :NA F
SAMPLED BY :RG
COLLECTED BY :RG
ANALYSIS DATE:12/05/85
P.O. NUMBER :56135

| SAMPLE/CONTAINER | TEST NUMBER ----> / TEST NAME ----> / UNIT MEASURE----> | W0001-PHL / SPC / /ML | W0005-MPN / COLI / MPN/100ML | W0121-MGL / CYANIDE / MG/L | W0801-UGL / 111-TRI * / UG/L | W0802-UGL / TCE * / UG/L | W0803-UGL / PCE * / UG/L |
|---|---|---|---|---|---|---|---|
| DRINKING WATER - WELL 1<br>206612 QC SUPPLIED CONTAINER | | | | | 377. | 297. | 9.2 |
| DRINKING WATER - SINK<br>206613 QC SUPPLIED CONTAINER | | | | | 548. | 329. | 11.1 |

* 111-TRI = 1,1,1-TRICHLOROETHANE
* TCE = TRICHLOROETHYLENE
* PCE = PERCHLOROETHYLENE

SAMPLE# COMMENT NOTE: EACH SAMPLE ABOVE IS GIVEN A UNIQUE ID# (PRINTED JUST BELOW THE SAMPLE)

SAMPLED BY RAYMOND GEORGE
206612 ALL TESTING IS CONDUCTED IN ACCORDANCE WITH E.P.A. METHODOLOGY.
206613 ALL TESTING IS CONDUCTED IN ACCORDANCE WITH E.P.A. METHODOLOGY.

Allen D. [illegible]

AR301285

ACCOUNT NO. W00700

QC Inc

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SOUTHAMPTON, PA 18966 • 215/355-3900

HUNTER SPRING DIVISION
1 SPRING AVENUE
HATFIELD, PA
19440

REPORT NUMBER :860212
RE DATE :06/25/8
S/ DATE :06/10/8
SAMPLE TIME :12:00PM
SAMPLE TEMP :NA F
SAMPLED BY :JF
COLLECTED BY :JF
ANALYSIS DATE :06/10/8
P.O. NUMBER :60038 (
PWS-ID NUMBER :

| SAMPLE/CONTAINER | TEST NUMBER → | W0100-UNI | W0121-MGL | W0209-MGL | W0210-MGL | W0228-MGL | W0601-UGL | W0602-UGL | W0603-UGL |
|---|---|---|---|---|---|---|---|---|---|
| | TEST NAME → | PH | CYANIDE | CHROMIUM | CHROM,HEX* | ZINC | 111-TRI * | TCE * | PCE * |
| | UNIT MEASURE → | UNITS | MG/L | MG/L | MG/L | MG/L | UG/L | UG/L | UG/L |
| DRINKING WATER - FOUNTAIN<br>287570 QC SUPPLIED CONTAINER | | | | | | | <0.5 | 0.6 | 0.9 |
| DRINKING WATER - WELL #1<br>287571 QC SUPPLIED CONTAINER | | | | | | | 92.6 | 93.2 | 4.9 |
| DRINKING WATER - WELL #2<br>287572 QC SUPPLIED CONTAINER | | | | | | | 867. | 452. | 33.7 |

* CHROM,HEX = CHROMIUM,HEXAVALENT
* 111-TRI = 1,1,1-TRICHLOROETHANE
* TCE = TRICHLOROETHYLENE
* PCE = PERCHLOROETHYLENE

SAMPLE# COMMENT: NOTE: EACH SAMPLE ABOVE IS GIVEN A UNIQUE ID# (PRINTED JUST BELOW THE SAMPLE)
SAMPLED BY JAMES FLANAGAN
287570 ALL TESTING IS CONDUCTED IN ACCORDANCE WITH E.P.A. METHODOLOGY.

Allen D. Schopbach

Allen D. Schopbach, President

AR301286

ACCOUNT NO: WOU/66

QC Inc
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SOUTHAMPTON, PA. 18966 • 215/355-3900

HUNTER SPRING DIVISION
1 SPRING AVENUE
HATFIELD, PA 19440

REPORT NUMBER : 860123
REPORT DATE : 04/22/
SAMPLE DATE : 04/02/
SAMPLE TIME : 01:35P
SAMPLE TEMP : NA F
SAMPLED BY : RG
COLLECTED BY : RG
ANALYSIS DATE : 04/02/
P.O. NUMBER : 60038
PWS-ID NUMBER :

| SAMPLE/CONTAINER | TEST NUMBER → | W0001-PML | W0005-MPN | W0100-UNI | W0121-MGL | W0147-MGL | W0209-MGL | W0210-MGL | W0228-MGL | W0601-UGL | W0602-UGL | W060 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TEST NAME → | SPC | COLI | PH | CYANIDE | CHLORINE | CHROMIUM | CHROM,HEX* | ZINC | 111-TRI * | TCE * | PCE |
| | UNIT MEASURE → | /ML | MPN/100ML | UNITS | MG/L | MG/L | MG/L | MG/L | MG/L | UG/L | UG/L | UG/L |
| DRINKING WATER - FOUNTAIN 254198 QC SUPPLIED CONTAINER | | | | | | | | | | <0.5 | 0.6 | |
| DRINKING WATER - WELL #1 254199 QC SUPPLIED CONTAINER | | | | | | | | | | 339. | 341. | |
| DRINKING WATER - WELL #2 254200 QC SUPPLIED CONTAINER | | | | | | | | | | 539. | 220. | |

* CHROM,HEX = CHROMIUM,HEXAVALENT
* 111-TRI = 1,1,1-TRICHLOROETHANE
* TCE = TRICHLOROETHYLENE
* PCE = PERCHLOROETHYLENE

SAMPLE# COMMENT NOTE: EACH SAMPLE ABOVE IS GIVEN A UNIQUE ID# (PRINTED JUST BELOW THE SAMPLE)
SAMPLED BY RAYMOND GEORGE

AR301287

Allen D. Schopbach

Allen D. Schopbach, President

REFERENCE 32
Industrial and Hazardous Waste Management 1984.

THE NATIONAL DREDGING AND PUMPING CORP. (continued)

Processes Available at Generator's Site
neutralization, stabilization/ solidification, filtration, flocculation, thickening, activated carbon, dewatering

Approval Time for New Waste: 1 week

Regulatory Status
RCRA interim status and Part B not applicable to this company's services.

Company Background
The company was founded in 1974. In addition to performing treatment at the generator's site, the company will arrange for the removal and disposal of the treated waste.

Other Services Offered
consulting

Transportation Services
Transportation of treated waste can be arranged.

* * * * *

WASTE CONVERSION, INC.
Hatfield, PA

Sales Office
2869 Sandstone Drive
Hatfield, PA 19440
215/822-8996

Emergency Phone Number
215/822-8996

Forms of Waste Accepted
bulk liquids, containerized liquids, containerized solids

Waste Types Accepted
acids, chromic acids, pickling acids, caustics, cyanides, paints and inks, waste oil, commercial chemical products, nonmetallic inorganics, metallic inorganics, contaminated soil

On-Site Processes
chemical fixation, chemical oxidation, chemical precipitation, chemical reduction, chlorination, cyanide degradation, detoxification, neutralization, stabilization/ solidification, clarification, coagulation, decanting, encapsulation, filtration, flocculation, flotation, thickening, activated carbon, blending; storage: container, tank, waste pile

Off-Site Processes (Arrangements Provided)
Landfill

Access: truck

Approval Time for New Waste: 2 weeks

Regulatory Status
RCRA interim status. Part B submitted 6/83; approval expected 6/84.

EPA Identification Number: PAD085690592

Company Background
The company was founded in 1977, and this facility opened the same year.

Other Services Offered
laboratory analysis, mobile laboratory, spill response/clean-up, consulting, waste brokerage, transfer station

Transportation Services
Transportation offered to this facility, partial and full loads.

Terminals: Hatfield, PA

Service Area: DE, MD, NJ, NY, PA

* * * * *

## PENNSYLVANIA TRANSPORTERS

ACE SERVICE CORP.

Sales Office
1924 S. Delaware Ave.
Philadelphia, PA 19148
215/755-5555

Terminal Locations
Burlington, Camden, Gloucester, and Salem counties, NJ; Bucks, Chester, Delaware, Montgomery counties, and Philadelphia, PA

Load Types Accepted
bulk liquids, bulk solids, containerized liquids, containerized solids; partial and full loads

Waste Types Accepted
acids, chromic acids, pickling acids, caustics, cyanides, explosives, paints and inks, solvents-nonhalogenated, solvents-halogenated, waste oil, commercial chemical products, nonmetallic inorganics, metallic inorganics, metallic organics, nonhalogenated organics, halogenated organics, pesticides, PCB liquids, PCB solids, low level nuclear, contaminated soil

* * * * *

REFERENCE 33
Groundwater Resources of the Brunswick Formation
in Montgomery and Berks Counties, Pennsylvania

AR301290

REFERENCE 34
Ametek Intraoffice correspondence

INTRA-OFFICE CORRESPONDENCE..... September 1, 1970..

TO: W. H. Spencer

Subject: DISPOSAL LAGOON INVENTORY QUESTIONAIRE

1. AMETEK/Hunter Spring

2. Same

3. See Robert E. Lamb Dwg. # P-1
   Location of Plant - 75° 18' Latitute
   40° 17' Longitude

4. See Robert E. Lamb Dwg. # P-1

5. See Lancy Labs Dwg. # HSD-102

6. Red rock beginning at approximately 12' below grade at sludge beds.

7. Unknown

8. Visually looking at bottom and sides, opinion is that said bottom and sides are virtually impervious to drainage and filtration.

9. See Lancy Labs Dwg. # HSD-102

10. Never, to date.

11. See Lancy Labs Dwg. # HSD-102

12. Varying ½ to full.

13. 2,700 gallons pumped once weekly.

14. Waste acids and alkalis, neutralized cyanides, neutralized chromates, inert metallic oxides, metallic hydroxides and tumbling sludges, maintained at PH 6.5 to 9.0

15. All wastes originate in the Plating Dept of the plant, resulting from metal finishing processes.

16. a. Lancy System - integrated cyanide treatment.

    b. Lancy System - integrated chromium treatment.

    c. Cyanide containing waste batches - neutralize cyanide with Chlorine, adjust PH, and pump to sludge beds.

AR301292

INTRA-OFFICE CORRESPONDENCE ..... 19.70.

TO: W. B. Spencer

Subject: DISPOSAL LAGOON INVENTORY QUESTIONAIRE

17. Once a year, liquid is pumped and sprayed onto owner's property: once every 3 or 4 years sludge is removed by mechanical means and used as fill on owner's property.

18. Anticipate connecting into regionalized sewage treatment plant for all wastes. This will probably be Hatfield Twp.

S. J. Feidi

AR301293

REFERENCE 35
Ametek Interoffice correspondence

AMETEK

Inter - House Correspondence

TO: Mike Theodore OFFICE Mfg./Engrg. FROM: Bill Panzeter

SUBJECT: Update on Toxic Materials DATE: August 19, 1980

Per your request to update our compilation of toxic materials in use at our division, please note the following yearly usage, storage, and disposal of our existing toxic chemicals.

1. Zinc, Cadmium and Sodium Cyanide

   A. Yearly usage - 8,000 lbs.

   B. Storage is in a temperature-controlled building. This building is above ground and separate from the main plant.

   C. Process - The zinc and cadmium cyanide is checked (in solution) on a regular four-hour cycle by trained plating personnel. The plating tanks are inspected periodically for structural stability by maintenance and replaced as needed. The tanks are fully vented and equipped with splash guards.

   D. Disposal - The zinc and cadmium cyanide plating solution is neutralized during process with chlorine which forms either zinc or cadmium hydroxide. This neutralized solution is then fed into our primary settling tanks, where the "PH" is leveled and from the primary settling tank the solution is transferred to our automatic, maintenance free, plating solution system room. The solution is permitted to settle out any solids and the resultant liquid is fed into the sewer in a diluted state. The parts per million fed into the sewer meet the Hatfield Sewer Authority criteria.

2. Sodium Bichromate

   A. Yearly usage - 5,800 lbs.

   B. Storage is as indicated in Item 1, Subpart B.

   C. Process - This material is purchased in a chrystaline condition and utilized in process in a molten state to organic plate parts per government specifications.

   The process tank, heated to 845° F, is vented and fully covered. Any possibility of splashing is contained and readily rinsed with water into a holding pan. The operator is required to wear protective apparel, as supplied by Hunter Spring.

AR301295

D. Disposal - When tank needs cleaning, approximately once a year, it is heated and molten residue is dipped out and put into a 55 gal. steel drum. This drum is picked up by a registered solid waste disposal dealer for recycle, neutralization, and/or disposal.

3. Sodium Hydroxide

A. Yearly usage - 18,000 lbs.

B. Storage is as indicated in Item 1, Subpart B.

C. Process - This material is used in the plating operation and cyanide primary treatment tank to retain proper "PH"

D. Disposal is as indicated in Item 1, Subpart D.

4. Cadmium, Zinc and Cadmium Oxide

A. Yearly usage - 7,000 lbs. total

B. Storage is as indicated in Item 1, Subpart B.

C. Process - These materials are used in electro-plating process for cadmium and zinc disposition as required by customers and government.

D. Disposal is as indicated in Item 1, Subpart D.

5. Phosphoric, Nitric, ~~and~~ Sulphuric ~~Acids~~ & HYDROCHLORIC, MURIATIC ACID

A. Yearly usage - 25,000 lbs. total

B. Storage is as indicated in Item 1, Subpart B.

C. Process - These materials are utilized in plating, pickling and passivate operations.

D. Disposal - When solutions are spent, they are added to our alkaline primary storage tank to obtain proper "PH" prior to disposition at final treatment.

6. Tri-Chlor

A. Yearly usage - 4,500 gals.

B. Storage - Tri-Chor is stored in a 1,500 gal. tank located outside of the plant.

C. Process - This material is used for degreasing parts. Our degreasers are equipped with splash guards and chiller coils. The tri-chlor tanks are cleaned by boiling down and removing residue. The residue is pumped into 55 gal. drums and shipped to U. S. Gauge for distillation. The cleaning procedure is accomplished every three months.

W. J. Panzeter

W. J. Panzeter

WJPds

8-19-80

AR301297

REFERENCE 36
Letter (w/enclosures) from Pamela Moore to
Lorie Acker regarding EPA 104(e) request

(Copie may be provided by EPA from reference files
for Zone of Contamination 7, the Spra-Fin Site)

REFERENCE 37
Final Facility Report (PRP Search Report)
North Penn Area, Amtek, Inc., Site
Tech Law, December 4, 1987
(Copy to be provided by EPA)

# CDM Federal Programs Corporation

December 10, 1987

Ms. Humane Zia
U.S. Environmental Protection Agency
841 Chestnut Street
Sixth Floor
Philadelphia, Pennsylvania 19107

PROJECT: EPA CONTRACT NO.: 68-01-7331
DOCUMENT NO.: T220-C03-EP-BJKF-1
SUBJECT: Attachments
Final Report for Work Assignment 220
North Penn Area
Ametek, Incorporated Site
Montgomery County, Pennsylvania

Dear Ms. Zia:

Enclosed please find the Attachments for the Final Report entitled "North Penn Area, Ametek, Incorporated Site," as partial fulfillment of the reporting requirements for this work assignment. The Final Report will be sent under separate cover.

If you have any comments regarding this submittal, please contact Robert Weissman of TechLaw, Inc at (703) 476-1100 within two weeks of the date of this letter.

Sincerely,

CDM Federal Programs Corporation

Mark diFeliciantonio

BRP/dmh

cc: Hans Waetjen, EPA TES III Project Officer (letter only)
Elaine Spiewak, EPA Regional Contact, CERCLA Region III (letter only)
Dan Dickson, EPA HQ Coordinator, CERCLA Region III (letter only)
Bruce Bakaysa (letter only)
Harry P. Butler, CDM Federal Programs Corporation Deputy Program Manager (letter only)
Benjamin Jackson, TechLaw, Inc. (letter only)



AR301299A

Printed for and Sold by John C. Clark Co., 1420 S. Penn Sq., Phila.

DEED. No. 736

# This Indenture, Made the

26th day of February in the year of our Lord one thousand nine hundred and sixty (1960)

**Between** MARIE R. MOYER, widow of the Township of Franconia, County of Montgomery and Commonwealth of Pennsylvania, Grantor, party of the first part; -AND- AMERICAN MACHINE AND METALS, INC., a Delaware Corporation, with a principal place of business in the Borough of Lansdale, County of Montgomery and Commonwealth of Pennsylvania, Grantee, party of the second part:

**Witnesseth,** That the said party of the first part, for and in consideration of the sum of Seventy-six Thousand Five Hundred ($76,500.00)------ lawful money of the United States of America, well and truly paid by the said party of the second part to the said party of the first part, at and before the ensealing and delivery of these presents, the receipt whereof is hereby acknowledged, has granted, bargained, sold, aliened, enfeoffed, released, conveyed and confirmed and by these presents does grant, bargain, sell, alien, enfeoff, release, convey and confirm unto the said party of the second part, its successors and assigns.

ALL THAT CERTAIN messuage, barn, outbuildings and tract of farm and woodland along the southeast side of Bergey Road extending from the Souderton-Hatfield Road to the Bethlehem Pike in Hatfield Township, Montgomery County, Pennsylvania, bounded and described according to a survey and plan dated December 31, 1951, as prepared by Stanley F. Moyer, Registered Engineer and Land Surveyor, Souderton, Pennsylvania, as follows, to wit:

BEGINNING at an iron pin a corner in the center line of Bergey Road, 33.0' wide and in the east property line of Bethlehem Branch of the North Pennsylvania Railroad, thence along the center line of Bergey Road the next two courses and distances (1) North Forty Two Degrees Sixteen Minutes East (N.42°16'E.) the distance of One Thousand Seven Hundred and Sixteen Hundredths Feet (1700.16') to a spike a corner; thence (2) North Forty Two Degrees Forty Six Minutes East (N.42°46'E.) the distance of Eight Hundred Twenty Three and Seventy Three Hundredths Feet (823.73') to an iron pin a corner, thence along land of Alfred Zisenang South Thirty Nine Degrees Forty Four Minutes East (S.39°44'E.) the distance of Five Hundred Twenty Three and Eighty Three Hundredths Feet (523.83') to an iron pin a corner; thence along land of Pierce Gerhart South Forty Five Degrees Nine Minutes West (S.45°09'W.) the distance of Five Hundred Sixteen and Twenty Four Hundredths Feet (516.24') to a stone a corner, thence along the same and land of Elizabeth Matiskoiny South Thirty Six Degrees Twenty One Minutes East (S.36°21'E.) the distance of Four Hundred Fifty Five and Thirty Four Hundredths Feet (455.34') to an iron pin a corner; thence along land of Max York the next two courses and distances (1) South Fifty One Degrees Fifty Four Minutes West (S.51°54'W.) the distance of Three Hundred Thirty Five and Six Hundredths Feet (335.06') to an iron pin a corner; thence (2) South Forty Degrees Forty Three Minutes East (S.40°43'E.) the distance of Eight Hundred Twenty and Twenty Eight Hundredths Feet (820.28') to a stone a corner; thence along land of John R. Hutt South Forty Nine Degrees Seven Minutes West (S.49°07'W.) the distance of Six Hundred Forty Eight and Thirty Six Hundredths Feet (648.36') to an iron pin and stone a corner; thence along land of Samuel M. Rorer the next two courses and distances (1) North Forty Six Degrees Seven Minutes West (N.46° 07'W.) the distance of Twenty Eight and Fifty Hundredths

3012993

105

106

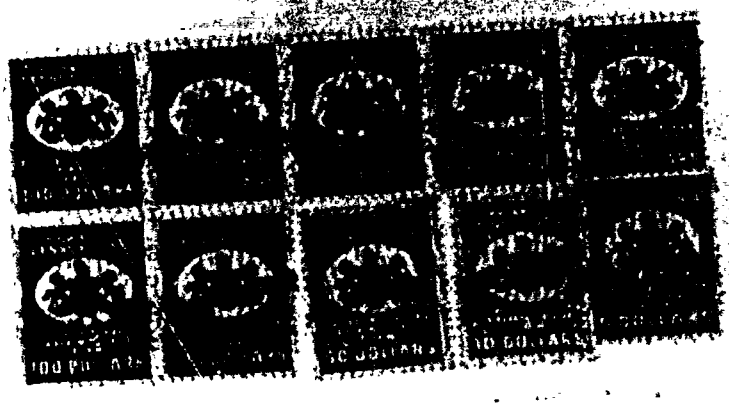
Feet (28.50') to an iron pin a corner; thence (2) South Thirty Nine Degrees Forty Four Minutes West (S.39°44'W.) the distance of One Thousand Two Hundred Sixty Eight and Ninety Three Hundredths Feet (1268.93') to an iron pin a corner in the center line of Moyer Road; thence along the center line of the same North Forty Seven Degrees West (N.47°W.) the distance of One Thousand Eighty and Seventy Three Hundredths Feet (1080.73') to an iron pin a corner in the east property line of the Bethlehem Branch of the North Pennsylvania Railroad; thence along the same North Seven Degrees West (N.7°W.) the distance of Seven Hundred Forty Seven and Eighty Three Hundredths Feet (747.83') to the place of BEGINNING.

CONTAINING 86.274 acres of land, more or less.

BEING THE SAME PREMISES which Sophie Schwenk, singlewoman, by her deed of indenture dated July 19, 1951, and recorded in the Office for the Recording of Deeds in and for Montgomery County in Deed Book 2198, page 217, granted and conveyed unto Nelson F. Moyer and Marie R. Moyer, his wife, as tenants by the entireties.

And that the said Nelson F. Moyer did depart this life on the 29th day of November, 1957, and that thereby by virtue of the laws and statutes of the Commonwealth of Pennsylvania, title to said premises did descend and vest in Marie R. Moyer, his wife, in fee.

SCHOOL DISTRICT OF
Hatfield TWP
BORO
March 1 1960 Received
$.765 Realty Transfer Tax



301300

**Together** with all and singular, the buildings, improvements, woods, ways, rights, liberties, privileges, hereditaments and appurtenances, to the same belonging, or in any wise appertaining, and the reversion and reversions; remainder and remainders, rents, issues, and profits thereof, and of every part and parcel thereof:
And also, all the estate, right, title, interest,
property, possession, claim and demand whatsoever, both in law and equity, of the said part y of the first part, of, in, and to the said premises, with the appurtenances:

**To have and to hold** the said premises, with all and singular the appurtenances unto the said part y of the second part, its successors and assigns, to the only proper use, benefit and behoof of the said part y of the second part, its successors and assigns forever,

**And** the said party of the first part, for herself, her heirs, executors and administrators, do es by these presents, covenant, grant and agree, to and with the said part y of the second part, her heirs and assigns forever, that she the said party of the first part, her heirs, all and singular the hereditaments and premises herein above described and granted, or mentioned and intended so to be, with the appurtenances, unto the said part y of the second part, its successors and assigns, against her the said party of the first part, her heirs, and against all and every other person or persons, whomsoever lawfully claiming or to claim the same or any part thereof, by, from, or under them, or any of them SHALL and WILL

BY THESE PRESENTS WARRANT and forever DEFEND.

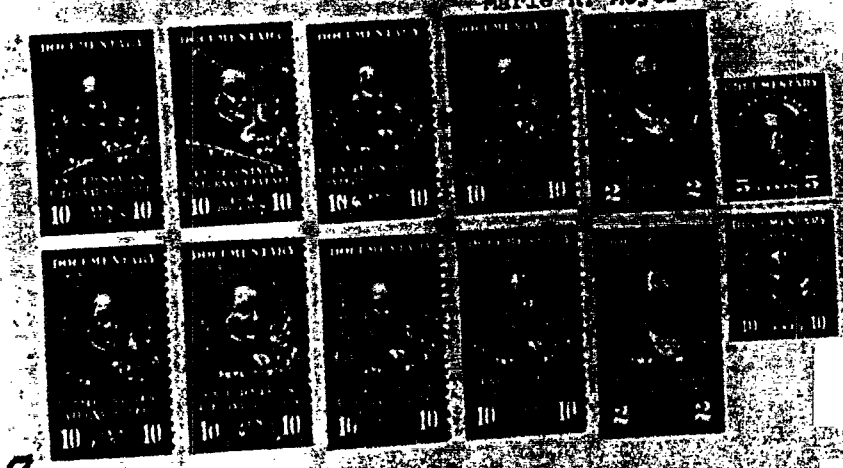
**In witness whereof,** the said part y of the first part to these presents has hereunto set her hand and seal. Dated the day and year first above written.

**Signed, Sealed and Delivered** IN THE PRESENCE OF US

Erin R. Souder

Marie R. Moyer (SEAL)

...e state stamps affixed represents tax on full consideration including liens and encumbrances.



107

AR301301

108

**Received,** *the day of the date of the above Indenture of the above named* party of the second part, the within mentioned consideration in full.

Witnesses:
Edna R. Sonder

Marie R. Moyer
Marie R. Moyer

*State of* PENNSYLVANIA
*County of* BUCKS } ss.

*On the* 20th *day of* February, 1960, *before me,* the subscriber, a Notary Public in and for the Commonwealth of Pennsylvania *the undersigned officer, personally appeared* Marie R. Moyer

*known to me (or satisfactorily proven) to be the person whose name* is *subscribed to the within instrument, and acknowledged that* she *executed the same for the purposes therein contained, and desired the same might be recorded as such.*

*In Witness Whereof, I hereunto set my hand and official seal.*

Marjorie A. Keck
Notary Public, Bensalem, Bucks County
My Commission Expires February 24, 1964
*Title of Officer*

The address of the within-named Grantee is Lansdale, Pa.
James C. Bowen
*On behalf of the Grantee*

650

# Deed.

MARIE R. MOYER
-TO-
AMERICAN MACHINE & METALS, INC.

Premises: Hatfield Twp. Montg. Co., Pa.

6-59 John C. Clark Co., Phila. 734

POWER, BOWEN & VALIMONT
Attorneys-at-Law
Sellersville, Penna.

Mar 1 9 11 AM '60

**Recorded,** *in the Office for the Recording of Deeds in and for* Montgomery County *in Deed Book* No. 3039 *page* 105 &c.

*Witness my hand and seal of Office this* 1st *day of* March *Anno Domini 19* 60

*Recorder*
*Deputy Recorder* John L Magill

301302

MONTGOMERY COUNTY, SS.
I HEREBY CERTIFY THAT THE FOREGOING
AND ANNEXED IS A FULL, TRUE AND CORRECT
COPY AS THE SAME APPEARS OF RECORD AND
RECORDED IN BOOK NO
PAGE
WITNESS MY HAND AND OFFICIAL SEAL THIS
DAY OF A.D. 19
RECORDING CLERK

AR301303

JUN 17 3 05 PM '83 007621

# EASEMENT AGREEMENT

9200
2350
2200

KNOWN TO ALL MEN BY THESE PRESENTS, that we, Ametek, Hunter Spring Division, of Bergey Road, Hatfield Township, Montgomery County, Pennsylvania (hereinafter called "OWNER") for and in consideration of the sum of One Dollar, ($1.00) to me in hand paid by the NORTH PENN WATER AUTHORITY (hereinafter called "AUTHORITY"), receipt of which is hereby acknowledged, do hereby give and grant to the Authority the right to construct, install, reconstruct and perpetually maintain water pipe lines, connections and appurtenances within a permanent exclusive easement, such easement being more fully described in Exhibit "A" and shown on plan marked Exhibit "B", all attached hereto.

To have and to hold the same perpetually to the Authority, its successors and assigns, together with the right and privilege at any and all times to enter the premises, or any part thereof, for the purposes of constructing, installing, reconstructing, repair or maintaining the water pipe lines and appurtenances and for making connections therewith.

Owner agrees, for themselves, their successors, heirs, executors, administrators and assigns, as follows:

(a) No building, or other structure of any kind shall be erected upon or within ten (10) feet of any Authority facilities as constructed

(b) No trees or shrubbery shall be planted on or within ten (10) feet of any Authority facility.

(c) No permission or easement shall be granted to any other person, corporation or other entity to install pipe, conduits, wires or other underground facilities within ten (10) feet of Authority facilities without the written permission of Authority, it being understood that the aforesaid easement is for the exclusive use of Authority.

REALTY TRANS. TAX PAID
STATE
LOCAL
PER

35-00-00277-00-3

-1-

MONTGOMERY COUNTY COMMISSIONERS REGISTRY
35-00-00277-00-3 HATFIELD DBK 3039
BERGEY RD SS PG 0105
AMERICAN MACHINE & METALS INC 2.00
B 76 U 019 4340 DATE 6/17/83
301304

BOOK 4709 PG 2246

(d) The grade above pipe line shall not be changed by the Owner so as to effect the cover over Authority's main unless Owner agrees to pay the cost of relocating Authority's facilities in order to provide cover of four (4) feet over facilities.

Authority agrees as follows:

(a) After doing any work in connection with the construction, installation reconstruction, repair or maintenance of the water pipes or appurtenances, or any connection therewith, to restore the premises to the same condition in which said premises were found before such work was undertaken; with the exception of any facilities prohibited in a, b, or c, above.

(b) To permit Owner to maintain lawn, roadways, sidewalks, and other surface improvements approved by Authority within the easement area, provided same does not interfere with the facilities of Authority. Such approval by Authority shall not be unreasonably withheld.



301305

BOOK 4709 PAGE 2247

(c) The Authority does hereby undertake to be solely liable and responsible to hold the Owner harmless from any and all claims, damages or obligations arising out of injury or damage to persons or property by reason of the Authority doing, or causing to be done, any of the construction, installing, reconstruction, repair, maintenance or restoration contemplated by this agreement.

(d) If, in the event Authority shall abandon its facilities within the right-of-way, and has no further need for the right-of-way for the purpose of providing water service, it shall abandon the easement and all rights therein will revert to Owner.

(e) If, in the event Owner requests Authority to relocate its facilities, Authority shall agree to do so at Owner's expense.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals this 16th day of MAY, 1983

Roland T. Scholl Chmn.

Ernest D. Yocum Jr. SECRETARY

NORTH PENN WATER AUTHORITY

By W. H. Skewan VP & GM

Attest Pete J. Gipe

(SEAL)

301306



BOOK 4709 PG 2248

METES AND BOUNDS DESCRIPTION

ALL THAT CERTAIN easement for water main situated in the Township of Hatfield, County of Montgomery, Commonwealth of Pennsylvania, bounded and described as follows, to wit:

BEGINNING at a point on the southeasterly side line of Bergey Road (33-1/3 feet wide), said point being located at the intersection of said side line with the line of land of now or late Bethlehem Branch, North Pennsylvania Railroad, thence leaving said point and extending along lands of now or late Hunter Spring Division of Ametek, Inc. the following (2) courses and distances: (1) North 42 degrees 16 minutes East 1712.16 feet to a point (2) North 42 degrees 46 minutes East 823.73 feet to a point a corner of the land now or late Alfred Zischang; thence extending along lands of Alfred Zischang South 39 degrees 44 minutes East 15.13 feet to a point on the line of land of Alfred Zischang, thence extending through the lands of now or late Hunter Spring Division of Ametek, Inc. South 42 degrees 46 minutes West 430 feet to a point; thence continuing through lands of now or late Hunter Spring Division of Ametek, Inc. the following (3) courses and distances (1) South 47 degrees 14 minutes East 10 feet to a point (2) South 47 degrees 46 minutes West 150.00 feet to a point (3) North 47 degrees 14 minutes West 10.00 feet to a point; thence continuing through the lands of now or late Hunter Spring Division of Ametek, Inc. South 42 degrees 46 minutes West 239.45 feet to a point, thence continuing through the lands of Hunter Spring Division of Ametek, Inc. South 42 degrees 16 minutes West 1657.29 feet to a point; thence continuing through the lands of Hunter Spring Division of Ametek, Inc. the following (2) courses and distances: (1) South 47 degrees 14 minutes East 35 feet to a point (2) South 42 degrees 16 minutes West 100 feet to a point on the line of land of Bethlehem Branch North Pennsylvania Railroad Company thence extending along the land of Bethlehem Branch, North Pennsylvania Railroad Company North 7 degrees West 65.98 feet to the point and place of beginning.

BEING an easement for water main made for the North Penn Water Authority.

BEING PARCEL NO. 35-00-00277-00-3.

301307

EXHIBIT "A"

BOOK 4709 PAGE 2249

Corpacin

ACKNOWLEDGEMENT

COMMONWEALTH OF PENNSYLVANIA :

§§

COUNTY OF MONTGOMERY :

On this 16th day of MAY, 1983, before me the subscribed, a Notary Public, in and for the Commonwealth of Pennsylvania and County of Montgoemry, the undersigned officer personally appeared the above named, WILLIAM H. SPENCER, who acknowledges himself to be the VICE-PRESIDENT, of AMETEK, INC, and, as such officer, being duly authorized to do so, executed the within instrument on behalf of AMETEK, INC, for the purpose therein contained, by signing the name of the corporation by himself as VICE-PRESIDENT & GENL MGR.

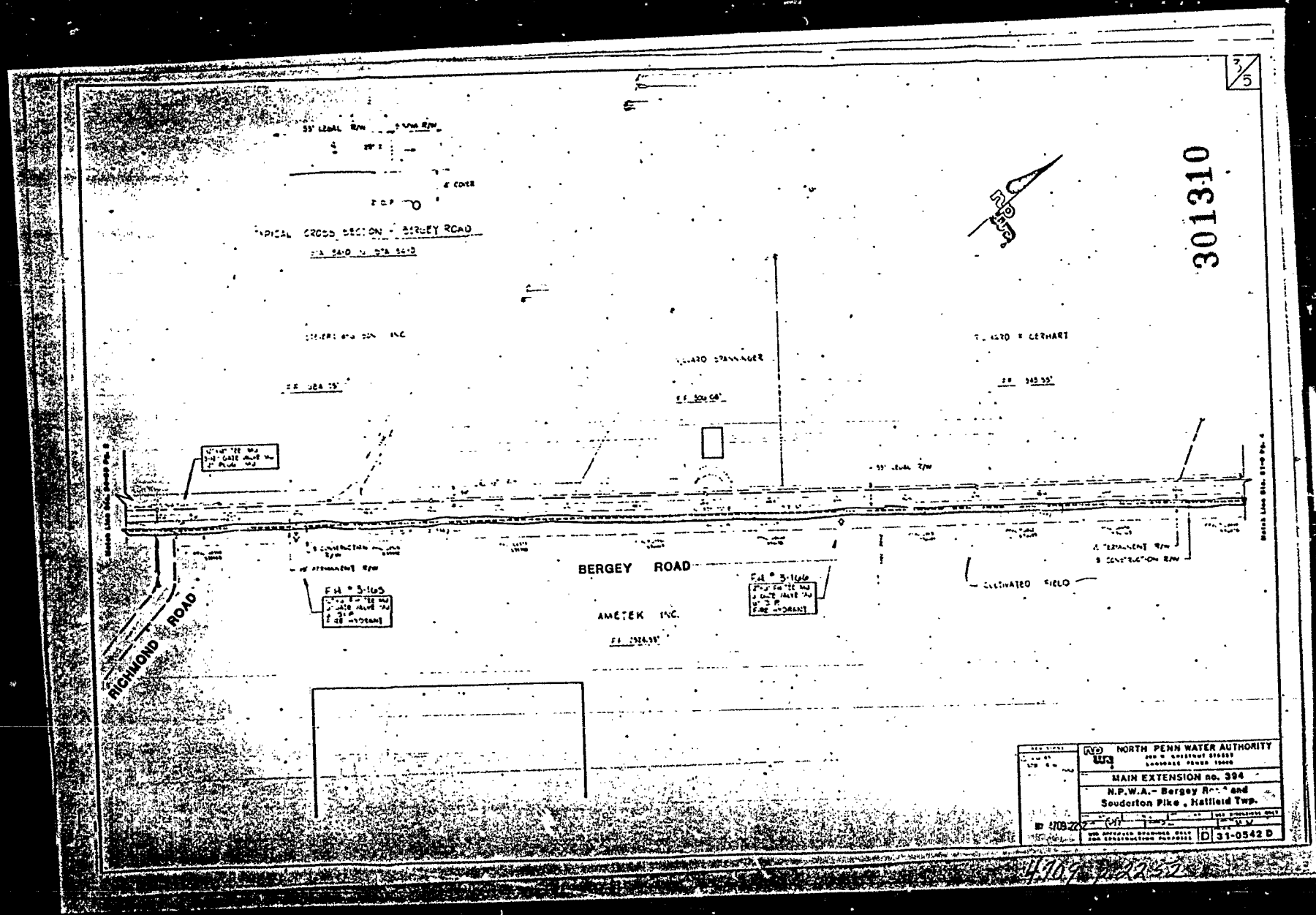
IN WITNESS WHEREOF, I have hereunto set my hand and seal.

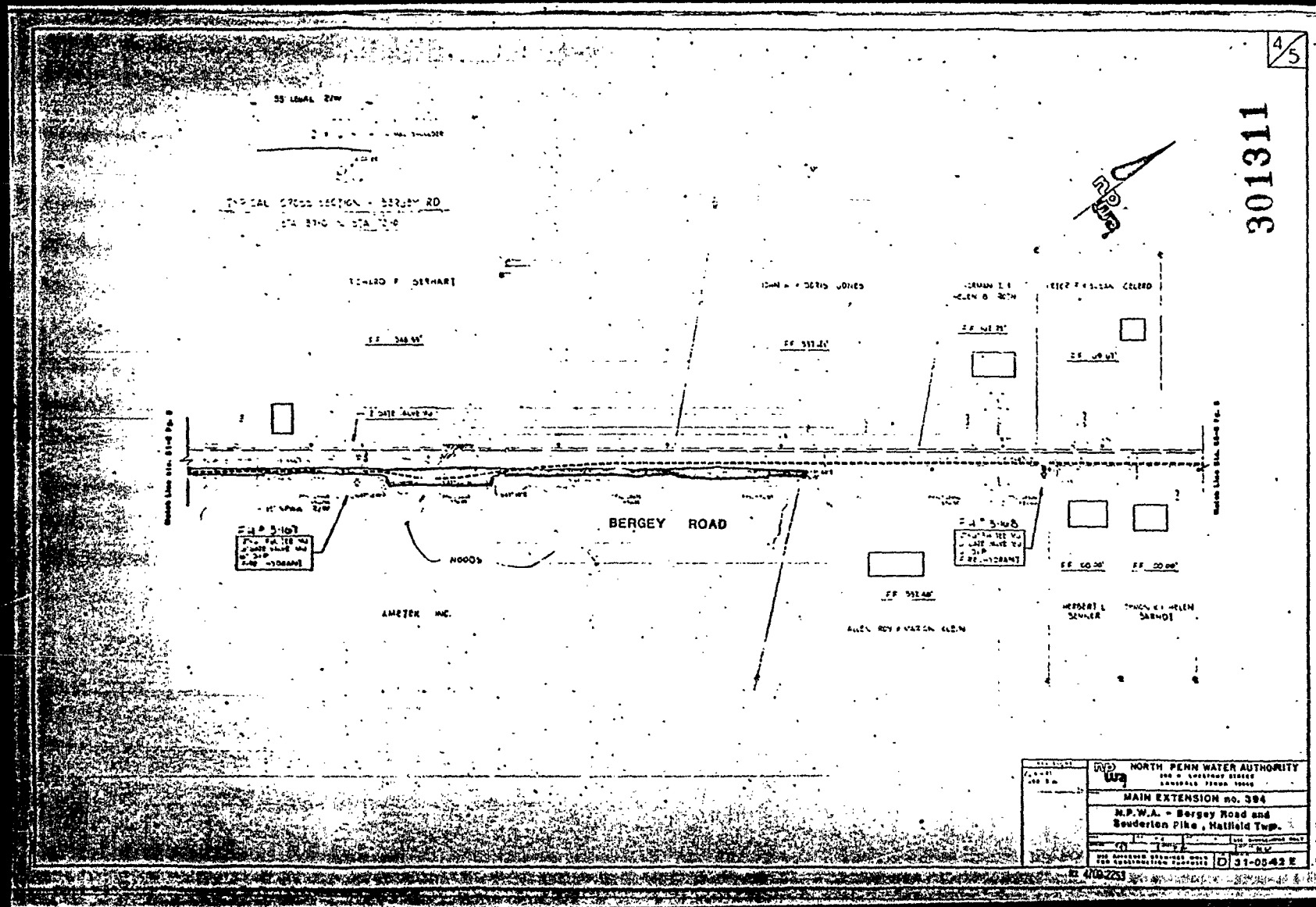
Norma F. Allen
NOTARY PUBLIC

NOTARY PUBLIC
MY COMMISSION EXPIRES OCT. 10, 1985

BOOK 4709 PAGE 2250 301308

BERGEY ROAD
BETHLEHEM BRANCH
READING CO.
NORTH PENN WATER AUTHORITY
MAIN EXTENSION no. 384
N.P.W.A. - Bergey Road and Souderton Pike, Hatfield Twp.
301309


3/5
301310
TYPICAL CROSS SECTION - BERGEY ROAD
BERGEY ROAD
RICHMOND ROAD
AMETEK INC.
CULTIVATED FIELD
F.H. # 3-165
F.H. # 3-166
NORTH PENN WATER AUTHORITY
MAIN EXTENSION no. 394
N.P.W.A.- Bergey Road and
Souderton Pike, Hatfield Twp.
D 31-0542 D


4/5
301311
BERGEY ROAD
AMETEK INC.
NORTH PENN WATER AUTHORITY
MAIN EXTENSION no. 394
N.P.W.A. - Bergey Road and
Souderton Pike, Hatfield Twp.
D 31-05-42 E

COMMONWEALTH OF PENNSYLVANIA :

: ss

COUNTY OF MONTGOMERY :

On this, the 16th day of May, before me, the undersigned officer, personally appeared Pollard S. Schell, Ernest Yocum, who acknowledged himself to be the Chairman and Sec.- of NORTH PENN WATER AUTHORITY, a municipal authority, and that they as such ~~have~~ are being authorized to do so, executed the foregoing instrument for the purpose therein contained by signing the name of the Authority by himself as

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

Barbara L. Granese

NOTARY PUBLIC
BARBARA L. GRANESE
Norristown, Montg. Co., PA
My Comm. Expires August 13, 1984

Montgomery County S. S.

Recorded in the Office for Recording of Deeds &c.
In and for said county in ..... book
No. 4709 ..... Page 2246 ..... &c.
Witness my hand and seal of office this 17th
day of June 1983

William J. Ashe Jr.
Recorder

RECORDER'S OFFICE * MONTGOMERY COUNTY, PA *

BOOK 4709 PG 2254

301312

MONTGOMERY COUNTY, SS.
I HEREBY CERTIFY THAT THE FOREGOING
AND ANNEXED IS A FULL, TRUE AND CORRECT
COPY AS THE SAME APPEARS OF RECORD AND
RECORDED 7-17-83 IN deed BOOK NO.
4709 PAGE 2346
WITNESS MY HAND AND OFFICIAL SEAL THIS
16th DAY OF Oct A.D., 1987
Mary E. Cabaton
RECORDING CLERK

301313

MONTGOMERY COUNTY COMMISSIONERS REGISTRY
[illegible] HATFIELD DOC 3037
2755 BERGEY RD PG 0105
AMERICAN MACHINE & METALS INC
B 876 U 018 4340 DATE 7/24/86

# ACKNOWLEDGMENT

_____ (State) } ss.
COUNTY OF _____
(Individual or Partner)

On this _____ day of _____, 19 ____, before me, the undersigned, personally appeared _____ satisfactorily proven to me to be the person(s) whose name(s) (is) (are) subscribed to the foregoing instrument, and acknowledged that (he) (she) (they) executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

_____
Notary Public

My Commission expires:
_____, 19 ____

RECORDER'S OFFICE MONTGOMERY COUNTY, PA.

| REALTY TRANS TAX PAID |
|---|
| STATE |
| LOCAL |
| PER |

State of New York (State) } ss.
COUNTY OF New York
(Corporation)

On this 18th day of July, 19 86, before me, the undersigned, personally appeared William H. Spencer (Name)

who acknowledged himself to be the Vice President (Title)

of Ametek, Inc. (Name of Corporation), a corporation, and that he, as such officer, being duly authorized to do so, executed the foregoing instrument for the purposes therein contained by signing the name of the corporation by himself as such officer.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Debra A. Desideri
Notary Public

DEBRA A. DESIDERI
Notary Public, State of New York
No. 4803378, Qualified in Nassau Co.
Certificate Filed in N.Y. County
Commission Expires Nov. 30, 1987

My Commission expires:
Nov 30, 19 88

Montgomery County, S. S.
Recorded in the Office for Recording of Deeds &c.
In and for said county in Deed book
No. 4807 Page 817 &c.
Witness my hand and seal of office this 29th
day of July 19 86
James R Price
Recorder

AR301314

MONTGOMERY COUNTY, SS.
I HEREBY CERTIFY THAT THE FOREGOING
AND ANNEXED IS A FULL, TRUE AND CORRECT
COPY AS THE SAME APPEARS OF RECORD AND
RECORDED 7-29-87 IN Deed BOOK NO.
4587 PAGE 817
WITNESS MY HAND AND OFFICIAL SEAL THIS
16th DAY OF Oct. A.D., 1987
Mary E. Cabaltero
RECORDING CLERK

301315

# AGREEMENT BY OWNER OF, OR HOLDER OF LESSER INTEREST IN, REAL ESTATE

13.50
2.00
B

The Undersigned is the owner of, or the holder of a lesser interest in, the premises briefly described as

One Spring Avenue
(Number and Street)

Hatfield (City, Township, etc. and County) Pennsylvania (State)

parcel # 35-00-00277-00-3

The Undersigned understands that Springtec Corporation (hereinafter called the "Tenant") has or may hereafter acquire an interest in the following described personal property:

All equipment as now owned or hereafter acquired by the Debtor and used in the operation of Debtor's business as now or hereafter conducted, all furniture and fixtures, and the Proceeds of all sales or other dispositions of said equipment, furniture, and fixtures.

All of Debtor's Inventory, Documents of Title, Accounts and Contract Rights, now owned, existing or hereafter acquired or arising; all goods and services the sale, lease, or performance of which gives rise to any Account of Contract Right of the Debtor including any returned goods and all Proceeds of all the foregoing.

and all accessories, equipment and parts* now or hereafter attached or added thereto or used in connection therewith (said personal property and said accessories, etc. being hereinafter collectively called the "Encumbered Personal Property") which is or may hereafter be located on and/or affixed to said premises, and that THE HARLEYSVILLE NATIONAL BANK (hereinafter called the "Bank") also has or may acquire an interest in the Encumbered Personal Property superior to the Tenant's interest therein.

*owned by Tenant and

The Undersigned, for the Undersigned and for any successor to the Undersigned's interest in said premises, intending to be legally bound, hereby covenants and agrees with the Bank, its successors and assigns, and any successor to the Bank's said interest that: (a) any lien or rights (including the right of distraint for unpaid rent) which the Undersigned, or any successor to the Undersigned's interest in the said premises, now has or hereafter may acquire in the Encumbered Personal Property, shall be subordinate and inferior to the rights therein of the Bank, its successors and assigns, and any successor to the Bank's said interest, and (b) in the enforcement of the rights of the Bank, its successors or assigns, or any successor to the Bank's said interest, the Encumbered Personal Property may be removed from said premises. All of the Undersigned's covenants and agreements herein shall constitute covenants running with the said land.

IN WITNESS WHEREOF the Undersigned has executed this Agreement under seal this 18th day of July, 19 86.

INDIVIDUALS OR PARTNERSHIP: IF PARTNERSHIP, ALL PARTNERS MUST SIGN

(Individual or Partnership Name) (Seal) (Individual or Partnership Address)

(Partners Name) (Seal) (Partners Name) (Seal)

(Partners Name) (Seal) (Partners Name) (Seal)

CORPORATION: CORPORATE SEAL MUST BE AFFIXED

Ametek, Inc. (Corporate Name) 410 Park Avenue, New York, NY (Corporate Address)

Attest: (Vice President)

By: W H Mower (Vice President) (Treasurer)

301316

BOOK 4807 PAGE 817

Jul 29 8 34 AM '86

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