N60478.AR.001087
NWS EARLE
5090.3a

PROPOSED PLAN OPERABLE UNIT 3 (OU3) SITE 26 NWS EARLE NJ
3/1/1997
BROWN & ROOT ENVIRONMENTAL

Proposed Plan
Operable Unit 3 (OU-3)
Site 26

Naval Weapons Station Earle
Colts Neck, New Jersey

Northern Division
Naval Facilities Engineering Command

March 1997

Brown & Root Environmental
A Division of Halliburton NUS Corporation

7695-5.2-004

~~7452~~

Brown & Root Environmental

Clark Avenue, Suite 3
King of Prussia, PA 19406-1433

(610) 491-9688
FAX: (610) 491-9645

BRPH\51-12-7-23

December 12, 1997

Mr. J. Kolicius, Code 1821
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop No. 82
Lester, Pennsylvania 19113-2090

Reference: Contract No. N62472-90-D-1298 (CLEAN)
Contract Task Order (CTO) No 279

Subject: Submission of Final Proposed Remedial Action Plan for OU-3 (Site 26)
NWS Earle - Colts Neck, New Jersey

Dear Mr. Kolicius:

Brown and Root (B&R) Environmental is pleased to provide 11 copies of the subject document. At your request, we are providing Sharon Jaffess, of the United States Environmental Protection Agency (EPA), Region II, with three copies, Bob Marcolina, of New Jersey Department of Environmental Protection, with three copies, Greg Goepfert of NWS Earle with two copies, and you with three copies.

This revised document reflects Navy preference for proposed remediation of Site 26.

Thank you for this opportunity to submit the subject document. Do not hesitate to contact me if you have questions or require revisions.

Sincerely,

Russ Turner

Russell E. Turner
Project Manager

RET/ejc

c: Greg Goepfert (NWS Earle)
Sharon Jaffess (EPA Region II)
Robert Marcolina (NJDEP)
John Trepanowski, P.E. (B&R Environmental)
Garth Glenn (B&R Environmental)
File

DOCS/NAVY/7452/077106

Department of the Navy

Proposed Remedial Action Plan for OU-3

Naval Weapons Station (NWS) Earle
Colts Neck, New Jersey **March 1997**

NAVY ANNOUNCES PROPOSED REMEDIAL ACTION PLAN

This Proposed Plan summarizes the findings of the Operable Unit 3 (OU-3) **feasibility study** (FS) report, identifies the clean-up alternative preferred by the Navy and the United States Environmental Protection Agency (EPA), and explains the reasons for this preference. In addition, this Proposed Plan explains how the public can participate in the decision-making process and provides addresses for the appropriate Navy contacts.

The Department of the Navy has completed an FS for OU-3 addressing contamination associated with Site 26 at Naval Weapons Station (NWS) Earle in Colts Neck, New Jersey. Sites 4, 5, and 19 are also included in the FS; however, separate Proposed Plans address OU-1 (Sites 4 and 5) and OU-2 (Site 19) remediation.

The FS was completed as part of the Navy's Installation Restoration Program (IRP) and the Superfund Remedial Program. Prior to the FS, the Navy performed **remedial investigation** (RI) and human health and ecological risk assessment. The purpose of the FS was to evaluate the clean-up alternatives available for Sites 4, 5, 19, and 26.

PUBLIC PARTICIPATION IS ENCOURAGED

This Proposed Plan is issued by the Navy, the lead agency for the IRP and Superfund activities at the NWS Earle facility, and by EPA, the support agency for Superfund activities. After the public comment period has ended and after any comments have been reviewed and considered, the Navy and EPA will select a remedy for Site 26.

NOTE: A glossary of relevant technical and regulatory terms is provided at the end of this Proposed Plan. These terms are initially indicated in **boldface** within the Proposed Plan.

NAVY'S RESPONSIBILITY

The Navy is issuing this Proposed Plan as part of its public participation responsibilities under the Superfund law and, in particular, Sections 113(k), 117(a), and 121(f) of the **Comprehensive Environmental Response, Compensation, and Liability Act** (CERCLA); commonly referred to as Superfund) as amended by the Superfund Amendments and Reauthorization Act (SARA) and Section 300.430(f) of the **National Contingency Plan** (NCP).

DOCS/NAVY/7452/027010

The Navy, under a Federal Facilities Agreement (FFA) with the EPA, is in the process of completing the Remedial Investigation and Feasibility Study (RI/FS) of 27 known or suspected waste disposal sites at NWS Earle. This Proposed Plan summarizes results and presents recommendations for one of the 27 sites under study, Site 26.

This document summarizes information that can be found in greater detail in the FS report and RI report for NWS Earle, as well as other site documents contained in the **Administrative Record** file for this site. The Navy invites the public to review the available materials and to comment on the Proposed Plan during the public comment period.

The Administrative Record file is available at the

Monmouth County Library, Eastern Branch
Route 35, Shrewsbury, New Jersey

PUBLIC MEETING DATE

A public meeting to discuss this Proposed Plan will be held on April 24, 1997 at 7:00 PM at the Colts Neck Courthouse. The meeting date will also be published in the *Asbury Park Press.*

The Navy, in consultation with EPA, may modify the preferred alternative or select another remedy presented in this Proposed Plan of the FS report for OU-3 based on new information or from the public comments. **The public is encouraged to review and comment on all the alternatives identified here.**

SITE BACKGROUND

NWS Earle is located in Monmouth County, New Jersey, approximately 47 miles south of New York City. The station consists of two areas, the 10,248-acre Main Base (Mainside area), located inland, and the 706-acre Waterfront area (see Figure 1). The two areas are connected by a Navy-controlled right-of-way.

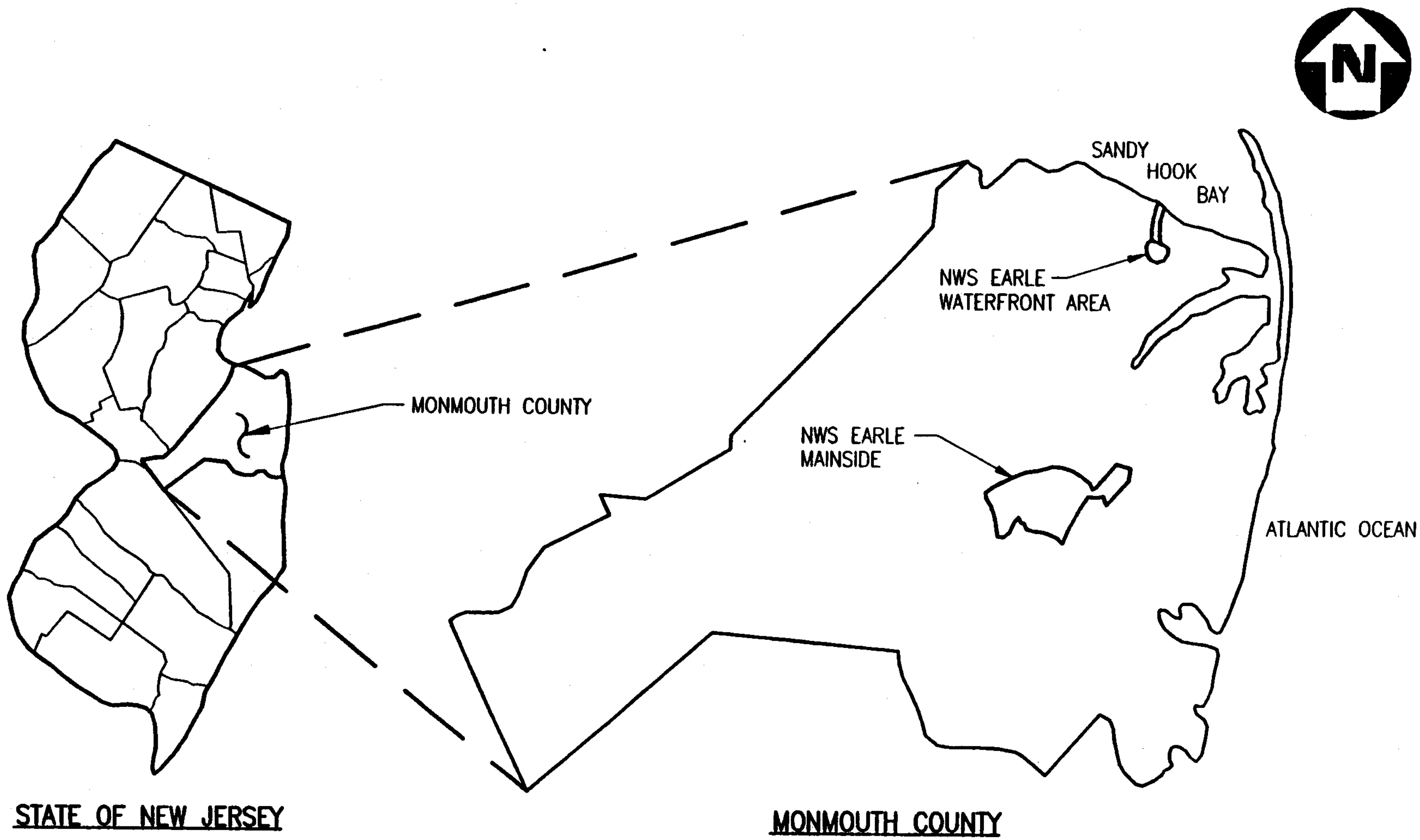
Commissioned in 1943, the facility's primary mission is to supply ammunition to the naval fleet. An estimated 2,500 people either work or live at the NWS Earle station.

The Mainside area is located in Colts Neck Township, which has a population of approximately 6,500 people. The surrounding area includes agricultural land, vacant land, and low-density housing. The Mainside area consists of a large, undeveloped portion associated with ordnance operations, production, and storage. Other land use in the Mainside area consists of residences, offices, workshops, warehouses, recreational space, open space, and undeveloped land. Site 26 is located in the Mainside area (Figure 2). A brief description of Site 26 follows.

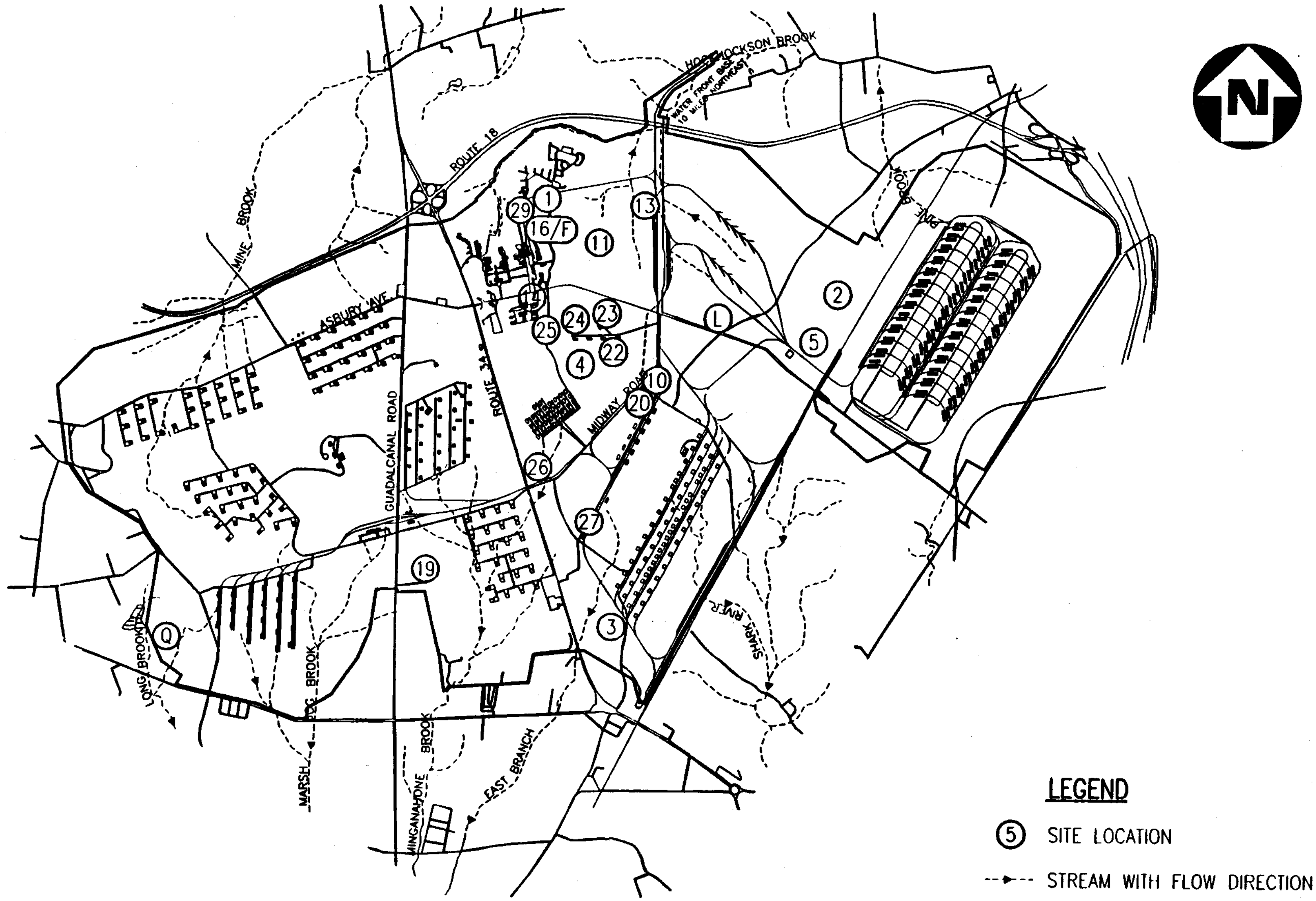
The Waterfront area is located in Middletown Township, which has a population of approximately 68,200 people.

Site 26: Explosive "D" Washout Area

Site 26, which is approximately 200 by 200 feet in size, is situated at the intersection of Macassar and Midway Roads (Figure 3). Two railway lines adjacent to the site run toward the northeast. The ground surface at the site is relatively flat, approximately 150 feet above mean sea level (MSL).



DRAWN BY DATE MRM 1/7/97	Brown & Root Environmental	CONTRACT NO.	OWNER NO.
CHECKED BY DATE RET 1/7/97	REGIONAL SITE MAP	APPROVED BY DATE	
COST/SCHED.-AREA	NAVAL WEAPONS STATION EARLE	APPROVED BY DATE	
SCALE NOT TO SCALE	COLTS NECK, NEW JERSEY	DRAWING NO. FIGURE 1	REV.



0 5,000 10,000

SCALE IN FEET

DRAWN BY	DATE
MRM	1/7/97
CHECKED BY	DATE
RET	1/7/97
COST/SCHED.-AREA	
SCALE 1"=5000'	

Brown & Root Environmental

MAINSIDE SITE LOCATIONS
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

CONTRACT NO.	OWNER NO.
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 2	REV.

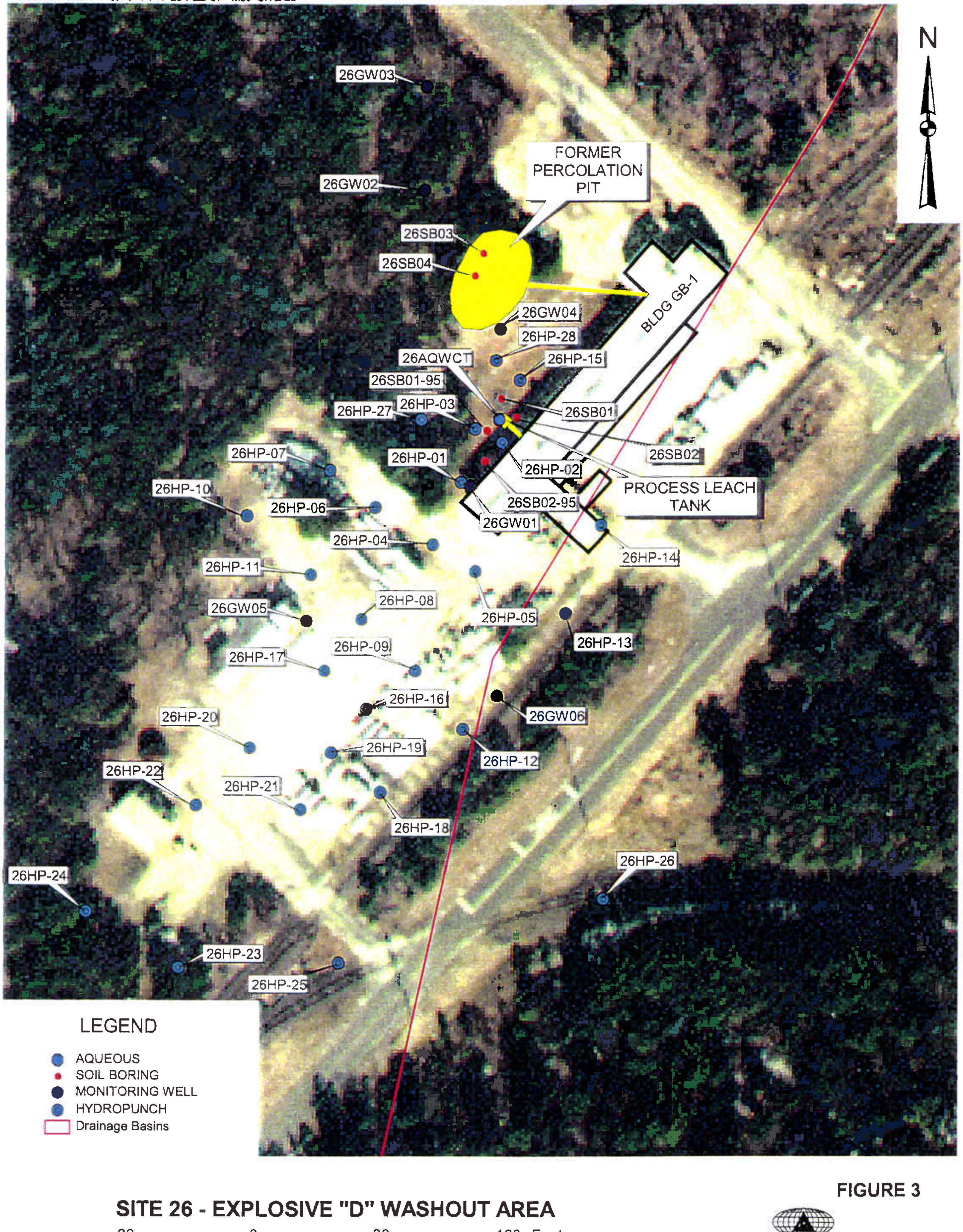


FIGURE 3

SITE 26 - EXPLOSIVE "D" WASHOUT AREA

Brown & Root Environmental

00505B01Y

A percolation pit in the center of the site measures approximately 30 feet in diameter and 10 feet in depth. A tile-lined open pipe runs from Building GB-1 to the percolation pit. A process leaching system north of the western end of Building GB-1, thought to consist of a grease trap and a cesspool-type leach tank, was used for process waste disposal.

For one year in the late 1960s, the site was used for the removal and recovery of ammonium picrate (known as explosive D) from artillery shells. The water-soluble explosive was removed from the shells by a hot water wash. The resulting solution flowed into a cooling/settling tank inside the building. Upon cooling, the ammonium picrate precipitated and was collected for reuse or disposal. Overflow from the settling tank flowed into the tile-lined open pipe to the percolation pit.

GB-1 reportedly was used for the reconditioning of munition casings/shells. Solvents were used in the reconditioning process. Spent solvents and wash waters were discarded into an unknown receptacle, possibly a collection tray at the formerly used paint spray booth, which drained to the process leaching system. The BG-1 process leaching system appears to have been used for the disposal of **trichloroethene** (TCE), **1,2-dichloroethene** (1,2-DCE), or related compounds.

STUDIES AND RESULTS

Potential hazardous substance releases at Site 26 were addressed in an **Initial Assessment Study** (IAS) in 1982, a **Site Inspection Study** (SI) in 1986, and a Phase I RI in 1993. These were preliminary investigations to determine the number of sources, compile histories of waste-handling and disposal practices at the site, and acquire data on the types of contaminants present and potential human health and/or environmental receptors. RI investigations at Site 26 included the installation and sampling of monitoring wells and collection and analysis of surface soils.

In 1990, NWS Earle was placed on the **National Priorities List** (NPL). This list includes sites where uncontrolled hazardous substance releases may potentially present serious threats to human health and the environment.

Site 26 was subsequently addressed by Phase II RI activities to determine the nature and extent of contamination. Activities included a soil gas survey at 68 locations, installation and sampling of groundwater monitoring wells, soil sampling, "direct push" groundwater sampling with on-site laboratory analysis, and cone penetrometer studies to delineate subsurface soil stratigraphy. The Phase II RI was initiated in 1995 and completed in 1996.

SI Results

Groundwater was analyzed for picric acid (the form of ammonium picrate found in groundwater) and pH. Picric acid was not detected and pH was within expected levels.

Phase I Remedial Investigation

Lead was detected at levels greater than background but below screening guidance levels in soil samples collected from the percolation pit. All other metals were within normal background ranges. Picric acid (the ammonium picrate analogue in soils) was detected in one sample. No other explosive compounds were detected.

Groundwater samples from all Site 26 wells were collected and analyzed for **Target Compound List/Target Analyte List** (TCL/TAL) analytes and explosive compounds. TCE was detected in the sample from MW26-01 at elevated levels (660 ug/L). Other **volatile organic compounds** (VOCs), such as dichloroethenes (related to TCE as impurities or breakdown products), were also present. The source of TCE was speculated to be associated with the process leaching system of Building GB-1. Low concentrations of several explosive compounds were detected in samples from wells MW26-01 and MW26-04.

Phase II Remedial Investigation

Natural background levels of metals in local soils and groundwater were determined during the RI using samples obtained from locations chosen as being isolated from former or present industrial or military operations. In general, background sample locations were hydraulically upgradient or far removed from potential sources of contamination. In order to compare site-related groundwater metals concentrations found in a specific geologic formation to naturally occurring (background) levels found in the similar distinct geologic formation, some existing facility monitoring well sample results were selected for use as "background". All monitoring wells used in the calculation of background concentrations were deemed to have been installed in "background" locations (upgradient of RI sites). The Navy, EPA, and NJDEP collaborated in the selection of all background sample locations. The process of background concentration determination and statistical evaluation is presented in section 31 of the RI report.

Concentrations of most metals in site-related subsurface soil samples were within the same ranges as background samples. Antimony was detected at low levels, near the instrument detection limit, in two site-related subsurface soil samples but was not found in background samples. Barium was detected in one site-related sample at levels greater than the concentration range associated with background samples but below the corresponding regulatory screening guidance level.

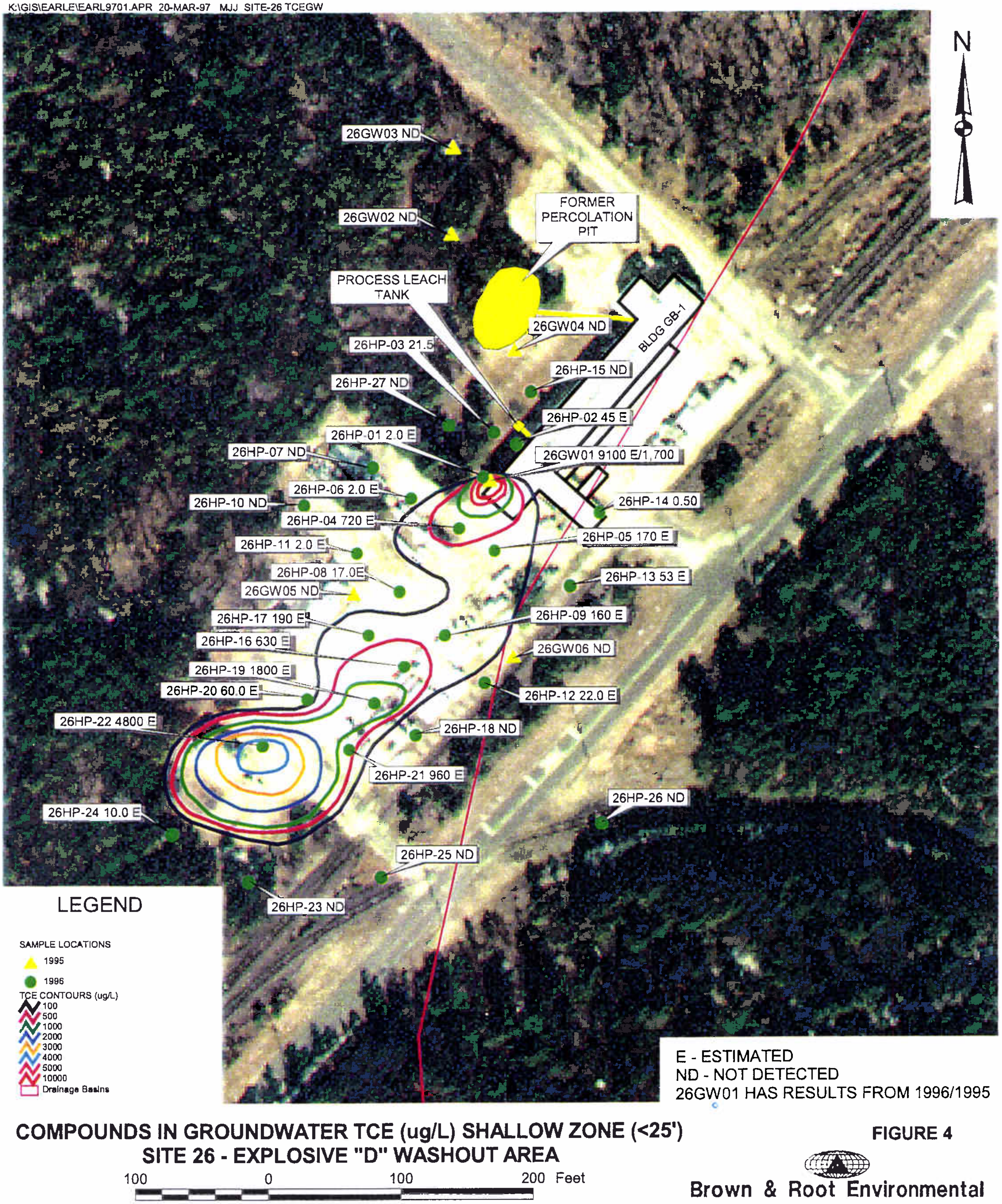
In soil borings taken near the process leach tank, TCE (up to 74.0 ug/kg) and 1,2-dichloroethene (up to 140 ug/kg) were found at concentrations above New Jersey soil criteria.

Groundwater samples were collected from monitoring wells and by direct-push groundwater sampling methods across Site 26. TCE, 1,2-DCE, and related compounds were encountered at significant concentrations in a wide plume (approximately 350 feet by 130 feet) of contaminated groundwater southwest of Building GB-1. Subsurface soil stratigraphy studies indicate the presence of a 15-feet-thick clay layer at a depth of approximately 25 to 40 feet below Site 26. Based on vertical profile sampling, the semi-confining clay layer appears to have limited the vertical migration of TCE and related compounds.

Figures 4, 5, and 6 depict the location and concentration (by depth interval) of affected groundwater below Site 26. The type of contaminants detected and the configuration of the plume implicate the process leach tank as the source of groundwater contamination. Table 1 summarizes the results of samples taken from groundwater compared to applicable standards.

Concentrations of most metals in site-related groundwater samples were within ranges similar to background samples. Zinc was detected in four site-related groundwater samples at levels greater than the concentration range associated with background samples. Barium was found at elevated levels in two samples, and cadmium

K:\GIS\EARLE\EARL9701.APR 20-MAR-97 MJJ SITE-26 TCEGW



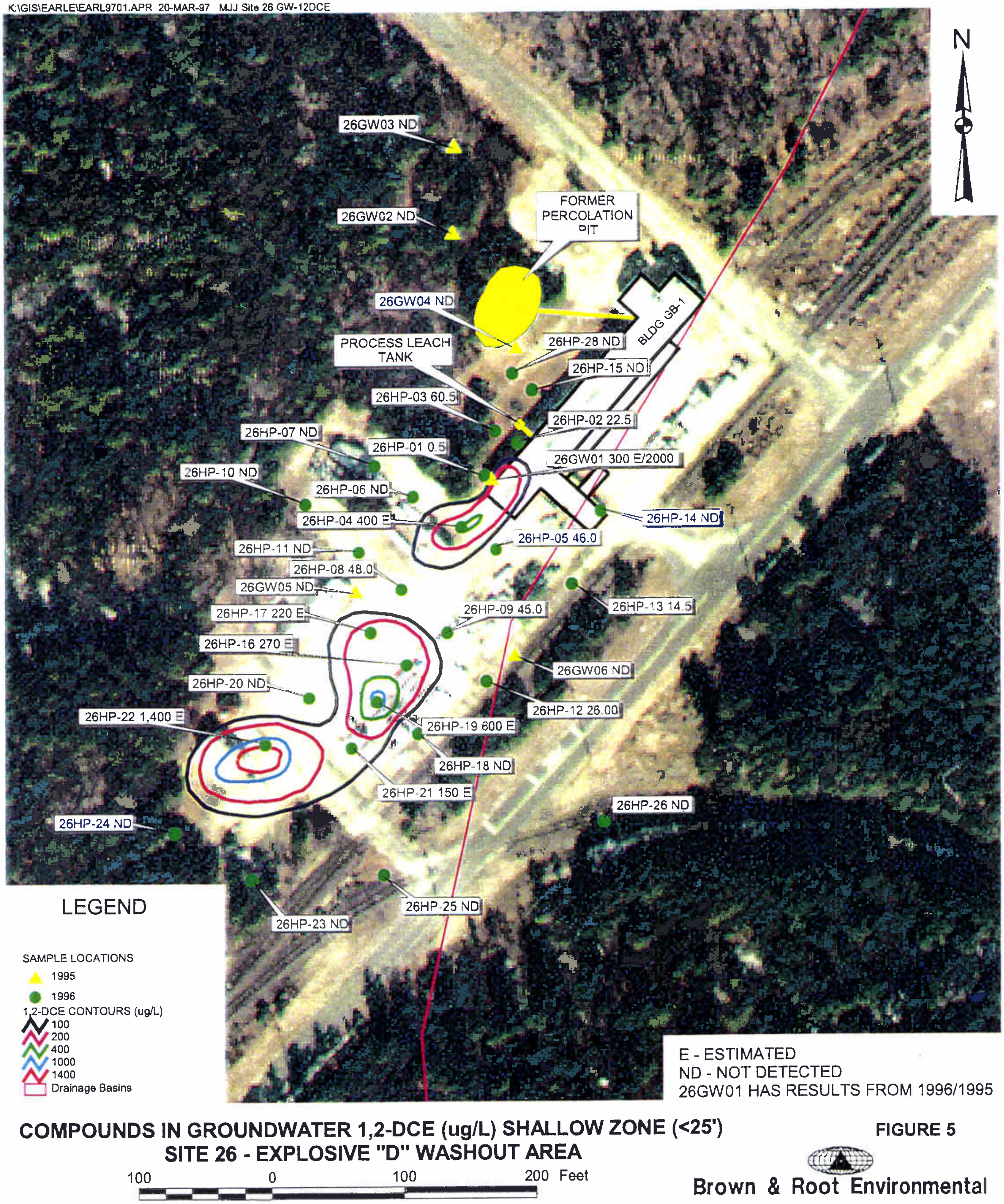
COMPOUNDS IN GROUNDWATER TCE (ug/L) SHALLOW ZONE (<25')
SITE 26 - EXPLOSIVE "D" WASHOUT AREA

FIGURE 4

Brown & Root Environmental

00505BB2Y

K:\GIS\EARLE\EARL9701.APR 20-MAR-97 MJJ Site 26 GW-12DCE

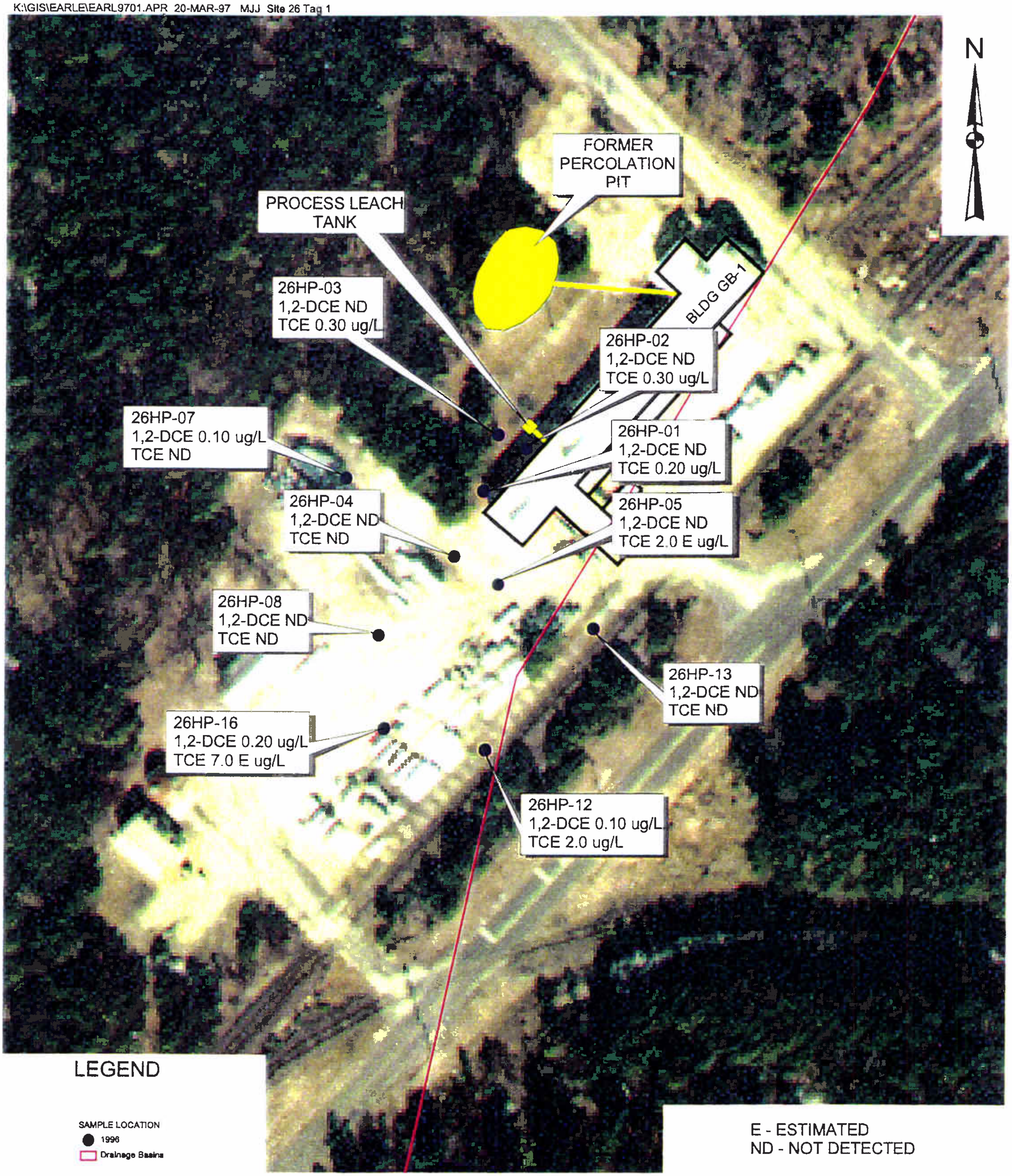


COMPOUNDS IN GROUNDWATER 1,2-DCE (ug/L) SHALLOW ZONE (<25')
SITE 26 - EXPLOSIVE "D" WASHOUT AREA

FIGURE 5

Brown & Root Environmental

K:\GIS\EARLE\EARL9701.APR 20-MAR-97 MJJ Site 26 Tag 1



COMPOUNDS IN GROUNDWATER LOWER ZONE (45-79')
SITE 26 - EXPLOSIVE "D" WASHOUT AREA

80 0 80 160 Feet

FIGURE 6

Brown & Root Environmental

TABLE 1
SITE 26 GROUNDWATER

INORGANICS (UG/L)	Maximum Exceedance	Frequency of Exceedance	ARARs and TBCs: Maximum Contaminant Level (MCL) (ug/L)	ARARs and TBCs: Drinking Water Health Advisory (Lowest Criterion Shown)	ARARs and TBCs: NJDEP Groundwater Quality Standard (ug/L)	Data Exceeding ARARs: 26GW01 1996 RI 10/16/96	26GW02 1995 RI 7/22/95	26GW03 1995 RI 7/22/95	26GW04 1995 RI 7/23/95	26GW05 1995 RI 8/15/95	26GW06 1995 RI 8/15/95
ALUMINUM	927	6 / 6	-	-	200		927 J	406 J	328	501 J	460 J
CADMIUM	4	1 / 6	5	5 e	4				4		
IRON	4740	4 / 6	-	-	300		828 J	719 J			373
MANGANESE	155	3 / 6	-	-	50					88	155
1,1-DICHLOROETHENE	5	7 / 87	7	7 a	2						
1,1-DICHLOROETHENE (TOTAL)	2000	11 / 87	70 a	70 a	70	300					
METHYLENE CHLORIDE	8	4 / 87	5	2000 d	3						
TETRACHLOROETHENE	56	9 / 87	5	1000 e	1						
TRICHLOROETHENE	9100	36 / 87	5	-	1	9100					

INORGANICS (UG/L)	Maximum Exceedance	Frequency of Exceedance	ARARs and TBCs: Maximum Contaminant Level (MCL) (ug/L)	ARARs and TBCs: Drinking Water Health Advisory (Lowest Criterion Shown)	ARARs and TBCs: NJDEP Groundwater Quality Standard (ug/L)	Data Exceeding ARARs: 26HP01-23 1996 RI 10/16/96	26HP02-16 1996 RI 10/17/96	26HP02-16 -DUP 1996 RI 10/18/96	26HP03-10 1996 RI 10/17/96	26HP03-10 -DUP 1996 RI 10/18/96	26HP04-15 1996 RI 10/22/96
ALUMINUM	927	6 / 6	-	-	200						
CADMIUM	4	1 / 6	5	5 e	4						
IRON	4740	4 / 6	-	-	300						
MANGANESE	155	3 / 6	-	-	50						
1,1-DICHLOROETHENE	5	7 / 87	7	7 a	2						4
1,1-DICHLOROETHENE (TOTAL)	2000	11 / 87	70 a	70 a	70					73	400
METHYLENE CHLORIDE	8	4 / 87	5	2000 d	3						
TETRACHLOROETHENE	56	9 / 87	5	1000 e	1						
TRICHLOROETHENE	9100	36 / 87	5	-	1	2	12	78	26	17	430

J = Value is estimated because the concentration is below the laboratory contract quantitation limit or because of data validation quality control criteria.
a = The listed health advisory criterion, lifetime adult, is equal to the most stringent of the EPA health advisories for this chemical
d = The listed health advisory criterion, ten-day child, is equal to the most stringent of the EPA health advisories for this chemical.
e = The listed health advisory criterion, long term child, is equal to the most stringent of the EPA health advisories for this chemical.

TABLE 1
SITE 26 GROUNDWATER

	Maximum Exceedance	Frequency of Exceedance	ARARs and TBCs: Maximum Contaminant Level (MCL) (ug/L)	ARARs and TBCs: Drinking Water Health Advisory (Lowest Criterion Shown)	ARARs and TBCs: NJDEP Groundwater Quality Standard (ug/L)	Data Exceeding ARARs: 26HP04-25 1996 RI 10/22/96	26HP05-15 1996 RI 10/22/96	26HP05-20 1996 RI 10/22/96	26HP05-68 1996 RI 10/23/96	26HP06-15 1996 RI 10/22/96	26HP08-15 1996 RI 10/23/96
INORGANICS (UG/L)											
ALUMINUM	927	6 / 6	-	-	200						
CADMIUM	4	1 / 6	5	5 e	4						
IRON	4740	4 / 6	-	-	300						
MANGANESE	155	3 / 6	-	-	50						
1,1-DICHLOROETHENE	5	7 / 87	7	7 a	2	3					
1,1-DICHLOROETHENE (TOTAL)	2000	11 / 87	70 a	70 a	70	380					
METHYLENE CHLORIDE	8	4 / 87	5	2000 d	3						
TETRACHLOROETHENE	56	9 / 87	5	1000 e	1						
TRICHLOROETHENE	9100	36 / 87	5	-	1	720	170	5	2	2	12

	Maximum Exceedance	Frequency of Exceedance	ARARs and TBCs: Maximum Contaminant Level (MCL) (ug/L)	ARARs and TBCs: Drinking Water Health Advisory (Lowest Criterion Shown)	ARARs and TBCs: NJDEP Groundwater Quality Standard (ug/L)	Data Exceeding ARARs: 26HP08-23 1996 RI 10/23/96	26HP09-15 1996 RI 10/23/96	26HP09-22 1996 RI 10/23/96	26HP11-18 1996 RI 10/23/96	26HP12-22 1996 RI 10/23/96	26HP12-50 1996 RI 10/24/96
INORGANICS (UG/L)											
ALUMINUM	927	6 / 6	-	-	200						
CADMIUM	4	1 / 6	5	5 e	4						
IRON	4740	4 / 6	-	-	300						
MANGANESE	155	3 / 6	-	-	50						
1,1-DICHLOROETHENE	5	7 / 87	7	7 a	2						
1,1-DICHLOROETHENE (TOTAL)	2000	11 / 87	70 a	70 a	70						
METHYLENE CHLORIDE	8	4 / 87	5	2000 d	3						6
TETRACHLOROETHENE	56	9 / 87	5	1000 e	1					2	
TRICHLOROETHENE	9100	36 / 87	5	-	1	17	160	120	2	22	3

J = Value is estimated because the concentration is below the laboratory contract quantitation limit or because of data validation quality control criteria.
a = The listed health advisory criterion, lifetime adult, is equal to the most stringent of the EPA health advisories for this chemical
d = The listed health advisory criterion, ten-day child, is equal to the most stringent of the EPA health advisories for this chemical.
e = The listed health advisory criterion, long term child, is equal to the most stringent of the EPA health advisories for this chemical.

TABLE 1
SITE 26 GROUNDWATER
Page 3 of 4

INORGANICS (UG/L)	Maximum Exceedance	Frequency of Exceedance	ARARs and TBCs: Maximum Contaminant Level (MCL) (ug/L)	ARARs and TBCs: Drinking Water Health Advisory (Lowest Criterion Shown)	ARARs and TBCs: NJDEP Groundwater Quality Standard (ug/L)	Data Exceeding ARARs: 26HP13-14 1996 RI 10/23/96	Data Exceeding ARARs: 26HP13-14 -DU2 1996 RI 10/23/96	Data Exceeding ARARs: 26HP13-14 -DUP 1996 RI 10/23/96	Data Exceeding ARARs: 26HP13-22 1996 RI 10/23/96	Data Exceeding ARARs: 26HP13-22 -DUP 1996 RI 10/23/96	Data Exceeding ARARs: 26HP15-23 1996 RI 10/23/96
ALUMINUM	927	6 / 6	-	-	200						
CADMIUM	4	1 / 6	5	5 e	4						
IRON	4740	4 / 6	-	-	300						
MANGANESE	155	3 / 6	-	-	50						
1,1-DICHLOROETHENE	5	7 / 87	7	7 a	2						
1,1-DICHLOROETHENE (TOTAL)	2000	11 / 87	70 a	70 a	70						
METHYLENE CHLORIDE	8	4 / 87	5	2000 d	3						4
TETRACHLOROETHENE	56	9 / 87	5	1000 e	1	5			2	3	
TRICHLOROETHENE	9100	36 / 87	5	-	1	47	58	59			

INORGANICS (UG/L)	Maximum Exceedance	Frequency of Exceedance	ARARs and TBCs: Maximum Contaminant Level (MCL) (ug/L)	ARARs and TBCs: Drinking Water Health Advisory (Lowest Criterion Shown)	ARARs and TBCs: NJDEP Groundwater Quality Standard (ug/L)	Data Exceeding ARARs: 26HP16-15 1996 RI 10/24/96	Data Exceeding ARARs: 26HP16-23 1996 RI 10/24/96	Data Exceeding ARARs: 26HP16-71 1996 RI 10/24/96	Data Exceeding ARARs: 26HP17-15 1996 RI 10/24/96	Data Exceeding ARARs: 26HP17-24 1996 RI 10/24/96	Data Exceeding ARARs: 26HP19-15 1996 RI 10/24/96
ALUMINUM	927	6 / 6	-	-	200						
CADMIUM	4	1 / 6	5	5 e	4						
IRON	4740	4 / 6	-	-	300						
MANGANESE	155	3 / 6	-	-	50						
1,1-DICHLOROETHENE	5	7 / 87	7	7 a	2		4				
1,1-DICHLOROETHENE (TOTAL)	2000	11 / 87	70 a	70 a	70		270			220	110
METHYLENE CHLORIDE	8	4 / 87	5	2000 d	3	8					6
TETRACHLOROETHENE	56	9 / 87	5	1000 e	1						
TRICHLOROETHENE	9100	36 / 87	5	-	1	89	630	7	52	190	720

J = Value is estimated because the concentration is below the laboratory contract quantitation limit or because of data validation quality control criteria.
a = The listed health advisory criterion, lifetime adult, is equal to the most stringent of the EPA health advisories for this chemical
d = The listed health advisory criterion, ten-day child, is equal to the most stringent of the EPA health advisories for this chemical.
e = The listed health advisory criterion, long term child, is equal to the most stringent of the EPA health advisories for this chemical.

TABLE 1
SITE 26 GROUNDWATER

	Maximum Exceedance	Frequency of Exceedance	ARARs and TBCs			Data Exceeding ARARs			
			Maximum Contaminant Level (MCL) (ug/L)	Drinking Water Health Advisory (Lowest Criterion Shown)	NJDEP Groundwater Quality Standard (ug/L)	26HP19-21 1996 RI 10/24/96	26HP20-24 1996 RI 10/25/96	26HP21-16 1996 RI 10/25/96	26HP21-24 1996 RI 10/25/96
INORGANICS (UG/L)									
ALUMINUM	927	6 / 6	-	-	200				
CADMIUM	4	1 / 6	5	5 e	4				
IRON	4740	4 / 6	-	-	300				
MANGANESE	155	3 / 6	-	-	50				
1,1-DICHLOROETHENE	5	7 / 87	7	7 a	2	3	4		
1,1-DICHLOROETHENE (TOTAL)	2000	11 / 87	70 a	70 a	70	600			150
METHYLENE CHLORIDE	8	4 / 87	5	2000 d	3				
TETRACHLOROETHENE	56	9 / 87	5	1000 e	1	2			2
TRICHLOROETHENE	9100	36 / 87	5	-	1	1800	60	2	960

J = Value is estimated because the concentration is below the laboratory contract quantitation limit or because of data validation quality control criteria.
a = The listed health advisory criterion, lifetime adult, is equal to the most stringent of the EPA health advisories for this chemical
d = The listed health advisory criterion, ten-day child, is equal to the most stringent of the EPA health advisories for this chemical.
e = The listed health advisory criterion, long term child, is equal to the most stringent of the EPA health advisories for this chemical.

and silver were detected in one sample at levels greater than background ranges. However, soil sampling results show no evidence of a source area of these contaminants, there is no evidence that these metals were used at significant concentrations or disposed of at the site, detections of metals in groundwater were sporadic over time and by location, and the risk assessment did not show these compounds to be the risk drivers.

Explosives were analyzed for but not detected in groundwater samples collected at Site 26, indicating that the one low level of picric acid found in soil during Phase I investigations (1992-1993) had no impact on groundwater and most likely was an isolated occurrence.

SUMMARY OF SITE RISKS

As part of the Phase II RI, a human health risk assessment and ecological risk assessment were performed.

Human Health Risks

A four-step process is utilized to assess site-related human health risks for a reasonable maximum exposure scenario:

- Hazard Identification -- identifies the contaminants of concern at the site based on factors such as toxicity, frequency of occurrence, and concentration.

- Exposure Assessment -- estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated well-water) by which humans are potentially exposed.

- Toxicity Assessment -- determines the types of adverse health effects associated with chemical exposures and the relationship between the magnitude of exposure (dose) and the severity of adverse effects (response).

- Risk Characterization -- summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks.

The baseline risk assessment began with the selection of contaminants of concern that would be representative of site risks. These contaminants included 1,2-dichloroethene and tetrachloroethylene, among others. Several of the contaminants are known to cause cancer in laboratory animals and are suspected or known to be human carcinogens.

The human health risk assessment estimates the potential risks to human health posed by exposure to contaminated groundwater and surface and subsurface soils at the site. To assess these risks at Site 26, the exposure scenarios listed below were assumed:

- Ingestion of groundwater as a drinking water source.

- Inhalation of contaminants in groundwater (i.e., volatile compounds emitted during showering).

- Dermal exposure to contaminants in groundwater (i.e., showering, hand washing, bathing).

- Dermal contact from contaminated soils.

- Inhalation of contaminants in soil (i.e., fugitive dusts).
- Incidental ingestion of contaminated soils.

These scenarios were applied to various site use categories, including current industrial use, future industrial use, future lifetime resident.

Potential human health risks are categorized as **carcinogenic** or **noncarcinogenic**. A hypothetical carcinogenic risk increase, based on a hypothetical exposure over a 70-year lifetime under the specific exposure scenario, should ideally fall below a risk range of 1×10^{-6} (an increase of one case of cancer for one million people exposed) to 1×10^{-4} (an increase of one case of cancer per 10,000 people exposed).

To assess the overall potential for noncarcinogenic effects posed by more than one contaminant, EPA has developed a **Hazard Index** (HI). The HI measures the assumed simultaneous subthreshold exposures to several chemicals that could result in an adverse health effect. When the HI exceeds one, there may be concern for potential noncarcinogenic health effects. Chemicals with corresponding HIs exceeding 1 included TCE and 1,2-DCE.

The approach to estimate lead risk is different from the cancer and non-cancer approach. Exposure to lead is based on the potential for 95 percent of the children to have blood-lead levels exceeding the Centers for Disease Control and Prevention (CDC) recommendation that children under age 6 should not have blood lead levels greater than 10 micrograms/deciliter. This blood-lead level is associated with a soil concentration of 400 ppm.

In addition, results are compared to applicable federal and/or state standards such as federal **Maximum Contaminant Levels** (MCLs) for drinking water, New Jersey Department of Environmental Protection (NJDEP) **Groundwater Quality Standards** (GWQS), or other published lists of reference values.

The cancer risks associated with future residential receptors exposed to groundwater exceeded 1E-04, the upper end of the target risk range.

Estimates for noncancer risks associated with future industrial and future residential (groundwater) exposure scenarios exceeded 1.0, the cutoff point below which adverse noncarcinogenic effects are not expected to occur. VOCs (TCE and DCE) are the primary risk drivers.

Lead concentrations detected at the site during the RI were below the EPA guidelines and are not expected to be associated with a significant increase in blood-lead levels.

Ecological Risks

The ecological risk assessment estimates the risk posed to ecological receptors, such as aquatic and terrestrial biota, from contamination at Site 26.

Site 26 is relatively small and consists of turfgrass or developed areas such as open storage or vehicle parking areas that provide little ecological habitat. Wooded uplands are present northwest of the site. These upland areas provide excellent habitat for a wide variety of terrestrial organisms. No wetlands, other sensitive habitats, or threatened or endangered species of any kind exist in the vicinity of Site 26.

No significant contaminant migration pathways to the upland habitats exist at the site. Water in the process leach tank/grease trap area is not expected to migrate via overland runoff to the upland areas since water tends to settle in this area, and the wooded areas are a few feet higher on grade than the area next to Building GB-1. Groundwater discharge of contaminants to surface water is also insignificant since no wetlands or other surface waters are present near the site.

REMEDIAL ACTION OBJECTIVES (RAOs)

The overall objective for the remedy at Site 26 is to protect human health and the environment.

Based on the baseline human health risk assessment, the ecological risk assessment, and the RI results, **RAOs** were developed to address contaminated environmental media (soils and groundwater) present at the NWS Earle OU-3, Site 26.

RI data indicate the presence of a TCE and 1,2-DCE plume at concentrations that exceed the GWQS. It is likely that the suspected source of TCE and 1,2-DCE, the process leach tank and associated contaminated soils, is contributing to groundwater contamination at Site 26.

Risk analysis of the RI data and comparison with the state GWQS and background concentrations, and the single detection of a cadmium concentration slightly higher than GWQS in 26MW-04, indicate that no further remedial actions are warranted to address metals in groundwater at Site 26.

RAOs Selection

The following remedial action objectives have been selected for Site 26:

Protection of Human Health RAO

Prevent potential human exposures to contaminated groundwater.

Protection of the Environment RAO

Mitigate VOC contaminants in groundwater.

Alternatives Development and Screening

The purpose of the alternatives development and screening process is to assemble an appropriate range of possible remedial options to achieve the RAOs identified for the site. In this process, technically feasible technologies are combined to form remedial alternatives that provide varying levels of risk reduction that comply with federal (EPA) and state (NJDEP) guidelines for site remediation.

The following eight criteria, as established by the NCP, were used for the detailed analysis of alternatives:

- Overall protection of human health and the environment.
- Compliance with **ARARs**.
- Long-term effectiveness and permanence.
- Reduction of mobility, toxicity, or volume through treatment.
- Short-term effectiveness.
- Implementability.
- Cost.
- State Concurrence.

The other evaluation criteria, community acceptance, will be addressed in the Record of Decision following the receipt of public comments.

Based on the nature of contamination and site conditions, the standards that will be used to gauge the achievement of remedial action objectives will be the New Jersey GWQS, Direct Contact Soil Cleanup Criteria, and the Impact to Groundwater Soil Cleanup Criteria. A complete discussion of all applicable, relevant and "to be considered" regulatory criteria is in the FS.

Engineering technologies capable of eliminating the unacceptable risks associated with exposure to site-related soils or groundwater were identified, and those alternatives determined to best meet RAOs after screening were evaluated in detail. Table 2 presents the considered alternatives and the results of screening.

Detailed Summary of Alternatives

Summaries of the remedial alternatives that passed the screening step for Site 26 are presented in the following sections.

<u>Alternative 1: No Action</u>

The no-action alternative was developed as a baseline to which other alternatives may be compared, as required by the NCP. No remedial actions would be taken to protect human health or the environment. The purpose of this alternative is to evaluate the overall human health and environmental protection provided by the site in its present state. No measures would be implemented to remove or contain the suspected contaminant source (the process leach tank and associated soils), to prevent potential human exposure to site groundwater, or to mitigate contaminant migration in the environment. Periodic reviews of site conditions, typically every 5 years, and long-term monitoring of groundwater would be conducted under this alternative.

<u>Cost</u>

Capital costs associated with the no-action alternative ($14,100) have been included in the first-year operation and maintenance (O&M) cost. The average annual O&M cost for long-term monitoring is $12,720, and 5-year reviews are $15,500 per event. Over a 30-year period, the net present-worth cost is $204,488 (a discount rate of 7 percent was used in all alternative cost calculations).

<u>Alternative 2: Source Removal, Institutional Controls, and Long-Term Monitoring</u>

Alternative 2 relies on source removal and institutional controls to limit exposures to hazardous substances. No engineered treatment or containment would be employed to address contaminated groundwater; however, the suspected contaminant source (the process leach tank and associated soils) would be removed to abet natural attenuation of groundwater contamination. Institutional controls would be used to preclude use of untreated groundwater. Long-term monitoring would be conducted to monitor natural attenuation effectiveness and potential threats to human health and the environment. Site conditions and risks would be reviewed every 5 years.

Alternative 2 would provide protection of human health through suspected source removal and use of institutional controls to restrict consumption of treated contaminated groundwater until groundwater criteria are met. Groundwater contaminants would decrease through natural attenuation over time. The effectiveness of this protection would depend upon enforcement of institutional controls, because no actions would be taken to accelerate cleanup of contaminated groundwater. Using the data available and a

TABLE 2
SITE 26 - SCREENING OF REMEDIAL ALTERNATIVES
FEASIBILITY STUDY
NWS EARLE, COLTS NECK, NEW JERSEY

	ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	COST	COMMENTS
1	No Action: (Long-Term Monitoring and Five-Year reviews)	Provides no additional protection of human health or the environment. Does not reduce potential for human exposure to contaminants in groundwater. Does not reduce contaminant migration in the environment. No reduction in toxicity, mobility, or volume of contaminants.	Readily implementable. No technical or administrative difficulties.	Capital: none O&M: low	Retained as baseline alternative in accordance with NCP.
2	Source Removal, Institutional Controls, Long-Term Monitoring, Five-Year Reviews	Protects of human health and the environment through institutional controls and natural attenuation. Groundwater use would be restricted. Would offer reduction of contaminant leaching to groundwater through source removal. Reduction in toxicity, mobility, or volume of contaminants through treatment only through source treatment. Groundwater contaminants would naturally attentuate over time.	Readily implementable. No technical or administrative difficulties.	Capital: low O&M: low	Relative to Alt. 1, provides greater protectiveness in the long term. Would result in reduction of groundwater contaminant levels. Retained.
3	Reactive Wall Treatment: (Source Removal, In-Situ Groundwater Treatment, Institutional Controls, and Long-Term Monitoring)	Protects human health and the environment by removing the suspected source of VOC contamination leaching to groundwater. Would prevent continuing migration of TCE plume until treatment and natural attenuation remediate the contaminants. Groundwater use would be restricted. Toxicity and volume of contaminants would be reduced through treatment only through source treatment.	Implementable. Reactive wall technology is innovative and is not well developed but offers potential for in-situ treatment with no ex-situ treatment residuals. No technical or administrative difficulties. Personnel and materials necessary to implement alternative are limited; currently, only one commercial firm available to implement full-scale construction.	Capital: moderate - high O&M: moderate	This technology will likely degrade TCE in the subsurface. May offer comparable degree of protectiveness as Alt. 4. Retained

	ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	COST	COMMENTS
4	Pump-And-Treat: (Source Removal, Groundwater Extraction and Treatment, Institutional Controls, and Long-Term Monitoring)	Protects human health and the environment by removing suspected source of VOC contamination leaching to groundwater. Would actively reduce TCE concentrations in the plume and prevent continuing migration of the TCE plume until extraction/treatment and natural attenuation remediate the contaminants. Groundwater use would be restricted. Toxicity and volume of contaminants would be reduced through treatment.	Readily implementable. Specialized treatment equipment is required but is available from several vendors. No technical or administrative difficulties. Personnel and materials necessary to implement alternative are widely available.	Capital: moderate O&M: moderate	Would employ well-demonstrated treatment process options. Retained as representative treatment alternative.
5	Air Sparging Soil Vapor Extraction: (Source Removal, Institutional Controls, and Long-Term Monitoring)	Protects human health and the environment by removing suspected source of VOC contamination leaching to groundwater. Would actively reduce TCE concentrations in the plume and prevent continuing migration of the TCE plume until extraction/treatment and natural attenuation remediate the contaminants. Groundwater use would be restricted. Toxicity and volume would be reduced through treatment	Implementable technology is well proven and offers potential for active in-situ treatment, depending on actual site conditions. Pre-design and pilot studies would be required, but pilot system could easily be expanded to full-scale system in the field. System requires significant sampling and analysis to gauge impact across the wide volume of soil in the remediation zone.	Capital: moderate O&M moderate to high	This technology set offers the advantage of actively treating the large volume of contaminated media and could require less time than the passive treatment or capture and treatment of the plume at the leading plume edge. This technology requires substantial chemical and biological monitoring to control the process. Retain for further evaluation.

TABLE 2
SITE 26 - SCREENING OF REMEDIAL ALTERNATIVES
FEASIBILITY STUDY
NWS EARLE, COLTS NECK, NEW JERSEY
PAGE 3 OF 3

	ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	COST	COMMENTS
6	Engineered Bioremediation: (Source Removal, In-Situ Engineered Bioremediation, Institutional Controls, and Long-Term Monitoring)	Protects human health and the environment by removing the suspected source of VOC contamination leaching to groundwater. Would actively remediate the entire plume by engineered bioremediation. Groundwater use would be restricted until clean-up levels are achieved. Toxicity and volume of contamination would be reduced through treatment	Implementable, although technology is patented. Technology is innovative and has rarely been applied on a full scale but offers potential for in-situ treatment with no ex-situ treatment residuals. Personnel and materials necessary to implement are available; however, it is not clear how licensable the technology is.	Capital: moderate O&M: moderate	This technology has the potential to degrade chlorinated VOCs in the subsurface, in a shorter time frame of all alternatives but Alternative 5. However, technology development is limited, and its licensability is uncertain. Because there are two other retained innovative technologies and two active treatment technologies and the ultimate success of engineered bioremediation is uncertain, this technology is eliminated.

best-case groundwater modeling approach, it is estimated that health risks would remain for a period of approximately 45 years, until contaminant concentrations decrease to acceptable levels through natural attenuation. During this time period, the plume will initially expand downgradient with groundwater flow. If groundwater use restrictions were not adequately enforced during the period of remediation, potential receptors could be exposed to site risks.

Periodic long-term monitoring would be conducted to assess contaminant status and potential threats to human health and the environment and to gauge the progress of anticipated natural attenuation. Site conditions and risks would be formally reviewed every 5 years to evaluate remedy progress.

Because site groundwater does not meet New Jersey groundwater quality standards, a classification exception area (CEA) pursuant to N.J.A.C. 7:9-6 would be established to provide the state official notice that the constituent standards will not be met for a specified duration and to ensure that use of groundwater in the affected area is suspended until standards are achieved.

If the excavated process leach tank and/or soils were determined to be hazardous wastes, their handling, management, and off-site transport would be conducted in accordance with RCRA hazardous waste generator and transporter requirements [40 CFR Parts 262 and 263] and New Jersey labeling, records, and transportation requirements [N.J.A.C. 7:26-7].

Under Alternative 2, if it is determined that soils are subject to **RCRA Land Disposal Restrictions** (LDRs) [40 CFR 268], the source materials would be treated off site prior to disposal, in accordance with these regulations. Any wastes determined to be subject to LDRs would be disposed of off site at a **RCRA Subtitle C facility**.

Cost

The capital costs for Alternative 2 total $157,000. The average annual O&M costs are $12,700, and 5-year reviews cost $15,500 per event. Over a 30-year period, the net present-worth cost is $348,000 (at a 7 percent discount rate).

Alternative 3: Reactive Wall Treatment (Source Removal, In-Situ Permeable Reactive Wall, Groundwater Treatment, Institutional Controls, and Long-Term Monitoring)

Alternative 3 employs suspected source removal, in-situ groundwater treatment, and institutional controls to protect human health and the environment. The suspected contaminant source (the process leach tank and associated VOC-contaminated soils) would be removed and the groundwater would be treated in situ using permeable reactive wall technology. Because of the relatively slow groundwater velocity, it is anticipated that a significant portion of the groundwater contaminants would naturally attenuate before they pass through the reactive wall. Institutional controls would be implemented to prevent exposure to contaminated groundwater for the duration of the groundwater treatment period, until GWQS are achieved. Long-term monitoring would be conducted for the duration of the remediation period to assess the effectiveness of the remedial action and to determine when the remediation is complete. Site conditions and risks would be reviewed every 5 years until the groundwater remediation is complete.

A principal component of Alternative 3 is in-situ permeable reactive wall groundwater treatment. This innovative technology utilizes granular iron to break down the chlorinated solvents as the groundwater plume passes through the wall.

Since the plume would be treated in-situ, no pumping would be required and the natural groundwater contours would not be disturbed. The potential for system failure would be minimized because no mechanical or electrical equipment would be used. An array of monitoring wells across the treatment zone would be used to evaluate the effectiveness of the treatment wall and to determine when maintenance is required.

Although this technology is innovative and its long-term track record is limited, several pilot studies have been conducted with impressive results. Full-scale implementation of the technology is underway at several locations. The FS concluded that subsurface conditions at Site 26 are favorable for a reactive wall. The permeable treatment wall would act as a passive treatment barrier, which would effectively prevent off-site migration of contaminated groundwater. Therefore, upon completion of the treatment wall, downgradient receptors would be protected.

The treatment wall would not immediately protect potential receptors of contaminated groundwater beneath Site 26; long-term, permanent protection would be achieved after a treatment duration of approximately 45 years, based on available data and groundwater modeling assuming passive treatment. In the interim, contaminants would be removed both by the treatment wall and natural attenuation.

In the interim period, until remediation goals for site groundwater have been achieved, human health would be protected through use of institutional controls that would restrict use of untreated contaminated groundwater as drinking water. The effectiveness of this interim protection would depend upon adequate enforcement. If groundwater use restrictions were not adequately enforced, existing health risks would remain until groundwater contaminant concentrations decreased to acceptable levels.

If the excavated process leach tank and/or soils were determined to be hazardous wastes, their handling, management, and off-site transport would be conducted in accordance with RCRA hazardous waste generator and transporter requirements [40 CFR Parts 262 and 263] and New Jersey labeling, records, and transportation requirements [N.J.A.C. 7:26-7].

Under Alternative 3, if it is determined that soils are subject to RCRA Land Disposal Restrictions [40 CFR 268], soils would be treated off site prior to disposal, in accordance with these regulations. Any wastes determined to be subject to LDRs would be disposed of off site at a RCRA Subtitle C facility.

Cost

The capital costs for Alternative 3 total $1,637,000. The average annual O&M costs are $60,100 for the first 5 years and $53,100 thereafter, and 5-year reviews cost $28,500 per event. Over a 30-year period, the net present-worth cost is $2,386,000 (at a 7 percent discount rate).

Alternative 4: Pump-And-Treat (Source Removal, Groundwater Extraction, Groundwater Treatment by Air Stripping, Institutional Controls, and Long-Term Monitoring)

Alternative 4 employs suspected source removal, groundwater pumping and treatment, and institutional controls to protect human health and the environment. The suspected contaminant source (the process leach tank and associated VOC contaminated soils) would be removed. A groundwater containment system consisting of groundwater extraction wells would be placed near the downgradient edge of the plume, and the groundwater would be extracted and treated above ground by air stripping. Additional groundwater extraction wells would be placed in the vicinity of the high- concentration plume area, also for groundwater pumping and above-ground treatment. Treated (clean) groundwater would be re-introduced to the aquifer via infiltration galleries downgradient of the extraction point. Institutional controls would be implemented to prevent exposure to contaminated groundwater for the duration of the groundwater treatment period, until GWQS are achieved. Periodic long-term monitoring would be conducted for the duration of the remediation period to assess the effectiveness of the remedial action and to determine when the remediation is complete. Site conditions and risks would be formally reviewed every 5 years until the groundwater remediation is complete.

Alternative 4 would employ source removal and groundwater extraction and treatment to provide long-term protection of human health and the environment. The groundwater extraction system would be designed to prevent off-site migration of contaminated groundwater as well as actively treat the VOC plume. Upon completion of the extraction system, downgradient receptors of contaminated groundwater would be protected. Potential users of contaminated groundwater beneath Site 26 would not be protected by Alternative 4 until groundwater remediation goals were achieved throughout the plume. It is anticipated that long-term, permanent protection would be achieved after a treatment duration of less than 45 years. During this period, groundwater contaminants would be removed both by the extraction system and through natural attenuation. Additional treatment efficiency could be attained by increasing the number of pumping wells, but this benefit would be offset by increased capital and operating costs.

In the interim period, until remediation goals for site groundwater have been achieved, human health would be protected through use of institutional controls that would restrict use of untreated contaminated groundwater as drinking water. The effectiveness of this interim protection would depend entirely upon adequate enforcement. If groundwater use restrictions were not adequately enforced, existing health risks would remain until groundwater contaminant concentrations decreased to acceptable levels.

If the excavated process leach tank and/or soils were determined to be hazardous wastes, their handling, management, and off-site transport would be conducted in accordance with RCRA hazardous waste generator and transporter requirements [40 CFR Parts 262 and 263] and New Jersey labeling, records, and transportation requirements [N.J.A.C. 7:26-7].

Under Alternative 4, if it is determined that the source materials are subject to RCRA Land Disposal Restrictions [40 CFR 268], the source materials would be treated off site prior to disposal, in accordance with these regulations. Any wastes determined to be subject to LDRs would be disposed of off site at a RCRA Subtitle C facility.

<u>Cost</u>

The capital costs for Alternative 4 total $588,000. The average (first-year) annual O&M costs are $75,200, and 5-year reviews cost $15,500 per event. Over a 30-year period, the net present-worth cost is $1,602,000 (at a 7 percent discount rate).

<u>Alternative 5: Air Sparging with Soil Vapor Extraction (Source Removal, Institutional Controls, and Long-Term Monitoring)</u>

Under Alternative 5, the suspected source of groundwater contaminants (the process leach tank and associated VOC-contaminated soils) would be removed, and the VOCs present in groundwater and saturated soils would be removed from the aquifer through a combination of air sparging and soil vapor extraction (AS/SVE), which comprises an active in-situ remediation process. Depending on the actual concentrations of VOCs in the gas stream, vapor phase activated carbon may be required to treat captured vapors above ground to meet applicable air emission standards. Spent activated carbon would be sent off site for reuse, recycling, or destruction. Institutional controls would be implemented to prevent exposure to contaminated groundwater for the duration of the groundwater treatment period, until GWQC are achieved. Periodic long-term monitoring would be conducted for the duration of the remediation period to assess the effectiveness of the remedial action and to determine when the remediation is complete. Site conditions and risks would be formally reviewed every 5 years until the groundwater remediation is complete.

Alternative 5 would employ suspected source removal and in-situ groundwater treatment to provide long-term protection of human health and the environment. The groundwater treatment system would be designed to reduce volume and concentration of contaminated groundwater; therefore, upon successful start-up of the treatment system (the plume area could actually widen during initial operations), downgradient receptors of contaminated groundwater would begin to be protected. However, potential users of contaminated groundwater beneath Site 26 would not be protected by Alternative 5 until groundwater remediation goals were achieved throughout the plume. It is anticipated that long-term, permanent protection would be achieved after a treatment duration of approximately 5 years. During this period, groundwater contaminants would be removed both by the AS/SVE, which comprises an active in-situ remediation process extraction system, as well as by enhanced bioremediation and natural attenuation.

In the interim, until remediation goals for site groundwater have been achieved, human health would be protected through the use of institutional controls that would restrict the use of untreated contaminated groundwater as drinking water. The effectiveness of this interim protection would depend entirely upon adequate enforcement. If groundwater use restrictions were not adequately enforced, existing health risks would remain until groundwater contaminant concentrations decreased to acceptable levels.

If the excavated process leach tank and/or soils were determined to be hazardous wastes, their handling, management, and off-site transport would be conducted in accordance with RCRA hazardous waste generator and transporter requirements [40 CFR Parts 262 and 263] and New Jersey labeling, records, and transportation requirements [N.J.A.C. 7:26-7].

Under Alternative 5, if it is determined that the source materials are subject to RCRA Land Disposal Restrictions [40 CFR 268], the source materials would be treated off site prior to disposal, in accordance with these regulations. Any wastes determined to be subject to LDRs would be disposed of off site at a RCRA Subtitle C facility.

Cost

The capital costs for Alternative 5 total $1,725,000. The average annual O&M costs are $213,000, and 5-year reviews cost $15,500 per event. Over a 30-year period, the net present-worth cost is $2,647,000 (at a 7 percent discount rate).

EVALUATION of ALTERNATIVES

The remedial alternatives were compared to one another based on the seven selection criteria to identify differences between the alternatives and how site contaminant threats are addressed.

Analysis

Overall Protection

Because no actions would be conducted, Alternative 1 would not reduce contaminant migration from the source area to groundwater and groundwater contamination may increase with time. Although Alternative 2 would remove the source, groundwater contamination would continue to migrate unabated. Because no actions would be taken under Alternatives 1 and 2 to contain or remediate groundwater, potential health risks would remain for an extended period of time.

Alternatives 3, 4, and 5 would all provide protection of both human health and the environment through treatment of contaminated groundwater and implementation of institutional controls. Removal of the suspected source of groundwater contamination should facilitate the remediation of contaminated groundwater. The effectiveness of this alternative for interim protection of human health (until groundwater remediation is complete) is dependent on enforcement of institutional controls.

Compliance with ARARs

Implementation of Alternatives 2, 3, 4, and 5 would comply with all ARARs and "to be considereds" (TBCs) identified in the FS, with the exception of the New Jersey GWQS [N.J.A.C. 7:9-6]. None of the alternatives would initially comply with these state ARARs for attainment of groundwater quality criteria; however, Alternatives 2, 3, 4, and 5 would include a provision to seek a temporary exemption (CEA) from these requirements until the GWQS are achieved through natural attenuation (Alternative 2 only) or treatment. Alternative 1 would not comply with these standards or include a provision to seek temporary exemption. Five-year reviews would be necessary until ARARs are met.

Long-Term Effectiveness and Permanence

Only Alternatives 3, 4, and 5 offer long-term protection of both human health and the environment. All three alternatives would result in permanent reduction of risks from exposure to site groundwater in a reasonable timeframe. Alternative 2 includes source removal and provides protection of human health through use of institutional controls. Alternative 1 does not provide any additional protection of human health or the environment.

Alternatives 3, 4, and 5 all employ groundwater treatment, institutional controls, and removal of the suspected source of groundwater contaminants to protect human health and the environment. All three would result in permanent reduction in risks from exposure to site groundwater to less than EPA guideline limits.

Alternatives 3 and 4 initially would provide identical protectiveness: downgradient receptors and the environment would be protected upon installation and start-up of the treatment systems. Protection of downgradient receptors would be expected to be achieved in a shorter period for Alternatives 4 and 5, as compared with Alternative 3.

Under all these alternatives, the effectiveness of the interim protection would depend upon enforcement of institutional controls; if groundwater use restrictions were not enforced, protection of human health would not be achieved until the groundwater remediation is complete.

Alternative 3 employs an innovative in-situ technology to treat contaminated groundwater. The technology shows great promise for treating contaminated groundwater, but it has not been demonstrated in long-term full-scale projects. The reliability of Alternatives 4 and 5 is expected to be high; both employ treatment systems that have been widely demonstrated for remediation of VOC-contaminated groundwater.

Long-term monitoring and 5-year reviews would be required for all five alternatives until groundwater contaminant concentrations decrease to acceptable levels through treatment or natural attenuation. Regular monitoring would allow the responsible agency to assess remediation progress or changes in contaminant status and identify potential impacts to downgradient receptors.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative 1 would not reduce the toxicity, mobility, or volume of contaminants through treatment.

Alternative 2 may reduce the toxicity, mobility, and volume of source area contaminants through treatment of the suspected source materials prior to disposal; it would not reduce groundwater contamination through treatment.

Alternatives 3, 4, and 5 would reduce the toxicity, mobility, and volume of contaminants through treatment of contaminated groundwater and possibly through treatment of the suspected source materials prior to disposal. All three treatment alternatives would be designed to address the same mass of contaminants: the entire groundwater contaminant plume and any source area materials requiring treatment.

Short-Term Effectiveness

The short-term effectiveness of all five alternatives would be similar since the use of appropriate engineering controls and personal protective equipment (PPE) would be expected to minimize adverse impacts to base residents and personnel, the local community, and workers during implementation.

Long-term monitoring, the only on-site action proposed under Alternative 1, would provide little opportunity for short-term impact to the local community or the environment.

Alternative 2 would present a somewhat greater opportunity for short-term impacts to human health and the environment due to excavation, handling, and decontamination of contaminated materials from the suspected source area. Alternatives 3, 4, and 5 would present the greatest opportunity for short-term impacts due to installation and operation of the groundwater treatment systems.

In all cases, short-term risks posed to base personnel, site workers, and the environment would be mitigated through use of engineering controls, transportation planning, and appropriate PPE. No permanent adverse impacts to the human health or the environment are anticipated to result from implementation of Alternatives 2, 3, 4, or 5.

Alternative 1 would not achieve any of the RAOs. Alternative 2 would achieve all RAOs within approximately 50 years. Alternative 3 would achieve all RAOs within approximately 45 years. Alternative 4, with extraction wells removing groundwater from the concentrated center of the plume, would require less than 45 years to achieve all RAOs. Alternative 5 would achieve all RAOs within approximately 5 years.

Implementability

Each of the alternatives would be implementable. Alternative 1 is the most easily implemented since the only activities proposed are long-term monitoring and 5-year reviews.

Alternative 2 would be the next easiest to implement because it involves only excavation and off-site transport and disposal. There are a sufficient number of companies available with the trained personnel, equipment, and materials to perform excavation, disposal, and long-term monitoring. Sufficient commercial landfill capacity is available to handle the small volume of contaminated materials (approximately 30 cubic yards) that would require off-base disposal under Alternative 2.

Alternative 3 may be somewhat more difficult to implement because it would require installation and operation of a new and innovative in-situ treatment technology. Reactive wall technology is available from only one vendor, but the equipment, materials, and personnel required to construct the system are available from several sources.

Alternatives 4 and 5 would be somewhat more difficult to implement because both would require installation and operation of an on-site treatment system. However, no difficulties are anticipated in implementing either alternative because both alternatives include demonstrated technologies that employ relatively common equipment and materials. Several vendors are available that could provide the necessary equipment, materials, and services.

If additional actions are warranted, they could be easily implemented under any of the alternatives.

Cost

The total present-worth cost associated with each alternative is provided below for comparison. Alternative 1, no action, would be the least expensive to implement and Alternative 5 would be the most expensive to implement.

Alternative 1	$ 204,000
Alternative 2	$ 348,000
Alternative 3	$2,386,000
Alternative 4	$1,602,000
Alternative 5	$2,647,000

State and Community Acceptance

The state of New Jersey supports the preferred alternative. Community acceptance of the preferred alternative will be evaluated at the conclusion of the public comment period and will be described in the **ROD**. Public comments on this Proposed Plan will help address state acceptance and community acceptance.

PREFERRED ALTERNATIVE SUMMARY

The Navy, with EPA and NJDEP, has selected Alternative 3: Reactive Wall Treatment (Source Removal, In-Situ Permeable Reactive Wall Groundwater Treatment, Institutional Controls, and Long-Term Monitoring) as the preferred alternative. This alternative is in compliance with ARARs and includes a CEA as required by the state groundwater quality protection criteria. It would actively mitigate the potential exposure scenarios, which are direct exposure and consumption of contaminated groundwater from the site, and would be protective of human health and the environment.

By placing a reactive wall in front of the leading edge of the contaminant plume, immediate protection of downgradient receptors would be achieved. Removal of the suspected source area would eliminate the potential for direct exposure.

Since the preferred alternative employs a passive treatment technology, groundwater within the plume would not attain state groundwater criteria until it passes through the reactive wall. Therefore, a classification exception area (CEA) would need to be established upgradient of the wall. A formal CEA would preclude use of site groundwater during the remediation period. Long-term monitoring would determine when criteria have been met and would also evaluate the effectiveness of the treatment wall. The Navy would periodically review remediation progress with EPA and NJDEP.

The preferred alternative is believed to provide the best balance of protection among the alternatives with respect to response criteria. It utilizes a technology that is innovative but has shown encouraging results in similar situations.

Based on available information, the Navy and EPA believe the preferred alternative would be protective of human health and the environment, would be cost effective, and would be in compliance with all statutory requirements of EPA, the state, and the local community.

THE COMMUNITY ROLE IN THE SELECTION PROCESS

The Navy solicits written comments from the community on the preferred alternative for Site 26 (OU-3) and the other alternatives for OU-3 identified in this Proposed Plan. The Navy has set a public comment period from March 21, 1997 through April 30, 1997, to encourage public participation in the remedy selection process for OU-3.

The Navy will hold a public meeting during the comment period. At the public meeting, the Navy, along with EPA, will present the RI/FS reports and the Proposed Plan, answer questions, and solicit both oral and written questions. **The public meeting is scheduled for 7:00 p.m. on April 24, 1997 and will be held at the Colts Neck Courthouse.**

Comments received during the public comment period will be summarized and responses will be provided in the Responsiveness Summary section of the ROD. The ROD is the document that will present the Navy's selection of the remedy for OU-3.

To send written comments or to obtain further information, contact

Commanding Officer
Naval Weapons Station Earle
Code 043
201 Highway 34 South
Colts Neck, New Jersey 07722-5014

For further information, contact John Kolicius, Remedial Project Manager

Phone: (610) 595-0567 ext. 157

Please note that all comments must be submitted and postmarked on or before April 30, 1997.

GLOSSARY OF EVALUATION CRITERIA

Overall Protection addresses whether remedies are protective of human health and the environment. A remedy is protective if it adequately eliminates, reduces, or controls all current and potential site risks posed through each exposure pathway at the site.

Compliance with ARARs is one of the statutory requirements for remedy selection. However, CERCLA allows selecting a remedy that will not attain ARARs if certain conditions exist. One condition is if the remedy is an interim measure and the final remedy will attain ARARs upon completion.

Long-Term Effectiveness and Permanence refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time.

Reduction of Toxicity, Mobility, or Volume addresses remedies that employ treatment as a principal element by ensuring that the relative performance of the treatment technologies will be assessed. This criterion examines the magnitude, significance, and irreversibility of reductions.

Cost includes capital costs and annual operation and maintenance costs incurred over the life of the remedial action.

Short-Term Effectiveness refers to the short-term impacts of the remedy on the neighboring community, workers, or surrounding environment. This includes potential threats to human health and the environment associated with the removal, treatment, and transportation of hazardous substances.

Implementability is the technical and administrative feasibility of a remedy, as well as the availability of materials and services needed to implement the selected solution.

State Acceptance indicates whether the state concurs with, opposes, or has no comment on the preferred remedy. Formal state comments usually will not be received until the state has reviewed the FS report and draft Proposed Plan.

Community Acceptance will be addressed in the ROD following a review of community comments received on the RI/FS reports and the Proposed Plan.

TERMS USED IN THE PROPOSED PLAN

1,2-Dichloroethene (1,2-DCE): Common volatile organic solvent formerly used for cleaning, degreasing or other uses in commerce and industry.

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state requirements that a selected remedy must attain. These requirements may vary among sites and remedial activities.

Administrative Record: An official compilation of site-related documents, data, reports, and other information that are considered important to the status of and decisions made relative to a Superfund site. The public has access to this material.

Carcinogenic: A type of risk resulting from exposure to chemicals that may cause cancer in one or more organs.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The Act created a trust fund, known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous substance facilities.

Feasibility Study (FS): Report identifying and evaluating alternatives for addressing the contamination present at a site or group of sites.

Groundwater Quality Standards (GWQS): New Jersey promulgated groundwater quality requirements, N.J.A.C. 7:9-6.

Hazard Index (HI): The sum of chemical-specific Hazard Quotients. A Hazard Index of greater than 1 is associated with an increased level of concern about adverse non-cancer health effects.

Hazard Quotient (HQ): A comparison of the level of exposure to a substance in contact with the body per unit time to a chemical-specific Reference Dose to evaluate potential non-cancer health effects. Exceedence of a Hazard Quotient of 1 is associated with an increased level of concern about adverse non-cancer health effects.

Initial Assessment Study (IAS): Preliminary investigation usually consisting of review of available data and information of a site, interviews, and a non-sampling site visit to observe areas of potential waste disposal and migration pathways.

Land Disposal Restrictions (LDRs): A set of EPA-prescribed limit concentrations with associated treatment standards regulating disposal in landfills.

Maximum Contaminant Level (MCL): EPA-published (promulgated as law) maximum concentration level for compounds found in water in a public water supply system.

Noncarcinogenic: A type of risk resulting from the exposure to chemicals that may cause systemic human health effects.

National Contingency Plan (NCP): The National Contingency Plan is the basis for the nationwide environmental restoration program known as Superfund and is administered by EPA under the direction of the U.S. Congress.

National Priorities List (NPL): EPA's list of the nation's top priority hazardous substance disposal facilities that may be eligible to receive federal money for response under CERCLA.

Presumptive Remedy: Preferred technologies for common categories of sites based on historical patterns of remedy selection and EPA's scientific and engineering evaluation of performance data on technology implementation. Presumptive remedies ensure the consistent selection of remedial actions.

RCRA Subtitle D facility: Municipal-type waste disposal facility (landfill) regulated by the Resource Conservation and Recovery Act (RCRA).

Record of Decision (ROD): A legal document that describes the remedy selected for a Superfund facility, why the remedial actions were chosen and others not, how much they are expected to cost, and how the public responded.

Reference Dose (RD): An estimate with an uncertainty spanning an order of magnitude or greater of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a portion of a lifetime.

Remedial Action Objective (RAO): An objective selected in the FS, against which all potential remedial actions are judged.

Remedial Investigation (RI): Study that determines the nature and extent of contamination at a site.

Site Inspection (SI): Sampling investigation with the goal of identifying potential sources of contamination, types of contaminants, and potential migration of contaminants. The SI is conducted prior to the RI.

Semivolatile Organic Compounds (SVOCs): Organic chemicals [e.g., phthalates or polycyclic aromatic hydrocarbons (PAHs)] that do not readily evaporate under atmoshperic conditions.

Target Compound List/Target Analyte List (TCL/TAL): List of routine organic compounds (TCL) or metals (TAL) included in the EPA Contract Laboratory Program.

Toxicity Characteristic Leaching Procedure (TCLP): Analytical test prescribed by EPA to determine potential leachate toxicity in materials; commonly used to determine the suitability of a waste for disposal in a landfill.

Trichloroethene (TCE): Common volatile organic solvent formerly used for cleaning, degreasing or other uses in commerce and industry.

Volatile Organic Compounds (VOCs): Organic liquids [e.g., vinyl chloride or trichloroethylene (TCE)] that readily evaporate under atmospheric conditions.

FOR FURTHER INFORMATION

MAILING LIST

If you did not receive this Proposed Plan in the mail and wish to be placed on the mailing list for future information pertaining to this site, please fill out, detach, and mail this form to:

Commanding Officer
Naval Weapons Station Earle
Code 043
201 Highway 34 South
Colts Neck, New Jersey 07722-5014

Name: ____________________ Affiliation: ____________________

Address: ____________________ Phone: ( )____________________

____

DOCS\NAVY\7452\037011