SUPERFUND PROGRAM
RECORD OF DECISION

North Penn Area 6 Superfund Site
Lansdale Borough, Montgomery County, Pennsylvania

PART I - DECLARATION

SITE NAME AND LOCATION

North Penn Area 6 Site (Operable Unit 3)
Lansdale Borough, Montgomery County, Pennsylvania

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the selected remedial action for Operable Unit 3 (OU3) for the North Penn Area 6 Site, chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This action is based on the Administrative Record file for the Site.

The Commonwealth of Pennsylvania concurs with the selected remedy. A copy of the concurrence letter is included in the Administrative Record file for the Site.

ASSESSMENT OF THE SITE

Pursuant to duly delegated authority, I hereby determine, pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, that actual or threatened releases of hazardous substances from this Site, as discussed in "Summary of Site Risks", Section VI, if not addressed by implementing the response actions selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

Operable Unit 3 is the third operable unit for the Site. OU3 addresses contaminated ground water, which is the principal threat posed by the Site. The selected remedy ensures safe-drinking water for the public and protection from further site-related ground water contamination. OU1 addresses the EPA funded investigation and remedy for soil contamination at 20 of the 26 potentially responsible parties/properties. OU2 addresses the PRP funded investigation and remedy for soil contamination at the remaining 6 properties.

The major components of the selected remedy include:

1. Completion of a ground water remedial design study to determine the most efficient design of a ground water extraction and treatment system.

2. Installation, operation and maintenance of onsite ground water extraction wells to remove contaminated ground water from beneath the Site and to prevent contaminants from migrating offsite.

3. Installation, operation and maintenance of air stripping treatment at onsite ground water extraction wells to treat ground water to required levels.

4. Construction, operation and maintenance of a pipeline from the onsite ground water treatment systems to the nearest surface water body or storm drain leading to a surface water body.

5. Periodic sampling of ground water and treated water to ensure treatment components are effective and ground water remediation is progressing towards the cleanup goals.

STATUTORY DETERMINATIONS

The remedy is protective of human health and the environment and is cost effective. EPA believes that the selected remedy will comply with all Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, unless they are waived. The selected remedy utilizes a permanent solution to the maximum extent practicable and satisfies the statutory preference for a remedy that employs treatment that reduces toxicity, mobility, or volume.

Because this remedy will result in hazardous substances remaining on-Site above health-based risk levels, a review by EPA will be conducted within five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Abraham Ferdas, Director
Hazardous Site Cleanup Division
Region III

8/10/00
Date

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RECORD OF DECISION

NORTH PENN AREA 6 SITE

PART II - DECISION SUMMARY

I. SITE NAME, LOCATION AND DESCRIPTION

The North Penn Area 6 Site (NP6 or "Site") is located within North Penn Water Authority (NPWA) service district in Montgomery County, Pennsylvania (Figure 1-1) and was placed on the National Priority List (NPL) in March 1989. Five other NPL sites (Areas 1, 2, 5, 7, and 12) and a state Superfund site (Area 4) have also been identified in the North Penn area.

The Area 6 Site is in the Borough of Lansdale and small portions of Hatfield, Towamencin, and Upper Gwynedd townships. NUS Corporation (1986) identified the preliminary boundary of the Area 6 Site based on ground water quality (Figure 1-2). The Site is located in a mixed industrial, commercial and residential setting. Ground water over an estimated four square miles has been contaminated as a result of activities at various locations of the Site. Primary contaminants include trichloroethene (TCE), tetrachloroethene (PCE) and cis-1,2-dichloroethene (cis-1,2-DCE).

Lansdale and the surrounding area are underlain by sedimentary rocks of the Brunswick and Lockatong Formations. The lower beds of the Brunswick Formation consist predominantly of mudstones, clay and mud-shales, and siltstones. Ground water originates from infiltration of local precipitation and discharges to streams and pumping wells. After infiltrating through soil and shallow, weathered bedrock, ground water moves through fractures in the bedrock.

Ground water is a major drinking water source at the Site. The NPWA treats the contaminated ground water from several wells before being delivered to the public. There are also residents who depend on private wells for their drinking water supply. EPA arranged for the connection of a number of residences to public water supplies. These residences had formerly used private wells for drinking water, but the wells had become contaminated. Because of the extensive use of ground water in the Lansdale area, minimization and control of existing contamination is critical to the continued beneficial use of the aquifer.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Site was discovered in 1979 when the NPWA discovered elevated levels of contamination in its wells. The wells were immediately taken out of service because of the high levels of TCE in the ground water. The NPWA began sampling of several wells in the area in 1979, to determine the types and levels of contamination in the ground water.

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Ground water samples had been collected at several locations in Area 6 over varying periods of time prior to the OU3 RI. Previous sampling data was available for the following locations:

NPWA production wells;
Wells at the J.W. Rex Company property;
Keystone Hydraulics wells and test holes;
Wells at John Evans and Sons, American Olean Tile, Royal Cleaners, Andale, Lehigh Valley Dairies, Decision Data, K and K Laundry, Penndale Coffee, Rybond Industrial Park, Philadelphia Toboggan/Skee Ball, Weaver, Lansdale Sewage Treatment Plant, Crystal Soap and Derstine; and
Residential wells

An examination of this data showed that in all municipal wells containing detectable volatile organics, the major contaminant was TCE. In well L-8 (approximately 600 feet NE of Keystone Hydraulics), PCE, vinyl chloride, and cis-1,2-DCE were also detected. Well L-8 was the most contaminated of all Area 6 municipal wells with TCE concentrations ranging from 300 to 935 g/l.

Among the industrial wells, the highest concentrations of contaminants were found at Keystone Hydraulics and Rybond, Inc. in central Lansdale, at John Evans and Sons and Philadelphia Toboggan/Skee Ball to the east and at J.W. Rex to the north. Another area of high levels of contamination, predominantly PCE, was in the vicinity of Royal Cleaners.

Among residential wells, the predominant contaminants were TCE and cis-1,2- DCE. PCE was predominant at one location. No vinyl chloride was detected in the residential well samples. Of the 31 residential wells for which analyses were available, about half (16) contained no volatile organics above the detection limit. Residential wells exhibiting detectable organic contamination were found primarily in the vicinity of Lehigh Valley Dairies, J.W. Rex, and Crystal Soap.

After the ground water contamination was identified, potentially responsible party (PRP) searches by EPA and others, identified 26 facilities in the area that may have contributed to the contamination. On August 5, 1991, EPA issued general notice letters to the owners and/or operators of each of the properties pursuant to Section 107(a) of CERCLA, to inform them of their potential Superfund liability as owners or operators of the properties. On June 30, 1992, EPA again notified the owners and/or operators of these properties of their potential liability for the Site. After several discussions with them concerning the nature and extent of EPA's work to be performed, the owners and operators of 20 of the properties indicated that they were not willing and/or able to perform or finance the Remedial Investigation for the Site. Therefore, EPA decided to perform the response action for these 20 properties with funds from the Superfund as authorized by Section 104 of CERCLA, 42 U.S.C. §9604. EPA grouped these 20 properties into Operable Unit 1 (OU1). The six properties whose owners or operators were willing and able to do the work themselves, were grouped into Operable Unit 2 (OU2).

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Operable Unit 1

In August 1993, EPA began a Source Control Remedial Investigation/Feasibility Study (RI/FS) for contaminated soils at the 20 properties in OU1. The objectives of the RI were to:

> Define the nature and extent of contamination in the ground water at the Site and to further define the Site boundaries
>
> Identify the nature and extent of contamination migration at the Site, including pathways related to ground water
>
> Perform a risk assessment to evaluate any potential threat to human health and the environment
>
> Develop and evaluate a range of final remedial action alternatives to control any identified human health or environmental threats for OU3.

Ten properties had soils that did not contain the contaminants of concern, and the remaining properties were found to have contaminated soils. On September 29, 1995, EPA issued a ROD that required the treatment or excavation and offsite disposal at four of these ten properties. This action has been completed by EPA at three properties (the former Keystone Hydraulics property, the Electra Products property, and the former Tate Andale property), and negotiations are ongoing with the current and previous owners at a fourth property (the John Evans Sons, Inc. property) to determine whether or not they will complete the cleanup. No remedial actions for soil were recommended at the remaining six properties, because the levels of contamination were not significantly impacting ground water.

Operable Unit 2

The PRP-lead investigation at the final six properties forms OU2. Under this operable unit, the owners or operators of these properties conducted the investigation of soil contamination in accordance with an Administrative Order on Consent (AOC) under EPA and Black and Veatch Special Project Corporation (BVSPC) oversight. Three of the properties are currently at various stages of remedial investigations. These are the Central Sprinkler property, the J.W. Rex property, and the former Parker Hannifin property. The remaining three properties have completed the AOC requirements, and were found to have none of the target contaminants in soils as specified in the AOC. These properties were therefore released from any further requirements under the AOC. These properties are listed below:

American Olean Tile
Borough of Lansdale
William M. Wilsons Sons

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The contaminated ground water at the North Penn Area 6 Site forms Operable Unit 3 (OU3).

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Documents which EPA used to develop, evaluate and select a remedy for the Site have been maintained at the Lansdale Borough Public Library, Susquehanna Avenue and Vine Street, Lansdale, PA and at the EPA Region III Office, 1650 Arch Street, Philadelphia, PA.

The Proposed Plan was released to the public on December 9, 1999. The notice of availability for the RI/FS and Proposed Plan was published in *The Reporter* on December 9, 1999. In accordance with Sections 113(k)(2)(B)(I-v) and 117 of CERCLA, 42 U.S.C. §§ 9613 (k)(2)(B)(I-v) and 9617, EPA held a public comment period from December 9, 1999 through January 20, 2000, with a 30-day extension to February 19, 2000.

A public meeting was held during the public comment period on December 16, 1999. At the meeting , EPA presented a summary of the alternatives in the Proposed Plan and EPA's preferred remedy. EPA answered questions about the Site and the remedial alternatives. Approximately 10 people attended the meeting, including residents from the impacted area, PRPs, and media representatives. A summary of the comments received and EPA's responses are contained in Part III of this document.

IV. SCOPE AND ROLE OF RESPONSE ACTIONS

The goal for the ground water pump and treat system is restoration of the aquifer to its beneficial use as a potable use aquifer. The cleanup goals are those specified in Table 1 (on Page 22) for the contaminants of concern. However, complete restoration of the entire contaminated portion of the aquifer associated with the North Penn Area 6 site is not anticipated due to the potential presence of dense, non-aqueous phase liquids (DNAPLS); the size of the plume, both laterally and vertically; and the long and varied pumping history by both water supply and industrial wells in the affected aquifer. During a future five year review assessment of the remedy, and once the extraction system has been operating and sufficient hydrogeological and chemical data have been collected, an evaluation of the technical impracticability to meet Applicable or Relevant and Appropriate Requirements (ARARs) for a limited area or areas of the aquifer will be made.

V. SUMMARY OF SITE CHARACTERISTICS

A. Regional Geology

Lansdale, Pennsylvania lies within the Triassic Lowlands section of the Piedmont physiographic province. Bedrock in the Lansdale Borough area is composed of the lower beds of the Brunswick Group and the older underlying Lockatong Formation. The Brunswick group consists of thin, discontinuous beds of reddish-brown shale interbedded with mudstone and

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siltstone. The total thickness of the Brunswick Formation in Montgomery County is approximately 9,000 feet, but thins to zero at locations where the underlying unit outcrops.

The Lockatong consists of massive beds of medium and dark gray argillite interbedded with thin beds of gray to black shale and siltstone. The Lockatong is more resistant to erosion than the Brunswick and tends to form low ridges when outcropping at the surface. The maximum thickness of the Lockatong, in the vicinity of the Site, is approximately 4,000 feet.

The Stockton Formation underlies the Lockatong and consists of interbedded layers of sandstone and shale. The formation is typically divided into three members: the upper member, made of very fine grained arkose and siltstone with an extremely hard and resistant layer of red and gray shale; the middle member, made of brown, red and gray fine to medium grained arkosic sandstone with thick beds of red shale and siltstone; the lower member, made of red to gray, medium to coarse grained arkosic sandstone and conglomerate. In the vicinity of the Site, the total thickness of the Stockton is approximately 6,000 feet.

B. Soils

Most of the soils in Montgomery County, especially in the vicinity of the Site, are moderate to deep in depth and gently sloping. They are generally acidic and have moderately slow drainage.

Only limited site-specific soil data is available. Because of the amount of construction in the urbanized part of the Site, not much native or undisturbed soil is expected to be present. Soil that is present probably consists mostly of residual soil reworked by construction activity. During soil sampling at the Keystone Hydraulics facility, NPWA encountered up to nine feet of soil. Subsurface soil sampling using the Geoprobe method during the source control RI usually encountered refusal at less than 10 feet of depth. The refusal layer, presumably bedrock, lies mostly at five to seven feet below the ground surface.

C. Topography and Surface Drainage

The Site is located within the Piedmont Physiographic Province in the Triassic Lowland and is underlain by the Triassic sedimentary rocks of the Newark Basin. The surrounding topography is generally flat to gently rolling, with low ridges and hills underlain by sedimentary rocks that are more resistant to erosion and, in some cases, by even more resistant igneous rocks intruded into the sedimentary deposits.

The Lansdale area is a relatively flat upland terrain which forms a surface water divide between the Wissahickon Creek to the southeast, Towamencin Creek to the west and southwest, and tributaries of the West Branch of the Neshaminy Creek to the north and northeast. The study area is drained by Neshaminy Creek and its tributaries, that flow generally eastward and discharge ultimately into the Delaware River, and by Towamencin and Wissahickon Creeks and their tributaries, which generally flow southward to the Schuykill River. Surface elevations vary

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from approximately 200 to 600 feet above mean sea level.

In the vicinity of the Site, surface runoff mostly moves toward the unnamed tributaries of the West Branch of Neshaminy Creek, toward Wissahickon Creek, or toward the tributaries of Towamencin Creek, although some runoff may be directed elsewhere by storm water collection systems.

D. Hydrogeology

Ground water occurs and flows mainly in the joints and fractures of the bedrock, after infiltrating down through soil and weathered bedrock. Primary porosity and the storage capacity of the bedrock is very low. The well developed, nearly vertical joints occurring in many of the rock units are the primary pathways for ground water flows. The distribution of these fractures controls the general flow of ground water. The intergranular porosity in sandstone may act as storage for ground water, but ground water flow in the primary porosity is limited.

Ground water in the Brunswick/Lockatong may be unconfined, semi-confined, perched or confined conditions. In general, the upper part of the aquifer is under unconfined conditions. Separate shallow and deep flow systems may exist in the area. Deeper parts of the aquifer may be under semi-confined or confined conditions, resulting in local artisian conditions.

E. Land Use and Water Supply

The majority of the Site is located in the Borough of Lansdale. There are 7,029 housing units in the Borough; most of the units rely on public systems or private companies for a water supply. The study area is a mixed residential, light industrial, commercial and agricultural area. Portions of the Site are also located in Hatfield, Towamencin, and Upper Gwynedd townships, which are smaller municipalities than Lansdale. The Site encompasses mostly residential areas from these townships. There are homes from these townships that use private wells for water supply at the Site; however, the number of these homes is unknown.

VI. NATURE AND EXTENT OF CONTAMINATION

EPA completed a RI/FS for OU3 at the Site in August 1999 to determine the extent of contamination in the Site ground water and to evaluate alternatives for cleaning up contamination, if necessary. The scope of the RI included gathering background information, identifying contamination sources at these properties through field sampling and analysis, evaluating analytical data, modeling contaminant fate and transport, and assessing human health and environmental risks associated with the contaminated soils. The following contaminants have been found in the ground water at the site:

Vinyl chloride	1,1,1-Trichloroethane
1,1-Dichloroethane	Carbon tetrachloride

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Methylene chloride	1,2-Dichloroethane
trans-1,2-Dichloroethene (DCE)	Trichloroethene (TCE)
cis-1,2-Dichloroethene (DCE)	Tetrachloroethene (PCE)
Chloroform	

These contaminants have been established as the target contaminants for the remedial investigation. Data collected during this RI included seven rounds of ground water, surface water and sediments sampling, well surveys and installations and ground water flow modeling. An additional two rounds of residential well sampling was also conducted.

The first two rounds of ground water sampling were preliminary investigations, intended to establish an overall understanding of the Site. Sixty-eight existing municipal, industrial and residential wells were sampled during Round 1 (April through early May 1995). These results identified major areas of contamination and contaminants of concern. The second round occurred during the winter of 1995 (December 1995 to February 1996). Additional existing industrial wells were included in an effort to fill the identified data gaps and a total of 81 wells were sampled for this round.

Existing wells were inadequate to characterize ground water contamination in the source areas and in order to fill the remaining data gaps, a third round was conducted after 30 new monitoring wells were installed. These new wells were primarily located near the source areas. Wells that were found not contaminated based on previous sample results, and those not located at strategic locations, were removed from the sampling list. A well was considered to be at a strategic location if it could be used to monitor the movement of the contamination plume. This round took place from September to October of 1997 and consisted of 95 wells.

Results from the first three rounds identified a need for continued sampling at selected locations. The additional sampling consisted of four sampling events (Rounds 4 through 7), spaced approximately three months apart, with the fourth round starting in February of 1998. The objectives of these rounds were: to continue monitoring seasonal variations in contamination to establish a long-term trend; to further understand contaminant movement near the source areas; and to monitor the movement of the contamination plume at its edges.

In the fourth round, samples were taken from 19 wells and 4 additional stream locations (for the ecological risk assessment). During the fifth round, 48 wells were sampled. The sixth round repeated the sampling of the 19 wells from the fourth round but also included the 30 new monitoring wells. The seventh round consisted of sampling 62 wells, of which 48 were repeat of the wells sampled during the fifth round. Further sampling was conducted at residential wells in March 1999 and May 1999 (Rounds 8 and 9). The objective of these rounds was to monitor the northern edge of the plume.

Based on results from the RI, ten general locations are believed to be at, or near, the contamination sources. The locations are Central Sprinkler, Electra Products, John Evans and

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Sons, the former Keystone Hydraulics, Precision Rebuilding, J.W. Rex, Royal Cleaners, the former Tate Andale Company, Westside Industries, and the area of Ninth Street and Moyers Road. The last location does not have a confirmed source. It is suspected that the area at Ninth Street and Moyers Road may be near a contamination source. These locations, except for Royal Cleaners and the former Tate Andale Company, are in the middle of the contamination plume.

Primary ground water contaminants of concern identified in ground water are volatile organic chemicals including TCE, PCE, cis-1,2- DCE, and vinyl chloride. The Maximum Contaminant Levels (MCLs) for these chemicals are 5 g/l, 5 g/l, 70 g/l, and 2 g/l, respectively.

PCE: PCE levels found in ground water at this site range from 0.8 to 955 g/l. During the first round of sampling, the highest level of PCE in ground water was 190 g/l at the J.W. Rex facility and 180 g/l at John Evans and Sons. During the second round, a well next to Royal Cleaners, suspected to be a major source for PCE contamination, contained 887 g/l. In the third round, PCE concentrations were high at John Evans and Sons (450 g/l), Keystone Hydraulics (620 g/l) and Electra Products (807 g/l). In the fourth round, high readings were found at Royal Cleaners (466 g/l) and Electra Products (955 g/l). During the fifth round of sampling, the highest concentration was 448 g/l in a well near Royal Cleaners. This same well also had the highest concentration during the sixth sampling round (725 g/l).

Away from the source areas, PCE distribution changed significantly at the northern edge (near Royal Cleaners) of the plume from the second round of sampling to the third round (from 0.8 g/l to 128 g/l).

TCE: TCE results found during sampling, range from 46 to 87,000 g/l. During the first round of sampling, TCE concentrations were highest at J.W. Rex (350 g/l) and a well increased to 1680 g/l in well L-8, and 548 g/l at J.W. Rex. Even higher concentrations were detected at Philadelphia Toboggan (8,350 g/l) and Tate Andale (7,740 g/l). Three highly contaminated locations were identified when the new monitoring wells were installed after the second round. The locations were J.W. Rex (3,120 g/l), former Keystone Hydraulics (9,800 g/l), and Westside Industries (13,000 g/l).

All of the new wells had significant increases in TCE concentration during the fourth round, with the exception of one of the Westside wells where TCE concentration decreased. During the fifth round, TCE concentrations were very high at Westside (39,000 ug/l and 40,300 ug/l). These levels found at two different wells onsite, indicated a downward migration. During this round, levels of 3 ug/l and 4.9 ug/l were detected at two home wells. During the sixth round, concentrations remained high in wells on the Westside property (68,000 ug/l and 7,900 ug/l). Concentrations at the two home wells increased to 6.8 ug/l and 27.2 ug/l, exceeded the MCL of 5 ug/l.

During the seventh round, concentrations on Westside continued to increase to 87,000 ug/l and the home wells decreased to 6.1 ug/l and 13.4 ug/l.

cis-1,2-DCE (MCL = 70 ug/l): The locations with the highest concentrations during the RI sampling include former Keystone Hydraulics (27,300 ug/l), Westside (10,600 ug/l) and Electra Products (1,270 ug/l), all of which were detected in the new monitoring wells installed for this RI.

Vinyl Chloride (MCL = 2 ug/l): Trends were not observed for vinyl chloride concentrations since 1995. Historical data from the 1980's for comparable wells do not indicate that concentrations have changed significantly. The locations with the highest concentrations include former Keystone Hydraulics (3,890 ug/l) and Westside (1,530 ug/l).

VII. SUMMARY OF SITE RISKS

Following the RI, analyses were conducted to estimate the human health and environmental hazards that could result if contamination at the Site were not cleaned up. These analyses are commonly referred to as risk assessments and they identify existing and future risks that could occur if conditions at the Site do not change. The Baseline Human Risk Assessment (BLRA) evaluated human health risks and the Ecological Risk Assessment (ERA) evaluated environmental impacts from the Site. These risk assessments demonstrated that actual or threatened releases of hazardous substances from this Site, if not addressed by EPA's preferred alternative or one of the other cleanup alternatives considered, may present a current or potential threat to public health, welfare, or the environment.

A. Human Health Risks

The BLRA is intended to evaluate the potential risks to human health due to exposure to contaminants in ground water at the Site. The data for this evaluation was collected during the three rounds of sampling from 1995 to 1997. The intention of these three rounds of sampling was to fully characterize the spatial distributions of contaminants at the Site.

The BLRA for the Site consists of the following:

Data Collection and Evaluation
Exposure Assessment
Toxicity Assessment
Risk Characteristics

1. Data Collection and Evaluation

This step in the risk assessment process involves "gathering and analyzing the site data relevant to the human health evaluation and identifying the contaminants present at the site" that will be included in the risk assessment process. This also includes the Identification and Selection of Chemicals of Potential Concern (COPCS).

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Identification and Selection of COPCS

The identification of COPCS includes data collection, evaluation, and screening. The data collection and evaluation steps involve gathering and reviewing the available Site data and developing a set of data that is of acceptable quality for risk assessment. This data set is then further screened to determine those chemicals and media of potential concern. The data used for the quantitative risk analyses were all validated prior to use in the risk assessment.

The RI field activities which supported the risk assessment included the collection of ground water samples for chemical analyses. A summary of the completed RI field activities as they pertain to the risk assessment is provided below.

Ground water samples were collected from a total of 59 well locations in the first round, 79 well locations in the second round and 94 well locations in the third round. Background concentrations were removed from consideration because of ground water conditions at the Site and potential influences from nearby areas and because the contaminated ground water is in a generally upgradient recharge area. As a result duplicate samples were taken from rounds one (3 duplicates) and two (3 duplicates) and used to report the average concentrations at locations where the duplicates were taken.

Ground water samples were collected for volatile organic compounds and metals at all well locations in each round. All well locations were sampled for semi-volatile and pesticide/PCB compounds in the first round. During the second and third rounds, a portion of the well locations were sampled for semi-volatile and pesticide/PCB compounds. Selected samples from all rounds were filtered and analyzed for dissolved metals; only unfiltered metals data were used in the risk assessment calculations. The results showed that several volatile organic compounds and metals had high frequencies of detection.

2. Exposure Assessment

An exposure assessment is conducted to estimate the magnitude of actual (current)and potential (future) human exposures to site media, the frequency and duration of these exposures, and the pathways that result in human exposures. In the exposure assessment, conservative extimates of exposure are developed for both current and future land-use assumptions. Current exposure estimates are based on existing exposure conditions at the site. Future exposure estimates provide an understanding of potential future exposures and threats. Conducting an exposure assessment involves analyzing contaminant releases; identifying exposed populations; identifying all the potential pathways of exposure; estimating exposure point concentrations for specific pathways. The results are pathway-specific intakes for exposure to contaminants at the site.

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3. Toxicity Assessment

The toxicity assessment involves determining the types of adverse effects and the related uncertainties involved. Risk assessments rely on existing information developed for specific chemicals. The two primary sources for this information are the Integrated Risk Information System database and the Health Effects Assessment Summary Tables. The components of this assessment fall into two categories, those related to noncarcinogenic risk and those related to carcinogenic risk. To evaluate noncarcinogenic risk, the intake of a contaminant is compared to the corresponding reference dose (RfD) of that compound. The RfD used in the risk assessment is a best estimate of the level at which there will be no observed adverse effect to the exposed population. To evaluate carcinogenic risk, the intake of a contaminant is factored with the slope factor (SF) for that contaminant. The SF used in the risk assessment represents the 95% upper confidence limit for the best estimate of the carcinogenic potency of a contaminant, or its ability to cause cancers in an exposed population. For humans, both the RfDs and SFs are derived from human epidemiology studies and animal dose-response relationships.

4. Risk Characterization

The risk characterization section of the risk assessment summarizes and combines the exposure and toxicity assessments to characterize baseline risks, both quantitatively and qualitatively. During risk characterization, chemical-specific toxicity information is compared against the estimated exposure levels to determine whether contaminants at the site pose current and future risks that are of a magnitude to be of concern.

The risk of adverse noncarcinogenic effects from chemical exposure is expressed in terms of the Hazard Quotient (HQ). The HQ is the ratio of the estimated dose, which a human receives; to the reference dose, the estimated dose below which it is unlikely for humans to experience adverse health effects. All of the HQ values for chemicals within each exposure pathway are summed to yield the hazard index (HI). If the value of HI is less than 1.0, it is interpreted to mean that the risk of noncarcinogenic injury is low. If the HI is greater than 1.0, it is indicative of some degree of noncarcinogenic risk or effect. Only chronic HIs are calculated, since the subchronic risks will always be equal to or less than the chronic risks.

An evaluation of noncarcinogenic risk calculations indicates that all resident hazard indices under the current and future use scenarios are above 1.0 for the three rounds of data collected (results shown in Table 2) (Appendix A). The trend shows a general increase in the HI from the first to the third rounds. Current and future adult residents have a total HI of 12.6 (RME) and 7.1 (CT) when averaged over the three rounds. Current and future child residents have a total HI of 32 (RME) and 21.6 (CT) when averaged over the three rounds. The RME is defined as the maximum exposure that is reasonably expected to occur and the CT is the arithmetic mean exposure that is expected to occur. In addition, the HI for effects to the liver is also above 1.0 for both adults and children. The noncarcinogenic risk to current and future residents is due mainly

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to ingestion of and dermal contact with ground water containing volatile organic compounds (VOCS).

All exposure scenarios for RME assumptions, and some exposure scenarios for CT assumptions which were evaluated, have potential carcinogenic risks in excess of the accepted USEPA risk range of 1E-06 to 1E-04 for each round of data. Potential carcinogenic risks for current and future adult residents are shown in Table 3 (Appendix A). When averaged over the three rounds of data, the lifetime excess cancer risk for adult residents under current and future land use conditions is 4.6E-04 (RME) and 9.1E-05 (CT). The trend shows a general increase in cancer risk from the first to the third rounds. The cancer risk to current and future adult residents is primarily due to ingestion of and dermal contact with contaminated ground water.

Potential carcinogenic risks for current and future child residents are shown in Table 3 (Appendix A). The lifetime excess cancer risk for child residents under current and future land use conditions is 2.1E-04 (RME) and 1.4E-04 (CT) when averaged over the three rounds. As with the adult population, the trend over three rounds of data shows a general increase in cancer risk from the first to the third rounds. The cancer risk to current and future child residents is also primarily due to ingestion of and dermal contact with contaminated ground water.

B. Ecological Risk Assessment

Using results for surface water and sediments, a screening ecological risk assessment (SERA) was performed. Based on the review of the contaminants detected in the surface water and sediment sampled, contaminant-specific ecotoxicity may be provided. The ecotoxicity data will be used to determine the proper assessment endpoints when evaluating potential ecological risk. In general, the contaminant can be segregated into four major groups: chlorinated organic compounds, semi-volatile organic compounds, pesticides and PCBs, and inorganic analytes (heavy metals). The only compounds detected which are not part of one of these groups are 2-butanone and carbon disulfide.

The SERA performed on the headwaters located at the North Penn Area 6 Site indicated a potential risk to aquatic organisms. This level of risk varied between the micro-watersheds evaluated.

The results of the SERA are the following:

> The southeastern Neshaminy Creek micro-watershed is primarily affected by inorganic analytes present in the surface water. The predominant analytes include iron, barium and lead. Lead is the only obviously elevated analyte. It was unclear whether the analytes which drove the score are actually elevated or at background levels for a suburban/urban setting. The same is true for polynuclear aromatic hydrocarbons (PAHS) detected in the streams. Until further data is collected this watershed appears to pose low ecological risk to aquatic organisms.

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The northwest Neshaminy Creek micro-watershed is the watershed at greatest risk. A wide range of contaminants have been detected at elevated concentrations. PAHS are the primary group present. The Keystone property is within this micro-watershed. Based on the evaluation of the data, this watershed warrants further study.
The northern Towamencin Creek micro-watershed may be the healthiest of the watersheds evaluated. However, this micro-watershed has some of the greatest concentrations of phenols detected within the study area. Based on the SERA, this micro-watershed poses a low risk to aquatic organisms.

The southern Towamencin Creek micro-watershed is predominantly affected by PAHS and pesticides. The individual scores for numerous PAH compounds were exceeded significantly.

The Wissahickon Creek micro-watershed was nearly devoid of organic compounds. Inorganic analyte concentrations were also low. The only exception was a single sample having elevated lead. This single "hit" does not appear to be sufficient to pose an ecological risk.

The level of risk between the micro-watersheds is varied. However, the risk was caused primarily by contaminants that were typically related to urban development and are not believed to be site related.

VIII. DESCRIPTION OF REMEDIAL ALTERNATIVES CONSIDERED FOR THE SITE

In accordance with Section 300.430(e)(9) of the NCP, 40 CFR § 300.430 (e)(9), remedial response actions were identified and screened for effectiveness, implementability and cost during the Feasibility Study to meet remedial action objectives at the Site. The technologies that passed the screening were developed into remedial alternatives. EPA assessed these alternatives against the nine criteria specified in the NCP at 40 CFR § 300.430(e)(9)(iii). In addition, EPA evaluated the No Action Alternative as required by the NCP. These alternatives are presented and discussed below. All projected costs provided for the alternatives are estimates.

Alternative 1: No Action

Capital Costs:	$0
Long Term Monitoring:	$2,472,406
Operation and Maintenance	$0
Present Worth of Total Cost	$2,472,406

Consideration of the no action alternative is required by the National Contingency Plan, 40 CFR Part 300, as a baseline alternative against which other alternatives can be compared. Under this alternative, no control or remediation would occur. A review of Site conditions would be

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required every five years, since under this alternative, waste would be left in place.

Alternative 2: Extraction Wells, Liquid Phase GAC Treatment, Surface Water Discharge Public Water Connection

Capital Costs:	$954,628
Long Term Monitoring:	$2,472,406
Operation and Maintenance	$44,747,286
Present Worth of Total Cost	$64,637,173

This alternative includes extraction wells to be installed and used to reduce the levels of contamination at the 10 identified source locations, in an attempt to restore the aquifer to beneficial use. The extracted water would be treated using liquid phase GAC units before discharge. Depending on the chemical and physical characteristics of the ground water, a pretreatment unit may be installed before the GAC units. A pump house would be constructed at each location to enclose the GAC treatment systems. Trenches and piping would be installed to discharge the treated ground water to a storm sewer, or directly to surface water.

Homes with wells that are contaminated above MCLs and used for drinking water shall be connected to public water. Long term monitoring for about 50 wells would also be performed under this alternative for 30 years.

Alternative 3: Extraction Wells, Liquid Phase GAC Treatment, Re-injection, Public Water Connection

Capital Costs:	$3,535,346
Long Term Monitoring:	$2,472,406
Operation and Maintenance	$44,747,286
Present Worth of Total Cost	$67,992,106

For this alternative, extraction wells would be installed and operated in the same manner as the system described under Alternative 2. However, the treated ground water would be re-injected into the aquifer to minimize the impact on the regional ground water balance. Injection wells, monitoring wells, piping and manhole covers will be installed at the 10 source locations. The ground water would be re-injected away from the contaminant source and highly contaminated locations. Because the deep aquifer is normally much less contaminated that the shallow aquifer, the depth of injection would be preferably 150 feet or greater. The depth will be determined during the design phase. An overflow pipe would be installed at each injection well. The overflow would be directed to a storm sewer, or directly to surface water.

Homes with wells that are contaminated above MCLs and used for drinking water will be connected to public water. Long term monitoring for about 50 wells would also be performed under this alternative for 30 years.

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Alternative 4: Extraction Wells, Air Stripping and Off-gas Treatment, Surface Water Discharge, Public Water Connection

Capital Costs:	$2,117,428
Long Term Monitoring:	$2,472,406
Operation and Maintenance	$9,557,965
Present Worth of Total Cost	$20,402,692

For this alternative, extraction wells would be installed and operated in the same manner as alternatives 2 and 3. An air stripping system would treat the ground water by stripping volatile organic compounds via an air stream. The contaminants would then be removed from the air stream using a vapor phase GAC or UV oxidation unit. The treated water would be discharged to surface water. A pump house will be constructed at each location to enclose the treatment system. Trenches and piping will be installed to discharge the treated ground water to a storm sewer, or directly to surface water.

Homes with wells that are contaminated above MCLs and used for drinking water will be connected to public water. Long term monitoring for about 50 wells would also be performed under this alternative for 30 years.

Alternative 5: Extraction Wells, Air Stripping and Off-gas Treatment, Surface Water Re-injection, Public Water Connection

Capital Costs:	$5,817,192
Long Term Monitoring:	$2,472,406
Operation and Maintenance	$9,557,965
Present Worth of Total Cost	$25,212,386

This alternative includes extraction wells to be installed and operated as described in alternatives 2, 3 and 4. However, the treated ground water would be re-injected into the aquifer to minimize the impact on the regional ground water balance. Injection wells, monitoring wells, piping and manhole covers will be installed at the 10 source locations. The ground water would be re-injected away from the contaminant source and highly contaminated locations. The depth of injection would preferably be 150 feet or greater, this will be decided during the design phase. Before re-injection, oxygen in the treated water would be removed to prevent damaging the injection wells. An overflow pipe would be installed at each injection well and directed to the storm sewer or to a nearby surface water body.

Homes with wells that are contaminated above MCLs and used for drinking water will be connected to public water. Long term monitoring for about 50 wells would also be performed under this alternative for 30 years.

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Preferred Alternative:

EPA's preferred alternative for remediating the ground water contamination is Alternative 4.

IX. COMPARATIVE EVALUATION OF ALTERNATIVES

The alternatives discussed above were compared on the basis of the nine criteria set forth in the NCP at 40 CFR § 300.430(e)(9)(iii) in order to select a remedy for the Site. These nine criteria are categorized according to three groups: threshold criteria; primary balancing criteria; and modifying criteria. These evaluation criteria relate directly to the requirements in Section 121 of CERCLA, 42 U.S.C. § 9621, which determine the overall feasibility and acceptability of the remedy.

Threshold criteria must be satisfied in order for a remedy to be eligible for selection. Primary balancing criteria are used to weigh major trade-offs among remedies. State and community acceptance are modifying criteria formally taken into account after public comment is received on the Proposed Plan. A summary of each of the criteria is presented below, followed by a summary of the relative performance of the alternatives with respect to each of the nine criteria. These summaries provide the basis for determining which alternative provides the "best balance" of trade-offs with respect to the nine criteria.

Overall Protection of Human Health and the Environment

CERCLA requires that the selected remedial action be protective of human health and the environment. A remedy is protective if it reduces current and potential risks to acceptable levels within the established risk range posed by each exposure pathway to the contamination.

Compliance with ARARs

This criterion addresses whether a remedy will meet applicable or relevant and appropriate standards, requirements, criteria and limitations (collectively referred to as "ARARs") or provide grounds for invoking a waiver under CERCLA Section 121(d)(4), 42 U.S.C. § 9621(d)(4), and the NCP at 40 C.F.A. § 300.430(f)(1)(ii)(C). Applicable requirements are those substantive environmental standards, requirements, criteria, or limitations promulgated under Federal or State law that are legally applicable to the remedial action to be completed at the Site. A "legally applicable" requirement is one which would legally apply to the response action if that action were not taken pursuant to Sections 104, 106, or 122 or CERCLA. Relevant and appropriate requirements are those substantive environmental protection standards, requirements, criteria, or limitations promulgated under Federal or State law which, while not being legally applicable to the remedial action, do pertain to problems or situations sufficiently similar to those encountered at a specific site that their use is well suited to the site. ARARs may relate to the substances addressed by the remedial action, to the location of the site, or to the manner in which the remedial action is implemented.

In addition, Section 121 (d)(2)(A) of CERCLA requires a level of cleanup "which at least attains Maximum Contaminant Level Goals (MCLGs) established under the Safe Drinking Water Act (42 U.S.C. § 300f et seq.) and Water Quality Criteria (WQC) established under section 304 or 303 of the Clean Water Act (33 U.S.C. § 1314 or 1313), where such goals or criteria are relevant and appropriate under the circumstances of the release..." 42 U.S.C. § 121(d)(2)(A). The NCP expands upon this provision of CERCLA, specifying that at Superfund sites whose ground or surface waters are current or potential sources of drinking water, all non-zero MCLGs must be met to the extent they are relevant and appropriate; and that to the extent a non-zero MCLG is not relevant and appropriate for a given contaminant, the MCL for that contaminant must be met in the surface and ground water to the extent relevant and appropriate. The NCP also provides that where an MCLG for a contaminant has been set at a level of zero, the MCL promulgated for the contaminant under the SDWA must be attained by remedial actions for ground or surface waters that are current or potential sources of drinking water, where the MCL is relevant and appropriate under the circumstances of the release.

A. Identification of ARARs

ARARs are generally divided into three categories: chemical-specific, location-specific, and action-specific. Chemical-specific ARARs provide guidance on acceptable or permissible contaminant concentrations in soil, air, and water. Location-specific ARARs govern activities in critical environments such as floodplains, wetlands, endangered species habitats, or historically significant areas, while action-specific ARARs are technology- or activity-based requirements.

1. Chemical-Specific ARARs

This section presents a summary, which may not be all inclusive, of federal and state chemical specific ARARs. Chemical-specific ARARs for the contaminants of concern at the Site (PCE, TCE, cis-1,2-DCE and vinyl chloride) are discussed below.

The Safe Drinking Water Act (SDWA) promulgated the National Primary Drinking Water Standards (42 U.S.C. §§ 300(f)-300(j), and 40 C.F.R. § 141) for the regulation of contaminants in all surface or ground waters utilized as potable water supplies. The primary standards include both Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs). MCLs are enforceable standards for specific contaminants based on public health factors as well as the technical and economic feasibility of removing the contaminants from the water supply. MCLGs are nonenforceable standards that do not consider the feasibility of contaminant removal. Federal MCLs, MCLGs, and other criteria for the contaminants of concern are listed in the table below.

The Pennsylvania Water Quality Standards (PA Code, Title 25, Chapters 93.1-9z) sets forth water quality standards for waters of the Commonwealth. The standards are based upon water uses that are to be protected and are considered by PADEP in its regulation of discharges to surface waters. These would be applicable to point or non-point discharges from the Site or

recovered ground water treatment discharges to the surface water.

Table 1: Chemical-Specific ARARs

	Federal Human Health Drinking Water MCLS (mg/l)[1]	Freshwater Objectives[2]		MCL Goals[1] (mg/l)
		Fish&water Ingestion (mg/l)	Fish Ingestion Only (mg/l)	
cis-1,2-Dichloroethene	0.07	--	--	0.07
Tetrachloroethene	0.005	0.0008	0.00885	--
Trichloroethene	0.005	0.0027	0.0807	0
Vinyl Chloride	0.002	0.002	0.525	0

1. 40 CFR §141.61, 141.62.
2. The Delaware River Basin Commission (DRBC) Water Quality Regulations, 18 C.F.R. §430.7, 430.9, 430.11, 430.15-.23

2. Location-Specific ARARs

Location-specific ARARs that may govern activities in critical environments such as wetlands, endangered species habitats, and historic locations are as follows.

The Delaware River Basin Commission (DRBC)(18 C.F.R. §430.7, 430.9, 430.11, 430.15-430.23) has established water quality standards, the Ground water Protected Area Regulations, based on anti-degradation of existing water quality. The standards are concerned with natural conditions in waters considered by the DRBC to have exceptionally high scenic, recreational, ecological, and/or water supply values. The DRBC has standards for some parameters not listed in the PADEP regulations, and others may be more stringent. These regulations establish requirements for the extraction and discharge of ground water within the Delaware River Basin.

3. Action-Specific ARARs

The Resource Conservation and Recovery Act, as amended (RCRA, 42 USC §§6901 et seq) deals with the treatment and disposal methods of all hazardous wastes. The wastes from the Site, if there are any, must be in handled accordance with the Federal hazardous waste regulations (40 CFR §§261, 262.10-.57, 261.20-.22, 268.30-.49) promulgated under RCRA, as well as applicable Pennsylvania Hazardous Waste Regulations (PA Code, Title 25, Sections 262,11-13, 262.20-23, 262.30, 262.33, 262.34, 264.111, 264.117, 264.310(1), 264.310(4), 264.310(5), as well as Part 263 and Subparts 264 I and J.) Determination of the presence and appropriate waste code for any hazardous wastes at the Site or residuals from the treatment of such wastes would be made in accordance with these regulations.

Clean Water Act and National Pollution Discharge Elimination System (NPDES) Requirements, 40 CFR Sections 122.2, 122.4, 122.5, 122.21, 122.26, 122.29, 122.41, 122.43-45, 122.47, and 122.48,

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which regulate discharge of pollutants into navigable waters. Wastewater generated during decontamination activities shall be properly managed in accordance with Pennsylvania Hazardous Waste Management regulations and/or the Clean Water Act.

Pennsylvania NPDES Rules, Pennsylvania Code Title 25, Sections 92.3, 92.31, 92.41, 92.51, 92.55, 92.57 and 92.73 , which provides regulations which govern point-source discharges to Pennsylvania waters.

The Pennsylvania Stormwater Management Act (Act No. 167 32 P.S. §§680.1 et. seq.) sets forth measures to control stormwater runoff during remedial alternatives or development of land. Stormwater management systems must be constructed in a manner consistent with the country watershed management plan. The requirements of this act may be applicable to remedial actions that include disturbance of the land (i.e., cleaning grading, excavation, etc.)

The Pennsylvania Clean Streams Law (25 PA Code, § 16.1, 16.24, 16.31-51 and 16.101-102) is a statute with the objective to reclaim and restore polluted streams. The law provides for the protection of streams and water quality control. This statute may be applicable to remedial alternatives that require the discharge of water/waste, and/or the clean-up of contaminated streams.

The Pennsylvania Municipal Pretreatment Regulations (25 PA Code, §§94.11) establish procedures and standards for the discharge of industrial-source wastewater to the POTWs. The regulations may be applicable to remedial alternatives that discharge to POTW.

A Memorandum of Agreement between DRBC and EPA III (October 23, 1991) establishes standards for discharges to surface water and withdrawals from aquifers in the Delaware Rive Basin. Under this MOA, the DRBC does not review or require permits for ground water withdrawal or recharge for federal Superfund sites in EPA Region III. However, the MOA does require that ground water withdrawal meet the following four ARARs taken from the DRBC Ground Water Protected Area Regulations:

1) Extraction wells must have readily accessible capped ports and drop pipes so that water levels may be measured under all conditions.
2) Extraction wells shall be metered with an automatic continuous recording device that measures flow within 5% of actual flow. A daily record shall be maintained and monthly totals shall be reported to DRBC.
3) Extraction wells shall not significantly interfere with domestic or other existing wells.
4) The operation of extraction wells shall not cause long-term progressive lowering of ground water levels, permanent loss of storage capacity or substantial impact on low flows of perennial streams. The MOA establishes standards for discharges to surface water and withdrawals from aquifers in the Basin.

Hatfield Township Municipal Authority Ordinance (No. 420 Chapter 18, Part 1A) specifically prohibits ground water from being discharged to the sanitary sewer. However, approval for

temporary discharges of well drilling water has been granted.

Air Resources Regulations (25 Pa Code §§121-143) provides for the control and prevention of air pollution anywhere in the Commonwealth (unless expressly excluded in the act, or otherwise noted in the regulation). This regulation also provides guidance on the design and operation of source facilities. Under Chapter 127.14 (a)(9), some air emission sources may be classified by PADEP as a source of minor significance. However, a request for Determination must be submitted.

Fugitive dust emissions generated during remedial activities will be controlled in order to comply with fugitive dust regulations in the federally-approved State Implementation Plan (SIP) for the Commonwealth of Pennsylvania, 25 Pa. Code §§ 123.1 - 123.2 and the National Ambient Air Quality Standards for Particulate Matter in 40 C.F.R. §§ 50.6 and Pa. Code §§ 131.2 and 131.3.

Any VOC emissions from the air strippers will be in accordance with the Pennsylvania Department of Environmental Protection air pollution regulations outlined in 25 Pa. Code §§ 121.1 - 121.3, 121.7, 123.1, 123.2, 123.31, 123.41, 127.1, 127.11, 127.12, and 131.1 - 131.4. 25 Pa. Code § 127.12 requires all new air emission sources to achieve minimum attainable emissions using the best available technology (BAT). In addition, the PADEP air permitting guidelines for remediation projects require all air stripping and vapor extraction units to include emission control equipment. Federal Clean Air Act requirements, 42 U.S.C. §§ 7401 et seq., are applicable and must be met for the discharge of contaminants to the air. Air permitting and emissions ARARs are outlined in 40 C.F.R. §§ 264.1030 -264.1034 (Air Emissions Standards for Process Vents), and 40 C.F.R. §§ 264.1050 - 264.1063 (Air Emissions Standards for Equipment Leaks). Air emissions of vinyl chloride will comply with 40 C.F.R. Parts 61.60 - 61.69, National Emission Standards for Hazardous Air Pollutants (NESHAPS).

The installation of new wells will be done in accordance with 25 Pa. Code Chapter 107. These regulations are established pursuant to the Water Drillers Act, 32 P.S. §§645.1 et seq. In the event that any existing pumping monitoring wells have to be plugged and abandoned, it will be done in accordance with PADEP's Public Water Supply Manual, Part II, Section 3.3.5.11.

4. To Be Considered (TBC)

The Clean Air Act (CAA) passed in 1977 governs air emissions resulting from remedial actions at CERCLA sites. National Ambient Air Quality Standards (40 CFR Part 50) have been promulgated under the CAA for six criteria pollutants, including airborne particulates. No specific air quality standards for the contaminants of concern at this Site have been promulgated, however. To the extent that remedial actions undertaken at the Site emit and regulate air contaminants, the CAA would be relevant.

OSWER Directive #9355.0-28, Control of Air Emissions from Superfund Air Strippers at Superfund Ground Water Sites. Air emissions from Superfund Sites shall be controlled.

Borough of Lansdale Ordinance No. 1623 is concerned with sewer rentals, permits, etc. Discharges to the POTW are permitted but subject to an initial connection fee of $4,000 per equivalent dwelling unit (approximately 3.2 people), generates 250 gallons per day. In addition, there is a usage fee of $3.43/hundred cu. feet. The rate may be negotiable for larger flows. The discharge water must meet the federal pretreatment contaminant levels.

Long Term Effectiveness/Permanence

This evaluation criterion addresses the long-term protection of human health and the environment after remedial action cleanup goals have been achieved, and focuses on residual risks that will remain after completion of the remedial action.

Reduction of Contaminant Toxicity, Mobility, and Volume through Treatment

This evaluation criterion addresses the degree to which a technology of remedial alternative reduces the toxicity, mobility, or volume of a hazardous substance. Section 121(b) of CERCLA, 42 U.S.C. § 9621(b), establishes a preference for remedial actions that permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances. A combination of treatment and engineering controls may be used, as appropriate, to achieve protection of human health and the environment, as set forth in the NCP at 40 CFR § 300.430(a)(iii). Treatment should be utilized to address the principal threats (such as liquids, high concentrations of toxic compounds, and highly mobile materials) presented by a Site, and engineering controls such as containment will be considered for wastes that pose a relatively low, long-term threat or where treatment is impracticable. See 40 CFR § 300.430(a)(iii).

Short-Term Effectiveness

This evaluation criterion addresses the period of time needed to achieve protection of human health and the environment, and any adverse impacts that may be posed by construction and implementation of a remedy.

Implementability

This evaluation criterion addresses the technical and administrative feasibility of each remedy, including the availability of materials and services needed to implement the chosen remedy.

Cost

The cost of each of the alternatives is evaluated, and compared to the no action alternative and each other.

State Acceptance

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The EPA, as lead agency for this Site, selects the remedy in consultation with the State. EPA has provided the information on which this Record of Decision is based to the Pennsylvania Department of Environmental Protection (PADEP), and has had discussions on this matter with PADEP representatives.

Community Acceptance

The comments and concerns expressed by the public during the public meeting and during the comment period are considered. This criterion includes a determination of which components of the alternatives interested persons in the community support, have reservations about, or oppose based on public comments.

A summary of the relative performance of the Alternatives with respect to each of the nine criteria follows:

Overall Protection of Human Health and the Environment

The No Action alternative would not effectively protect human health and the environment. This alternative would not contain the contaminant plume, therefore allowing the continued migration of ground water contaminants offsite and increased human health risks.

The continuous pumping of extraction wells in Alternatives 2, 3, 4 and 5 would prevent further migration of the ground water contaminants. Under these alternatives, the contamination would be treated, at the source locations, therefore reducing human exposure to the contaminated ground water and restoring the aquifer to beneficial use. The liquid phase GAC systems in Alternatives 2 and 3 would remove the contaminants from the extracted ground water and allow for either the discharge or re-injection of treated water. The air stripping treatment in Alternatives 4 and 5 would remove the contaminants from the extracted ground water and allow for either the discharge or re-injection of treated water. The potential air emissions would be treated onsite by air phase GAC or UV oxidation units. The injected water in Alternatives 3 and 5 would help maintain ground water balance.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Alternative 1 would neither remove contaminated ground water nor prevent further ground water contamination. It would only include long term ground water monitoring; and contaminants may continue to migrate offsite, resulting in unacceptable human exposure.

Under any of the remaining alternatives, the location and action specific ARARs, including the Delaware River Basin Commission's Water Resources Program (DRBC) requirements, would be complied with. The chemical specific ARARs would also be met once cleanup goals are met. Cleanup goals for this site are the MCLs, but if contamination levels at the Site have remained relatively unchanged, 5 to 10 years after implementation, the Agency will evaluate the relevance of a Technical Impracticability (TI) Waiver. A TI Waiver is a document that waives ARARs at a site

where the remedy has been proven to be ineffective in lowering site contamination levels to MCLs.

Long-Term Effectiveness and Permanence

In Alternatives 2, 3, 4, and 5, the ground water contamination would be treated, at the source locations, allowing low concentration contaminants to attenuate under the pumping and treatment system. Source contaminants leach from the vadose zone would be contained and eventually collected by the extraction wells. This would decrease the possibility of long term human contact with contaminants through use of ground water as a drinking water source. The No Action Alternative is neither effective in treating the contamination nor is it a permanent solution.

Reduction of Toxicity, Mobility, or Volume through Treatment

The No Action remedy does not reduce the contaminant toxicity, mobility, or volume. The contaminants are not treated, contained or removed under this alternative. After either remedy in Alternative 2, 3, 4, or 5 is implemented, contamination at the selected source locations would be hydraulically contained, thus reducing contaminant mobility. Contaminants in areas around the source locations would be extracted, treated and discharged, reducing the contaminant volume and toxicity.

Short-Term Effectiveness

The estimated time period for construction and implementation of Alternatives 2 and 4 is six months. The estimated time period for construction and implementation of Alternatives 3 and 5 is estimated to be nine months. The time required to achieve remedial action objectives depends on factors including biological and geochemical conditions at the Site.

Once the hydraulic barriers are established, it would take at least 12 years (the estimated residence time of the contaminated ground water) for significant attenuation to take place in the low concentration area. However at source locations, the time required for significant decreases in contaminant concentration depends on the time required to deplete the sources in the vadose zone of the bedrock aquifer.

Implementability

Alternative 1 is easily implemented because of existing monitoring wells, readily available equipment and supplies and construction is not required. Implementation of either Alternative 2 or 3 would involve drilling and installation of extraction wells and assembly of a liquid-phase GAC treatment system. The GAC system may require a pretreatment unit at some locations if the ground water has high solid content or contains chemicals that may affect the efficiency of the system. There are no technical difficulties associated with these processes.

Implementation of either Alterative 4 or 5 would require the installation of extraction wells, and an

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air stripping treatment system with vapor phase treatment units and associated piping. An air phase GAC or UV oxidation unit would be installed to treat contaminants from air stripping. There are no major difficulties associated with this technology.

The re-injection systems in Alternatives 3 and 5, require treatment units to be operated under closed systems. Therefore, oxygen needs to be removed before re-injection at all locations. There are some operation and maintenance difficulties associated with this technology.

Access to properties could become a significant issue, for either alternative, if multiple wells are installed to select the best pumping configurations.

Cost

The present worth costs of the alternatives range from $2,472,406, for the no action Alternative 1, to $67,992,106, for Alternative 3. These estimates are based on the estimated capital costs, long term monitoring costs and operation and maintenance costs associated with each alternative.

Estimated Total Cost of Alternatives				
Alternative	**Total Capital Costs**	**Long Term Monitoring**	**O&M**	**Total Present Worth Cost**
1	$0	$2,472,406	$0	$2,472,406
2	$954,628	$2,472,406	$44,747,286	$64,637,173
3	$3,535,346	$2,472,406	$44,747,286	$67,992,106
4	$2,117,428	$2,472,406	$9,557,965	$20,402,692
5	$5,817,192	$2,472,406	$9,557,965	$25,212,386

The total present worth is a sum of the costs shown above and other estimated engineering, land lease and contingency costs. The O&M cost for Alternatives 4 and 5 is much less than that for Alternatives 2 and 3. The capital costs for Alternative 4 are less than Alternative 5 and that is due to the added cost of re-injection equipment for Alternative 5. Surface Water Discharge (Alternative 4) is less costly and remains protective of human health and the environment.

The overall present worth of Alternative 4 is lower than Alternatives 2, 3 and 5 but maintains its effectiveness and is therefore, the most cost efficient remedy.

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State Acceptance

PADEP has had the opportunity to review and comment on all the documents in the Administrative Record and has participated in selecting the remedy for this Site. PADEP has also had the opportunity to comment in the draft ROD and has concurred on the ROD.

Community Acceptance

A public meeting on the Proposed Plan was held on December 16, 1999 at the Lansdale Borough Hall. Written comments were received and are addressed in the Responsiveness Summary in this document. (See Part III)

X. SELECTED REMEDY AND PERFORMANCE STANDARDS

Based upon considerations of the requirements of CERCLA and the detailed analysis of the alternatives using the nine criteria, EPA has determined the most appropriate remedy for the Site is Alternative 4. The remedy shall specifically include the following:

1. Extraction wells shall be installed to remove the contamination at the 10 identified source locations. An air stripping system shall be installed to treat the ground water by stripping volatile organic compounds at each of the locations. The contaminants shall then be removed using a vapor phase (granular activated carbon) GAC or (ultra-violet) UV oxidation unit. If necessary, after the air stripping, the water may receive additional liquid phase treatment to achieve discharge standards. The treated water shall then be discharged to surface water. The extraction and treatment system shall operate until cleanup standards are achieved for all COPCs identified in this ROD at the points of compliance.

2. Pump houses shall be constructed to enclose the treatment system at each of the locations. Trenches and associated piping shall be installed to discharge the treated ground water to a storm sewer, or directly to surface water. At the low concentration area outside the source locations, this alternative relies on four new extraction wells and treatment systems, in conjunction with existing pumping and treatment operated by the local water authority and industrial and commercial facility owners. These pumping and/or treatment locations shall include L-10, L-23, L-25, J.W. Rex, and Lehigh Valley Dairies.

3. Homes with wells that are contaminated above MCLs and used for drinking water shall be connected to public water. The number of homes to be connected will vary depending on whether the contamination plume continues to migrate.

4. Long term monitoring in accordance with the terms of the EPA approved Operation and Maintenace Plan, at approximately 50 locations shall be performed for a length of 30 years.

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Detailed requirement and further performance standards associated with the selected remedy are presented below.

A. General

1. A background analysis, in accordance with the EPA Approved Sampling Plan, shall be conducted during the remedial design phase to determine if any of the inorganic contaminants of concern are background or site-related.

2. Five-year statutory reviews under Section 121(c) of CERCLA are required, as long as hazardous substances remain on the Site and prevent unlimited use and unrestricted access to the Site. The initial five-year review shall be conducted within five years of the initiation of the remedial action in accordance with applicable EPA guidance.

B. Ground Water Treatment System

The ground water contamination associated with and in the vicinity of the Site, shall be reduced through extraction and treatment. An air stripping system would treat the ground water by stripping volatile organic compounds. Air stripping involves the physical removal of volatile ground water contaminants by exposure to a stream of air. At locations where a significant level of vinyl chloride is present, or the total contaminant concentration exceeds 1,000 g/l, a UV oxidation unit shall be installed for off-gas treatment. Otherwise, the off-gas from an air stripper shall be treated using a vapor phase GAC. GAC involves the removal of organic contaminants from ground water by pumping it through a vessel containing GAC. GAC is created by exposing charcoal to high temperatures and steam in the absence of oxygen. GAC is extremely porous and has a large surface area, allowing organic contaminants to readily attach themselves. UV oxidation is designed to destroy dissolved organic contaminants in ground water by using ultraviolet radiation and hydrogen peroxide. Hydrogen peroxide is added to the contaminated ground water and when exposed to ultraviolet light, hydrogen peroxide breaks down to form chemicals which react with and destroy organic contaminants.

1. The ground water contamination associated with and in the vicinity of the Site shall be removed and contained through extraction and treatment. The exact number and location of the extraction wells and monitoring wells shall be subject to approval by EPA during the remedial design and/or remedial action phase.

2. The treated ground water effluent shall be discharged to the nearest surface water body or storm drain leading to a surface water body and shall meet the discharge limits.

3. A long-term ground water monitoring program complying with the terms of the EPA approved Operation and Maintenance Plan, as well as analyses of flow and contaminant levels shall be implemented to evaluate the effectiveness of the treatment system. The

installation of additional monitoring wells may be required. Numbers and locations of these monitoring wells may be subject to change, with EPA approval, during the remedial design. Installation of additional wells may be necessary and shall be in accordance with 25 Pa. Code Chapter 107.

4. Once the ground water extraction and treatment system is operating, monitoring well samples will be collected and analyzed quarterly in year one and semi-annually in years two through five. Based upon the results, collection and analysis of these data may be continued, modified or discontinued as determined by EPA, in consultation with PADEP. Monitoring for compliance with cleanup standards shall be conducted at the points of extraction and monitoring wells to provide information as to the efficacy of the extraction system. The monitoring locations will be determined by EPA during future design activities.

5. The extraction and treatment system shall operate until cleanup standards are achieved for all selected COPCs at the points of compliance monitoring (extraction wells and related monitoring wells). As additional data is developed for the Site (i.e., through collection of monitoring well data), EPA may modify the selected cleanup standard for a COPC of modify the list of COPCS, as determined necessary by EPA based on its review of Site-specific data and the NCP. If such a decision is made, EPA will issue an appropriate decision document to reflect that modification.

6. The monitoring for compliance shall be conducted quarterly in the first year and semi-annually thereafter. The decision to discontinue extraction of ground water from a well, or to close the system, will be made as follows:

   a. If an extraction well and related monitoring points continue to meet the cleanup standards at two consecutive semi-annual monitoring events, pumping will be discontinued, upon approval by EPA, and the frequency of monitoring would be increased to quarterly.

   b. If the extraction well and related monitoring points continue to meet the cleanup standards for the next four quarters, monitoring would be continued for a final four quarters. If the extraction wells and related monitoring points meet the cleanup standards for the final four quarters, the extraction well may be closed, subject to EPA approval. This approval to close the well will be based in part of the following: the contaminant levels remain at or below the cleanup standards and no statistically significant trends are observed in the data indicating that a future exceedance of cleanup levels could occur.

   c. The system may be shut down in a phased manner as portions of the ground water achieve compliance with cleanup standards. The ground water treatment system shall operated until the last extraction well is removed from service. A long-term ground water monitoring program, which will be approved by EPA, shall be instituted before the wells are closed.

XI. STATUTORY DETERMINATIONS

The following sections discuss how the selected remedy for the North Penn Area 6 Site meets these statutory requirements.

A. Overall Protection of Human Health and the Environment

Based on the Baseline Human Health Risk Assessment for the Site, measures should be considered to reduce potential risk from contaminants in ground water. This media and contaminants were selected because potential health hazards for some exposure scenarios exceeded the EPA target range of 1.0E-04 (or 1 in 10,000) and 1.0E-06 (or 1 in 1,000,000) for lifetime cancer risk or a non-cancer hazard of one (1). The results from the Ecological Risk assessment also showed a potential risk resulting from contamination found in nearby surface water.

The selected remedy protects human health and the environment by reducing ground water contamination through extraction and treatment using the vapor phase GAC or UV unit. The treated water would then be discharged to a nearby surface water body.

Implementation of the selected remedy will not pose any unacceptable short term risks or cross media impacts to the Site, or the community.

B. Compliance with and Attainment of Applicable or Relevant and Appropriate Requirements (ARARs)

The selected remedy will comply with all applicable or relevant and appropriate chemical- specific, location-specific and action-specific ARARs to the extent discussed in Section IX of this ROD.

C. Cost Effectiveness

The selected remedy is cost-effective in providing overall protection to cost and meets all other requirements of CERCLA. 40 CFRSection 300.400 (f)(ii)(D) of the NCP requires EPA to evaluate cost-effectiveness by comparing all of the alternatives which meet the threshold criteria - protection of human health and the environment and compliance with ARARs - against three additional balancing criteria: long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; and short-term effectiveness. The selected remedy meets these criteria and provides for overall effectiveness in proportion to its cost.

The estimated present worth cost for the selected remedy presented in this ROD is $20,402,692.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

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EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized while providing the best balance among other evaluation criteria. Of those alternatives evaluated that are protective of human health and the environment and meet ARARs, the selected remedy provides the best balance of trade-offs in terms of long-term and short-term effectiveness and permanence, cost effectiveness, implementability, reduction in toxicity, mobility or volume through treatment, State and community acceptance, and preference for treatment as a principal element.

Under the selected remedy, extraction and treatment of ground water, reduces the risk associated with exposure to the ground water to the extent practicable.

E. Preference for Treatment as a Principal Element

The selected remedy satisfies, in part, the statutory preference for treatment as a principal element. The air stripping unit in conjunction with the GAC or UV unit will provide treatment for the contamination and will prevent the migration of contamination. The selected remedy provides the best overall protection of human health and the environment.

XII. DOCUMENTATION OF CHANGES FROM THE PROPOSED PLAN

The Proposed Plan identifying EPA's preferred alternative was released for comment on December 6, 1999. EPA reviewed all the verbal comments received at the public meeting and written comments received during the comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary. Written comments that were received during the public comment period are addressed in the Responsiveness Summary, found in Part III of this document.

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Appendix A

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Table 2: Noncarcinogenic Risk Results

Current and Future Adults	Round	RME	CT
	1	5.8	2.9
	2	10	7.5
	3	22	11
Current and Future Children	Round	RME	CT
	1	13	8.9
	2	34	23
	3	49	33

Table 3: Carcinogenic Risk Results

Current and Future Adults	Round	RME	CT
	1	2.2E-04	4.4E-05
	2	3.8E-04	8.0E-05
	3	7.8E-04	1.5E-04
Current and Future Children	Round	RME	CT
	1	1.0E-04	6.7E-05
	2	1.5E-04	1.0E-04
	3	3.7E.04	2.5E-04

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