46749

Received 11-21-90 by
V. Janosik, RPM

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November 6, 1990
TCN 4204-01

Mr. Victor Janosik
U. S. Environmental Protection Agency
Region III
Mail Code 3HW21
841 Chestnut Building
Philadelphia, PA 19107

APPROVED
AS FINAL
Victor Janosik 12/7/90
Signature Date
PA. Remedial Response Section

Dear Vic:

SUBJECT: REVISIONS TO FIELD SAMPLING PLAN, BUTZ LANDFILL, USEPA CONTRACT NO. 68-W8-0092, WORK ASSIGNMENT NO. 92-04-3LQ6

The contents of this letter shall be incorporated as final revisions to the Field Sampling Plan. These revisions are made in accordance with our telephone conversation of November 5, 1990, and in response to written comments received from you, Bruce Rundell (USEPA hydrogeologist), and Tom Ziemba (PADER Project Officer). The revisions are also based on comments submitted September 26, 1990, from Diann Sims of the Region III Central Regional Laboratory.

The following revisions are made to the Field Sampling Plan (FSP):

p. 4-2, Table 4-1: The domestic water samples will be subjected to DQO Level IV, as will the monitoring well samples.

p. 4-5, Item #2: As per my letter of October 16, 1990, and your letter of October 24, 1990, a decontamination pad will not be constructed, but decontamination rinseate will be discharged directly to the ground.

p. 4-17, Item #3: Amend the first sentence to read: "Following the measurements of field parameters, fresh samples will be obtained with the collection jar and transferred to the sample bottles."

p. 4-24, Figure 4-5: Sampling point #5 will not be located on a vehicle track, but will be located several feet to one side.

p. 4-27, 4.6.2: The first paragraph in this section, under "Objective," shall be amended to read: "To investigate two linear magnetic anomalies, a number of (now unrecognizable) pits and trenches, and to generally characterize the type and extent of landfill wastes.

p. 4-31, Item #5: Amend the first sentence as follows: "Excavation will not proceed past the water table in any test pit, except potentially in areas that are specifically being investigated for the presence of buried metal.

Insert this sentence after the first sentence: "Should the water table be encountered in these areas, the RPM will be consulted before excavation proceeds.

p. 4-34, Item #2: This item will be deleted and replaced with: "Any water used for drilling or decontamination shall be obtained from a potable supply."

p. 4-49, Item #4: After second sentence, add this sentence: "The sample shall only be collected after the system has been thoroughly flushed; in other words, the water samples should not be collected the first thing in the morning."

p. 4-52: Amend first sentence as follows: "Resistivity, caliper, temperature, natural gamma, and density logs will be run on all of the ten existing monitoring wells open in bedrock."

p. 5-9: Delete the third sentence. Add this sentence at the end of the section: "All wastes generated during this remedial investigation shall be disposed of at the conclusion of the field activities."

Also, please find enclosed the completed signature page to the Health and Safety Plan. The revisions to the Quality Assurance Project Plan shall follow shortly, under separate cover.

Should you have any questions, please do not hesitate to call.

Sincerely,

Christopher A. Burns /jlp

Christopher A. Burns, Ph.D.
Work Assignment Manager

jlp
Enclosures

cc: James Clark
James McKenzie
Susan Janowiak
Steve Pollak

TCN 4204-01-FSP
REVISION NO. 0
10/SEPT/90

ENVIRONMENTAL PROTECTION AGENCY
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY (ARCS)
REGION III
CONTRACT #68-W8-0092
WORK ASSIGNMENT #92-12-3L54.0

Draft

SAMPLING AND ANALYSIS PLAN
VOLUME II
(FIELD SAMPLING PLAN)

APPROVED
AS FINAL
Signature 12/7/90 Date
PA. Remedial Response Section

SEPTEMBER 1990

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

BUTZ LANDFILL
(ALSO KNOWN AS THE NORTH ROAD SITE)
JACKSON TOWNSHIP, MONROE COUNTY, PENNSYLVANIA

TETRA TECH, INC.

Victor Janoski, RPA

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APPROVAL PAGE

Prepared By: Mary C. Musetti — 11-13-90 Date

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Approved By: Carl K. Hsu — 11-13-90 Date

Carl K. Hsu, Ph.D., P.E.
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APPROVED
AS FINAL
Signature — 12/7/90 Date
PA. Remedial Response Section

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10/SEPT/90

ENVIRONMENTAL PROTECTION AGENCY
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY (ARCS)
REGION III
CONTRACT #68-W8-0092
WORK ASSIGNMENT #92-12-3L54.0

Draft

SAMPLING AND ANALYSIS PLAN
VOLUME II
(FIELD SAMPLING PLAN)

APPROVED
AS FINAL
Signature 12/7/90 Date
PA. Remedial Response Section

SEPTEMBER 1990

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

BUTZ LANDFILL
(ALSO KNOWN AS THE NORTH ROAD SITE)
JACKSON TOWNSHIP, MONROE COUNTY, PENNSYLVANIA

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BUTZ LANDFILL

FIELD SAMPLING PLAN

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FIELD SAMPLING PLAN

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AR300318

BUTZ LANDFILL

FIELD SAMPLING PLAN

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AR300319

1.0 INTRODUCTION

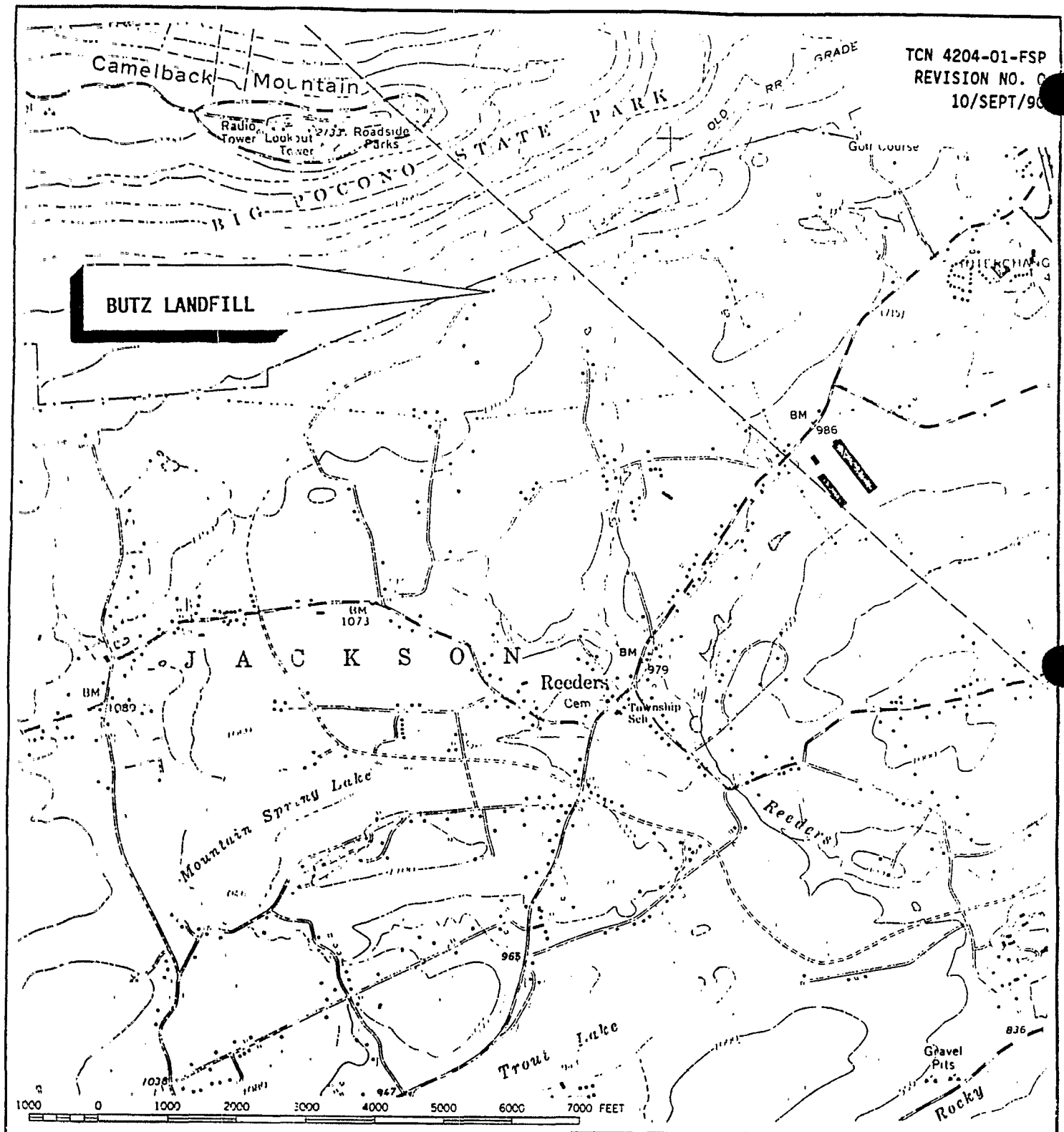
The United State Environmental Protection Agency (USEPA), Region III, utilizing the Alternative Remedial Contracting Strategy (ARCS), has authorized Tetra Tech Inc. (Tetra Tech) to conduct the Remedial Investigation/Feasibility Study (RI/FS) for the Butz Landfill located in Jackson Township, Monroe County, Pennsylvania (Figure 1-1). The RI/FS activities will be performed under Work Assignment #92-04-3LQ6, dated December 16, 1988. All RI/FS activities shall be based on regulations and procedures for implementing response actions set forth in the National Oil and Hazardous Substances Contingency Plan (NCP) as amended.

This FSP is intended to supplement the Quality Assurance Project Plan (QAPjP) and the Health and Safety Plan (HSP), and shall be used by Tetra Tech personnel and subcontractors as a guide for conducting field activities. The FSP is intended to be a stand-alone document, and includes the information required to carry out all field activities. All activities shall also follow the guidelines of the QAPjP and the Health and Safety Plan (HSP) for the site.

This Field Sampling Plan (FSP) addresses the following field activities for the RI/FS at the Butz Landfill:

- Site Mobilization
- Ground Survey
- Wetlands Survey
- Sediment/Surface Water Sampling
- Ecological Assessment
- Surface and Subsurface Soils Investigation
- Hydrogeological Investigation

AR300320



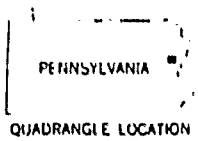


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FIGURE 1-1
GENERAL LOCATION MAP
BUTZ LANDFILL

SOURCE: USGS TOPOGRAPHIC MAP MOUNT POCONO QUADRANGLE

AR300321

2.0 SITE BACKGROUND

The Butz Landfill site is approximately 13.42 acres in size and located on the south side of Township Road 601 (North Road) in Jackson Township, Monroe County, Pennsylvania (Figure 2-1). The landfill is surrounded on three sides by an undeveloped mature hardwood forest. Land use in the surrounding area land use is primarily agricultural and recreational. The population within a three mile radius of the site is approximately 3,300 people, which doubles during the tourist seasons of winter and summer.

The Butz Landfill site was purchased by the Butz family in March 1963. Landfill operations began in 1965 and continued until 1973. The landfill was unpermitted, and accepted household refuse, solid waste, sewage sludge/liquids, and possibly some industrial wastes. The exact quantities of waste accepted by the Butz Landfill is unknown.

Based upon citizen complaints, investigation into the landfill operations began in 1971 by the Pennsylvania Department of Environmental Resources (PADER). Water well pollution and leachate seeps were discovered at this time. In early 1973 PADER ordered the Butz Landfill closed and required the owners to develop a surface water management plan, a ground-water monitoring plan, and cover the landfill. The owners complied with PADER's requests and closed the landfill in late 1973.

The cover for the landfill was installed in late 1973, a surface water management plan was implemented, and ground-water monitoring of nearby domestic water wells was initiated. The parameters tested for included

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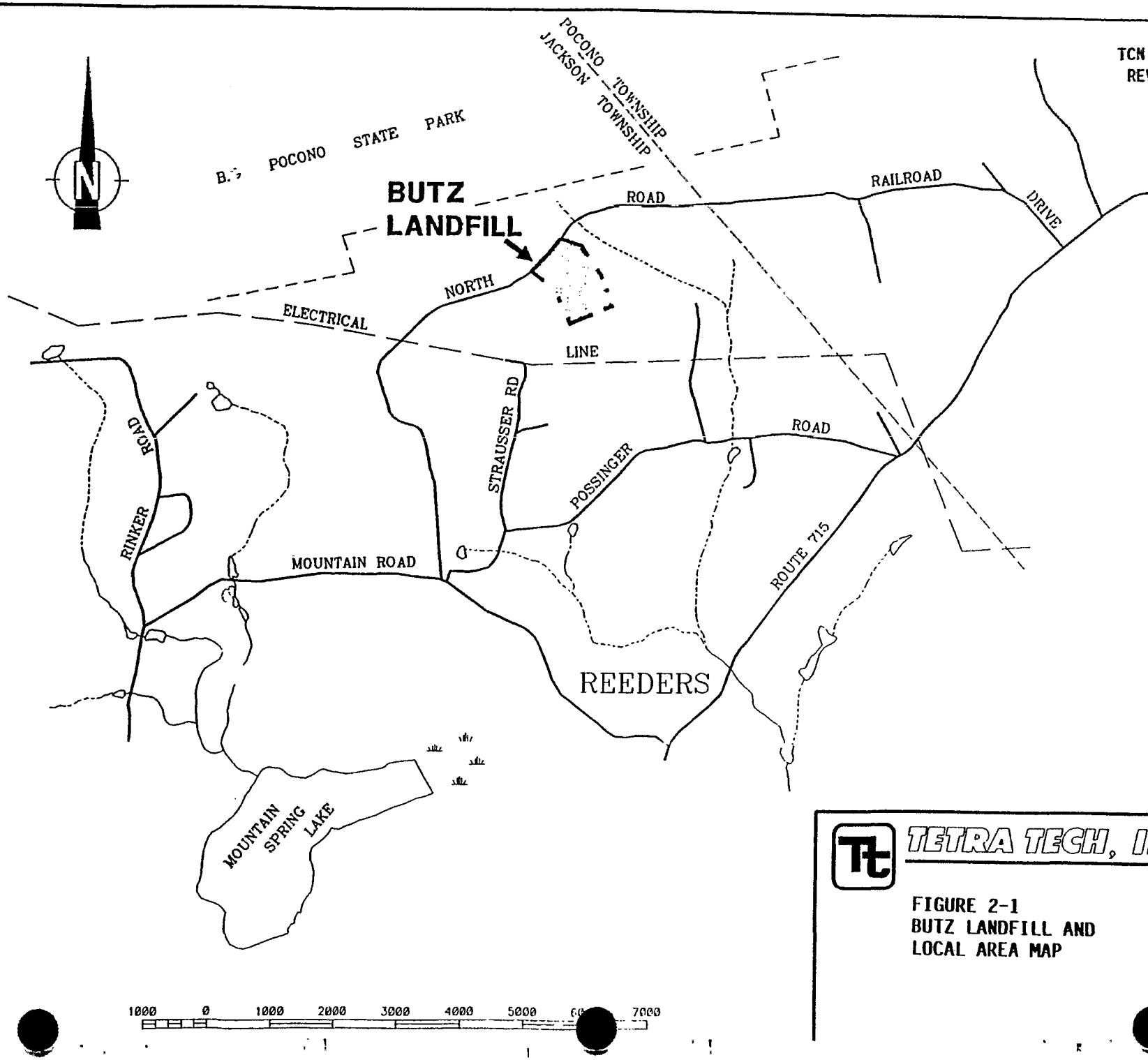

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FIGURE 2-1
BUTZ LANDFILL AND
LOCAL AREA MAP

AR300323

fecal coliform, odor, color, conductivity, pH, hardness, iron, and chloride concentrations. The ground-water monitoring by the owners continued until 1979.

In 1986 PADER found high levels of volatile organic compound (VOCs) contamination (primarily trichloroethylene) in the domestic water wells in the vicinity of the Butz Landfill. Due to the high concentration levels found, PADER requested assistance from USEPA. The USEPA Emergency Response Branch (ERB) began operations at the site. The USEPA distributed bottled water and installed treatment and filtration system in the nearby residences with contaminated wells. USEPA also performed a soil vapor survey and magnetometer survey of the landfill and installed 17 monitoring wells on and near the landfill in 1987.

The soil vapor survey was limited in extent but revealed low concentrations of VOCs. The magnetometer survey identified two localized areas of ferrous materials (metal) in the subsurface of the southern toe of the landfill. No further investigation has been done to confirm the presence of these materials.

Ground-water sampling of the 17 monitoring wells was completed, and a limited number of surface water and soil samples on and near the landfill were collected. These results indicated the primary contaminants were volatile and semivolatile organic compounds. Results of previous sampling efforts are contained in Tables 2-2, 2-3, and 2-4 of the Work Plan.

AR300324

Currently, the USEPA Technical Assistance Team (TAT) continues to collect ground-water samples from selected residential wells on a quarterly basis. The data provided from this sampling, as well as the data collected from other investigations has provided a good starting point for this RI/FS. However, the extent of contamination in the shallow aquifer, subsurface soils, surface water, and sediments has not been fully characterized. Additionally, the total extent of contamination in the deep aquifer is not known. Therefore, a number of data gaps still exist for the site.

AR300325

3.0 SAMPLING OBJECTIVE, SCHEDULE, AND PERSONNEL

Sampling Objective

The purpose of this sampling effort at the Butz Landfill site is to fill existing data gaps regarding potential contaminant sources and pathways, to properly assess the risk to human health and the environment associated with any contamination, and evaluate various alternative remedial technologies for the site. The specific objective of each task is given in each task section.

The sampling efforts described in this Field Sampling Plan have been developed for Phase I RI activities only and shall be revised for Phase II activities, should any be required. Phase II RI activities, if initiated, will be described in an amendment to this document.

Sampling Schedule

The general schedule proposed for the RI field activities is presented in Figure 3-1. The entire field effort for the RI/FS is expected to take two months. The field work is tentatively scheduled for October and November of 1990. All field work is dependent, of course, on generally favorable weather and field conditions, as well as subcontractor procurement and USEPA approval of all operations plans.

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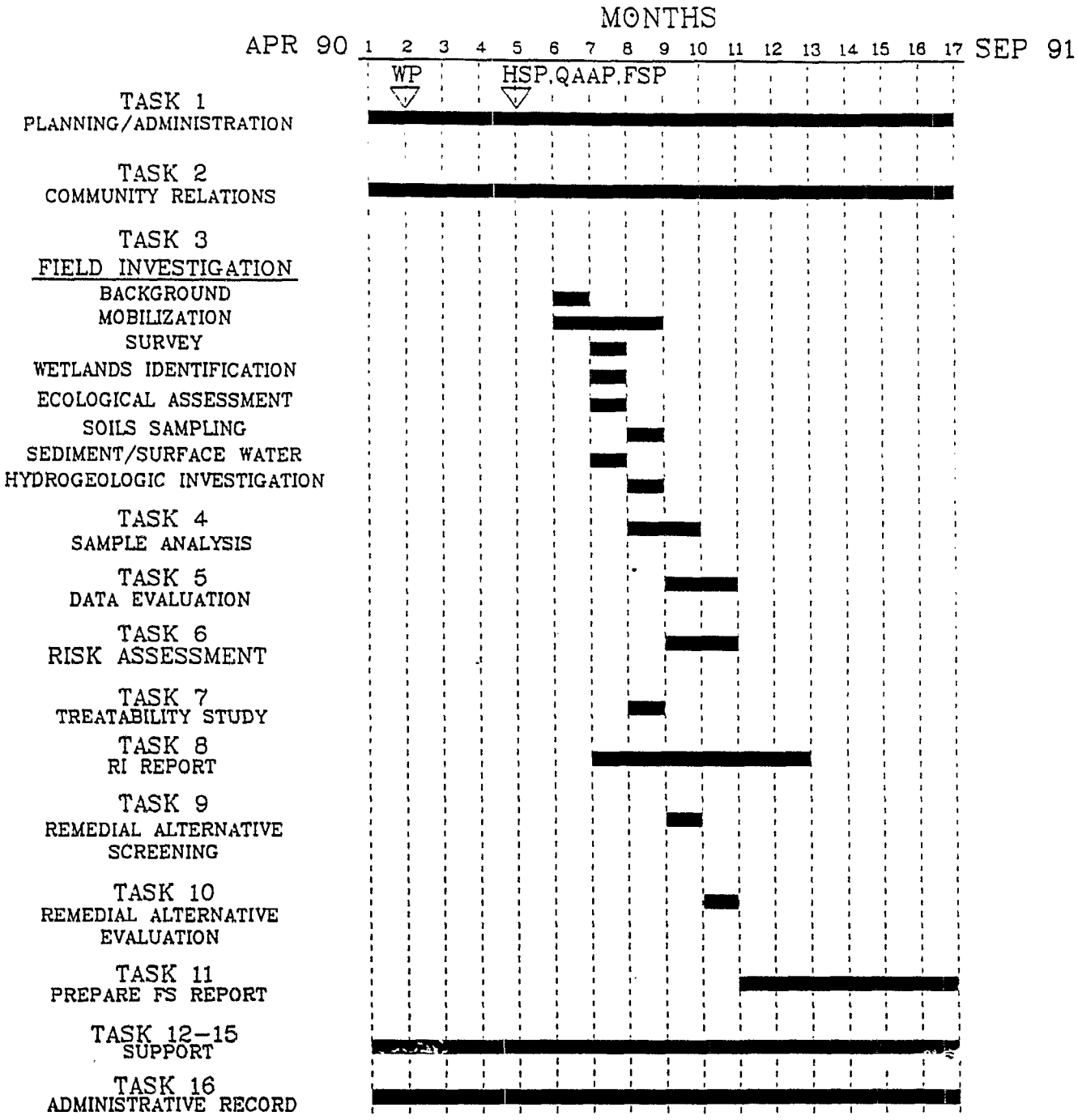

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FIGURE 3-1
PROPOSED RI/FS SCHEDULE
BUTZ LANDFILL

AR300327

Project Personnel

The field activities will be performed and managed as per the field organizational chart presented in Figure 3-2. A detailed description of personnel responsibilities can be found in the QAPjP under "Project Organization and Responsibilities" (Tetra Tech, September 1990).

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BUTZ LANDFILL
RI/FS PROJECT ORGANIZATION

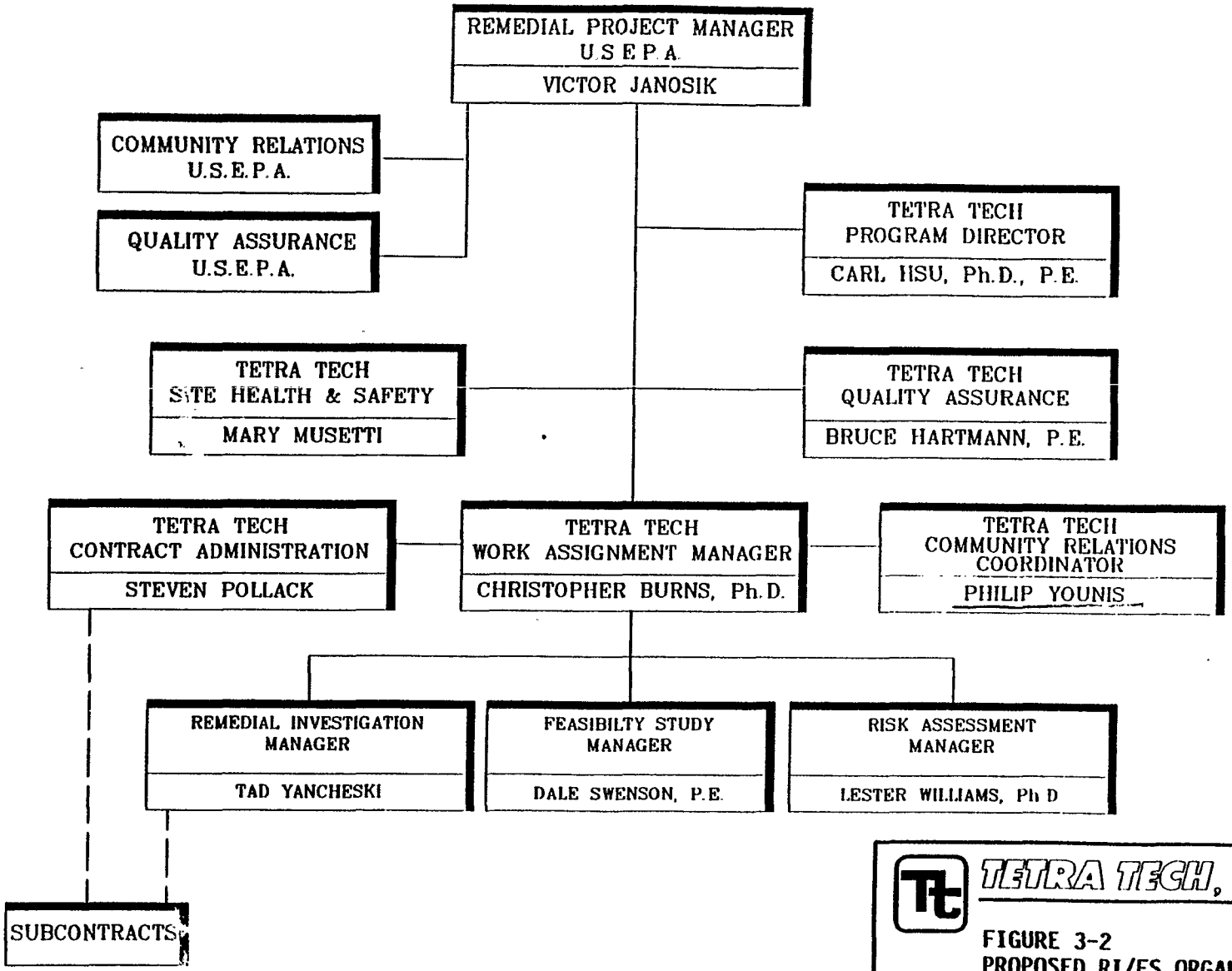

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FIGURE 3-2
PROPOSED RI/FS ORGANIZATION CHART
BUTZ LANDFILL

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4.0 FIELD ACTIVITIES

A summary of all sampling to be performed is presented in Table 4-1. This includes the number of primary samples and the number of quality control (QC) samples to be collected for each media. Also included in this table are the analyses that each sample will undergo. Table 4-2 lists the bottle requirements and preservation requirements for each sampling task. Refer to these tables to address questions regarding these issues.

4.1 SITE MOBILIZATION

Objective

The objective of site mobilization is to prepare for the field investigation and all activities associated with the investigation including setting up a field office and performing site reconnaissance prior to sampling. This task also includes subcontractor procurement, waste removal, etc; however, these activities will not be performed in the field and hence are not discussed in this section.

Location

A field office, temporary decontamination pad, and drum storage area will erected (or designated) on the northern portion of the site, along North Road.

AR300330

TABLE 4-1

BUTZ LANDFILL

Sampling Summary

MATRIX	ANALYSIS	DATA USE (a)	DATA QUALITY OBJECTIVE LEVEL (b)	TARGET DETECTION LIMIT (c)	PROPOSED ANALYTICAL METHOD	SOURCE OF ANALYSIS	NUMBER OF SAMPLES	NO. OF FIELD DUPLICATES	NO. OF MS & MSD PAIRS (d)	NO. OF FIELD BLANKS (e)	NO. EQUIP. RINSEATE BLANKS (f)	NO. OF TRIP BLANKS (g)
GROUNDWATER	TCL ORGANICS	1,2,3,4	IV	CRDL	CLP PROTOCOL	CLP RAS	36	4	4	4	4	8
	TAL INORGANICS	1,2,3,4	IV	CRDL	CLP PROTOCOL	CLP RAS	36	4	4	4	4	-
	TCL ORGANICS (h)	1,2,3,4	III	CRDL	CLP PROTOCOL	CLP SAS	5	1	1	1	1	1
	TAL INORGANICS (h)	1,2,3,4	III	CRDL	CLP PROTOCOL	CLP SAS	5	1	1	1	1	-
SURFACE WATER	TCL ORGANICS	1,2,3,4	IV	CRDL	CLP PROTOCOL	CLP RAS	16	1	1	1	1	4
	TAL INORGANICS	1,2,3,4	IV	CRDL	CLP PROTOCOL	CLP RAS	16	1	1	1	1	-
	TEMP, pH, Eh, BOD	1,2,3,4.	II				16	1	1	1	1	-
	SPEC. COND., DO	1,2,3,4.	II				16	1	1	1	1	-
	ALK., TDS, TSS	1,2,3,4.	V	CRDL	CLP PROTOCOL	CLP SAS	16	1	1	1	1	-
	COD,TOC	1,2,3,4.	V	CRDL	CLP PROTOCOL	CLP SAS	16	1	1	1	1	-
SEDIMENT	TCL ORGANICS	1,2,3,4	IV	CRDL	CLP PROTOCOL	CLP RAS	16	1	1	1	1	1
	TAL INORGANICS	1,2,3,4	IV	CRDL	CLP PROTOCOL	CLP RAS	16	1	1	1	1	-
	GRAIN SIZE, % Moisture & Solids	1,2,3,4	V	-	ASTM D422-63 D421-85	CLP SAS	16	1	-	-	-	-
	TOC	1,2,3,4	V	CRDL	CLP PROTOCOL	CLP SAS	16	1	1	1	1	-
	TEMP, pH, Eh,	1,2,3,4.	II				16	1	1	1	1	-
	SPEC. COND.	1,2,3,4.	II				16	1	1	1	1	-
SOIL	TCL ORGANICS	1,2,3,4	IV	CRDL	CLP PROTOCOL	CLP RAS	43	4	4	4	4	12
	TAL INORGANICS	1,2,3,4	IV	CRDL	CLP PROTOCOL	CLP RAS	43	4	4	4	4	-
AIR	ORGANIC VAPORS	1	I				*	-	-	-	-	-

(a) 1 - Site Characterization
2 - Risk Assessment
3 - Evaluation of Alternatives
4 - Engineering Design of Alternatives

(b) I - Vapor detection using portable field instruments
II - Field Analysis
III - Organics/Inorganics using EPA procedures other than CLP
IV - TCL Organics/Inorganics Low detection levels
V - Non-Conventional Parameters

(c) Contract Required Detection Limit (See Appendix D of QAPjP)

(d) Matrix Spikes (MS) and Matrix Spike Duplicates (MSD)

* Continuous Monitoring

(e) Number based on one QC sample per 20 matrix samples

(f) Number based on one QC sample per 20 matrix samples

(g) Number based on estimated number of days of sampling and taking 1 trip blank per day

(h) Domestic water well samples to be analyzed for TCL organics/TAL inorganics using Drinking Water (EPA 500 Series Methods) detection limits

AR300331

TABLE 4-2

BUTZ LANDFILL

ANALYTICAL PARAMETERS, PRESERVATION, AND HOLDING TIMES

PARAMETERS	NUMBER OF SAMPLES (2)	FREQUENCY OF COLLECTION	MATRIX	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATION	HOLDING TIME	CONTAINER
TCL ORGANICS	30,30,10	3 EVENTS	GROUNDWATER	CLP PROTOCOL			
VOLATILES					Cool, 4 C HCL to pH<2	14 Days *	3-40 ml glass vials w/Teflon-lined septum
EXTRACTABLES					Cool, 4 C Store in dark	14 Days *	4-1L amber glass bottles w/Teflon-lined cap
TAL INORGANICS (1)	26,26,9	3 EVENTS	GROUNDWATER	CLP PROTOCOL			
METALS					HNO3 to pH<2 Cool, 4 C	6 Months	1-L high density polyethylene bottle w/white poly cap
CYANIDE					NaOH to pH>12	14 Days	1-L high density polyethylene bottle w/white poly cap
TCL ORGANICS	21	1 EVENT	SURFACE WATER	CLP PROTOCOL			
VOLATILES					Cool, 4 C HCL to pH<2	14 Days *	3-40 ml glass vials w/Teflon-lined septum
EXTRACTABLES					Cool, 4 C Store in dark	14 Days *	4-1L amber glass bottles w/Teflon-lined cap
TAL INORGANICS (1)	20	1 EVENT	SURFACE WATER	CLP PROTOCOL			
METALS					HNO3 to pH<2 Cool, 4 C	6 Months	1-L high density polyethylene bottle w/white poly cap
CYANIDE					NaOH to pH>12	14 Days	1-L high density polyethylene bottle w/white poly cap
ALKALINITY (4)	20	1 EVENT	SURFACE WATER	CLP PROTOCOL	Cool, 4 C	48 Hours	1-200 ml glass bottle w/Teflon-lined cap
BOD	20	1 EVENT	SURFACE WATER	CLP PROTOCOL	Cool, 4 C	48 Hours	1-1L amber glass bottle w/Teflon-lined cap
TOC (4)	20	1 EVENT	SURFACE WATER	CLP PROTOCOL	HCL to pH<2 and Cool, 4 C	28 Days	1-125 ml glass bottle w/Teflon-lined cap
COD	20	1 EVENT	SURFACE WATER	CLP PROTOCOL	Cool, 4 C	28 Days	1-1L glass bottle w/Teflon-lined cap
TSS (3)	20	1 EVENT	SURFACE WATER	CLP PROTOCOL	Cool, 4 C	7 Days	1-500 ml glass bottle w/Teflon-lined cap
TDS (3)	20	1 EVENT	SURFACE WATER	CLP PROTOCOL	Cool, 4 C	7 Days	1-500 ml glass bottle w/Teflon-lined cap

(1) Filter samples on-site

(2) Includes QA/QC samples

(3) TSS and TDS will be collected in one 1-L glass bottle w/Teflon-line cap

w/ = with
oz. = ounce
ml = milliliter
L = Liter
C = degrees Celsius

(4) Alkalinity and TOC will be collected in one 500 ml glass bottle w/ teflon-lined cap

* 14 days until the extraction, then 45 days after the extraction to complete the analysis

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TABLE 4-2 (continued)

BUTZ LANDFILL

ANALYTICAL PARAMETERS, PRESERVATION, AND HOLDING TIMES

PARAMETERS	NUMBER OF SAMPLES (2)	FREQUENCY OF COLLECTION	MATRIX	ANALYTICAL METHOD REFERENCE	SAMPLE PRESERVATION	HOLDING TIME	CONTAINER
TCL ORGANICS	39,20,12	3 EVENTS	SOIL	CLP PROTOCOL			
VOLATILES					Cool, 4 C	14 Days *	2-40 ml glass vials w/ Teflon-lined septum
EXTRACTABLES					Cool, 4 C	14 Days *	1-8 oz. wide mouth glass bottle w/Teflon-lined cap
TAL INORGANICS	33,17,9	3 EVENTS	SOIL	CLP PROTOCOL		6 Months	1-8 oz. wide mouth glass bottle w/Teflon-lined cap
TCL ORGANICS	21	1 EVENT	SEDIMENT	CLP PROTOCOL			
VOLATILES					Cool, 4 C	14 Days *	2-40 ml glass vials w/ Teflon-lined septum
EXTRACTABLES					Cool, 4 C	14 Days *	1-8 oz. wide mouth glass bottle w/Teflon-lined cap
TAL INORGANICS	20	1 EVENT	SEDIMENT	CLP PROTOCOL		6 Months	1-8 oz. wide mouth glass bottle w/Teflon-lined cap
GRAIN SIZE	17	1 EVENT	SEDIMENT	ASTM D422-63, D421-85			1-8 oz. wide mouth glass bottle w/Teflon-lined cap
% MOISTURE							1-8 oz. wide mouth glass bottle w/Teflon-lined cap
% SOLIDS							1-8 oz. wide mouth glass bottle w/Teflon-lined cap
TOC	20	1 EVENT	SEDIMENT	CLP PROTOCOL	HCl to pH<2 and Cool, 4 C	28 Days	1-125 ml glass bottle w/Teflon-lined cap

(1) Filter samples on-site
(2) Includes QA/QC samples

w/ = with
oz. = ounce
ml = milliliter

L = Liter
C = degrees Celsius

* 14 days until the extraction, then 45 days after the extraction to complete the analysis

AR300333

Equipment and Procedures

The field office will be equipped with electricity and telephone service. A portable sanitation unit will be located adjacent to the Field Office. These items will be rented for the period of the field investigation. Lumber, 8 millimeter thick polyethylene liner, and appropriate hand tools are necessary to construct a temporary decontamination pad. Snow fencing will be used to designate a drum storage area for the period of the on-site investigation.

The following work will be performed upon initial mobilization:

1. Refer to Section 6-1 of the Health and Safety Plan before proceeding with any work.

2. Two decontamination pads will be constructed in such a manner as to contain all rinseate produced during decontamination activities. One decontamination pad will be sturdy enough to support heavy equipment such as backhoes and drilling rigs. The second pad will be smaller and used for decontamination of personnel.

3. A drum storage area must be designated and constructed on site. This area will be surrounded by temporary snow fencing.

4. Prior to sampling, a reconnaissance survey of the site will be performed to limit the problems that may be encountered during sampling. The reconnaissance survey will include identifying the

AR300334

location and the accessibility of the 17 existing monitoring wells, determining the accessibility of the proposed location for the additional monitoring well to be installed, and the accessibility to the surface water bodies where sixteen surface water and sediment samples will be collected. All observations and/or potential problems will be recorded in the field log book and reported to the RI Task Manager.

4.2 GROUND SURVEY

Objective

The objective of performing a ground survey is to provide a detailed base map for all site activities.

Equipment and Procedures

The Tetra Tech survey crew will consist of a registered professional surveyor and a rod person. Equipment will include a Leitz Model 20 transit level mounted on a steel tripod, a fiberglass rod marked in increments of 0.2 inches, and a 100-foot Leitz surveyor's tape. All survey equipment will be calibrated and tested for parallax, vertical cross-hair alignment, line-of-sight and bubble adjustment.

The ground survey will consist of the following elements:

AR300335

1. Refer to Section 6-1 of the Health and Safety Plan before proceeding with any work.

2. Prepare a detailed base map of the Butz property, including a boundary survey, at a scale of 1 inch equals 50 feet.

3. Prepare a general base map of the area in the vicinity of the site at a scale of 1 inch equals 200 feet.

4. Locate the vertical and horizontal position of all sampling points accurately on the base map.

4.3 WETLANDS IDENTIFICATION

Objective

The objective of this task is to identify potentially sensitive habitats on or near the Butz Landfill that may be impacted by contaminants related to the landfill.

Sample Location and Frequency

Wetlands on the landfill will be evaluated at 9 stations located along 3 transects on the landfill and 3 stations along one transect in an area immediately east of the landfill as depicted in Figure 4-1. This evaluation will be made only once.

AR300336

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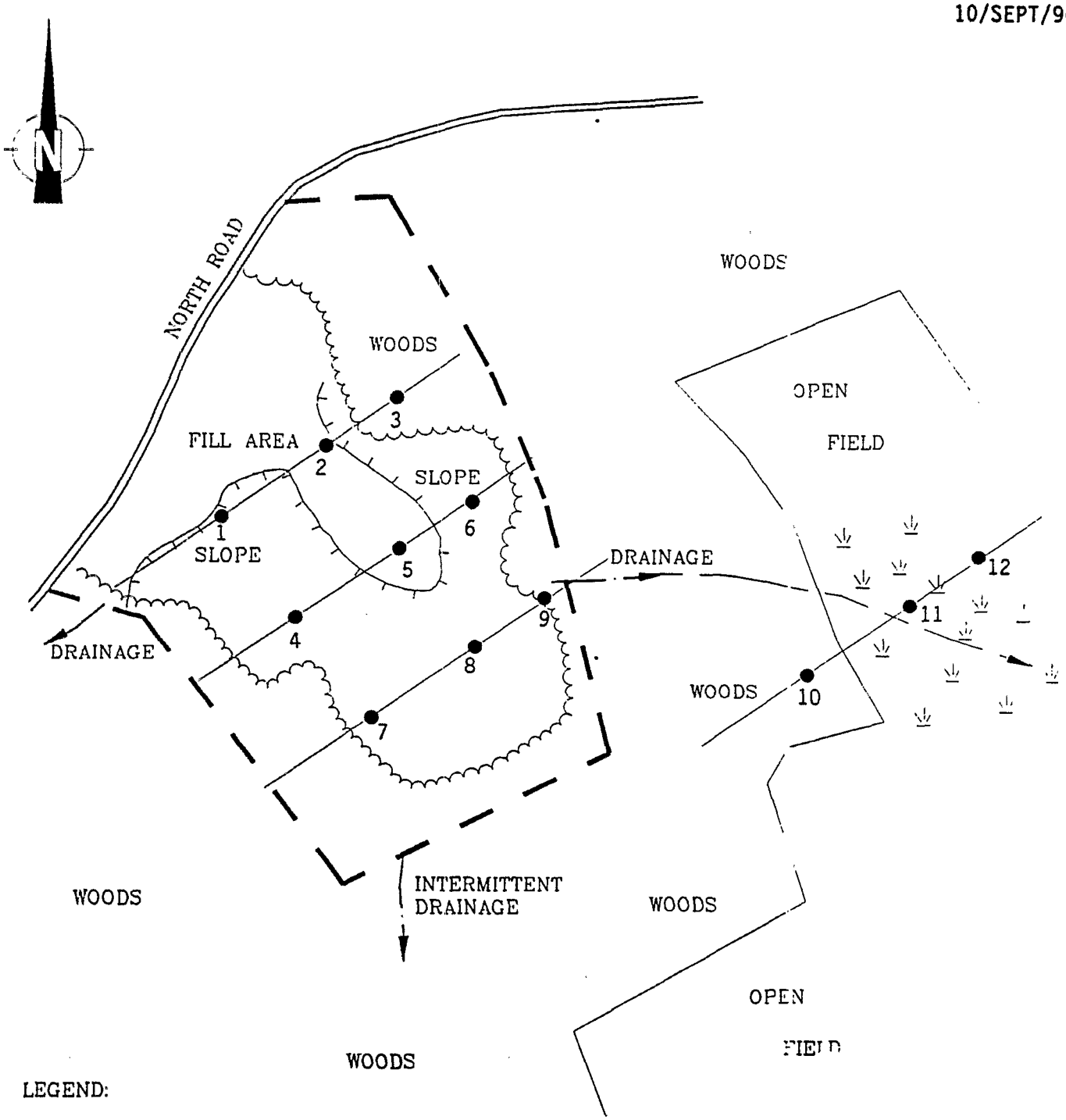

LEGEND:

● PROPOSED LOCATIONS FOR WETLANDS IDENTIFICATION

APPROXIMATE SCALE

0 75 150

SCALE FEET

TETRA TECH, INC.

FIGURE 4-1
PROPOSED WETLAND TRANSECTS
BUTZ LANDFILL

AR300337

Sample Designation

The 12 stations where wetlands will be evaluated will be designated BLWET-01 through BLWET-12. The letters BL identify the site, the letters WET identify the task, and the numbers 01 through 12 identify the station location.

Sampling Equipment and Procedures

To perform this task, the sampling team must be equipped with a hand auger, a Munsell Soil Color Chart, appropriate botanical guides for the area, the Federal Guide for Identifying and Delineating Jurisdictional Wetlands (1989), a tape measure, and the proper health and safety equipment.

These specific procedures will be followed in this task:

1. Refer to Section 6-1 of the Health and Safety Plan before proceeding with any work.

2. The vegetation within a 30-foot radius of the sampling point will be catalogued, identified to the species level, and ranked according to their indicator status (Reed, 1988).

2. The soil profile from the boring will be described in horizons. For each horizon, the texture and color of the soil will be determined by comparing the soil to color templates in a Munsell Soil Color Chart

AR300338

(1975). Both matrix and mottle colors will be evaluated to determine if the soil has hydric characteristics.

3. The hydrology at each sampling location will be determined by observations and field indicators, and by comparing these to the wetlands hydrology criteria. The depth to ground water, if encountered, will be measured. The presence of surface water will also be recorded. Other field indicators including soil color, organic staining, water marks on vegetation, sediment deposits, surface scouring, and morphological plant adaptations will also be recorded.

4. All data will be recorded on routine data forms depicted in the Federal Manual (Figure 4-2).

5. Follow proper decontamination procedures as specified in Section 5.0 of this FSP.

Sample Handling and Analysis

All samples will be evaluated and analyzed at the sampling location. No samples will be sent off-site for analysis.

AR300339

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD

Field Investigator(s):_____ Date:_____
Project/Site:_____ State:_____ County:_____
Applicant/Owner:_____ Plant Community #/Name:_____
Do normal environmental conditions exist? (If no, see report) ____Yes ____No
Has one or more of the parameters been significantly disturbed?
(If yes, see report) ____Yes ____No

VEGETATION

Dominant Plant Species	Indic. Stat.	Strat.
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Percent of dominant species that are OBL, FACW, and/or FAC:_____
Is the hydrophytic vegetation criterion met? _____Yes _____No
Rationale:_____

SOILS

Series/phase:_____ Subgroup:_____
Is the soil on the hydric soils list? _____Yes _____No _____Undetermined
Is the soil a Histosol? ____Yes ____No Histic epipedon present? ____Yes ____No
Is the soil: Mottled? ____Yes ____No Gleyed? ____Yes ____No
Matrix Color:_____ Mottle Colors:_____
Other hydric soil indicators:_____
Is the hydric soil criterion met? _____Yes _____No Rationale:_____

HYDROLOGY

Is the ground surface inundated? _____ Yes _____ No Surface Water Depth:_____
Is the soil saturated? _____Yes _____No
Depth to free-standing water in pit/soil probe hole:_____
List other field evidence of surface inundation or soil saturation:_____

Is the wetland hydrology criterion met? _____Yes _____No Rationale:_____

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? _____Yes _____No Rational for jurisdictional decision:_____

*For additional information see soil boring logs.
**Dominant plant species are listed by stratum starting with canopy and ending with groundcover. The first species listed for each stratum is the dominant species for that stratum.

TETRA TECH, INC.

FIGURE 4-2
ROUTINE WETLANDS DATA FORM
BUTZ LANDFILL

AR300340

4.4 SURFACE WATER AND SEDIMENT SAMPLING

Objective

The objective of sampling of surface water and sediments in various streams adjacent to the Butz Landfill is to determine the presence and extent of contamination emanating from the landfill. Additionally, this information will determine the necessity for further ecological studies.

Sample Location and Frequency

Surface water and sediment sampling will be performed concurrently at the same sampling locations on a one-time basis. The 16 sampling locations are shown on Figure 4-3.

Stations 1 through 3 are located on the North Fork of Reeders Run to its confluence with the West Fork of Reeders Run. Station 4 is located just upstream of the landfill at a temporary stream that feeds into the North Fork of Reeders Run. This station will serve as a comparison to downstream stations 1 through 3. The North Fork of Reeders Run is an intermittent stream that is fed by several springs. Station 5 is located along an unmapped intermittent stream that probably drains downslope into the North Fork of Reeders Run. Stations 6 and 7 are located at springs that drain downslope into the West Fork of Reeders Run. Stations 8 and 9 are located along the West Fork of Reeders Run. Station 10 is located at the confluence of the East Fork of Reeders Run, which is also an intermittent stream that emanates from a spring, with the drainage from the area around the landfill.

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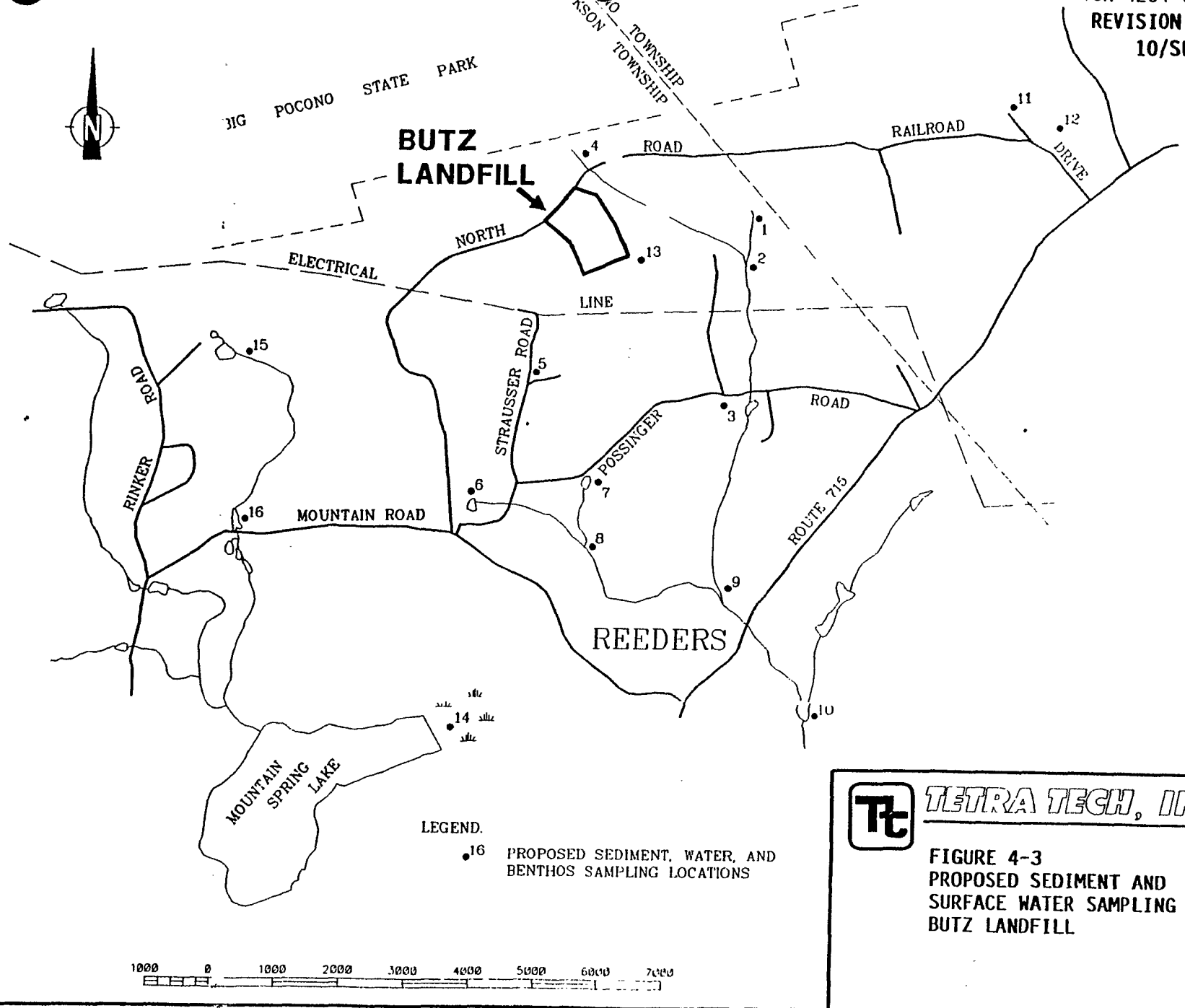

TETRA TECH, INC.

FIGURE 4-3
PROPOSED SEDIMENT AND
SURFACE WATER SAMPLING LOCATIONS
BUTZ LANDFILL

AR300342

These locations are the most likely to be contaminated by either surface runoff or ground water from the Butz Landfill.

Stations 11 through 14 represent sensitive habitat sampling locations. Stations 11 and 12 are located in a mapped wetlands area. Station 13 is located in a probable wetlands habitat down slope from the landfill. Station 14 is located in a swamp area near Mountain Spring Lake within one mile of the landfill.

Stations 15 and 16 are located along an intermittent stream emanating from a spring to the west of the site that drains into Mountain Spring Lake. These should represent background samples. These stations are located along an intermittent stream that is downstream from a spring, which is similar to the siting of the other stations.

Sample Designation

The following sample designation system will be employed: BL-SW-01 through BL-SW-16 for surface water samples, and BL-SED-01 through BL-SED-16 for sediment samples. The letters BL identify the site; the letters SW or SED identify the sample matrix (surface water and sediment), and the numerals 01 through 16 identify the sampling locations.

A duplicate sample of surface water and sediment will be collected at station #8 and will be designated BL-SW-17 and BL-SED-17, respectively. One field blank for each matrix will be collected and designated BL-SW-18 and BL-SED-18. One equipment rinseate blank will be collected for each

AR300343

matrix and designated BL-SW-19 and BL-SED-19. These samples should be collected after the sample at station #1 is collected. A matrix spike and matrix spike duplicate will be collected at station #2 and will be designated BL-SW-02-MS and BL-SED-02-MS, and BL-SW-02-MSD and BL-SED-02-MSD.

One trip blank will be collected per matrix for each day of sampling. The trip blanks will be designated BL-SW-TB-01, BL-SED-TB-01 etc., for each successive trip blank used. The letters SW-TB denote a surface water trip blank; the letters SED-TB denote a sediment trip blank.

Sampling Equipment and Procedures

To perform this task, the sampling team must be equipped with the proper health and safety equipment, dedicated bottles to collect surface water samples and dedicated stainless-steel scoops to collect the sediment samples. This task will also require a pH meter, an Eh meter, a dissolved oxygen (DO) meter, a thermometer, and a specific conductance meter.

These general procedures will be followed:

1. Refer to Section 6-1 of the Health and Safety Plan before proceeding with any work.

2. The surface water sample will be collected first, followed by the collection of the sediment sample.

AR300344

3. Sampling will generally occur from downstream to upstream, proceeding in the following order: 14, 16, 15, 10, 9, 8, 7, 6, 5, 3, 2, 1, 4, 13, 11 and 12.

4. Field sampling personnel will collect the samples from areas of stream bottom where there is predominantly fine-grained sediment. These areas should also be characterized by a steady, but non-turbulent, flow of water. These criteria are designed to maximize sample quality by maximizing the adsorption of metals and organics in the sediments and the retention of volatile constituents in the water column, respectively.

5. One team member will perform the actual sample collection; he will carefully adopt an optimal sampling position, and once in that position, will not move his feet until all sampling at that locality is concluded in order to minimize agitation of the sediment and water. The other team member will be positioned within arms-length of the sampler on dry ground, and will perform field measurements, fill sample bottles, and document the collection effort in the field logbook.

6. Both the samples and the work zone airspace will be monitored during sampling for the presence of VOC's, using a calibrated PID or OVA. The results of VOC screening will be recorded in the field logbook, as well as a detailed description of the sampling location (including distances from marker features, if any) and procedures.

These specific procedures will be followed for Surface Water Sampling:

AR300345

1. At each sampling location a laboratory-clean collection jar will be used for sampling. The jar will be triple-rinsed with stream water then lowered into the surface water body a fourth time to obtain actual sample volume. When the jar is filled it will then be removed from the stream and tested for the required field parameters.

2. Field measurements of Eh, pH, specific conductance, dissolved oxygen, and temperature will be obtained for each sample of surface water collected as per Tetra Tech S.O.P. (Appendix A). Field parameter measurements will be recorded on data tables in the field logbook.

3. Following the measurements of field parameters, the samples will be transferred from the collection jar to the sample bottles. Surface water samples will not be filtered. Special care will be taken regarding the volatiles sample, which will be poured very slowly down the side of the bottle (in order to minimize entrainment of air and loss of volatiles) and inverted to ascertain the absence of bubbles in the sample. If bubbles are present, the sample will be discarded and recollected. This procedure will be repeated until all specified sample bottles have been filled at that locality.

4. The volatiles samples should be preserved with hydrochloric acid to a pH of less than 2. The sample to be analyzed for cyanide should be preserved with a pellet of sodium hydroxide. The sample to be analyzed for metals should be preserved with nitric acid to a pH of less than 2.

AR300346

5. Stream sediments are to remain undisturbed by the sampling jar. Should contact with the bottom and resuspension of sediment occur, the sampling team is to halt sampling until the water has cleared. If the water does not clear within a few minutes, the team is to proceed slightly upstream (about 1 meter or just above the disturbed area) and resume the sampling effort.

6. Upon completion of the water sampling at a given locality, the used collection jar and nylon cord will be placed in a plastic bag for disposal. The team sampler will remain in position for the sediment sampling effort.

These specific procedures are to be followed for sediment sampling:

1. Samples of sediment from depths of 0 to 6 inches will be collected from the same localities as the surface water samples.

2. One large stainless-steel scoop for each sample locality will be cleaned by Tetra Tech prior to going to the site using an Alconox scrub, a tap water rinse, a rinse with distilled water, a nitric acid solution rinse and a final distilled water rinse. The scoops will be air dried, then sealed in individual plastic bags for transport to the Butz Landfill site.

3. At the site, a dedicated scoop will be used at each locality to collect sediment to fill the appropriate sample jars. Additionally, field measurements of Eh, pH, specific conductance, dissolved oxygen, and

AR300347

temperature of the sediment will be measured. Field measurements will be recorded on data tables in the field logbook.

4. When all the sample jars have been filled, the scoop will be rinsed in the stream to remove particulates, then placed in the plastic bag containing the surface water collection jar and nylon cord. After all the samples have been properly deposited in a cooler, the sampling gloves and boots will also be placed into the plastic trash bag.

These specific procedures are to be followed for decontamination:

1. Decontamination of sampling equipment between each sampling location is not required, due to the use of dedicated sampling devices. To prevent the potential spread of surface contaminants from the sampling localities, all sampling devices and personal protective equipment (gloves, boot covers, etc.) are to be sealed in a plastic bag prior to leaving the locality.

2. At subsequent sample locations, new personal protective equipment will be used. At the conclusion of the sampling effort, all plastic bags will be disposed of in an on-site drum. Further information on decontamination procedures can be found in section 5.0 of this FSP.

Sample Handling and Analysis

The surface water samples will be analyzed by CLP laboratories for all TCL/TAL compounds, as well as alkalinity, total dissolved solids (TDS),

AR300348

total suspended solids (TSS), chemical oxygen demand (COD), and total organic carbon (TOC). Sediment and seep samples will also be analyzed for all TCL/TAL compounds, as well as TOC, percent moisture, percent solids, and grain size. In addition to the sixteen sample locations for each sample matrix, a duplicate sample of each matrix from Station #8 will be taken for QA/QC purposes. As required per Section 7.0, QA/QC Sampling Collection, one matrix spike and matrix spike duplicate sample will be collected at Station #2. Additional QA/QC samples to be collected include one field blank and one equipment rinseate blank for each analysis (TCL, TAL) and for each matrix. Also one trip blank per day of sampling or per (TCL) sample cooler will be used.

The use of dedicated sample collection devices nullifies the need to sample rinseate from the equipment decontamination procedure. Instead, deionized water will be run over the "clean" sampling devices at Location #1 (1 sample collection jar and 1 scoop) prior to their use, as a test of their integrity. The deionized water will be collected and designated as the equipment rinseate blank.

4.5 ECOLOGICAL ASSESSMENT

Objective

To determine the identity of the flora and fauna on and adjacent to Butz Landfill.

AR300349

Sampling Location and Frequency

The flora and fauna will be identified along one continuous transect running northwest to southeast across the landfill (Figure 4-4) and at 16 stations located near surface water bodies adjacent to the landfill. The 16 stations will be the same stations where sediment and surface water sampling will be performed (Figure 4-3).

This environmental assessment is considered preliminary. Should the results of the soil, sediment, and surface water sampling warrant, a more detailed ecological assessment will be performed.

Sampling Designation

The transect shall be identified as BL-Transect. The stations will be designated BL-ECOL-01 through BL-ECOL-16 for the purposes of recording data. The letters BL identify the site; the letters ECOL identify this portion of the investigation as the Ecological Assessment, and the numerals 01 through 16 identify the location.

Sample Equipment and Procedures

The only equipment needed to perform this task is the proper health and safety equipment and appropriate guide and keys to local flora and fauna.

These specific procedures will be followed in this task:

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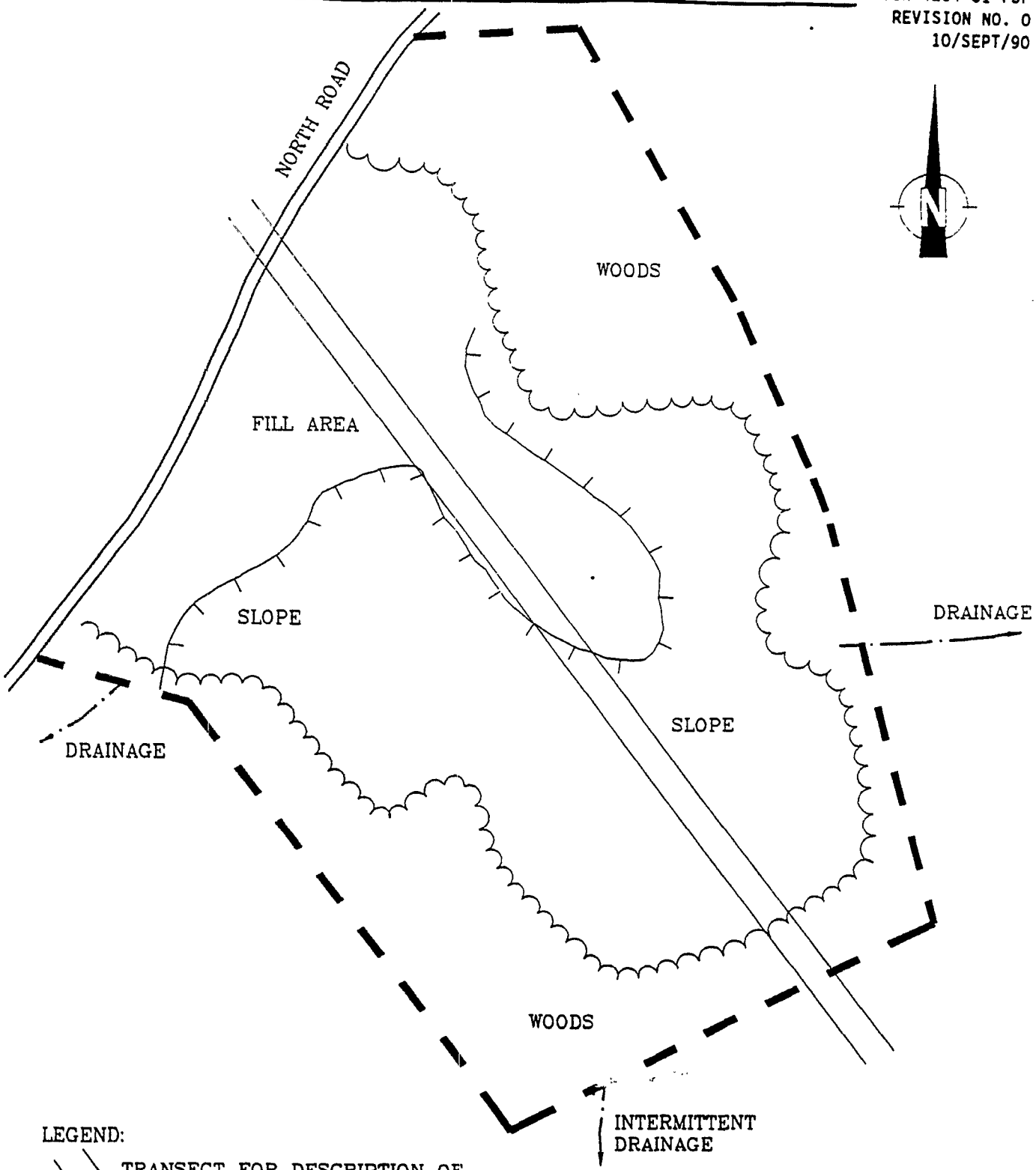


LEGEND:

TRANSECT FOR DESCRIPTION OF FLORA AND FAUNA

APPROXIMATE SCALE

0 125 250

SCALE FEET

TETRA TECH, INC.

FIGURE 4-4
FLORA AND FAUNA TRANSECT
BUTZ LANDFILL

AR300351

1. Refer to Section 6-1 of the Health and Safety Plan before proceeding with any work.

2. Use the appropriate guides and keys to identify all flora and fauna along the landfill tract and the 16 station locations to the genus level; species level if possible.

Sample Handling and Analysis

All samples will be evaluated and analyzed at the sampling location. No samples will be sent off-site for analysis.

4.6 SOILS INVESTIGATION

4.6.1 SURFACE SOILS

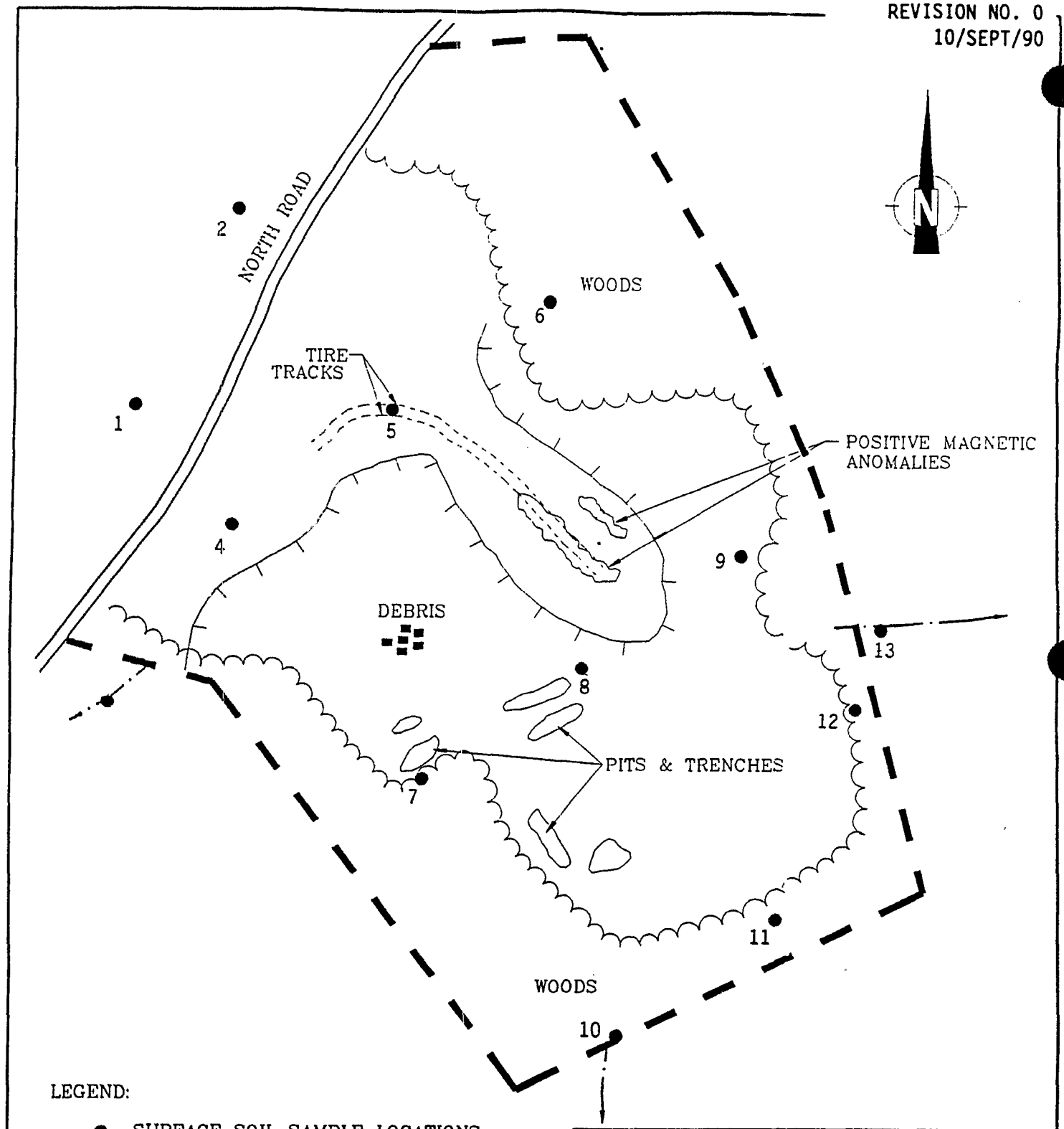
Objective

To determine whether the surface soils are contaminated and to determine the risk associated with exposure to the potentially contaminated surface soils of the Butz Landfill.

Sample Location and Frequency

Thirteen surface soil samples will be collected at the locations depicted in Figure 4-5. Nine sampling points are located within the bounds of the Butz property, two sampling points are located topographically upgradient

AR300352



LEGEND:

● SURFACE SOIL SAMPLE LOCATIONS

APPROXIMATE SCALE

0 125 250

SCALE FEET

TETRA TECH, INC.

FIGURE 4-5
PROPOSED SURFACE SOIL
SAMPLING LOCATIONS
BUTZ LANDFILL

AR300353

of the landfill for control purposes, and two sampling points are located in drainage swales leading from the site to assess possible migration of contaminants from the landfill. Sampling will occur once.

Sample Designation

The surface soil samples will be designated BL-SS-01 through BL-SS-13. The letters "BL" designate the site, the letters "SS" denote a surface soil sample, and the numerals 01 through 13 denote the station.

A duplicate soil sample will be collected at station #4 and will be designated BL-SS-14. One field blank will be collected and designated BL-SS-15. One equipment rinseate blank will be collected and designated BL-SS-16. A matrix spike and matrix spike duplicate will be collected at station #8 and will be designated BL-SS-08-MS and BL-SS-08-MSD.

One trip blank will be collected for each day of sampling. The trip blanks will be designated BL-SS-TB-01, BL-SS-TB-02 etc., for each successive trip blank used. The letters SS-TB denote a surface soil trip blank.

Sample Equipment and Procedures

The equipment needed for this task includes a hand auger, a shovel, stainless-steel bowls, wooden stakes, a hammer, indelible ink pens, a 300-foot measuring tape, a Brunton compass, appropriate sample jars, and appropriate health and safety equipment.

AR300354

The following procedures will be followed for the collection of these samples:

1. Refer to Section 6-1 of the Health and Safety Plan before proceeding with any work.

2. Use the shovel to clear any surface debris from the sampling location, including grasses or other vegetation.

3. Collect the samples with the hand auger from 0-6 inches depth. Carefully push the soil out of the auger into a stainless-steel bowl.

4. Pack the volatile organic sample jars first. Then pack all other sample fractions. The samples should be preserved by cooling to 4°C.

5. After sampling is completed, the sampling location should be marked by a wooden stake. The station number and date of sampling should be written on the stake in indelible ink. Then use the measuring tape to the distance and direction to the nearest landmark. Record the location in the field logbook.

6. Decontaminate the sampling equipment as specified in Section 5.0 of this FSP and move to the next sampling location. Repeat steps 1 through 4.

AR300355

Sample Handling and Analysis

Samples will be analyzed for full TCL organic compounds, and full TAL elements (metals and cyanide). Also refer to Sections 7.0 and 8.0 for QA/QC sample collection procedures and Contract Laboratory Program procedures.

4.6.2 SUBSURFACE SOILS - TEST PIT EXCAVATION

Objective

To investigate two linear magnetic anomalies (identified in the 1987 ERB/EERU investigation) and a number of (now unrecognizable) pits and trenches identified in a review of aerial photographs (EPIC, 1989).

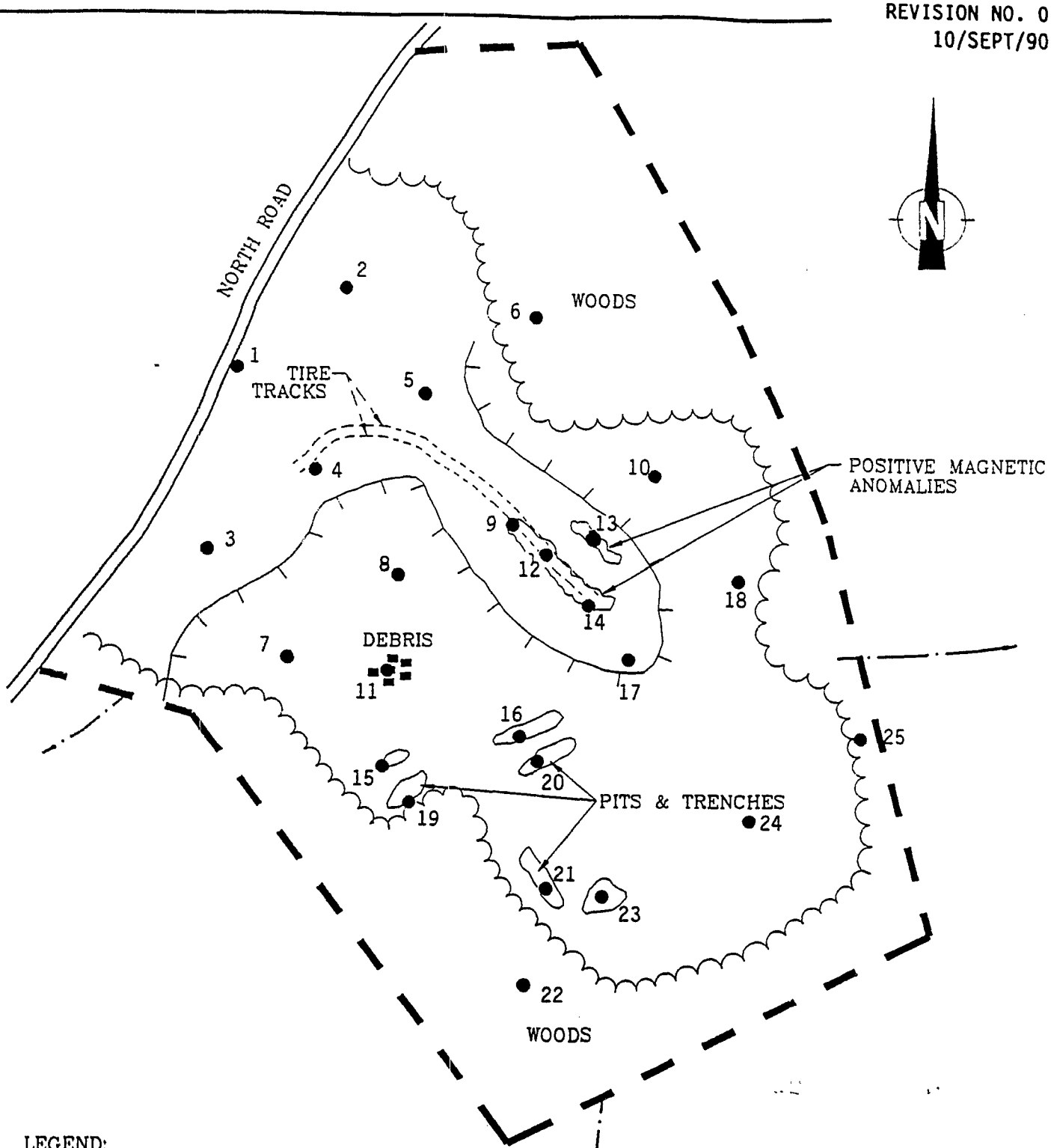
Sample Location and Frequency

Twenty-five test pits will be excavated. The locations of the test pits are depicted in Figure 4-6. Most of the test pit locations were selected to investigate these specific features. The rest of the locations were selected randomly to investigate all other areas in the landfill. This sampling task will be performed once.

Sample Designation

In each of the test pits, one sample will be selected for analysis. The samples will be designated BL-TP-01 through BL-TP-25. Additionally, the

AR300356



LEGEND:

● PROPOSED TEST PIT EXCAVATION LOCATIONS

APPROXIMATE SCALE

0 125 250

SCALE FEET

TETRA TECH, INC.

FIGURE 4-6
PROPOSED TEST PIT LOCATIONS
BUTZ LANDFILL

AR300357

depth where the sample is collected in each test pit must be added as a suffix; for example, a sample collected from a depth of 4 to 6 feet below grade at station #1 would be designated BL-TP-01/4-6. The letters "BL" denote the site, the letters "TP" denote a test pit, and the numerals 01 through 25 denote the sample location.

Two sets of QA/QC samples will be collected during this task. One duplicate soil sample will be collected at station #4 and will be designated BL-TP-6. One field blank will be collected and designated BL-TP-27. One equipment rinseate blank will be collected after the sample at station #6 is collected and will be designated BL-TP-28. A matrix spike and matrix spike duplicate will be collected at station #10 and will be designated BL-TP-10-MS and BL-TP-10-MSD.

A duplicate sample will also be collected at station #18 and will be designated BL-TP-29. One field blank will be collected and designated BL-TP-30. One equipment rinseate blank will be collected after the sample at station #20 is collected and will be designated BL-TP-31. A matrix spike and matrix spike duplicate will be collected at station #22 and will be designated BL-TP-22-MS and BL-TP-22-MSD.

One trip blank will be collected for each day of sampling. The trip blanks will be designated BL-TP-TB-01, BL-TP-TB-02 etc., for each successive trip blank used. The letters TP-TB denote a test pit trip blank.

AR300358

Sampling Equipment and Procedures

The excavation of the test pits will be completed with a backhoe. The backhoe and operator will be subcontracted by Tetra Tech. Other equipment needed includes a shovel, wooden stakes, indelible ink pens, hammers, a combustible gas meter, a photoionization detector, the appropriate sample jars, and the appropriate health and safety equipment.

The following procedures should be followed to perform this task:

1. Refer to Section 6-1 of the Health and Safety Plan before proceeding with any work.

2. Attempt to identify the locations of the magnetic anomalies and pits and trenches in the field. Consult the Work Assignment Manager for help.

3. Using a photoionization detector and a combustible gas meter, begin the excavation of the test pits. One sample from each test pit will be selected for analysis on the basis of visual appearance and field screening with the photoionization detector; in other words, the area in the test pit that visually appears most contaminated and/or emits the highest concentration of organic vapors.

4. Screening and evaluation of the soils in the test pit should be performed on a continual basis. Each of the test pits will be 2 feet wide, 12-14 feet deep and 10 feet long.

AR300359

5. Excavation will not proceed past the water table in any test pit. Should buried drums (or other material that presents an immediate threat be encountered in a test pit, work will stop and the Tetra Tech Work Assignment Manager will be notified. Work will resume only after a consultation has been made with the USEPA RPM.

6. Samples will be collected directly from the backhoe bucket. Pack the volatile organic sample jars first. Then pack all other sample fractions. The samples should be preserved by cooling to 4°C.

7. After sampling is completed, the test pit will be backfilled and its location will be marked by a wooden stake. The station number and date of sampling should be written on the stake in indelible ink. Then use the measuring tape to determine the distance and direction to the nearest landmark. Record the location in the field logbook.

8. Decontaminate the backhoe and all other sampling equipment as specified in Section 5.0 of this FSP and move to the next test pit location. Repeat steps 2 through 6.

Sample Handling and Analysis

Samples will be analyzed for full TCL organic compounds, and full TAL elements (metals and cyanide). Also refer to Sections 7.0 and 8.0 for QA/QC sample collection procedures and Contract Laboratory Program procedures.

AR300360

4.6.3 SUBSURFACE SOILS - TEST BORINGS

Objective

The purpose of drilling test borings is to determine the thickness of fill, to determine whether native soils lie beneath the fill, and whether leachate is present beneath the fill material.

Sample Location and Frequency

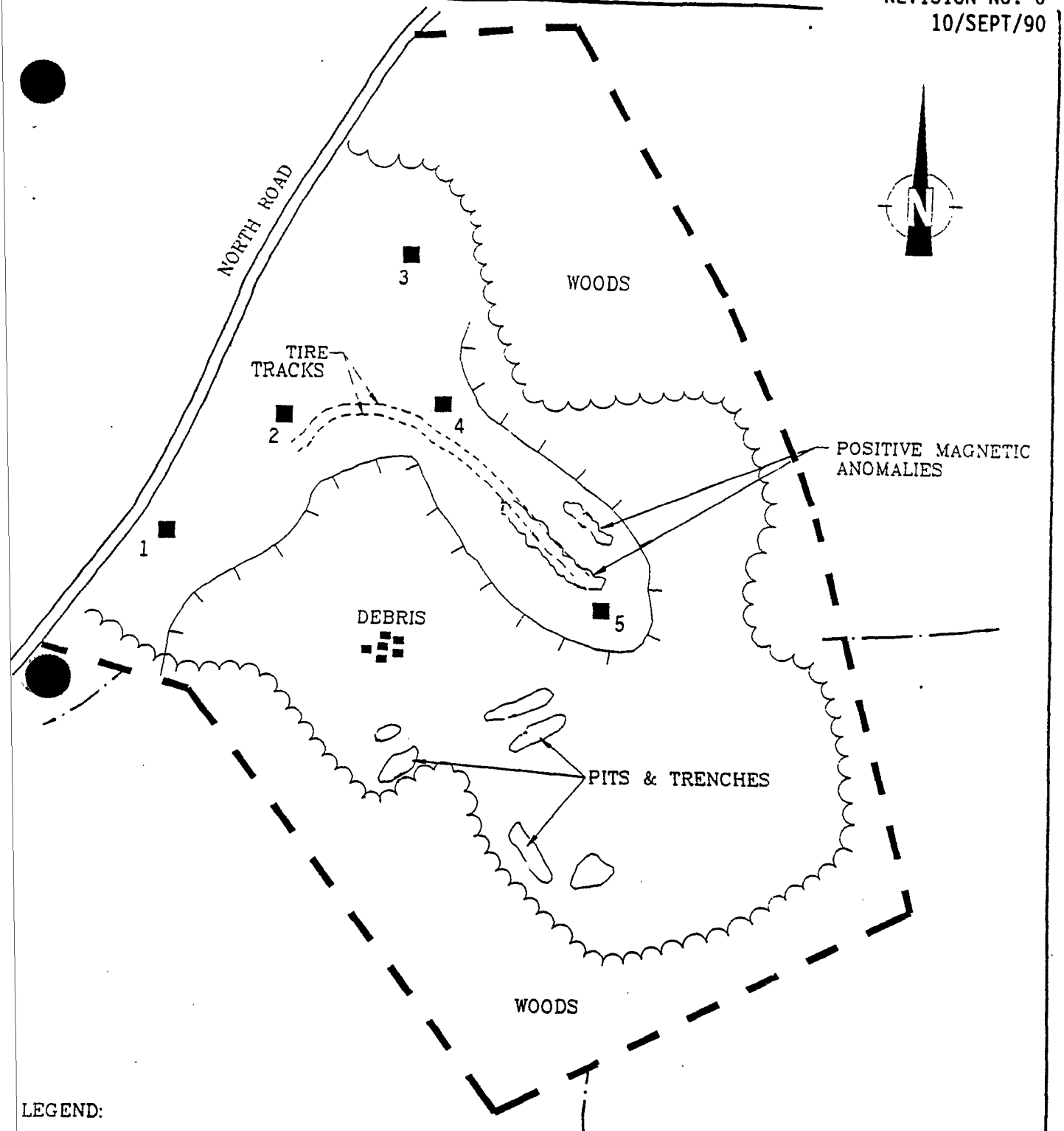
Five test borings will be drilled through the landfill. The locations are depicted in Figure 4-7. The drilling and sampling will be performed once.

Sample Designation

In each of the test borings, one soil sample will be selected for analysis. The samples will be designated BL-BOR-01 through BL-BOR-05. Additionally, the depth where the sample is collected in each test boring must be added as a suffix; for example, a sample collected from a depth of 4 to 6 feet below grade at station #1 would be designated BL-BOR-01/4-6. The letters "BL" denote the site, the letters "BOR" denote a test boring, and the numerals 01 through 05 denote the sample location.

Should leachate be encountered in any test boring, a sample of that leachate will be collected. Leachate samples will be designated as described above, with the word "leachate" added as a suffix.

AR300361



LEGEND:

■ PROPOSED TEST BORING LOCATIONS

APPROXIMATE SCALE

0 125 250

SCALE FEET

TETRA TECH, INC.

FIGURE 4-7
PROPOSED SOIL TEST BORING LOCATIONS
BUTZ LANDFILL

AR300362

A duplicate soil sample will be collected at station #4 and will be designated BL-BOR-06. One field blank will be collected and designated BL-BOR-07. One equipment rinseate blank will be collected and designated BL-BOR-08. A matrix spike and matrix spike duplicate will be collected at station #2 and will be designated BL-BOR-02-MS and BL-BOR-02-MSD.

One trip blank will be collected for each day of sampling. The trip blanks will be designated BL-BOR-TB-01, BL-TP-BOR-02 etc., for each successive trip blank used. The letters BOR-TB denote a test boring trip blank.

Sample Equipment and Procedures

Drilling will be performed by a licensed drilling firm under the direction of Tetra Tech. The drilling field crew will consist of a driller, a driller's assistant, and a Tetra Tech field geologist. The field geologist will supervise drilling operations and conduct the geologic logging of the boreholes. The equipment needed for drilling boreholes at the site is summarized in Table 4-3.

1. Refer to Section 6-1 of the Health and Safety Plan before proceeding with any work.

2. Prior to drilling any water source used in drilling or decontamination shall be analyzed to determine absence of contaminants.

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TABLE 4-3

EQUIPMENT NEEDED FOR INSTALLATION OF BOREHOLES AND GROUND-WATER MONITORING WELLS

Equipment to be Supplied by Driller

Hollow-stem auger
Split-barrel samplers
Alternate sampling devices
4-inch I.D. PVC casing and end caps
4-inch I.D. PVC screen (0.010 inch slot size)
6-inch locking surface steel protector cap

Cement
Bentonite
#2 Morie sand

Bore brush
Water truck (if needed)
Stainless steel tape (100 feet)
Tremie pipe

55-gallon drums
Steam cleaner
Generator for steam cleaner
Shovels

Additional Equipment to be Supplied by Tetra Tech

Foxboro Organic Vapor Analyzer
Camera and film
Rock hammer
Site map
Fiberglass tape (100 feet)
Personnel safety equipment
Field vehicle
Decimal tape measures
Plastics bags
Chain-of-custody forms
Brushes (for decontamination)
Dilute HC1 in dropper bottle

Padlock and keys
Solvent squirt bottle
Oil Recovery Systems interface probe
Shovels
Munsell soil color chart
Grain size chart
battery (2)
Field logbook
Indelible felt pens
Stainless steel trowel
Sample tags

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3. The drilling rig and sampling equipment shall be decontaminated by steam-cleaning (high pressure, hot water) prior to drilling.

4. The boreholes will be drilled with a hollow-stem auger drilling rig using an 6 1/4-inch outside diameter augers. Split spoon samples will be collected continuously from surface grade to bedrock. Drilling progress and information about the formations encountered shall be recorded by the geologist on the geologic log. The geologist, using standard geologic logging techniques, shall record the depths and thickness of strata, color (using a color chart), grain size and approximate distribution, sample recovery, penetration resistance, moisture content, and other pertinent data. The locations of chemical deposits and zones of weathering or chemical reaction shall be noted. The geologist shall also record information on depth drilled, problems with borehole advancement, fill materials encountered, and water levels.

5. After the samples have been described, they will be placed in sealed glass jars. These samples will then be screened for VOC's with an organic vapor analyzer (OVA) after coming to room temperature.

6. Additionally, the air space surrounding the borehole shall be scanned with an OVA during all drilling activities to determine the absence of volatile organic compounds. Results of this air monitoring shall be recorded in the field logbook. Activities shall proceed according to the site HSP if the presence of volatile organic compounds is indicated.

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7. Between boreholes, the down-hole drilling tools shall be steam-cleaned.

8. All borehole cuttings shall be collected in 55-gallon waste storage drums.

Sample Handling and Analysis

Samples will be analyzed for full TCL organic compounds, and full TAL elements (metals and cyanide). Also refer to Sections 7.0 and 8.0 for QA/QC sample collection procedures and Contract Laboratory Program procedures.

4.7 GEOLOGIC/HYDROGEOLOGIC INVESTIGATION

4.7.1 WELL INSTALLATION

Objective

One additional shallow ground water monitoring well will be installed to the east of Butz Landfill in order to provide additional downgradient information on the extent of ground water contamination and to obtain additional stratigraphic information in the area.

AR300366

Well Location

The ground water monitoring well will be installed east of the Butz Landfill (Figure 4-8).

Well Designation

The additional monitoring well will be called T5. The "T" designates this as a till or overburden well, and the "5" denotes that it will be the fifth in the sequence of wells already installed on or near the Butz Landfill.

Sampling Equipment and Procedures

Drilling will be performed by a licensed drilling firm under the direction of Tetra Tech. The drilling field crew will consist of a driller, a driller's assistant, and a Tetra Tech field geologist. The field geologist will supervise drilling operations and conduct the geologic logging of the boreholes. The equipment needed for installation of wells at the site is summarized in Table 4-3.

Refer to the "Sampling Equipment and Procedures" section of task 4.6.3 for specific procedures to be followed to complete this task. In addition, these procedures will be followed regarding the drilling and installation of the well:

1. Refer to Section 6-1 of the Health and Safety Plan before proceeding with any work.

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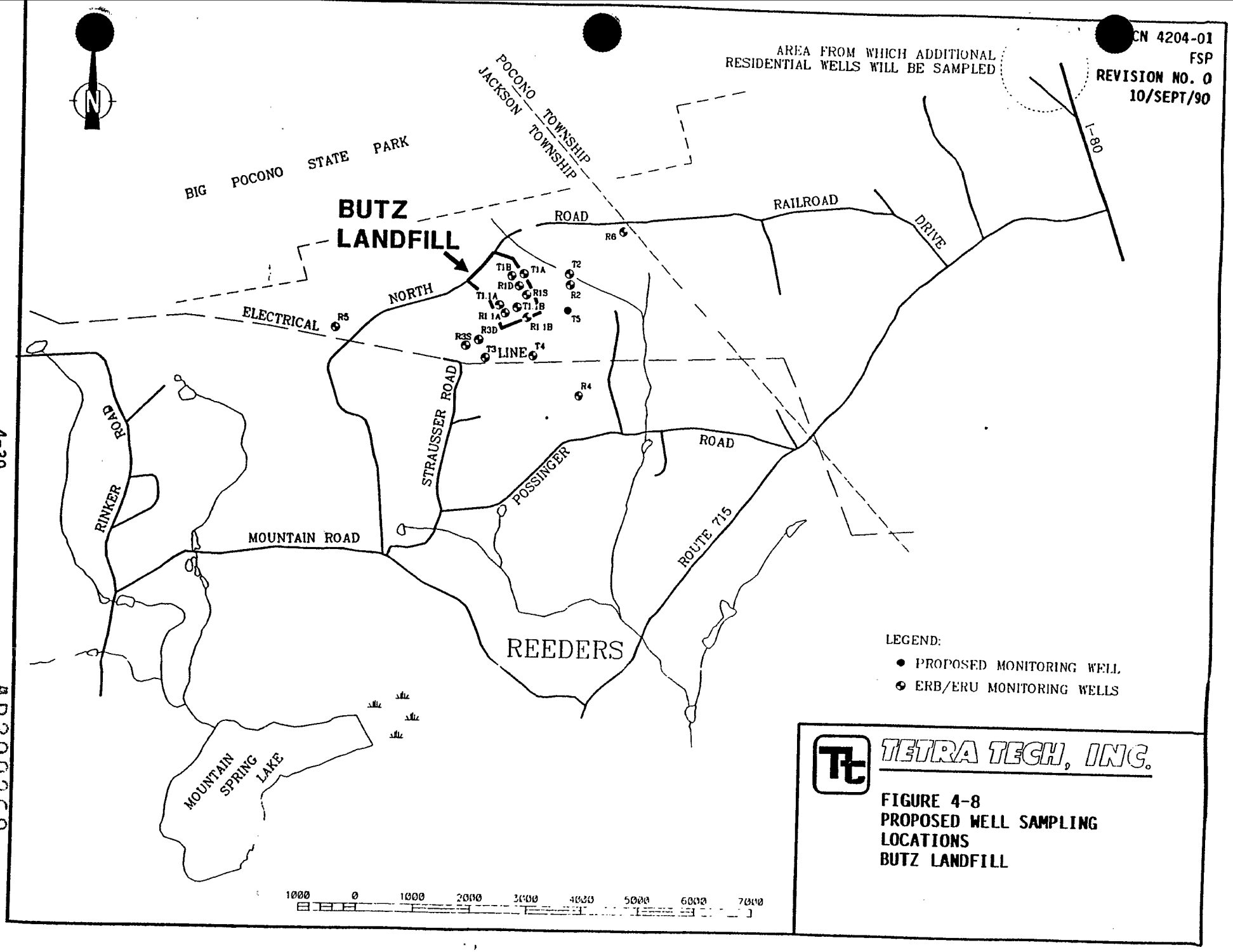

FIGURE 4-8
PROPOSED WELL SAMPLING LOCATIONS
BUTZ LANDFILL

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2. The borehole in which the well will be installed will be drilled with a hollow stem auger drilling rig using 8-inch outside diameter augers.

3. All well casing and screens shall be decontaminated (steam-cleaned) prior to installation in the borehole. Contact of casing or screen with the ground prior to installation shall be avoided. Plastic sheeting (e.g., visqueen) shall be placed on the ground and used as a cover to protect stockpiled materials from contamination.

4. The well will be constructed in a manner consistent with the other wells previously installed on site. The well will be screened across the water table, will use ten feet of screen (0.010 inch machine slotted), and shall be constructed of 4-inch PVC.

5. An annular sand pack composed of washed #2 Morie sand will be installed in ~~each~~ the well from the base of the screen to two feet above the screened interval using a tremie pipe. A bentonite pellet seal will extend two feet above the sand pack, and will be tamped into place. All annular packs and seals will be measured using a stainless-steel tape. All well measurements will be recorded in the field logbook. The remaining annulus to the ground surface will be filled with a cement-bentonite grout [not to exceed 14.2 pounds/gallon (less than 5 percent bentonite)] using a tremie pipe.

6. The well shall extend 3 feet above grade with a 6-inch diameter protective steel surface casing. The surface casing will be surrounded

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by a three-foot square concrete pad. The protective casing shall be fitted with a lockable water-tight cap.

7. Well development shall be performed to remove clay, silt, and sand that is already in the well, and to remove clay and silt found in the filter pack surrounding the well. (Well development ensures free movement of water from natural subsurface materials into the well.)

   The wells will be developed by mechanically surging the screened portion of the well with a decontaminated, 5-foot long, surge block, constructed of stainless-steel rod and pipe, with five 3-1/2 inch diameter rubber washers spaced equidistantly along the length of the surge block. The surging will be accomplished by attaching a rope to the top of the surge block and manually pulling the rope through a pulley mounted on a tripod, centered over the well casing. ~~Each~~ The well will be surged along the entire length of the screen for a total of 20 to 25 minutes.

8. After the completion of mechanical surging, the monitoring well will be purged until the discharge water is clear.

9. The well will be surveyed, developed, and purged prior to any sampling.

~~Sample Handling and Analysis~~

~~Not Applicable~~

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4.7.2 MONITORING WELL SAMPLING - ROUND 1 AND ROUND 2

Sampling Objective

The objective of the first round of sampling is to update information obtained in 1987 ERB/EERU Investigation regarding the extent and magnitude of ground water contamination in both the overburden and bedrock aquifers. A second round of ground water sampling shall also be performed in order to confirm the results of the first round of sampling. This information will also be used for risk assessment and evaluation of remedial alternatives.

Sample Location and Frequency

After the installation of monitoring well T5 is completed, there will be a total of 18 ground water monitoring wells located on or near the Butz Landfill (Figure 4-8). All of these wells will be sampled twice.

Sample Designation

The same well numbers used in the ERB/EERU Investigation (1987) will be used for sample identification to facilitate the comparison of the results from this investigation with those of the 1987 investigation. However, the prefix "BL", for Butz Landfill, will be added to all sample names. Additionally, "-01" and "-02" will be added at the end of each sample name as a sample round identifier (e.g., BL-R2-01, BL-T1A-01, etc., for first round samples, and BL-R2-02, BL-T1A-02, etc., for second round samples).

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Two sets of QA/QC samples will be collected for each round of sampling. A duplicate sample will be collected at well **R1S** and will be designated BL-R7-01. One field blank will be collected and designated BL-R8-01. One equipment rinseate blank will be collected and designated BL-R9-01. The letter/number combination R7, R8, and R9 are dummy names for the duplicate, field blank, and equipment rinseate blank, respectively. The Matrix spike and matrix spike duplicate samples will be collected at well **T1A**; these samples will be designated BL-T1A-MS-01 and BL-T1A-MSD-01.

A second duplicate sample will be collected at well **R3S** and will be designated BL-R10-01. A second field blank will be collected and designated BL-R11-01. One equipment rinseate blank will be collected and designated BL-R12-01. The letter/number combination R10, R11, and R12 are dummy names for the duplicate, field blank, and equipment rinseate blank, respectively. The Matrix spike and matrix spike duplicate samples will be collected at well **T1B**; these samples will be designated BL-T1B-MS-01 and BL-T1B-MSD-01.

Second round QA/QC samples will be collected in the same manner but will be identified with the sample round identifier of "-02".

One trip blank will be collected for each day of sampling. The trip blanks will be designated BL-GW-TB-01, BL-GW-TB-02 etc., for each successive trip blank used. The letters GW-TB denote a ground water trip blank.

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Sampling Equipment and Procedures

The equipment needed for ground water sampling includes four-inch submersible pumps, two-inch submersible pumps, sufficient lengths of discharge hosing, teflon and stainless-steel bailers, nylon rope, a pH meter, an Eh meter, a dissolved oxygen meter, a thermometer, a specific conductivity meter, 55-gallon drums, a generator, the appropriate sample bottles, and the appropriate personal protective equipment.

The monitoring well samples shall be collected according to the following procedures as follows:

1. Refer to Section 6-1 of the Health and Safety Plan before proceeding with any work.

2. The wells will generally be sampled from the least contaminated well to the most contaminated well in the following order: R5, R3S, R3D, T3, T4, R4, new well T5, T1.1A, R1.1A, T1.1B, R1.1B, R1S, T1B, T1A, T2, R6, R1D, and R2.

3. Prior to sampling, all wells shall be measured for the presence of organic vapors using a Photoionization Detector (PID). Any readings shall be noted in the field logbook, and activities shall proceed in accordance with the site HSP.

4. Using a clean, decontaminated measurement probe, determine the water level in the well; then calculate the fluid volume in the casing.

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5. Using a clean, decontaminated surface pump, submersible pump or stainless-steel bailer, purge the well of a minimum of three well volumes. Conductivity, pH, and temperature readings shall be taken and recorded during the well purging. The well will be considered properly purged when a minimum of three well volumes have been purged <u>and</u> the conductivity, pH, and temperature have stabilized.

   It is important that during the lowering of the pump or bailer into the well, the pump tubing, electrical cords or rope do not come into contact with the ground.

6. Attach a new bailer line to a clean decontaminated stainless-steel bailer equipped with a single-check valve. Check the operation of the check valve assembly to confirm free operation.

7. Lower the single check valve bailer slowly into the well until it contacts the water surface. Then lower the bailer just below the water surface with a minimum of disturbance. Repeat steps 6 and 7.

8. When filled with ground water, slowly raise the bailer to the surface. Discharge the first bailer to a 55-gallon drum.

9. Tip the bailer to allow the water to slowly discharge from the top and to flow gently down the side of the sample bottle with minimum entry turbulence and aeration. First collect TCL VOA samples, making absolutely certain that there are no bubbles adhering to the walls or

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the top of the VOA container. Next collect all samples for other TCL organic analyses. Then collect the sample for the inorganic parameter of cyanide. Finally, collect a sample for metals analysis. All ground water samples for metals analysis will be filtered in the field using 0.45-um acrylic copolymer filters in a prepackaged, disposable polypropylene in-line filter holder (Sample Pro assembly; Q.E.D. Environmental Systems, Inc.). A peristaltic pump will be used to pump the ground water through the in-line filter and into the sample container for metals analysis. To reduce the potential for redox reactions because of aeration, the flow rate must not exceed 100 mL/min.

10. The volatiles samples should be preserved with hydrochloric acid to a pH of less than 2. The sample to be analyzed for cyanide should be preserved with a pellet of sodium hydroxide. The sample to be analyzed for metals should be preserved with nitric acid to a pH of less than 2.

11. Repeat Steps 4 through 10 as needed to fill all sample containers. Recheck that the sample collected for the analysis of volatiles does not contain headspace. If any air bubbles are present, the VOA sample must be recollected using a fresh sample container. All samples collected will be filled to the capacity required for analysis. Sample containers must not be rinsed with sample water before final filling in case of possible presence of floating products in the well, which can adhere to the sample container wall and bias the analyses.

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12. Decant any remaining ground water into two clean 250-mL glass beakers. If necessary, bail additional ground water from the well. Insert the cleaned, calibrated pH, Eh, temperature, and conductivity probes into the two beakers and allow the instruments to equilibrate. Record the results of each analysis in the field logbook.

13. Decontaminate all equipment (probes, beakers, bailers, pump, electrical cords, etc.) used during purging and sampling as per Section 5.0 of this FSP.

Sample Handling and Analysis

The samples for this first round of sampling will be analyzed for full TCL and TAL compounds by CLP laboratories. In addition to the 18 well samples collected, QA/QC samples will be collected and analyzed as per Section 7.0, QA/QC Sample Collection. One duplicate sample, one field blank, one equipment rinseate blank, and one matrix spike/matrix spike duplicate sample will be collected during each round of sampling. The locations for the duplicate sample and the matrix spike/matrix spike duplicate samples have been identified earlier in this section under Sample Designation. Final handling of samples shall be as per Section 8.0, Sample Handling.

AR300376

4.7.3 RESIDENTIAL WELL SAMPLING

Objective

To determine the extent of contamination in the bedrock aquifer to the east/northeast of the landfill.

Sample Location and Frequency

Five residential wells located in the area depicted in Figure 4-8 will be sampled on a one time-basis. The specific five wells will be selected at a later date, in consultation with the USEPA RPM.

Sample Designation

The samples will be designated BL-RW-"name of residence" for each sample. The letters BL-RW denote Butz Landfill-Residential Well. One duplicate sample, one field blank, one equipment rinseate blank, and one trip blank will also be used for quality control purposes. These samples will be designated BL-RW-"name of residence"-DUP, BL-RW-FB, BL-RW-ER, and BL-RW-TB, respectively.

Sample Equipment and Procedures

No special equipment is needed for this task other than the appropriate sample bottles and latex gloves.

AR300377

These procedures should be followed for completion of this task:

1. Refer to Section 6-1 of the Health and Safety Plan before proceeding with any work.

2. Identify the 5 residences to be sampled. Consult the Work Assignment Manager for more information.

3. Interview the homeowner. Use the Well Data Sheet (Figure 4-9) to obtain the necessary information.

4. If the household water system is fitted with anything other than a sediment trap or filter, the water sample must be collected from a point in the water line located before the filter. Otherwise the water sample may be collected at the kitchen tap. Fill all appropriate bottles and add the appropriate preservatives.

5. The volatiles samples should be preserved with hydrochloric acid to a pH of less than 2. The sample to be analyzed for cyanide should be preserved with a pellet of sodium hydroxide. The sample to be analyzed for metals should be preserved with nitric acid to a pH of less than 2.

Sample Handling and Analysis

The samples will be analyzed for full TCL/TAL parameters using USEPA 500 Series Methods. Also refer to Sections 7.0 and 8.0 for other pertinent information regarding sample handling procedures.

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WELL DATA SHEET

TCN 4204-01-FSP
REVISION NO. 0
10/SEPT/90

Date: _____ Residence: _____ Sample #: _____

Address: _____

Directions: _____

Phone: _____ Owner? Yes ____ No ____ Other: _____

Well Construction: Drilled ____ Dug ____ Spring ____ Other: _____

Depth: _____ Date Installed: _____ Driller's Name: _____

Well Casing: Plastic ____ Steel ____ Unknown ____ Other: _____

Household Plumbing: Copper ____ Plastic ____ Cast Iron ____ Lead ____

Water Treatment: Particulate Filter ____ Neutralizer ____ Softener ____ Carbon Filter __

Comments: _____

Sketch location of house, wells, septic, and other features:

Complaints: Tastes _____

Odor _____

Stains _____

Other _____

Previous Analysis: By: _____ Date: _____

Comments: _____

SAMPLING INFORMATION

Sample #: _____ Time: _____

Water Purging: Began _____ Until: _____ From Where? _____

Sample Drawn From: _____

Comments: _____

Sample #: _____ Time: _____

Water Purging: Began _____ Until: _____ From Where? _____

Sample Drawn From: _____

Comments: _____

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FIGURE 4-9
WELL DATA FORM

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4.7.4 BOREHOLE GEOPHYSICAL SURVEYING

Objective

The purpose of performing borehole geophysical logging is to identify water-bearing zones and determine whether a potential exists for cross-contamination between water-bearing zones. Additionally, the logs will help determine whether particular stratigraphic units are preferentially fractured. This data will aid in understanding the pathways for ground water movement.

Sample Location and Frequency

Borehole geophysical logging will be performed on all bedrock wells (R1S, R1D, R1.1A, R1.1B, R2, R3S, R3D, R4, R5, and R6). The location of these wells is depicted in Figure 4-8. This logging will be performed once.

Sample Designation

Well logs produced during this task will be labelled as BL-R1S, BL-R1D, etc.

Sample Equipment and Procedures

This task will be performed by a qualified subcontractor under Tetra Tech's supervision. All equipment will be supplied by the subcontractor.

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Resistivity, caliper, temperature, SP, and density logs will be run on all of the ten existing monitoring wells open in bedrock.

Sample Handling and Analysis

Not Applicable

4.7.5 PACKER TESTING

Objective

The purpose of the packer testing is to help determine the vertical hydraulic gradient in the bedrock aquifer beneath the site.

Sample Location and Frequency

Packer testing will be performed on two rock wells. The two wells to be tested will be selected on the basis of the results from the borehole geophysics. The testing will be performed once.

Sample Designation

The wells tested will be designated BL-"well name".

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Sample Equipment and Procedures

This task will be performed by a qualified subcontractor under Tetra Tech's supervision. All equipment will be supplied by the subcontractor. The equipment will include a dual packer system (top packer separated from bottom packer by 5 or 10 feet) appropriate for 6-inch diameter boreholes, nitrogen tanks to inflate the packers, and a water level meter.

The following specific procedures are to be followed to perform this task:

1. Review the results of the borehole geophysics to identify all of the water-bearing zones in the open rock wells. Select two wells for testing.

2. Insert the packer system in the first well so that the top and bottom packers span a water-bearing zone. An open tube should extend through the top packer to act as a piezometer. Measure the water level in the open tube. Continue to take readings until the water level becomes stable. Record the stable reading.

3. Repeat this step for all water-bearing zones in both wells.

Sample Handling and Analysis

Not Applicable

AR300382

4.7.6 PUMP TESTING: WELL R2

Objective

A step drawdown test and a 24-hour pump test will be performed on rock well R2. This well was selected for additional testing because it had the highest yield of all the monitoring wells measured, in the ERB/EERU (1987) investigation. The step drawdown test is being performed to evaluate the potential success of ground water remediation through a pump-and-treat action. The 24-hour pump test will evaluate the hydraulic characteristics of the bedrock aquifer.

Sample Location and Frequency

The location of well R2 is depicted in Figure 4-8. The pump testing will be performed once.

Sample Designation

The well will be designated BL-R2.

Sample Equipment and Procedures

This task will be performed by a qualified subcontractor under Tetra Tech's supervision. All equipment will be supplied by the subcontractor. This task will also require procurement of a separate subcontractor responsible

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for providing for the storage and transport of the well water to be purged during the pump testing.

These specific procedures will be followed to perform this task:

1. Refer to Section 6-1 of the Health and Safety Plan before proceeding with any work.

2. The step drawdown test will begin using a pumping rate of 5 gpm. The well will be pumped at that rate for one hour. Drawdown in the well will be measured every half a minute for the first ten minutes, every minute from 10 to 15 minutes, and every 5 minutes from 15 to 60 minutes. After one hour, the pumping rate will be increased by a 5 gpm increment. The procedure described above will be repeated until the well cannot support that pumping rate. Maximum pumping rate is expected to be 25 to 30 gpm.

3. After the step drawdown test is completed, the well will be allowed to recover for a period of 24 hours. A twenty four pump test will then be performed on well R2 at a rate determined by the step drawdown test.

4. Drawdown in the pumping well will be measured at the same intervals described above for the step drawdown test; in addition, drawdown will be measured every 30 minutes from 1 hour to 5 hours, and every 60 minutes from 5 hours to 24 hours. As the pump test is performed, drawdown in all existing overburden monitoring wells will be measured

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to determine the degree of interconnection between the bedrock and the overburden aquifer.

5. All discharge water from both pump tests must be collected in 5,000 gallon tankers. A series of tankers will be used.

Sample Handling and Analysis

Not Applicable

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5.0 DECONTAMINATION PROCEDURES

The objective of decontamination is to prevent the transmission of contaminants to personnel and equipment and to prevent the spread of contaminants off-site. Decontamination is performed as a quality assurance measure and a safety precaution during sampling. It prevents cross-contamination between samples and helps maintain a clean working environment.

Decontamination of personnel and equipment shall take place in separate decontamination (decon) pads located in the Contamination Reduction Zone. Each pad shall be constructed of plywood and polyethylene plastic and shall be designed in a manner to contain the rinseate residuals. A submersible pump will pump the rinseate from the decon pad into 55-gallon drums.

5.1 PERSONNEL

All personnel must undergo decontamination prior to leaving the site. Personnel decontamination sequences for the different levels of PPE are depicted in flow charts (Figure 5-1). If non-disposable clothing is used for Level D activities, it must be removed in the Decontamination Reduction Zone. All personnel must wash their hands with soap and water prior to each entry back into the Support Zone. All personnel should also shower and wash their hair as soon as possible after leaving the site.

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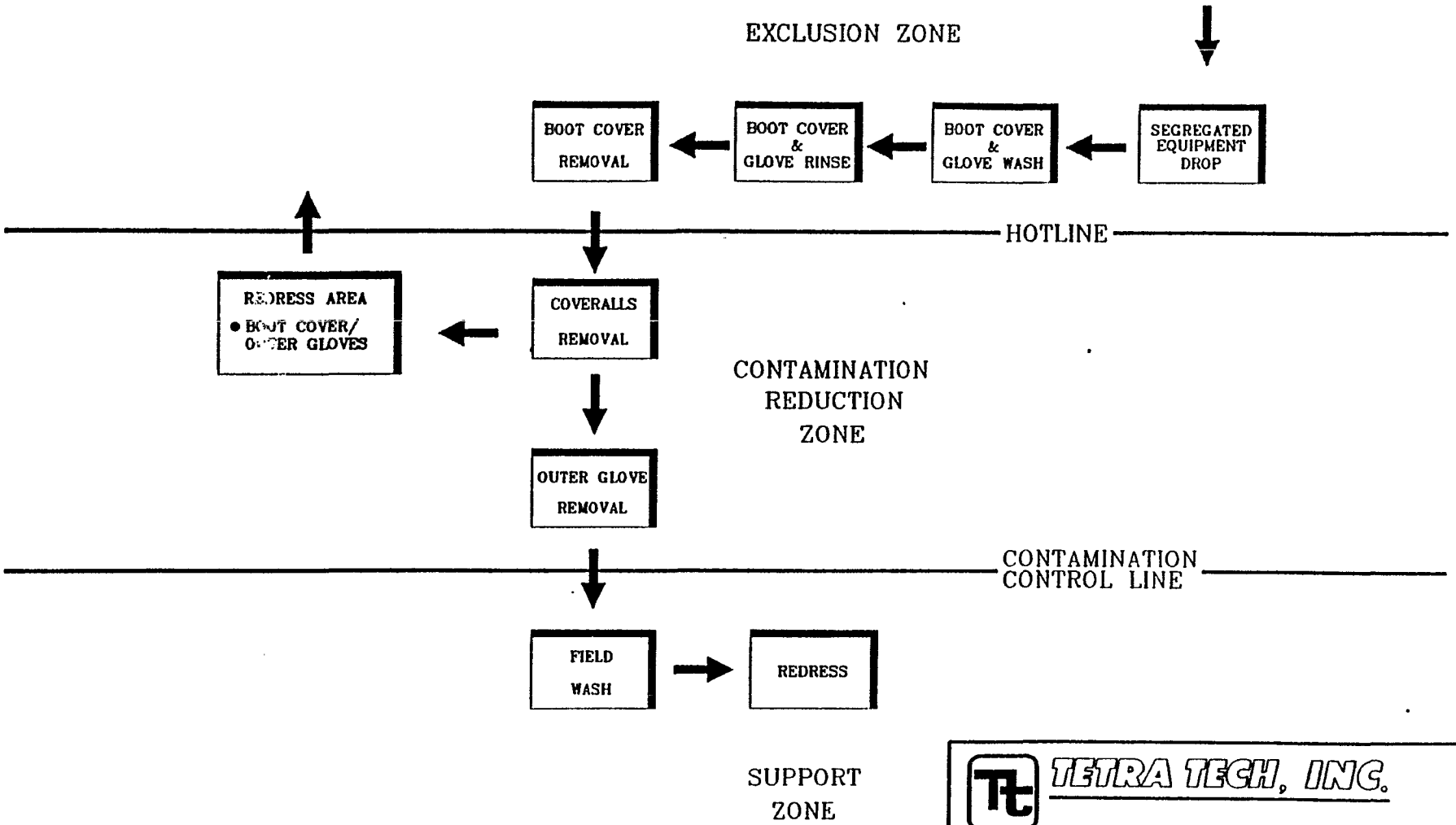
DECONTAMINATION SEQUENCE MODIFIED LEVEL D PROTECTION



SOURCE: OCCUPATIONAL SAFETY & HEALTH MANUAL FOR HAZARDOUS WASTE SITE ACTIVITIES NIOSH/OSHA/USCG/EPA 1985

TETRA TECH, INC.

FIGURE 5-1
PERSONNEL DECONTAMINATION SEQUENCE
MODIFIED LEVEL D PROTECTION
BUTZ LANDFILL

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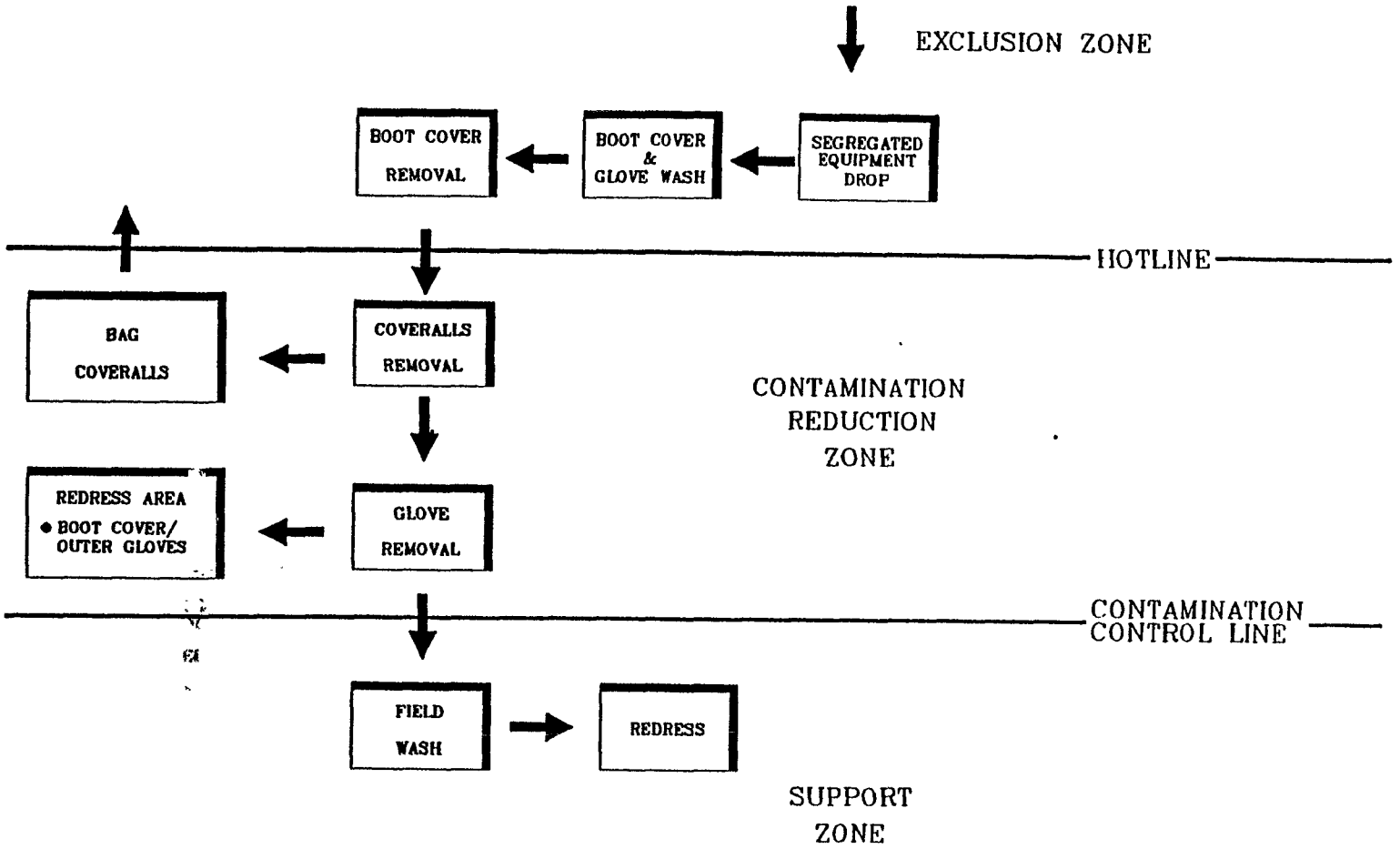
DECONTAMINATION SEQUENCE
LEVEL D PROTECTION



SOURCE: OCCUPATIONAL SAFETY & HEALTH MANUAL FOR HAZARDOUS WASTE SITE ACTIVITIES
NIOSH/OSHA/USCG/EPA 1985

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FIGURE 5-1
PERSONNEL DECONTAMINATION SEQUENCE
LEVEL D PROTECTION
BUTZ LANDFILL

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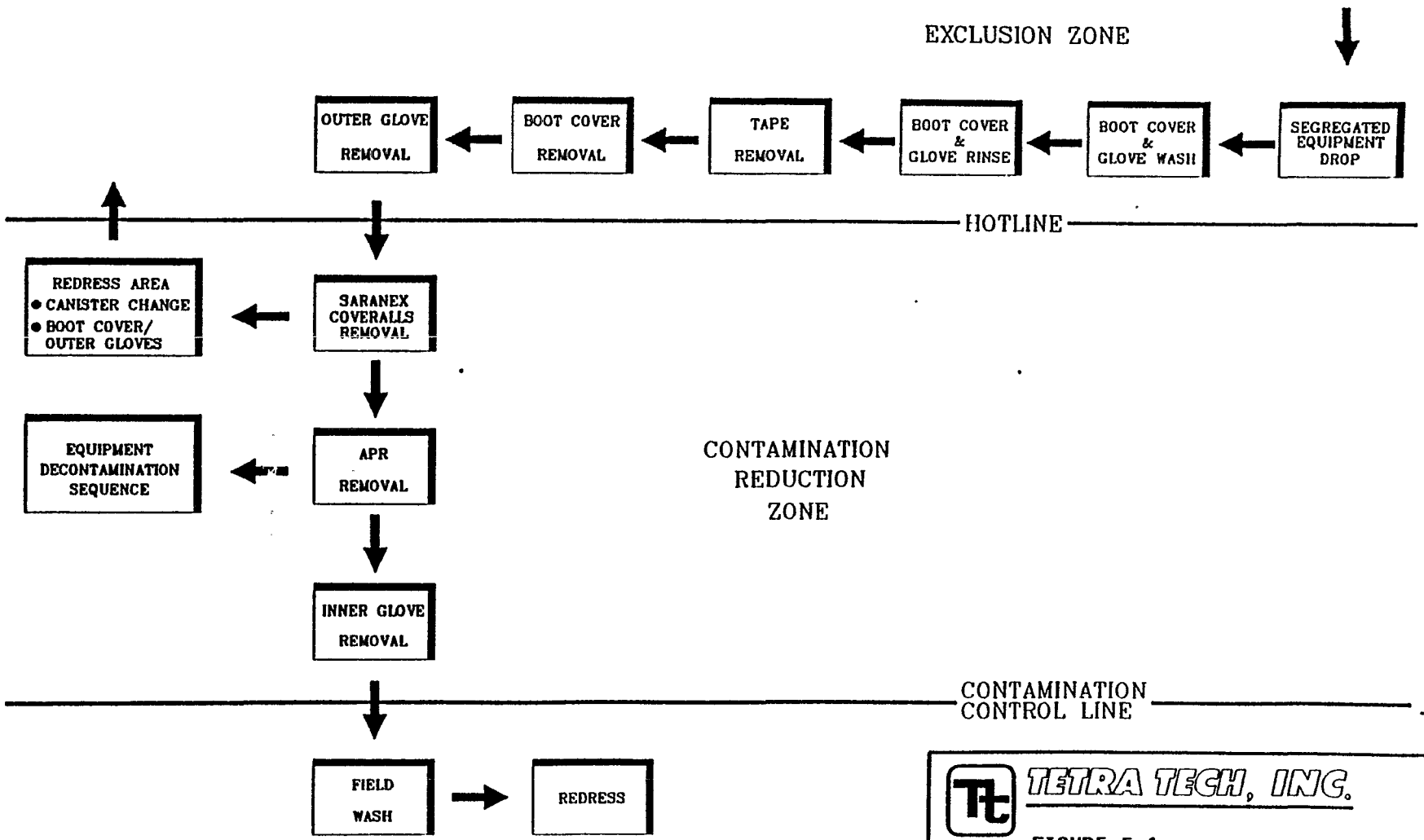
DECONTAMINATION SEQUENCE
LEVEL C PROTECTION



SOURCE: OCCUPATIONAL SAFETY & HEALTH MANUAL FOR HAZARDOUS WASTE SITE ACTIVITIES
NIOSH/OSHA/USCG/EPA

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FIGURE 5-1
PERSONNEL DECONTAMINATION SEQUENCE
LEVEL C PROTECTION
BUTZ LANDFILL

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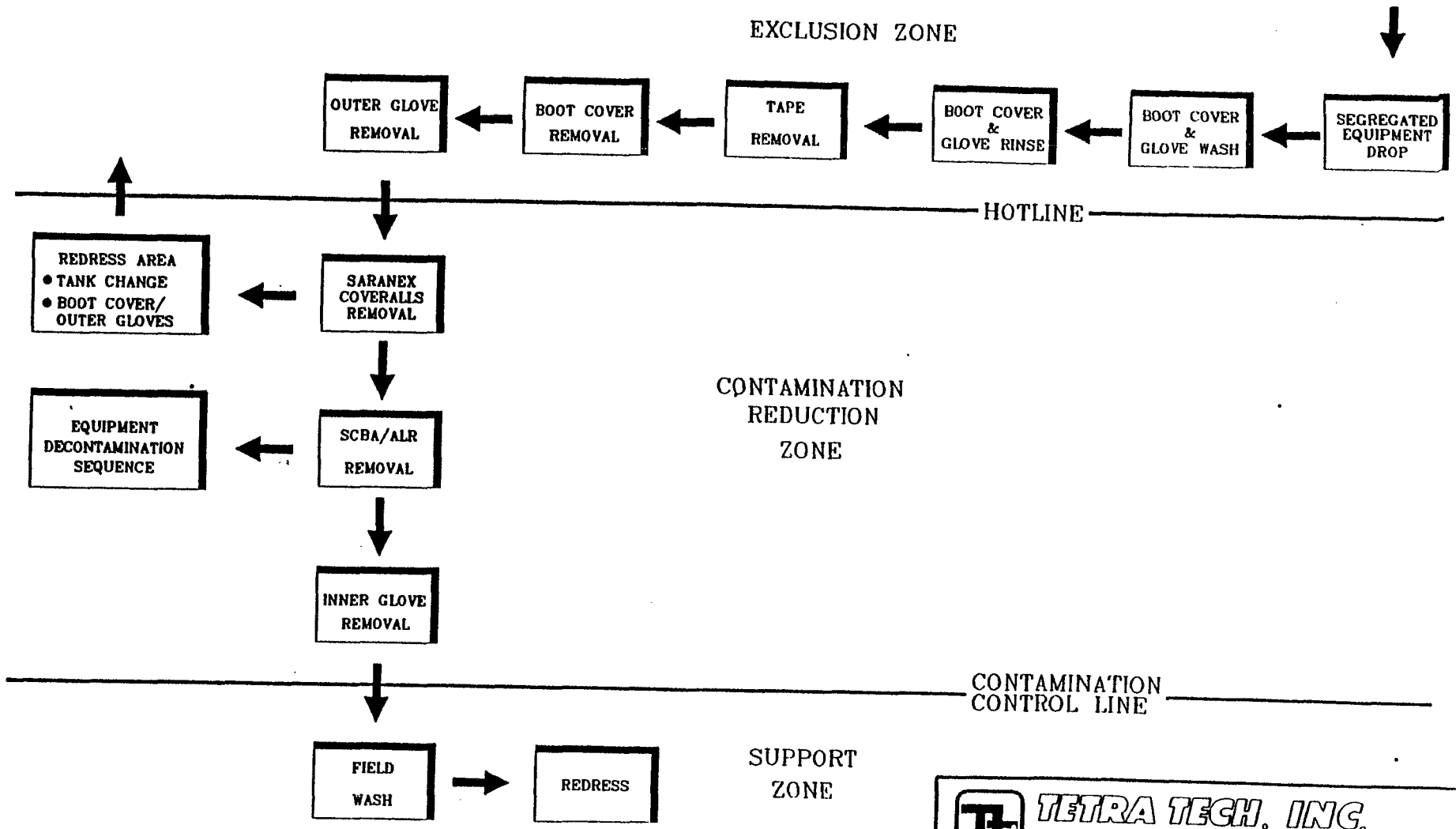
DECONTAMINATION SEQUENCE
LEVEL B PROTECTION



SOURCE: OCCUPATIONAL SAFETY & HEALTH MANUAL FOR HAZARDOUS WASTE SITE ACTIVITIES
NIOSH/OSHA/USCG/EPA 1985

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FIGURE 5-1
PERSONNEL DECONTAMINATION SEQUENCE
LEVEL B PROTECTION
BUTZ LANDFILL

AR300390

5.2 EQUIPMENT

All equipment and monitoring instruments shall undergo the Equipment Decontamination Sequence (Figure 5-2) prior to leaving the site. Decontamination of equipment is mainly achieved by rinsing the equipment with solutionss that may include: soap and/or detergent solutions, tap water, distilled water, and methanol. The type of decontamination solution to be used is dependent on the type of chemical hazards and the equipment or instruments to be cleaned. The decontamination solution for this site is water with an Alconox-type detergent. The decontamination solution shall be changed daily (at a minimum). No methanol rinse shall be used on the air monitoring instruments or respirators. Equipment may be allowed to air dry after being decontaminated.

Reusable PPE, such as respirators, chemical resistent overboots, gloves shall also undergo the equipment decontamination sequence. Reusable cloth coveralls shall be individually bagged and tagged and then taken to laundry facilities off-site to be cleaned. The sampling equipment may include split spoons, bailers, trowels, shovels, hand augers, or any other equipment used during field activities. Heavy equipment, such as the drill rigs and the backhoe, shall be decontaminated with a steam cleaner.

Personnel involved in equipment decontamination must wear the appropriate PPE (Table 5-1) during decontamination procedures.

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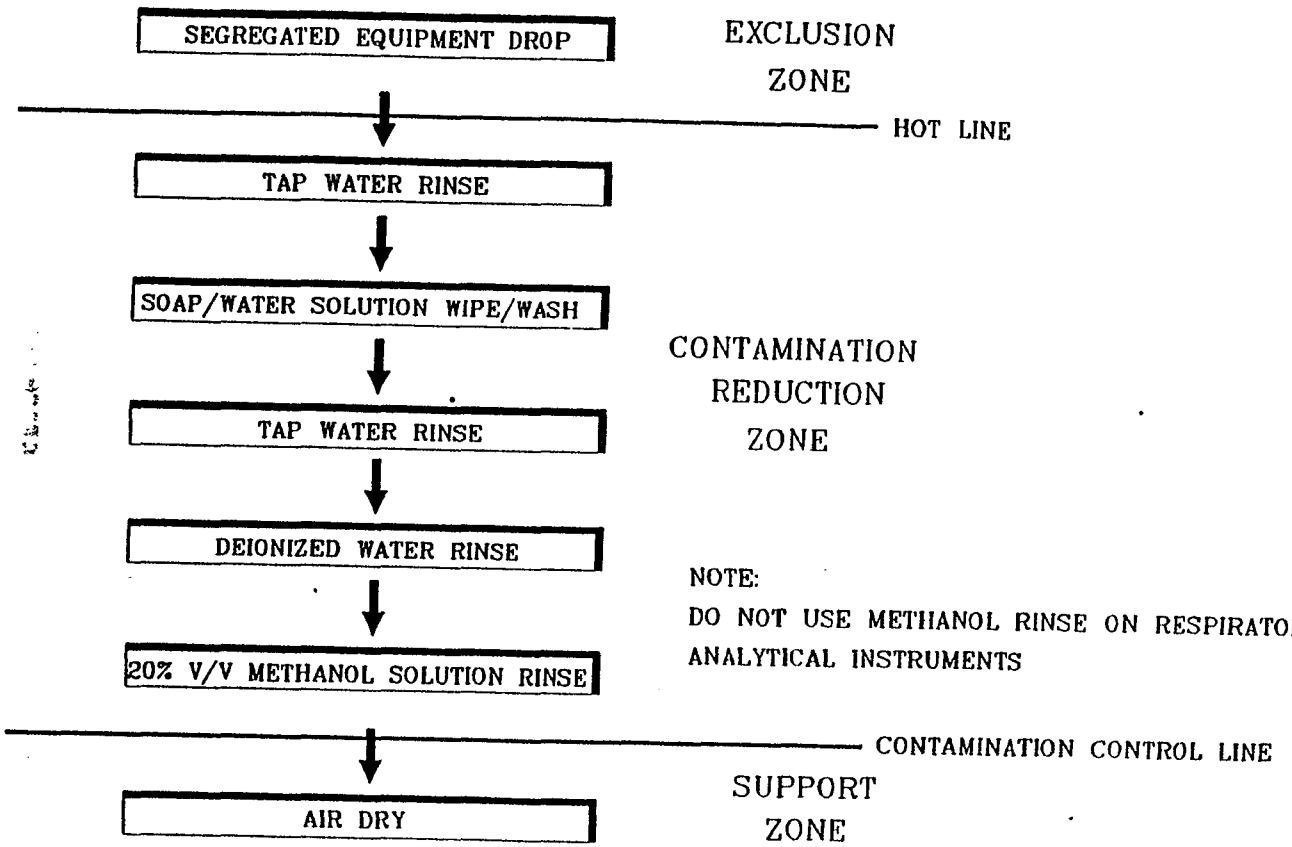
DECONTAMINATION SEQUENCE
SAFETY EQUIPMENT/MONITORING INSTRUMENTS



NOTE:
DO NOT USE METHANOL RINSE ON RESPIRATORS OR ANALYTICAL INSTRUMENTS

SOURCE: OCCUPATIONAL SAFETY & HEALTH MANUAL FOR HAZARDOUS WASTE SITE ACTIVITIES
NIOSH/OSHA/USCG/EPA 1985

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FIGURE 5-2
EQUIPMENT DECONTAMINATION SEQUENCE
BUTZ LANDFILL
MONROE COUNTY, PENNSYLVANIA

AR300392

TABLE 5-1

PERSONAL PROTECTION EQUIPMENT,
SAFETY EQUIPMENT, AND MONITORING INSTRUMENTS

TASK: DECONTAMINATION

MINIMUM PROTECTION LEVEL

Modified Level D

Hard hat*
Safety glasses*
Polycoated Tyvek coveralls
Steel-toe safety shoes*
Latex rubber boot covers*
NBR gloves - outer
Latex gloves - inner
Hearing protection* - when the potential for a noise hazard exists

UPGRADED PROTECTION LEVEL

Level C

Full-face APR with combination cartridges (grey and yellow stripes)
Polycoated Tyvek coveralls
Duct tape at ankles and wrists
NBR gloves - outer
Latex gloves - inner

Level B

Air-Line respirator (ALR) with a 5-minute escape bottle OR Self-contained breathing apparatus (SCBA)
Saranex coveralls
NBR gloves - outer
Latex gloves - inner
Duct tape at ankles and wrists

SAFETY EQUIPMENT

First-aid kit (located in Tetra Tech vehicle or at the Support Zone)
Fire extinguisher (located in Tetra Tech vehicle or at the Support Zone)
Eye wash (located in Tetra Tech vehicle or at the Support Zone)
Two-way radio communications or air horn

MONITORING INSTRUMENTS

OVA or PID - Establish background level and periodically monitor in breathing zone

Note: **Prior to upgrading protection to Level B, work activities must stop and immediately notify Tetra Tech SSO. Level B is not expected for this activity.**

***These must be worn during all levels of protection.**

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5.3 RESIDUALS MANAGEMENT

All residual sampling media and decontamination rinseate shall be handled as hazardous waste. All residual sampling media shall remain in the Exclusion Zone. All rinseate from the decontamination of personnel and equipment shall be collected and placed in labeled 55-gallon drums. All disposable PPE shall be double bagged, tagged, and placed in a 55-gallon drum. All 55-gallon drums shall be clearly labelled and stored in a secure area on site, awaiting future disposal. The drums containing waste liquids and solids will be left at the site for later proper disposal. The number of solid and liquid 55-gallon drums will be counted and recorded in the field logbook. A separate inventory of full and empty drums shall be maintained.

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6.0 FIELD DOCUMENTATION

Documentation of all field activities shall be in accordance with the Tetra Tech Standard Operating Procedure, Field Logbook/Photographs, specified below:

6.1 FIELD LOGBOOK

All pertinent field survey and sampling effort information shall be recorded in a logbook during each day of the field effort. A logbook will be assigned to each field task and will have a unique document control number. The logbook will be bound and will have consecutively numbered pages. The field task leader shall be responsible for ensuring that sufficient detail is recorded, and shall review the site logbooks daily and initial each page reviewed. No general rules can specify the extent of information that must be entered in a logbook. However, logbooks shall contain sufficient information so that someone can reconstruct the field activity without relying on the memory of the field crew. All entries shall be made in indelible ink. Each day's entries will be initialed and dated at the end by the author, and a line will be drawn through the remainder of the page. All corrections shall consist of line-out deletions that are initialed.

At a minimum, entries in a logbook shall include:

- Date and time of starting work;
- Names of field task leader and team members;
- Purpose of proposed work effort;

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- Description of work area, including information on photographs taken;
- Location of work area, including map reference;
- Details of work effort, particularly any deviation from the field; operations plan or standard operating procedures;
- Field observations;
- Field measurements (e.g., pH);
- Field laboratory analytical results;
- Personnel and equipment decontamination procedures; and
- Daily health and safety entries, including levels of protection.

For sampling efforts, specific details for each sample shall be recorded on separate sample data sheets. However, in addition to the items listed above, the following general information shall be included in the logbook during sampling efforts:

- Type and number of samples;
- Sampling method, particularly deviations from the standard operating procedures;
- Sample location and number; and
- Sample handling, packaging, labeling, and shipping information (including destination).

Strict custody procedures shall be maintained with the field logbooks. While being used in the field, logbooks shall remain with the field team at all times. Upon completion of the field effort, the logbook shall be locked in a filing cabinet in the field office. Photocopies of the logbooks will be used as working documents.

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6.2 PHOTOGRAPHS

Photographs provide the most accurate demonstration of the field worker's observations. They can be significant to the field team during future inspections, informal meetings, and hearings. Photographs should be taken with a camera-lens system having a perspective similar to that afforded by the naked eye. Telephoto or wide-angle shots cannot be used in enforcement proceedings. A photograph must be documented if it is to be a valid representation of an existing situation. Therefore, for each photograph taken, several items shall be recorded in the field logbooks:

- Date and time;
- Name of photographer;
- Name of site and field task;
- General direction faced and description of the subject;
- Location on-site; and
- Sequential number of the photograph and roll number.

Once a roll of film is developed, the slides or prints will be placed in task files in the field office. Photographic information from the logbooks will be photocopied and placed in the file accompanying the slides or prints.

AR300397

7.0 QA/QC SAMPLE COLLECTION

Quality Assurance/Quality Control (QA/QC) sampling for the Butz Landfill site shall be conducted as detailed below. Table 4-1, Sample Summary, identifies the QA/QC Samples required for Butz Landfill .

7.1 DUPLICATE COLLECTION

Generally, duplicate samples will be collected for every fifteen (15) routine samples collected per matrix, per analysis. The actual number of duplicate samples per matrix, per analysis will be per Table 4-1, Sampling Summary. The duplicates will be collected in the same manner as their corresponding routine samples.

7.2 MATRIX SPIKE AND MATRIX SPIKE DUPLICATE COLLECTION

Matrix spikes and matrix spike duplicates are laboratory required quality control samples. However, the laboratory must be provided with additional sample volume for each sample matrix to complete their analysis. One matrix spike/matrix spike duplicate (MS/MSD) pair will be collected per Table 4-1, Sampling Summary. Again, the MS/MSD pairs will be collected in the same manner as their corresponding routine samples.

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7.3 FIELD BLANK COLLECTION

Field blanks are blanks prepared prior to the sampling event from clean, analyte-free materials most closely resembling the sample matrices to be collected in the field. The blanks are transported to the field along with the containers in which the routine samples will be collected. Once in the field, the caps of the field blanks are removed so that the field blanks are exposed to the same conditions as the routine samples. At the end of each location sampling event, the caps to the field blanks are replaced, and the blanks are then subjected to the same protocol as the routine samples. Field blanks per matrix, per analysis requested will be collected per Table 4-1, Sampling Summary.

7.4 EQUIPMENT RINSEATE BLANK COLLECTION

Equipment rinseate blanks per analysis requested will be collected per Table 4-1, Sampling Summary. The equipment rinseate blank will be collected by pouring analyte-free water, supplied by the laboratory, directly over decontaminated sampling equipment into a prepared sample container. The equipment rinseate blanks are then shipped to the laboratory with the other routine samples collected.

7.5 TRIP BLANK COLLECTION

Trip blanks for volatile organic samples are prepared in the laboratory prior to the sampling event using analyte-free water. The trip blanks accompany the routine sample containers to the field, during collection of

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the samples in the field, and during transport of the routine volatile organic samples back to the laboratory. One trip blank sample will be used for each day of sampling for volatile organic compounds.

AR300400

8.0 SAMPLE HANDLING PROCEDURES

8.1 CLP PROTOCOL

Under the Contract Laboratory Program (CLP), a number of elements are necessary to ensure proper handling of the samples once they are collected in the field. These element consist of: proper labeling of the samples, maintaining and documenting sample custody, documenting sample transfer, proper packaging and shipping of samples, and notifying the proper agents that the samples have been shipped.

Prior to the sampling event, certain forms and information will be made available by either the Sample Management Office (SMO) of the CLP or EPA's Central Regional Laboratory (CRL). The forms required include Chain-of-Custody Record (Figure 8-1), Organic and Inorganic Traffic Reports (Figures 8-2 and 8-3), Special Analytical Services (SAS) Packing List (Figure 8-4), and EPA Shipping Logs (Figure 8-5). Also required are CLP Sample Numbers, Chain-of-Custody Seals, and Sample Tags (Figure 8-6).

The required information that will be provided includes the Case Number, the type of activity (e.g., RA, RD, RI/FS, etc.), the Site Spill ID, the sample bottle lot numbers, and the name of the CLP Laboratory where the samples will be shipped.

Upon collecting any given sample, the sample label must first be filed in. The information required on the label includes a unique sample number, the sample location, the sampling date and time, the name of the sampler, the

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ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 3
Curtis Bldg., 6th & Walnut Sts
Philadelphia, Pennsylvania 19106

CHAIN OF CUSTODY RECORD

PROJ NO: 1736
PROJECT NAME: McA
SAMPLERS (Signature): Christopher Bruno

STA NO	DATE	TIME	COMP	GRAB	STATION LOCATION	NO OF CONTAINERS	BNA	VOA					OTR*	TAG*
C10-1-1	9/28/89	1645		X	C10-1-1	1	X						CAN 59	3-1050057
"		"		X	C10-1-1	3		X					CAN 59	3-1050058 3-1050059 3-1050060
C6-1-1		1700			C6-1-1	1	X						CAN 60	3-1050062
"		"			C6-1-1	3		X					CAN 60	3-1050063 3-1050064 3-1050065
B4-1-1		1120			B4-1-1	1	X						CAN 61	3-1050036
"		"			B4-1-1	3		X					CAN 61	3-1050037 3-1050038 3-1050039
B5-1-1		1100			B5-1-1	1	X						CAN 62	3-1050040
"		"			B5-1-1	3		X					CAN 62	3-1050041 3-1050042 3-1050043

Relinquished by (Signature)	Date / Time	Received by (Signature)	Relinquished by (Signature)	Date / Time	Received by (Signature)
Christopher Bruno	9/29/89 1300				
Relinquished by (Signature)	Date / Time	Received by (Signature)	Relinquished by (Signature)	Date / Time	Received by (Signature)
Relinquished by (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks: FEDEX AIRBILL # 9450644206	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

TETRA TECH, INC.

FIGURE 8-1
CHAIN-OF-CUSTODY RECORD

AR300402

EPA

United States Environmental Protection Agency
Contract Laboratory Program Sample Management Office
PO Box 818 Alexandria, VA 22313
703-557-2490 FTS 557-2490

Organic Traffic Report
(For CLP Use Only)

Case Number: 5204C
SAS No. (if applicable): 1173 TASK 2

1. Type of Activity (Check one): ENF, ER, ESI, NPLD, O&M, PA, RA, RD, RIFS, SI, ST, STPA, STSI, Other (Specify)
2. Region Number: III
Sampling Co.: TETRA TECH
Sampler (Name): C. BURNS
4. Date Shipped: 3/25/90
Airbill Number: FED 37345-33
Carrier: FEDERAL EXPRESS
5. Sample Description (Enter in Column A)
1. Surface Water
2. Ground Water
3. Leachate
4. Rinsate
5. Soil/Sediment
6. Oil (SAS)
7. Waste (SAS)
8. Other (SAS) (Specify)

Non-Superfund Program
Site Name: PUBLICKER SITE
City, State: PHILADELPHIA, PA
Site Spill ID
3. Ship To: SWRI 300 SOUTH ANN ST. LANG. OH 12357

Triple volume required for matrix spike/duplicate aqueous sample.
Ship medium and high concentration samples in paint cans.
See reverse for additional instructions.

CLP Sample Number (From labels)	(A) Sample Description (From box 5)	(B) Concentration L=low M=med H=high	(C) RAS Analyses VOA	BNA	Pest/PCB	(D) Special Handling	(E) Station Location	(F) Date/Time of Sample Collection	(G) Corresponding CLP Inorganic Sample Number
CDA 54	1	L	X	X	X		SW-1	3/24/90 1000	MCAN 54
CDA 55	1	L	X	X	X		SW-2	3/24/90 1015	MCAN 55
CDA 56	1	L	X	X	X		SW-3	3/24/90 1025	MCAN 56
CDA 57	2	L	X	X	X		MW-1	3/24/90 1205	MCAN 57
CDA 58	2	L	X	X	X		MW-2	3/24/90 1215	MCAN 58
CDA 59	2	L	X	X	X		MW-3	3/24/90 1245	MCAN 59
CDA 60	5	L	X	X	X		A16	3/24/90 1300	MCAN 60
CDA 61	5	L	X	X	X		A17	3/24/90 1330	MCAN 61
CDA 62	5	L	X	X	X		A17	3/24/90 1345	MCAN 62
CDA 63	4	L	X	X	X	Equip Rinsate	ER-1	3/24/90 1400	MCAN 63
CDA 64	4	L	X			Trip Blank	TB	3/23/90 0800	NA

EPA Form 9110-2 (8-88) Replaces EPA Form 2075-7, which may be used. Blue - SMO Copy Pink - Region Copy White - Lab Copy for Return to SMO Yellow - Lab Copy

TETRA TECH, INC.

FIGURE 8-2
ORGANIC TRAFFIC REPORT

AR300403

EPA

United States Environmental Protection Agency
Contract Laboratory Program Sample Management Office
PO Box 818 Alexandria, VA 22313
703-557-2490 FTS 557-2490

Inorganic Traffic Report
(For CLP Use Only)

Case Number: 5204 B
SAS No. (If applicable): 1173 TASK 2

1. Type of Activity (Check one): ENF, NPLD, RA, SI, STSI, ER, O&M, RD, ST, Other (Specify), ESI, PA, X RIFS, STPA

2. Region Number: III
Sampling Co.: TETRA TECH
4. Date Shipped: 3/25/90
Airbill Number: FED 39345
Sampler (Name): C. BURNS
Carrier: FEDERAL EXPRESS

Non-Superfund Program

Site Name: PUBLICKER SITE
City, State: PHILADELPHIA, PA
Site Spill ID

3. Ship To:
ABC LAB
21 SOUTH BOB ST.
ORANGE, FL 19737

Double volume required for matrix spike/duplicate aqueous sample.

Ship medium and high concentration samples in paint cans.

See reverse for additional instructions

5. Sample Description (Enter in Column A)
1. Surface Water
2. Ground Water
3. Leachate
4. Rinsate
5. Soil/Sediment
6. Oil (SAS)
7. Waste (SAS)
8. Other (SAS) (Specify)

CLP Sample Number (From labels)	(A) Sample Description (From box 5)	(B) Concentration L=low M=med H=high	(C) RAS Analysis: Total Metals	(C) RAS Analysis: Cyanide	(D) Special Handling	(E) Station Location	(F) Date/Time of Sample Collection	(G) Corresponding Organic Sample Number
MCAN 54	1	L	X	X		SW-1	3/24/90 1000	CDA 54
MCAN 55	1	L	X	X		SW-2	3/24/90 1015	CDA 55
MCAN 56	1	L	X	X		SW-3	3/24/90 1025	CDA 56
MCAN 57	2	L	X			MW-1	3/24/90 1205	CDA 57
MCAN 58	2	L	X			MW-2	3/24/90 1215	CDA 58
MCAN 59	2	L	X			MW-3	3/24/90 1245	CDA 59
MCAN 60	5	L	X	X		A 16	3/24/90 1300	CDA 60
MCAN 61	5	L	X	X		A 17	3/24/90 1330	CDA 61
MCAN 62	5	L	X	X		A 18	3/24/90 1345	CDA 62
MCAN 63	4	L	X	X	Equip Rinsate	ER-1	3/24/90 1400	CDA 63

EPA Form 9110-1 (8-88) Replaces EPA Form 2075-6, which may be used. Green - SMO Copy Pink - Region Copy White - Lab Copy for Return to SMO Yellow - Lab Copy

TETRA TECH, INC.

FIGURE 8-3
INORGANIC TRAFFIC REPORT

AR300404

U.S. ENVIRONMENTAL PROTECTION AGENCY
CLP Sample Management Office
P.O. Box 818 - Alexandria, Virginia 22313
Phone: 703/557-2490 - FTS/557-2490

SAS Number
5502C
TASK 2

SPECIAL ANALYTICAL SERVICE
PACKING LIST

Sampling Office:	Sampling Date(s):	Ship To: 713-266-6800	For Lab Use Only
TETRA TECH	6/18-6/19/90	KEYSTONE ENVIRON. RESOURCES (KEYTX)	Date Samples Rec'd:
Sampling Contact: DALE SWENSON (name)	Date Shipped: 7/17/90	3911 FONDREN SUITE 100 HOUSTON, TX 77063-5821	Received By:
302-738-7551 (phone)	Site Name/Code: MSCS	Attn: KATHY DOTY	

Sample Numbers	Sample Description i.e., Analysis, Matrix, Concentration	Sample Condition on Receipt at Lab
1. 5502C-2-1 (BD-02)	TCLP-TAL / DRUM SOLIDS / HIGH CONC.*	
2. 5502C-2-2 (BD-03)	↓	
3. 5502C-2-3 (BD-05)	DRUM SOLID-POLYMER	
4. 5502C-2-4 (BD-04)	FLAMMABLE LIQUID	
5.		
6.		
7.	* Note - Extraction will probably not	
8.	be high concentration	
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
20.		

For Lab Use Only

White - SMO Copy, Yellow - Region Copy, Pink - Lab Copy for return to SMO, Gold - Lab Copy

TETRA TECH, INC.

FIGURE 8-4
SAS PACKING LIST

AR300405

(1) page 1 of 1 EPA SAMPLE SHIPPING LOG FOR ALL SAMPLES SENT THROUGH THE CONTRACT LAB PROGRAM (12/85 version)

CASE# 1176 SAS# _____ SITE NAME: McAroo

Site Leader: Christopher Burns EPA Project Officer: Eugene Dennis
Phone:

SAS REQUEST: (details required)
(10)

QC SAMPLE INFO AND/OR COMMENTS	CONC. (low/med/high)	SAMPLE PHASE (aq/sol)	TYPE OF REQUEST org,dio inor, SAS	SAMPLE TRAFFIC REPORT NUMBER	ORGANICS OR INORGANICS: LAB NAME	DATE SHIPPED	DATA RECEIVED XX out items not requested: VOA	BNA	PEST	TCOD	METALS	CN	LAB NAME	SAS REQUEST (itemize)	DATE SHIPPED	DATA REC'D
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(9)	(9)	(9)	(9)	(9)	(11)	(12)	(13)	
	L	Sol	ORG	CAN 51	SWOK	3/23/89			X	X	X	X				
	L	Sol	ORG	CAN 52					X	X	X	X				
	L	aq	ORG	CAN 53				X	X	X	X	X				
	L	Sol	ORG	CAN 54					X	X	X	X				
Dup of CAN51	L	Sol	ORG	CAN 55					X	X	X	X				
	L	Sol	ORG	CAN 56					X	X	X	X				
Lab QC	L	Sol	ORG	CAN 57					X	X	X	X				
	L	Sol	ORG	CAN 58					X	X	X	X				
	L	Sol	ORG	CAN 59					X	X	X	X				
	L	Sol	ORG	CAN 60					X	X	X	X				
	L	Sol	ORG	CAN 61					X	X	X	X				
	L	Sol	ORG	CAN 62					X	X	X	X				
	L	Sol	ORG	CAN 63					X	X	X	X				
Field Blank	L	aq	ORG	CAN 64					X	X	X	X				
Equip Rinse Blank	L	aq	ORG	CAN 65					X	X	X	X				
Trip Blank	L	aq	ORG	CAN 66				X	X	X	X	X				
Dup of CAN53	L	aq	ORG	CAN 67				X	X	X	X	X				

TETRA TECH, INC.

FIGURE 8-5
EPA SHIPPING LOG

AR300406

Project Code	Station No.	Month/Day/Year	Time	Designate	Comp.	Grab
	B5-1-1	2/28/89	1300 Hrs.			X

Station Location: B5-1-1

Samplers (Signatures): Christopher Burns

Preservative: Yes ☒ No ☐

ANALYSES

BOD Anions Solids (TSS) (TDS) (SS)	
COD, TOC, Nutrients	
Phenolics	
Mercury	
Metals	
Cyanide	
Oil and Grease	
Organics GC/MS	
Priority Pollutants	
Volatile Organics	X
Pesticides	
Mutagenicity	
Bacteriology	

Remarks:
CASE# 1746
CLP# CAN51
BOTTLE LOT# 631292

Tag No. 3-1050006 Lab Sample No.

CUSTODY SEAL
Date 2/29/89
Signature Christopher Burns

CUSTODY SEAL
Date 2/29/89
Signature Christopher Burns

CAN 51 BNA
CAN 51 VOA
CAN 51 VOA

TETRA TECH, INC.

FIGURE 8-6
CLP SAMPLE NUMBERS,
CHAIN-OF-CUSTODY SEALS,
SAMPLE TAGS

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analysis requested, and the preservative, if any. This information should also be recorded in the field book.

After completing the sample label, one of the "unique" CLP Sample Number Labels should be placed on the sample bottle. Figure 8-6 shows an example of each of the three separate "unique" Sample Number Labels that the CLP requires. The analysis indicated on the CLP Sample Number Label should match the analysis requested on the sample bottle label. The preprinted labels beginning with the letter "C" represents label and sample numbers to be used for all TCL sample bottles. For TAL sample bottles the preprinted "M" labels will be used.

After the CLP Sample Number has been placed on the sample bottle, the Sample Tags should be completed and affixed to the sample bottles. To complete the Sample Tags (Figure 8-6), the following information is required:

- The sampling station number and the sampling station location;
- The date and time;
- Whether the sample is composite or grab;
- Whether the sample has been preserved or not;
- The type of analysis requested;
- Under "Remarks";
  - The case number;
  - The CLP sample number; and
  - The bottle lot number.

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Under the type of analysis requested on the sample tag, TCL volatile organics is equivalent to volatile organics, TCL BNA is equivalent to organics GC/MS, TCL pesticides/PCB's is equivalent to pesticides, and TAL inorganics is equivalent to metals.

8.2 SAMPLE CUSTODY

In order to verify sample integrity, written conclusive proof is required that samples are taken, transferred, prepared and analyzed in an unbroken chain. That written proof is a chain-of-custody record. By definition, samples are in custody if they:

- Are in the possession of an authorized individual;
- Are in the field of vision of an authorized individual; and
- Are in a secure area or a locked container.

The field and laboratory sample custodians are responsible for sample custody during all sample handling activities.

A completed example of a Chain-of-Custody Record is shown in Figure 8-1.

To complete the form, the following information must be provided:

- The project number which is equivalent to the case number;
- An abbreviation for the project name; the contract lab is not to be given the full site name;
- The samplers signature;

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- The station number which may be equivalent to the station location;
- The date and time the sample was taken;
- Whether the sample is composite or grab;
- The number of containers in which the sample has been placed;
- The type of analyses requested;
- Under "Remarks" (in the upper right corner of the record), the CLP sample number that was previously placed on the sample;
- Under "Remarks" (in the lower right corner of the record), the airbill number of the container in which the samples will be shipped to the laboratory. (When samples are shipped to the laboratory via commercial carrier, the airbill serves as an extension of the chain-of-custody.); and
- Under "Relinquished by" and "Received by", the signature of every authorized person who maintains custody of the samples.

8.3 TRAFFIC REPORTS

Included with samples to be shipped for analysis of organics or inorganics to a CLP laboratory contracted under the Routine Analytical Services (RAS) program will be an Organic Traffic Report or an Inorganic Traffic Report. A completed example of an Organic Traffic Report and Inorganic Traffic Report are shown in Figures 8-2 and 8-3. The following information must be provided to complete the top portion of each Traffic Report:

The case number and SAS number (if applicable)

(1) The type of activity (PA, SI, ESI, RI/FS, etc.)

- The site name;

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- The city and state of the site; and
- The Site Spill ID.

(2) The EPA region number where the sampling is being performed; and the name of the sampling company and sampler.

(3) The name and address of the laboratory where the samples are being shipped.

(4) The date the samples were shipped, the commercial carrier and the airbill number for the container in which the samples were shipped.

(5) Sample description (water, soil/sediment, etc.).

In the bottom portion, from left to right, list the following:

CLP sample number

(A) The sample description (codes are obtained from box 5 in upper right corner of the form). Blanks of aqueous matrix should be listed with a code number of 3.

(B) The sample concentration (L, M, or H)

(C) X out the analyses requested

(D) Under "special handling", list the quality control samples, matrices notes, etc.

(E) The station location

(F) The date/time of sample collection

(G) Corresponding CLP organic or inorganic sample number

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8.4 SPECIAL ANALYTICAL SERVICES PACKING LIST

For laboratory services contracted by CLP as special analytical services (e.g., TCL/TAL fast turnaround, grain size, etc.), a SAS Packing List will be completed as shown on Figure 8-4.

The following information must be provided to complete the Packing List:

The top portion of the list will include:

- In the upper right hand corner, the SAS Number that has been assigned by CRL;
- Identify the Sampling Office: "TETRA TECH", the sampling contact: Chris Burns and the telephone number: (302) 738-7551;
- The date(s) of sampling and the date shipped;
- Site Code - Butz Landfill ; and
- The name and address of the laboratory, the contact person and telephone number.

The bottom portion must include:

- A sample number of each sample bottle: the number will be the SAS Number plus a consecutive dash number for each sample contains (e.g., 5226-01, 5226-02); and
- The sample description which will be include type of analysis, sample matrix and whether High, Medium or Low Concentration.

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8.5 EPA SAMPLE SHIPPING LOG

This log is to be sent to the EPA Central Regional Laboratory after the samples have been shipped to the laboratory. The log is divided into three sections. The first section, which includes items (1) through (6), must be completed for all sample shipping logs. For organic and inorganic analysis, Items (7) through (9) of the shipping log are to be completed. For other analyses that require SAS Requests, Items (10) through (13) must be completed. An example of a completed shipping log for organics/inorganics is shown in Figure 8-5. To complete the form, the following information must be provided:

Section 1 - All Shipping Logs:

(1) Complete the page number;
The case number,
The SAS number, if applicable,
The site name,
The name and phone number of the site leader,
The name of the EPA project officer.

(2) Under "QC Sample Info and/or Comments", list field duplicates, laboratory quality control samples, field blanks, equipment rinseate blanks, and trip blanks;

(3) Under "Conc.", list sample concentration (L, M or H);

(4) List sample phase: "aq" for aqueous, "soil" for soil and sediment;

(5) The type of analysis requested: "org" for volatile organic compounds, BNA compounds, and Pesticides/PCB's; "dio" for dioxins; "inor" for inorganics and "SAS" for special analytical service;

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(6) Under "Sample Traffic Report Number", list the CLP sample number;

Section 2 - Organics or Inorganics:

(7) Under "Lab Name", list the abbreviation for the CLP laboratory;
(8) List the date the samples were shipped;
(9) Leave blank the analyses requested, X out analyses not requested;

Section 3 - SAS Requests:

(10) Description of type analysis required;
(11) Under "Lab Name", list the abbreviation for the CLP laboratory;
(12) Itemize the analysis requested: dioxin, grain size, etc.; and
(13) List the date the samples were shipped.

8.6 PACKAGING AND SHIPPING

Once the samples have been collected, properly labeled and tagged, these steps should be followed to properly pack and ship the samples:

- Seal all containers in clear plastic bags (The chain-of-custody seals, depicted in Figure 8-6, are not to be placed on individual sample containers because the adhesive on the back of the seal may potentially affect sample integrity);
- Pack all medium and high level and dioxin samples in metal paint cans:
  - Label paint cans with sample number of sample contained inside;
  - Surround contents of can with vermiculite;

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- Pack all samples in sturdy ice chest for shipment;
- Pack all soil and sediment VOA's in inverted position;
- Use freezer packs to cool the organic low level water samples and the low level organic and inorganic soil/sediment samples to 4°C;
  - Do not cool dioxin, inorganic low level water, inorganic medium/high level water or soil/sediment, or organic high level water or soil/sediment samples;
- Surround ice chest content with vermiculite;
- Tape paperwork in plastic bag on inside of cooler lid (The paper work includes the chain-of-custody record, and the bottom two copies of the traffic report); and
- Close cooler and seal with custody seals.

Immediately upon shipment of samples, the sampler is to call the SMO at (703) 557-2490 with the following information:

- The case number;
- Name of laboratory where samples were shipped;
- Date of shipment;
- The name of the commercial carrier and the airbill number;
- Number and matrixes of samples shipped;
- Sampler's name, region, and phone number;
- SMO must be notified by 3:00 p.m. on Friday, if samples are intended for Saturday delivery; and
- Whether change or delays are expected.

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The EPA Sample Shipping Log is then to be sent to:

Ms. Jean Cooper
Central Regional Laboratory
EPA Region III
839 Bestgate Road
Annapolis, MD 21401

(301) 266-9180

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FSP APPENDIX A

STANDARD OPERATING PROCEDURES

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TETRA TECH STANDARD OPERATING PROCEDURE

FIELD MEASUREMENT OF WATER TEMPERATURE
Tt SOP-001

1. Carry two NBS - calibrated thermometers, in cases, into the field
2. Check thermometer for cracks or gaps in the mercury.
3. Draw sample of at least 200 mL into beaker or sample bottle.
4. Place thermometer in sample. Do not allow thermometer bulb to touch sides of beaker. Allow to equilibrate (about 1 min).
5. Record temperature to nearest 1° C in field logbook or on field data sheet.
6. On a quarterly basis, check against NBS-calibrated field laboratory thermometer. Agreement should be within 0.5° C.

TETRA TECH STANDARD OPERATING PROCEDURE

FIELD MEASUREMENT OF pH FOR SURFACE AND GROUNDWATERS
Tt SOP-002

Field Procedures

1. Rinse 500-mL plastic beaker with small portions of sample water 3 times.

2. Rinse electrodes with sample water.

3. Immerse electrode in sample while swirling the sample, if needed, to provide thorough mixing. Turn on meter. Read pH to nearest 0.1 unit once the reading is stabilized.

4. Record sample pH. Note any problems such as drift of meter.

Instrument Calibration

1. Calibrate pH meter according to manufacturer's instructions in the field laboratory at the beginning of any day of field work or field lab work when pH will be measured, then recalibrate each time pH meter is moved (e.g., station to station), or at a minimum of every 10 samples analyzed.

Maintenance

1. Check batteries each time meter is used. Carry a spare battery pack and a screwdriver into the field in the pH meter case.

TETRA TECH STANDARD OPERATING PROCEDURE

FIELD MEASUREMENT OF SPECIFIC CONDUCTANCE
Tt SOP-003

Field Procedure

1. Mechanically zero the instrument while the instrument is OFF using screwdriver adjustment on the meter face.

2. Collect water sample in 500-mL plastic beaker.

3. Swirl conductivity probe in sample; discard sample.

4. Collect fresh sample in beaker.

5. Measure sample temperature to nearest 1° C with an NBS-calibrated thermometer. Record temperature.

6. Adjust the temperature setting on conductivity meter as per recorded temperature.

7. Turn on meter and immerse conductivity probe in sample. Move probe around in sample to displace any air bubbles.

8. Select the lowest appropriate multiplier setting to obtain the greatest meter needle deflection. Read the conductivity from the dial and record in field notebook.

Instrument Calibration

At the beginning and end of each day of sampling, determine cell constant in the field laboratory.

1. Rinse probe with one portion of the standard KCl solution.

2. Measure conductivity of another portion of the standard KCl solution.

3. Measure temperature of standard KCl solution.

4. Calculate cell constant. The cell constant is the ratio of the known conductivity to the measured conductivity of the standard KCl solution. Use this constant and measured field temperatures and conductivities to calculate conductivity at 25° C for each sample taken during the day.

Maintenance

1. Rinse the probe between measurements to keep it clean. If oils coat electrodes, the coating can be removed by first immersing the probe in a strong detergent solution and then rinsing with deionized water.

2. Check batteries each morning before taking meter into the field by setting power switch to ON and setting RANGE switch to TEST. Carry spare AA alkaline batteries and screwdriver.

Calculations

1. Correct all conductivities (including measured conductivity of KCl standard) to 25° C:

$$K = \frac{K_{measured}}{1 + 0.0191(t-25)}$$

where:

t = temperature of measurement, ° C
K = conductivity, umhos/cm

2. Using temperature-corrected conductivities, adjust sample conductivity (at 25°) by cell constant:

$$\text{Conductivity} = \frac{K_{SD}}{K_{KCl}} \times K_{sample}, \text{ umhos/cm}$$

where:

K_{SD} = listed conductivity of standard KCL solution
K_{KCL} = measured conductivity of standard KCL solution

TETRA TECH STANDARD OPERATING PROCEDURE

FIELD MEASUREMENT OF DISSOLVED OXYGEN BY MEMBRANE ELECTRODE
Tt SOP-004

Field Laboratory Procedures

On the morning of a sampling trip, check meter batteries and electrode.

1. Check that meter pointer is exactly at zero when meter is upright. If necessary, adjust its position with the screw in the center of the meter panel.

2. Switch to Red Line and adjust knob until needle aligns with red line. If needle cannot be brought up to red line, replace instrument batteries (four size C batteries).

3. Examine electrode. If membrane is damaged, or there are bubbles beneath it, or it is wrinkled or pinched under the O-ring, replace membrane.

   a. Take off the O-ring and remove old membrane.

   b. Fill electrode with half-saturated KCl solution. Holding probe sensor-end up, drip solution into the top while pumping gently on the probe diaphragm with the eraser end of a pencil. Continue until no more bubbles appear.

   c. Secure a membrane against the probe body under your left thumb. Add more electrolyte to the probe until a large meniscus completely covers the gold cathode. NOTE: Handle membrane material with care, keeping it clean and dust free, touching it only at the ends.

   d. With the thumb and forefinger of your other hand, grasp the free end of the membrane.

   e. Using a continuous motion stretch the membrane up, over, and down the other side of the sensor.

   f. Secure the end of the membrane under the forefinger of the hand holding the probe.

   g. Roll the O-ring over the end of the probe. There should be no wrinkles in the membrane or trapped air bubbles. Some wrinkles may be removed by lightly tugging on the edges of the membrane beyond the O-ring. Trim off excess membrane with scissors or sharp knife. Check that the stainless steel temperature sensor is not covered by

excess membrane.

4. Store probe attached to meter, with the electrode end inserted in the special plastic bottle. Check that Kimwipe in bottom of bottle is moist. If necessary, add distilled water.

Field Procedures

1. At each station, air-calibrate the probe according to the manufacturer's instructions before taking a reading.

2. Immerse probe in sample water. For groundwater, have pump discharge tube in the bottom of a beaker, allow water to overflow. For surface water, probe is immersed in a beaker which has been dipped from the stream with minimal turbulence.

3. Allow probe to acclimate to sample temperature for 30 sec.

4. Switch to 0-10 setting and read dissolved oxygen concentration to nearest 0.1 mg/L. If the reading is less than 5 ppm, switch to 0-5 setting. In a quiescent beaker of water, the probe must be gently moved up and down while the reading is taken.

5. Check meter calibration against replicate Winkler determinations at the beginning and end of each day in the field according to the manufacturer's instructions. The water used may be distilled or tap water brought into the field.

Reagents

Half-saturated KCl: Weigh out 17 g of reagent-grade KCl, transfer to 250-mL beaker. Add 90-92 mL distilled water, swirl to dissolve.

TETRA TECH STANDARD OPERATING PROCEDURE

GROUNDWATER SAMPLING BY BAILER
Tt SOP-111A

1. If floating and/or sinking immiscible phase products are suspected to be present in the well, thickness and elevation of the product layers should first be measured with the interface probe according to Tt SOP-102.

2. Measure groundwater surface elevation and well depth according to Tt SOP-101. Calculate casing storage volume.

3. Remove one casing volume from well using a decontaminated, stainless steel or polytetrafluorethylene (PTFE) bailer, placing the purged water in a graduated container to determine purged volume . If possible, draw water from above the well screen in high-yield wells. In low-yield wells water should be removed from the bottom of the screened interval.

4. Rinse a clean beaker with well water prior to filling it for field measurements.

5. Measure temperature, pH, and specific conductance of the purge sample in beaker according to Tt SOPs-001, -002, and -003. Record measurements in field notebook.

6. Repeat Steps 3 through 5 twice. If the well yields insufficient water to purge three casing volumes, evacuate well to dryness once and sample as soon as well recovers sufficiently.

7. Determine if temperature, pH, or specific conductance of the purged water has varied by greater than 10 percent between consecutive casing volumes. If yes, repeat Steps 3, 4, 5, and 7. If no, proceed to Step 8. If measurements do not stabilize after five casing volumes have been purged, note in field notebook and proceed to Step 8.

8. Lower the bailer slowly until it contacts the water surface. Allow the bailer to sink with a minimum of disturbance to a point midway between the well bottom and the water surface.

9. After filling the bailer with groundwater, slowly raise it to the surface.

10. Groundwater samples should be collected and containerized in the order of volatilization sensitivity (i.e., volatile organics first, then other organics, and inorganics last). Volatile organic analysis (VOA) sample containers, in particular, should be filled carefully by tipping the bailer to allow discharge from the top to flow slowly and carefully down the side of the sample bottle with minimum turbulence and aeration. VOA samples must be absolutely free of bubbles. Repeat Steps 8 and 9, as necessary, to fill all required sample containers.

11. If a dissolved metals sample is to be collected, follow the procedures for filtering water samples noted in the FSP.

12. Repeat Steps 4 and 5 to obtain field measurements for samples. Any other field parameters requiring measurement should also be measured at this time.

13. Add appropriate preservatives to samples as given in Table 3.3 of this FSP.

14. Label the sample bottles with all necessary information. Clean the exterior of the filled, sealed sample containers using a brush and soap and water mixture, and rinse with tap water. Record the sample information in the field logbook and complete all chain-of-custody documents and seals. Seal each sample container in a resealable bag to reduce the possibility of contamination other samples if a sample bottle leaks or breaks.

15. Place the properly labeled and sealed sample bottles in a cooler with ice and maintain at 4°C for the duration of the sampling and transportation period. Do not allow samples to freeze. Note whether the sample types require isolation from each other and isolate appropriately.

TETRA TECH STANDARD OPERATING PROCEDURE

DOMESTIC WELL SAMPLING
Tt SOP-112

In most cases, direct sampling of groundwater within a domestic well is not practical due to difficulty in gaining access to the interior of the well casing, and also due to the potential of inadvertently introducing contaminants to the well during sampling. Therefore, sampling of a domestic water supply system at the tap or purge valve nearest to the well head is recommended.

1. Flush the domestic water supply system by running one of the system's taps for several minutes.

2. Rinse a clean beaker with well water prior to filling it for field measurements. Insure that any aeration or filtering device present at the tap is removed prior to measuring any field parameters of the samples or filling any sample containers.

3. Measure temperature, pH, and specific conductance of the purge sample in beaker according to Tt SOPs-001, -002, and -003. Record measurements in field notebook along with the full address of the residence/structure.

4. Repeat steps 1 through 3 twice, as required to find additional readings of pH, Temperature, and Specific Conductance.

5. Determine if temperature, pH, or specific conductance of the purged water has varied by greater than 10 percent between measurements. If yes, repeat Steps 1,2,3, and 5. If not, proceed to Step 6. If measurements do not stabilize after five periods of flushing, note in field logbook and proceed to Step 6.

6. Fill the appropriate sample containers directly from the tap or valve being sampled. Sample containers for volatile organic analysis (VOA) should be carefully filled using a low flow rate and the discharge should flow slowly down the side of the sample bottle with minimum turbulence and aeration. VOA samples must be absolutely free of bubbles.

7. Repeat Steps 2 and 3 to obtain field measurements for the samples. Any other field parameters requiring measurement should also be measured at this time.

8. Add appropriate preservatives to samples as given in Table 6-1 of this FSP.

9. Label the sample containers with all necessary information. Record the sample information in the field logbook and complete all chain-of-custody documents and seals.

10. Place the properly labeled and sealed sample bottles in a cooler with ice

and maintain at 4°C for the duration of the sampling and transportation period. Do not allow samples to freeze.

TETRA TECH STANDARD OPERATING PROCEDURE

SURFACE WATER SAMPLING
Tt SOP-115

1. Submerse open sample bottle in water with bottle mouth below the water surface. Take care not to collect any floating solids or materials disturbed from the bottom of the water body. In areas of active flow, point bottle mouth upstream.

2. Fill a sample bottle with water from sampled water body. Perform field measurements according to Tt SOPs-001, -002, -003. Record measurements in field note book.

3. Add appropriate preservatives to samples as given in Table 6-1 of this FSP.

4. Label the sample bottles with all necessary information. Record the information in the field logbook and complete all chain-of-custody documents and seals.

5. Place the properly labeled and sealed sample bottles in a cooler with ice and maintain at 4°C for the duration of the sampling and transportation period. Do not allow samples to freeze.

TETRA TECH STANDARD OPERATING PROCEDURE

SUBSURFACE SOIL SAMPLING BY "SPLIT-SPOON" SAMPLER
Tt SOP-151A

Disturbed samples of subsurface soil can be collected using the standard Penetration Test procedure "split-spoon" method.

1. At the chosen depth interval, drive a clean, standard, 18 in long, 2 in outside diameter, split-spoon sampler into the soil a distance of 18 in using a 140 lb hammer, free falling 30 in. The number of hammer blows required to drive the sampler the last 12 in is the Standard Penetration Resistance. Record the number of blow counts on the field boring log.

2. Retrieve the sampler from the borehole and place it on a clean, flat surface. Open the sampler and immediately scan the sample with an air monitoring instrument (e.g., HNu or OVA). Record instrument readings on field boring log. Describe and record the following properties of the sample: Sample length recovered, presence of any slough in sampler, basic soil type (e.g., sand, gravel, clay), structure, texture, sorting, grain size, grain shape, degree of saturation, competency, color, odor, staining, and presence of foreign material(s).

3. If a sample is required for chemical analysis, place the selected soil from the sampler in a clean, stainless steel bowl and mix thoroughly using a clean, stainless steel spoon. Completely fill the appropriate sample container with the homogenized soil, leaving no headspace. Important note: if a subsurface soil sample is to be submitted for volatile organics analysis, the selected soil should be transferred directly from the sampler to the sample container as soon as possible after the sampler is opened, to reduce volatilization of the sample.

4. Label the sample container with all necessary information. Record the sample information in the field logbook and complete all chain-of-custody documents and seals.

5. Place the properly labeled and sealed sample containers in a cooler with ice and maintain at 4°C for the duration of the sampling and transportation period. Do not allow the samples to freeze.

6. All equipment used in subsurface soil sample (including the split-spoon sampler and compositing bowl) must be decontaminated between samples.

TETRA TECH STANDARD OPERATING PROCEDURE

BOTTLE HEADSPACE ANALYSIS OF SURFACE SOIL SAMPLES
Tt SOP-F001

On morning of sampling trip, check meter batteries and apparatus operation as described in Tt SOP-021.

1) Materials to be sampled should be carefully and quickly transferred with decontaminated stainless steel spoons to a mason jar (approximately 1 L). Fill jar to approximately 90% of capacity.

2) Seal mason jar air tight with aluminum foil and place jar in cooler which is at ambient air temperature. The cooler must be kept out of the sun.

3) Take background reading of emission levels with photoionization detector and record in field logbook.

4) After a waiting period of 30 minutes remove sample from cooler and carefully pierce the foil seal on mason jar with the probe of a photoionization meter. Take measurement.

5) Record headspace measurement in field logbook, along with location, data and time, and a description of climatic conditions.

TETRA TECH STANDARD OPERATING PROCEDURE

SEDIMENT SAMPLE COLLECTION FROM SHALLOW WATER BODIES
Tt SOP-F003

This procedure is applicable to collecting disturbed samples of bottom sediments is shallow water bodies that are less than 2 ft deep. Either a 100- to 500-ml plastic or stainless steel scoop with several 5 mm holes drilled in the upper portion of the back and rear sides, or a hard-driven corer may be used to collect the samples. In fine-grained sediment, deeper and less disturbed samples can be obtained with the corer.

1) Insert scoop or corer into sediment to be sampled. Slowly lift the sample from the water and allow excess water to drain slowly, being careful no to lose fine-grained particles. Depending on the area to be covered, up to five component samples should be collected to form a composite sample. Samples for volatile organics analysis should be placed directly in sample containers and not mixed or composited.

2) Place the component samples for each sediment composite in a clean, stainless steel bowl for homogenization. Remove any objects larger than approximately 0.5 inches in diameter using clean, stainless steel forceps. Record the amount and type of removed material in the field notebook.

3) Thoroughly mix the sediment in the bowl and separate into quarters.

4) Place an aliquot from each quarter into an appropriate sample container. Fill the container completely, leaving no headspace.

5) Label the sample container with all necessary information. Record the information in the field logbook and complete all chain-of-custody documents and seals.

6) Place the properly labeled and sealed sample bottle in ca cooler with ice and maintain at 4°C for the duration of the sampling and transportation period. Do not allow samples to freeze.

TETRA TECH STANDARD OPERATING PROCEDURES

EQUIPMENT DECONTAMINATION
Tt SOP-F004

All equipment decontamination shall follow this Tetra Tech Standard Operation Procedure. To assess the adequacy of decontamination procedures, equipment blanks are collected for aqueous samples and soil samples. The specific number of blanks and replicates is defined in Table 3-3 in this FSP.

General Equipment Decontamination

All field equipment that becomes potentially contaminated during a sample collection task will be decontaminated using the method described below. The equipment may include bailers, beakers, hand augers, compositing bowls, or any other equipment used during field activities.

Decontamination is performed as a quality assurance measure and a safety precaution. It prevents cross contamination between samples and helps maintain a clean working environment.

Decontamination is achieved mainly by rinsing with liquids that include: soap and/or detergent solutions, tap water, distilled water, and methanol. Equipment may be allowed to air dry after being cleaned.

At the project site, decontamination will be accomplished between each sample collection point. Waste products produced by the decontamination procedures such as waste liquids, solids, rags, gloves, etc., will be collected and disposed of properly based on the nature of contamination. Specific details for the handling of decontamination wastes will be addressed in the project plans.

It is the responsibility of the field sampling coordinator to assure that proper decontamination procedures are followed and that all waste materials produced by decontamination are properly managed. It is the responsibility of the project safety officer to draft and enforce safety measures that provide the best protection for all persons involved directly with sampling or decontamination.

It is the responsibility of any subcontractor (e.g., drilling contractors) to follow the proper, designated decontamination procedures specified in the contract and outlined in the project Health and Safety Plan. It is the responsibility of all personnel involved with sample collection or decontamination to maintain a clean working environment and to ensure that any contaminants are not negligently introduced to the environment.

Supporting materials to be available at the site include:

- Cleaning liquids and dispensers: soap and/or detergent solutions,

tap water, distilled water, methanol

- Personal safety gear as defined in the project Health and Safety Plan
- Chemical-free paper towels
- Disposal gloves
- Waste storage containers: drums, boxes, plastic bags
- Cleaning containers: plastic and/or galvanized steel pans and buckets
- Cleaning brushes
- Aluminum foil.

The extent of known contamination will determine the degree of decontamination required. If the extent of contamination cannot be readily determined, cleaning should be done according to the assumption that the equipment is highly contaminated.

The standard procedures listed below can be considered the procedure for full field decontamination. If different or more elaborate procedures are required for a specific projects, they will be spelled out in the project plans. such variations in procedures may include following all, just part, or an expanded scope of the decontamination procedure stated herein.

- Disassemble equipment, as required
- Remove gross contamination from the equipment by brushing and then rinsing with tap water
- Wash with soap or detergent solution (Alconax solution preferred)
- Rinse with tap water
- Rinse with methanol
- Rinse with distilled water
- Repeat entire procedure or any parts of the procedure as necessary, followed by rinsing with distilled water.
- Air dry equipment

Field personnel will use a new pair of outer gloves before handling sample equipment after it is cleaned.

Large Equipment Decontamination

The drilling rig/excavation equipment and materials need to arrive on-site in a clean condition, and should be free of oil, grease, and debris. The Field Team Leader must inspect the rig for any fluids leaks. The leader should also be sure that drill rigs, tools, and drill bits, buckets, etc., are steam cleaned prior to the start of drilling. After steam cleaning, the equipment should be inspected for residues such as machine oil. If residues are observed, the equipment should be steam cleaned until such residues are removed.

Steam clean the drill rods and tools used during drilling to prevent cross-contamination between each test well and test boring. Inspect all equipment

for any residues after steam cleaning. If the equipment is not clean, repeat the steam cleaning procedure. Conduct decontamination of the rig and equipment in a shallow plastic-lined collection pit.

In the event that equipment is contaminated with heavy oils or products that cannot be removed by the standard decontamination procedures outlined above, the following modifications will be made. First, wipe all excess oil/tar from the equipment with a paper towel. Second, with a paper towel that has been soaked in hexane, wipe any residual contamination off the equipment. When equipment is relatively free of gross oil or tar contamination, proceed with the usual decontamination procedure.

Personnel Decontamination

Personnel decontamination will be performed as specified in the HSP.

TETRA TECH STANDARD OPERATING PROCEDURE

FIELD MEASUREMENT OF REDOX POTENTIAL (Eh)

Tt SOP-F009

Currently under development

TETRA TECH STANDARD OPERATING PROCEDURE

FIELD MEASUREMENT WITH AN OVA METER

Tt SOP-F010

This instrument uses hydrogen flame ionization to detect and measure organic vapors. In survey mode, the instrument detects the total concentration of all organic vapors at the same time. When the vapors are ionized, a current is produced which causes a meter response. This relative response can be quantified by comparison to gases of known concentration. The instrument is generally calibrated to methane, and it can detect concentrations as low as 0.1 ppm methane.

Field Operating Procedure

1. Connect the Probe/Readout Assembly to the Sidepart Assembly by attaching the sample line and the electronic jack to the sidepack.

2. Attach the desired sample probe to the probe/readout assembly, making sure that a particulate filter is installed.

3. Move the INSTRUMENT switch to the 'BATT' position to test the battery condition. The meter needle should move beyond the white line if sufficient charge is available for normal operation. If the battery is not charged, recharge it as per the manufacturer's instructions. (The battery should generally be recharged overnight after each use.)

4. Move the INSTRUMENT switch to the 'ON' position and then wait five minutes for warm-up.

5. Set the CALIBRATE Switch to LOW; if properly calibrated, the meter should read 10 ppm. Next, move the CALIBRATE Switch to OFF. (If calibration is off, the instrument should be sent to the manufacturer for adjustment.)

6. Set the PUMP Switch to ON and observe the SAMPLE FLOW RATE Indicator while the Sidepack Assembly is in a vertical position. The indication should be approximately 2 on the scale.

7. Open the HYDROGEN TANK VALVE one full turn and observe the HYDROGEN TANK PRESSURE Indicator. (Approximately 150psi of pressure is consumed with each hour of use.) If insufficient fuel is available for anticipated use, it will be necessary to refill the fuel according to the manufacturer's instructions.

8. Open the HYDROGEN SUPPLY VALVE one full turn and then wait one minute to allow hydrogen to purge the system.

9. Depress the Igniter Button to light the burner while observing the probe readout. However, do not depress the button for more than six seconds. (There will be a slight "pop" as the hydrogen ignites, and the meter

needle will deflect upscale momentarily.) If the burner does not ignite, allow the instrument to run for a few minutes before depressing the igniter button again.

10. After ignition, allow approximately five minutes for instrument warm-up. (Note that it is normal to observe a background hydrocarbon concentration of 5 to 10 ppm after warm-up.) THE INSTRUMENT IS READY FOR USE IN SURVEY

Field Shutdown Procedure

1. Close the HYDROGEN TANK VALVE

2. Close the HYDROGEN SUPPLY VALVE.

3. Move the INSTRUMENT Switch to the OFF position.

4. Wait 5 seconds and then move the PUMP Switch to the OFF position.

Battery Charging

1. Plug the charger connector into mating connector on the front of the Sidepack Assembly and then plug the charger into a 115 Volt a/c wall outlet.

2. Move the battery charger switch to the ON position.

3. Allow approximately one hour of charging time for each hour of operation. (Overnight charging is recommended, as the charger can be left on indefinitely without damaging the battery.)

4. When fully charged, pointer will be in line with the "charged" marker. Move the battery charger switch to OFF, and disconnect from the Sidepack Assembly. (Do not allow the battery to be completely discharged.)

Fuel Refilling Procedure

It is imperative that only PREPURIFIED, or ZERO grade hydrogen be used. In addition, refilling should only be done in a ventilated area where there are no potential sources of ignition or flame. In order to ensure a safe refilling operation with no hydrogen leaks, be sure that all fittings are firmly tightened with a wrench.

1. Make sure that the instrument is completely shut down before initiating refilling operations.

2. If this is the first filling or if the filling hose has been allowed to fill with air, the hose should be purged with hydrogen prior to filling the instrument. For subsequent fillings this step will not be necessary.

3. Attach the filling hose assembly to the hydrogen supply tank, making sure

that the FILL/BLEED valve is in the OFF position.

4. Connect the hose to the Sidepack Assembly at the refill position.

5. Open the hydrogen supply bottle valve only slightly.

6. Open the REFILL VALVE and the HYDROGEN TANK VALVE on the Sidepack Assembly and turn the FILL/BLEED Valve on the filling hose assembly to the FILL position. At this point, the pressure in the OVA fuel tank will be indicated on the OVA HYDROGEN TANK PRESSURE Indicator. (Note that the filling hose assembly contains a flow limiting device, and filling will take approximately 2 minutes.)

7. Once the fuel tank is filled, close the REFILL VALVE on the Sidepack Assembly, the FILL/BLEED VALVE on the filling hose assembly, and the hydrogen supply bottle valve.

8. Bleed off hydrogen that is trapped in the hose. (Because of the flammability danger involved in releasing hydrogen to the atmosphere, do not perform this bleeding operation if there is a source of ignition in the area.) Turn the FILL/BLEED Valve on the filling hose assembly to the BLEED position. Once gas has been released, turn the FILL/BLEED Valve to the FIL1 position to allow any hydrogen which is trapped in the connector fittings to go into the hose assembly. Once again, turn the FILL/BLEED Valve on the filling hose assembly to the BLEED position to allow gas to escape to the atmosphere. Repeat this procedure (Filling and then Bleeding) once or twice, if deemed necessary. Next turn the FILL/BLEED Valve to OFF to keep any remaining hydrogen in the hose at atmosphere pressure.

9. Close the HYDROGEN TANK VALVE.

10. Observe the HYDROGEN TANK PRESSURE Indicator to ensure that the pressure reading does not decrease rapidly. (A decrease of more than 350 psi/hour would be indicative of a significant leak in the system.)

TETRA TECH STANDARD OPERATING PROCEDURE*

SURGE BLOCK WELL DEVELOPMENT

Tt SOP-F013

Mechanical surging is a method of development is to force water to flow into and out of a screen by operating a plunger up and down in the casing, similar to a piston in a cylinder. The tool normally used is called a surge block, surge plunger, or swab. A heavy bailer may be used to produce the surging action, but it is not as effective as the close-fitting surge block.

Before starting to surge, the well should be bailed to make sure that water will flow into it. Lower the surge block into the well until it is 10 to 15 feet (3 to 4.6m) beneath the static water level, but above the screen or packer. The water column will effectively transmit the action of the block to the screen section. The initial surging motion should be relatively gentle, allowing any material blocking the screen to break up, go into suspension, and then move into the well. The surge block (or bailer) should be operated with particular care if the formation above the screen consists mainly of fine sand, silt, or soft clay which may slump into the screen. As water begins to move easily both into and out of the screen, the surging tool is usually lowered in steps to just above the screen. As the block is lowered, the force of the surging movement is increased. Development should begin above the screen and move progressively downward to prevent the tool from becoming sand locked.

Continue surging for several minutes, then pull the block from the well. Air may be used to blow the sediment out of the well if development is done with a rotary rig or if an air compressor is available. Sediment can also be removed by a bailer or sand pump.

Continue surging and cleaning until little or no sand or fines can be pulled into the well.

*After Driscoll, F.E., Ground-water and Wells. Second Edition, Johnson Division, St. Paul, MN. 1986, P. 504-506

TETRA TECH STANDARD OPERATING PROCEDURE

AIRLIFT SURGING WELL DEVELOPMENT TECHNIQUES*

Tt SOP-F014

Compressed air can be used to develop wells in consolidated and unconsolidated formations. In air surging, air is injected into the well to lift the water to the surface. As it reaches the top of the casing, the air supply is shut off, allowing the aerated water column to fall. Air-lift pumping is used to pump the well periodically to remove sediment from the screen or borehole and is accomplished by installing an air line inside an eductor pipe in the well. Most rotary rigs have sufficient air capacity to use the casing as the eductor for 6- to 12-in (152- to 305-mm) diameter wells.

Air development procedures should begin by determining that groundwater can flow freely into the screen. Application of too much air volume in the borehole when the formation is clogged can result in a collapsed screen. To minimize the initial pumping rate, the air line and eductor (if used) can be placed at a rather shallow submergence. At this setting, even the introduction of large air volumes will produce only a moderate pumping rate and, therefore, will place only low collapse pressures on the well screen. Introduction of small air volumes at greater submergence also will produce low yields.

Once uninhibited flow into the screen has been established, the eductor pipe (if used) is lowered to within 5 ft. (1.5 m) of the bottom of the screen, assuming that sufficient pressure is available to overcome the static head. Development can also start near the top of the screen, depending on the preference of the driller. The air line is placed so that its lower end is up inside the eductor pipe at the proper submergence level. Before blowing any water or drilling fluid out of the well with a sudden large injection of air, the air lift should be operated to pump fluids at a reduced rate from the well.

Air is released into the line and the well is pumped until the water is virtually sand free. The valve at the air tank outlet is then closed, allowing the pressure in the tank to build. The actual pressure required will depend on the starting submergence; 43 psi (296 kPa) is needed for each 100 feet (30.5 m) of starting submergence. In the meantime, the air line is lowered so that its lower end is 1 feet or so below the eductor pipe. To initiate surging, the valve is opened quickly to allow air from the tank to rush suddenly into the well. This tends to drive the water outward through the well screen openings. Ordinarily, a brief but forceful head of water will also overflow or shoot from the casing and eductor pipe at the ground surface. When the air line is pulled up into the eductor pipe after the first charge of air has been released into the well, the air lift will again pump, thus reversing the flow (water flows into the well) and completing the surging cycle.

The well is pumped until the water clears up, and then another "head" of air is released with the air line set below the eductor pipe. To resume pumping, the air line is again lifted. Surging cycles are repeated until the water is

relatively free of sand or other fine particles immediately after the screen has received an air blast.

*After Driscoll, F.E. Ground-water and Wells Second Edition, Johnson Division, St. Paul, MN., 1986, P. 507-514