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Summary Report

for

Areas A and D Groundwater Monitoring

Naval Air Warfare Center

Warminster, Pennsylvania

Northern Division

Naval Facilities Engineering Command

Contract Number N62472-90-D-1298

Contract Task Order 0225

February 1998

Brown & Root Environmental

A Division of Halliburton NUS Corporation

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SUMMARY REPORT
FOR
AREAS A AND D GROUNDWATER MONITORING

NAVAL AIR WARFARE CENTER
WARMINSTER, PENNSYLVANIA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION - NAVY (CLEAN) CONTRACT

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February 1998

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1.0 INTRODUCTION

In response to Contract Task Order (CTO) No. 225 under Contract N62472-90-D-1298, Brown & Root (B&R) Environmental was tasked by the Naval Facilities Engineering Command (NAVFAC) Northern Division (NORTHDIV), as part of continuing investigations at the former Naval Air Warfare Center (NAWC) Warminster, Pennsylvania, to perform comprehensive groundwater monitoring for Areas A and D at the base. This work was outlined in the scope of work, dated October 30, 1997, as part of the Navy's Installation Restoration (IR) Program under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The IR Program is designed to identify contamination of Navy and Marine Corps facilities resulting from past operations and to institute corrective measures as needed.

1.1 PURPOSE

This report is intended to provide an updated overview of groundwater flow and water quality conditions in Areas A& D and nearby off-site areas. Groundwater monitoring for Areas A and D is intended to supplement the ongoing perimeter groundwater monitoring program and generate information to be presented in final RI reports for these groundwaters of concern. In addition, this monitoring will help support remedial actions for groundwater associated with Areas A and D.

For Area A, the groundwater results will be more fully discussed in the final Area A RI report for groundwater [Operable Unit 1 (OU-1)]; for Area D, the results will be presented in the final Area D RI report for groundwater (i.e., OU-4). The assessment of risks associated with groundwater is not part of this report but will be addressed during preparation of the RI reports.

Information presented in this report includes the following:

- Potentiometric surface maps showing groundwater elevations and flow directions for shallow, intermediate, and deep water-bearing zones.
- Tables displaying analytical results, including the range of positive detections, representative concentrations, and comparisons to background levels. The analytical results are specific to the shallow, intermediate, and deep water-bearing zones.
- Where appropriate, maps showing the distributions of concentrations for significant chemicals of concern [e.g., trichloroethene (TCE), tetrachloroethene (PCE), and any other selected hazardous substances].

- Brief narratives summarizing the nature and extent of groundwater contamination for each area.

1.2 BACKGROUND AND CURRENT STATUS

This section provides a brief background of Area A and Area D groundwaters of concern and the current status of each study area. For Area A, more detailed information can be found in the Phase II Remedial Investigation Report for Operable Unit 1, NAWC Warminster, Pennsylvania (Halliburton NUS, 1993a) and in the Draft Focused Remedial Investigation Report for Groundwater, NAWC Warminster, Pennsylvania (Halliburton NUS, 1995). A supplement to the draft focused RI report for groundwater (B&R Environmental, 1996b) provides more recent information regarding the nature and extent of groundwater contamination for Areas A and D.

For Area D, additional background information can be found in the Remedial Investigation Report for Operable Unit 4 (OU-4), NAWC Warminster, Pennsylvania (B&R Environmental, 1996a) and in the draft focused RI report for groundwater.

1.2.1 Area A Groundwater

In September 1993, the Navy and the United States Environmental Protection Agency (EPA) signed a Record of Decision (ROD) for Operable Unit 1 (OU-1). OU-1 consists of contaminated overburden and shallow bedrock groundwater attributable to Area A at the base. Area A includes IR Sites 1, 2, and 3, as well as adjacent areas west of Jacksonville Road (Figure 1-1). The ROD selected an interim clean-up plan to minimize the migration of contaminated groundwater while additional studies are performed to determine the full nature and extent of groundwater contamination. The clean-up plan called for continued testing of groundwater in monitoring wells and other wells near the base over a 30-year period.

The treatment plant for Area A groundwater has been constructed and an extraction well drilling plan for Area A groundwater has been finalized. The Navy plans to begin construction of the remaining components (e.g., extraction wells, conveyance piping, electrical service) of the OU-1 remedy in the near future.

In addition, the Navy is completing those groundwater investigations necessary to select a final remedy for contaminated groundwater attributable to Area A. A water-level study in the vicinity of Area A was completed in 1997. Final RI and FS reports (if needed) for Area A groundwater will be prepared upon completion of the investigations. The interim remedy for OU-1 will be considered as part of the final ROD

for this operable unit.

1.2.3 Area D Groundwater

In September 1997, an interim ROD was signed for OU-4. OU-4 consists of contaminated groundwater attributable to Area D at NAWC Warminster. Area D generally consists of base property west of Jacksonville Road in the vicinity of the main building complex at NAWC Warminster (Figure 1-1). An industrial park lies west of this area and a residential neighborhood is located to the southwest.

It is anticipated that the Area A treatment plant will also be used for Area D groundwater. The Navy plans to begin an expedited remedial design for OU-4 in the near future. The design will address the OU-4 extraction well network, the routing of piping carrying groundwater to the treatment plant, electrical requirements, and any other necessary items. Performance monitoring plans will be developed to evaluate the effectiveness of the extraction well network.

A base supply well study was performed within Area D in 1997 (B&R Environmental, 1998). Final RI and FS reports (if needed) for Area D groundwater will be prepared upon completion of any additional investigations necessary to select a final remedy for contaminated groundwater attributable to Area D. The interim remedy for OU-4 will be considered as part of the final ROD for this operable unit.

1.3 SCOPE OF WORK

As part of this task assignment for Area A and D groundwater monitoring, a total of 106 monitoring wells and nine residential or commercial wells were sampled in December 1997 (Figure 1-2). All groundwater samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs) using a low-concentration detection limit. In addition, 11 samples were analyzed for Target Analyte List (TAL) metals and cyanide, and five samples were analyzed for semivolatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs). Appropriate quality assurance/quality control (QA/QC) samples (e.g., field blanks, trip blanks, rinsate blanks, duplicates, and matrix spike/matrix spike duplicates) were collected and analyzed. A summary of the wells sampled, including sample number, date of collection, and analytical results, is provided in Appendix A. All samples were collected and analyzed according to the scope of work for Area A and D groundwater monitoring. (B&R Environmental, 1997c).

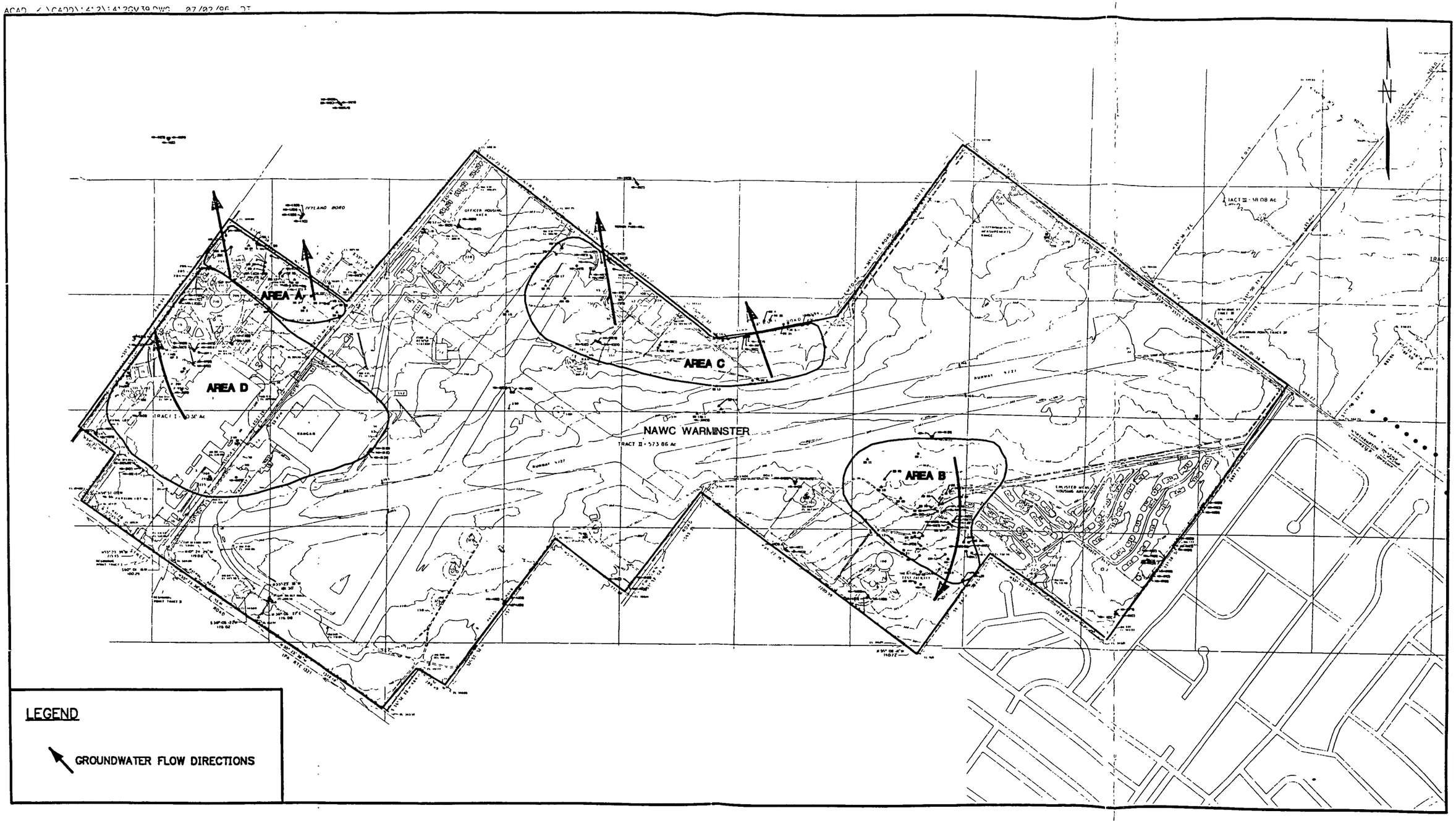

FIGURE 1-1

AREAS OF CONCERN
NAWC WARMINSTER, PA.

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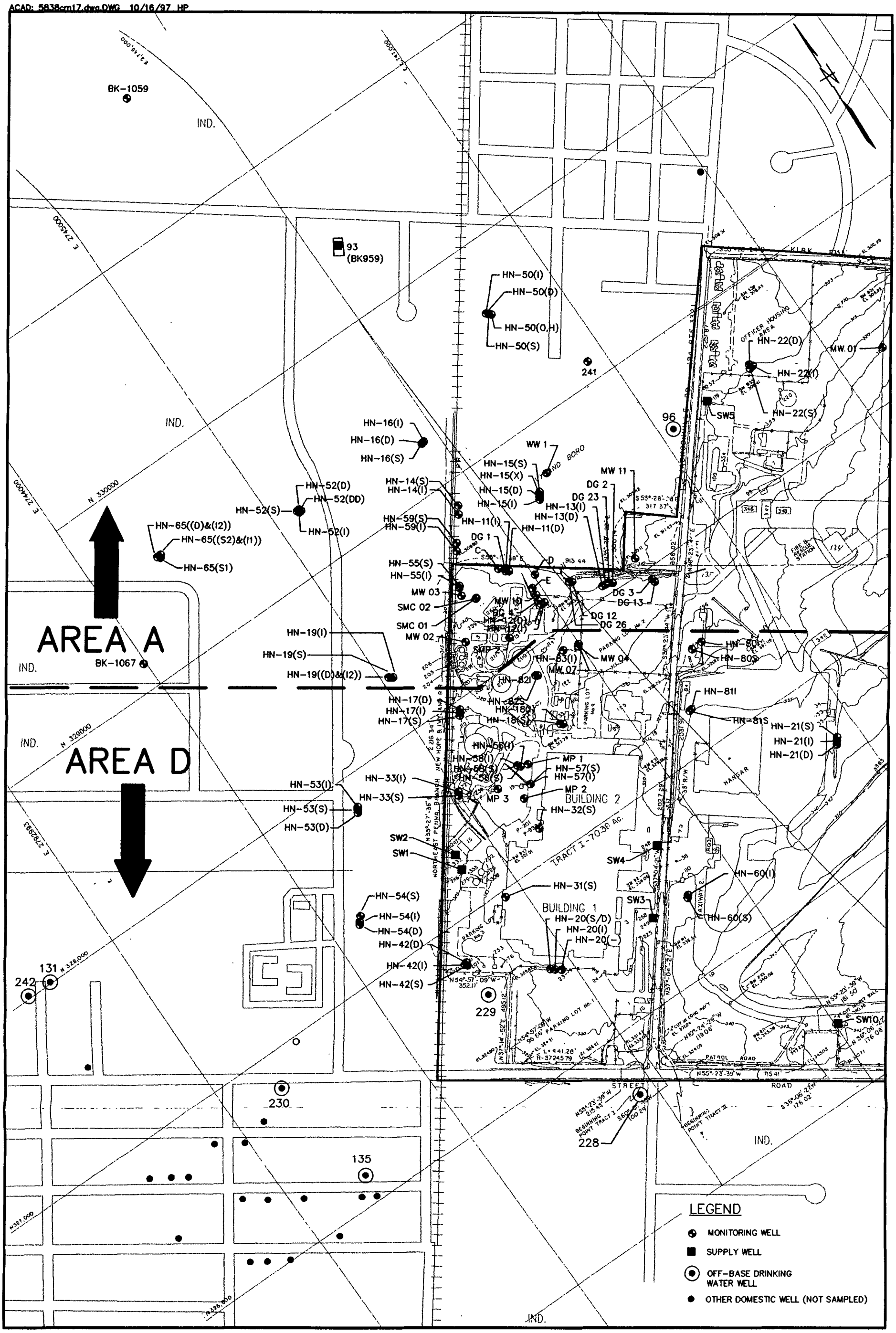

WELL LOCATIONS
AREAS A AND D GROUNDWATER MONITORING
NAWC WARMINSTER, PA

FIGURE 1-2

0 500 1000
SCALE IN FEET

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1.3.1 Specific Tasks

The following specific tasks were performed as part of the Area A and D groundwater monitoring:

- One comprehensive synoptic round of water level was collected from all wells sampled during this investigation, prior to purging/sampling activities.
- Groundwater samples were collected from 57 wells in Area A. All samples were analyzed for VOCs. Seven well water samples were analyzed for TAL metals and cyanide, and five water samples were analyzed for SVOCs, pesticides, and PCBs.
- Groundwater samples were collected from 49 wells in Area D. All samples were analyzed for VOCs. Four samples were analyzed for TAL metals and cyanide.
- Groundwater samples were collected from nine off-base residential, commercial, and other wells. All samples were analyzed for VOCs.
- The analytical data were validated in accordance with Naval Facilities Environmental Support Center (NFESC) guidelines and EPA Functional Guidelines for Region III.
- The results from comprehensive groundwater monitoring were evaluated and are presented in Section 2.0 of this report.

All samples were collected by B&R Environmental and analyzed by CEIMIC Corporation. The groundwater samples and associated quality assurance/quality control (QA/QC) samples were analyzed under the following Contract Laboratory Program (CLP) protocols:

- Low-Concentration Statement of Work (SOW) OLCO2.0 (October 1992), for VOCs
- SOW ILMO2.1 for TAL metals and cyanide
- SOW OLMO1.8 for SVOCs, pesticides, and PCBs

About 10 percent of the groundwater samples were analyzed for total inorganics, and about five percent were tested for SVOCs, pesticides, and PCBs. Well water samples to be tested for total inorganics, semivolatile organics, pesticides, and PCBs were selected based on the following considerations:

- Existing analytical results (or lack thereof).

- The likelihood of positive detections, based on the well's location to a suspected source area, for which these substances may potentially be present in that source. Suspected source areas include those investigated as part of RI work, underground storage tank (UST) work, or environmental baseline survey (EBS) work.

- Proximity of the well to the proposed Area A extraction well network.

- Proximity of the well to the conceptual Area D extraction well network.

- Proximity of the well to the former jet fuel storage area.

Well water samples from Well Clusters HN-14 (S/I), HN-55 (S/I), and HN-59 (S/I) and single wells HN-11S, HN-20I, HN-20D, HN-31S, and HN-42I were analyzed for total inorganics. Samples from single wells HN-11S, HN-59S, DG12, DG-13, and Well D were tested for SVOCs, pesticides, and PCBs.

The detection limits for all sample analyses can be found in Appendix A. The groundwater analytical results were compared to background groundwater concentrations from previous sampling at the base, to EPA screening value concentrations, and to applicable Maximum Contaminant Levels (MCLs). The screening values are risk-based concentrations (RBCs) for tap water ingestion and residential water use (inhalation) and correspond to fixed levels of risk. The RBCs represent aqueous concentrations associated with a 10^{-6} cancer risk or a non-cancer hazard index of 0.1. Table 1-1 displays the background levels, RBCs, and MCLs for selected chemicals found in groundwater underlying the study areas.

1.3.2 Methodology

Sampling and analysis of well water samples were conducted to determine groundwater quality conditions within and around Areas A and D. The groundwater sampling program was conducted from December 4, 1997 through January 2, 1998.

One comprehensive round of water-level measurements was obtained from the Area A and D monitoring wells on December 3, 1997. Water levels were obtained using a calibrated M-Scope and were taken from marked points on top of each well casing. The round of measurements was collected within a time period

TABLE 1-1
BACKGROUND AND SCREENING VALUE CONCENTRATIONS (ug/l)
SUMMARY REPORT FOR AREA A AND D GROUNDWATER MONITORING
NAVAL AIR WARFARE CENTER, WARMINSTER, PENNSYLVANIA

ANALYTE	BACKGROUND CONCENTRATION (1)	SCREENING VALUE (2)	MCL/MCLG (3)
Aluminum	8,220	3,700	
Antimony	ND	1.5	6
Arsenic	5.8	11	50
Barium	628	260	2,000
Beryllium	1.5	0.016	4
Cadmium	2.7	18	5
Calcium	31,800		
Chromium (total)	5.5	18 (Cr^{+6})	100
Copper	10	1,500	1,300(7)
Cyanide	ND	73	100
Iron	4,850	1,100	
Lead	13.6	15	15(7)
Magnesium	11,300		
Manganese	422	84	--
Mercury	0.17	1.1	2
Nickel	ND)	73	100
Potassium	2,150		
Silver	ND	18	
Sodium	14,700		
Thallium	ND (4)	2.9 - 3.3	2
Vanadium	3.7	260	--
Zinc	33.2	1,100	--
Toluene	NC (5)	75	1,000
Trichloroethene	NC	1.6	5
Tetrachloroethene	NC	1.1	5
Cis-1,2-Dichloroethene	NC	6.1	70
1,1,1-Trichloroethane	NC	79	200
Chloroform	NC	0.15	100
1,1-Dichloroethene	NC	0.044	7
1,1-Dichloroethane	NC	81	--
Carbon Tetrachloride	NC	0.16	5
Carbon Disulfide	NC	100	--
1.4-Dichloroebenzene	NC	0.44	75
Xylene (total)	NC	1,200	10,000
1,1,2-Trichloroethane	NC	0.19	3
Trans-1, 2-Dichloroethene	NC	12	100
Acetone	NC	370	
Ethylbenzene	NC	130	700
1,1,2,2-Tetrachloroethane	NC	0.052	
Vinyl Chloride	NC	0.019	2
1,2-Dichloroethane	NC	0.12	5

(1) Halliburton NUS Corporation; RI Report for OU-3, August 1994, Table 6-1. Concentrations are based on 95 percent upper confidence limits on the arithmetic or geometric means of metals results.
(2) EPA Region III; Risk-Based Concentration Table, March 14, 1997. All results are for tap water.
(3) EPA Office of Water; Drinking Water Regulations and Health Advisories, October 1996.
(4) ND = Not detected.
(5) NC = Not calculated; analyte is assumed to be anthropogenic in origin.
(6) Halliburton NUS Corporation; Draft RI Report for NAWC Warminster, November 1992, Table 4-10.
(7) Action level only.
MCL/MCLG - Maximum Contaminant Level/Maximum Contaminant Level Goal

of approximately 6 hours in order to minimize the effects of short-term water-level fluctuations. Appendix B contains the complete set of data obtained during the December 3, 1997 round of water levels. The majority of monitoring wells were sampled using EPA QA directives for low-flow purging and sampling of groundwater monitoring wells (Appendix C). Wells with yields of 1 gallon per minute (gpm) or greater were purged a minimum of three well volumes of groundwater and until the monitored parameters (pH, temperature, conductivity, and turbidity) of three consecutive samples of purge water fell within 10 percent of one another. The pumping rate was monitored to assure that the wells were not purged at a higher rate than the natural yield of the formation.

Within Area A, Well HN-12X was not sampled due to dry conditions. Groundwater samples were stored on ice in coolers and were submitted daily to the Naval Facilities Engineering Service Center (NFESC) approved laboratory. Quality control samples, including field duplicates, trip blanks, field blanks, and rinsate blanks, were collected and analyzed as required by NFESC sampling protocols and as outlined in the SOW. The analytical results of the groundwater sampling are summarized in Section 2.0.

1.3.3 Data Validation

All analytical results from samples collected by B&R Environmental were validated for this report (Appendix D). The data validation process serves as an independent quality assurance check for the accuracy of laboratory results and as a means of evaluating laboratory performance and determining the impact of noncompliance to the data. In addition, through the use of qualifiers, the data validation process lends interpretive guidance about the limitations of the data.

1.4 ORGANIZATION OF REPORT

Section 1.0 discusses the purpose, scope, and objectives of this report. Section 2.0 details the analytical results for samples collected at the site and describes the nature and extent of groundwater contamination within and in the vicinity of Areas A and D during the field investigation. Section 3.0 summarizes the findings and conclusions reached regarding groundwater conditions within and adjacent to Areas A and D.

2.0 RESULTS AND FINDINGS

2.1 INTRODUCTION

This section presents the results and findings for the Area A and D groundwater monitoring. Tables 2-1 and 2-2 summarize the samples collected during this phase of work; all samples were analyzed for VOCs, 11 samples were analyzed for TAL metals and cyanide, and five samples were analyzed for SVOCs, pesticides, and PCBs.

The depths of the monitoring wells sampled during this investigation ranged from 7 to 303 feet below the ground surface (Table 2-1). These wells were designed to monitor the most significant water-bearing zone within a designated target interval. In general, the target intervals were as follows:

- For overburden (X) wells, from the top of bedrock to a subsurface depth of 50 feet
- For shallow (S) wells, subsurface depths of 50 to 75 feet
- For intermediate (I) wells, subsurface depths of 75 to 150 feet
- For deep (D) wells, subsurface depths of 150 to 300 feet

2.2 AREA A AND D WATER LEVELS

Groundwater flow directions across Areas A and D were evaluated based on water-level data gathered from both on-base and off-base monitoring wells. The December 3, 1997 water-level data (Appendix B) were used to develop groundwater flow maps. Water-level data were evaluated within groups that were based on well depths and lithologic zones monitored, for both lateral and vertical flow determinations. Shallow, intermediate, deep, and very deep groundwater flow directions were evaluated using wells with monitored intervals generally in the less than 75, 75 to 150, 150 to 250, and greater than 250 feet depth ranges, respectively. In addition to considering the monitored intervals, wells were evaluated for inclusion in the data sets based on the measured water levels and the bedrock dip.

Shallow groundwater flow directions were defined based on water-level data from bedrock wells with monitored intervals generally less than 75 feet deep. The overall shallow bedrock groundwater flow direction across Areas A and D, as shown in Figure 2-1, is to the north-northwest, with an average on-base gradient of approximately .02. The gradient steepers in the off-base area to the north-northwest. This direction of groundwater flow is similar to the ground surface slope.

TABLE 2-1
SAMPLE SUMMARY
DECEMBER 1997 AREA A AND D GROUNDWATER MONITORING
NAWC WARMINSTER, PENNSYLVANIA

AREA	WELL NUMBER	WELL TOTAL DEPTH (Feet)	SAMPLE NUMBER
A	D	40	W-MW-D
	E	40	W-MW-E
	HN-11S/C	40	W-HN-11S
	HN-11X/DG-1	19	W-HN-11X
	HN-11I	88	W-HN-11I
	HN-11D	170	W-HN-11D
	HN-12X/MW-10	7	DRY
	HN-12S/BG-04	47	W-HN-12S
	HN-12I	86	W-HN-12I
	HN-12D	301	W-HN-12D
	HN-13-X/DG-2	18	W-HN-13X
	HN-13S/DG-23	47	W-HN-13S
	HN-13I	172	W-HN-13I
	HN-13D	243	W-HN-13D
	HN-14S	44	W-HN-14S
	HN-14I	100	W-HN-14I
	HN-15X	14	W-HN-15X
	HN-15S	44	W-HN-15S
	HN-15I	113	W-HN-15I
	HN-15D	202	W-HN-15D
	HN-16S	65	W-HN-16S
	HN-16I	120	W-HN-16I
	HN-16D	200	W-HN-16D
	HN-19S	44	W-HN-19S
	HN-19I1	155	W-HN-19I1
	HN-19I2	110	W-HN-19I2
	HN-19D	204	W-HN-19D
	HN-22S	55	W-HN-22S
	HN-22I	152	W-HN-22I
	HN-22D	271	W-HN-22D
	HN-50S	83	W-HN-50S
	HN-50I	122	W-HN-50I
	HN-50D	174	W-HN-50D
	HN-52S	87	W-HN-52S
	HN-52I	132	W-HN-52I
	HN-52D	194	W-HN-52D
	HN-52DD	283	W-HN-52DD
	HN-55S	44	W-HN-55S
	HN-55I	94	W-HN-55I
	HN-59S	62	W-HN-59S
	HN-59I	88	W-HN-59I
	HN-65S1	103	W-HN-65S1
	HN-65S2	52	W-HN-65S2
	HN-65I1	123	W-HN-65I1
	HN-65I2	171	W-HN-65I2
	HN-65D	303	W-HN-65D
	DG-3	15	W-DG-3
	DG-12	75	W-DG-12
	DG-13	22	W-DG-13
	DG-26	15	W-DG-26
	MW-02	90	W-MW-02

TABLE 2-1
SAMPLE SUMMARY
DECEMBER 1997 AREA A AND D GROUNDWATER MONITORING
NAWC WARMINSTER, PENNSYLVANIA
PAGE 2 of 3

AREA	WELL NUMBER	WELL TOTAL DEPTH (Feet)	SAMPLE NUMBER
A	MW-03	100	W-MW-03
	MW-11	10	W-MW-11
	SMC-01	60	W-SMC-01
	SMC-02	298	W-SMC-02
	SMP-O2	40	W-SMP-02
	HOBEN	130	W-HOBEN
	WW-1	103	W-WW-1
D	HN-17S	102	W-HN-17S
	HN-17I	202	W-HN-17I
	HN-17D	289	W-HN-17D
	HN-18S	100	W-HN-18S
	HN-18I	174	W-HN-18I
	HN-20S	96	W-HN-20S
	HN-20I	143	W-HN-20I
	HN-20D	300	W-HN-20D
	HN-21S	52	W-HN-21S
	HN-21I	95	W-HN-21I
	HN-21D	300	W-HN-21D
	HN-31S	69	W-HN-31S
	HN-32S	84	W-HN-32S
	HN-33S	66	W-HN-33S
	HN-33I	144	W-HN-33I
	HN-42S	65	W-HN-42S
	HN-42I	111	W-HN-42I
	HN-42D	202	W-HN-42D
	HN-53S	60	W-HN-53S
	HN-53I	83	W-HN-53I
	HN-53D	206	W-HN-53D
	HN-54S	71	W-HN-54S
	HN-54I	124	W-HN-54I
	HN-54D	204	W-HN-54D
	HN-56S	50	W-HN-56S
	HN-65I	134	W-HN-56I
	HN-57S	89	W-HN-57S
	HN-57I	133	W-HN-57I
	HN-58S	46	W-HN-58S
	HN-58I	76	W-HN-58I
	HN-60S	63	W-HN-60S
	HN-60I	157	W-HN-60I
	HN-80S	44	W-HN-80S
	HN-80I	115	W-HN-80I
	HN-81S	85	W-HN-81S
	HN-81I	145	W-HN-81I
	HN-82S	56	W-HN-82S
	HN-82I	159	W-HN-82I
	HN-83X	13	W-HN-83X
	HN-83S/MW-04	60	W-HN-83S
	HN-83I/MW-07	136	W-HN-83I
	MP-1	101	W-MP-01
	MP-2	101	W-MP-02
	MP-3	132	W-MP-03
	SW-01	247	W-SW-01
	SW-02	246	W-SW-02

TABLE 2-1
SAMPLE SUMMARY
DECEMBER 1997 AREA A AND D GROUNDWATER MONITORING
NAWC WARMINSTER, PENNSYLVANIA
Page 3 of 3

AREA	WELL NUMBER	WELL TOTAL DEPTH (Feet)	SAMPLE NUMBER
D	SW-03	570	W-SW-03
	SW-04	584	W-SW-04
	SW-10	400	W-SW-10

TABLE 2-2
SAMPLE SUMMARY
OFF-BASE DRINKING WATER WELL LOCATIONS
AREA A AND D GROUNDWATER MONITORING
NAWC WARMINSTER, PENNSYLVANIA

AREA	WELL NO.	STREET ADDRESS	WELL TOTAL DEPTH (IN FEET) WATER BEARING ZONE	SAMPLE NUMBER
A	93	Ivyland Road	250/Deep	W-OS-757
A	96	960 Jacksonville Road	100?/Intermediate	W-OS-764
D	135	215 Nemoral Street	**45?/Shallow**	W-OS-759
D	228	30 West Street Road	Unknown/Intermediate	W-OS-763
D	229	65 West Street Road	Unknown/Shallow	W-OS-765
D	230	250 West Street Road	Unknown/Shallow	W-OS-762
D	242	674 Mary Street	**Unknown/Shallow**	W-OS-766
D	131	679 Mary Street	Unknown/Shallow	W-OS-758
A	241	991 Pennsylvania Avenue	130/Intermediate	W-HOBEN-WELL

Locally in Area D, the shallow groundwater flow gradient is somewhat lower than occurs within Area A, as shown in Figure 2-1. This localized area of lower gradient may be related to the presence of the building complex. The large buildings within Area D may act to minimize precipitation recharge locally and lessen the shallow groundwater flow gradient. In addition, the shallow flow gradient north of Area A may be steeper than occurs within Area D due to pumping effects of a nearby municipal water-supply well.

Intermediate-depth groundwater flow is also to the north-northwest, following ground surface slope and bedrock dip, as shown in Figure 2-2. The lateral groundwater flow gradient in the intermediate flow system is approximately 0.02. As with the shallow wells, the local flow gradient in Area D is lower than in Area A and east of Jacksonville Road; however, the reasons for the decrease in flow gradient may be different than for the shallow flow system. Intermediate-depth groundwater within Area D is affected by cyclical pumping of nearby wells SW-3 and SW-4, particularly west and south of Building 1. Significant water-level fluctuations (greater than 1 foot) were seen during the Area D yield tests (wells HN-20S, HN-20I, HN-20D, HN-60S, and HN-60I). These fluctuations appear to be tied into the cyclical pumping of the base water-supply wells (B&R Environmental, 1998). The periodic withdrawal of water from this depth zone by the production wells likely acts to reduce the flow gradient locally in Area D.

Figures 2-3 and 2-4 show the altitude and configuration of the potentiometric surfaces for deep water-bearing zones, as defined by measured water levels. The flow of deeper groundwater is generally to the north-northwest. The potentiometric contours are dashed where inferred.

2.3 NATURE AND EXTENT OF CONTAMINATION FOR AREA A GROUNDWATER

Area A is located in the western portion of NAWC Warminster and encompasses portions of Warminster Township, Northampton Township, and Ivyland Borough. A total of 66 wells (57 monitoring wells and eight drinking water wells) were sampled in the vicinity of Area A (Tables 2-1 and 2-2). The groundwater investigation primarily focused on the industrial area along the northwestern installation boundary and directly north of the base property boundary. The sample locations include monitoring, production, and residential wells.

Area A monitoring wells are concentrated at the northeastern end of the investigation area and include several off-base well clusters (HN-14, HN-15, HN-16, HN-19, HN-50, HN-52, HN-59, and HN-65), one former residential well (Well No. 241), one former production well screened as a monitoring well (WW-1), one

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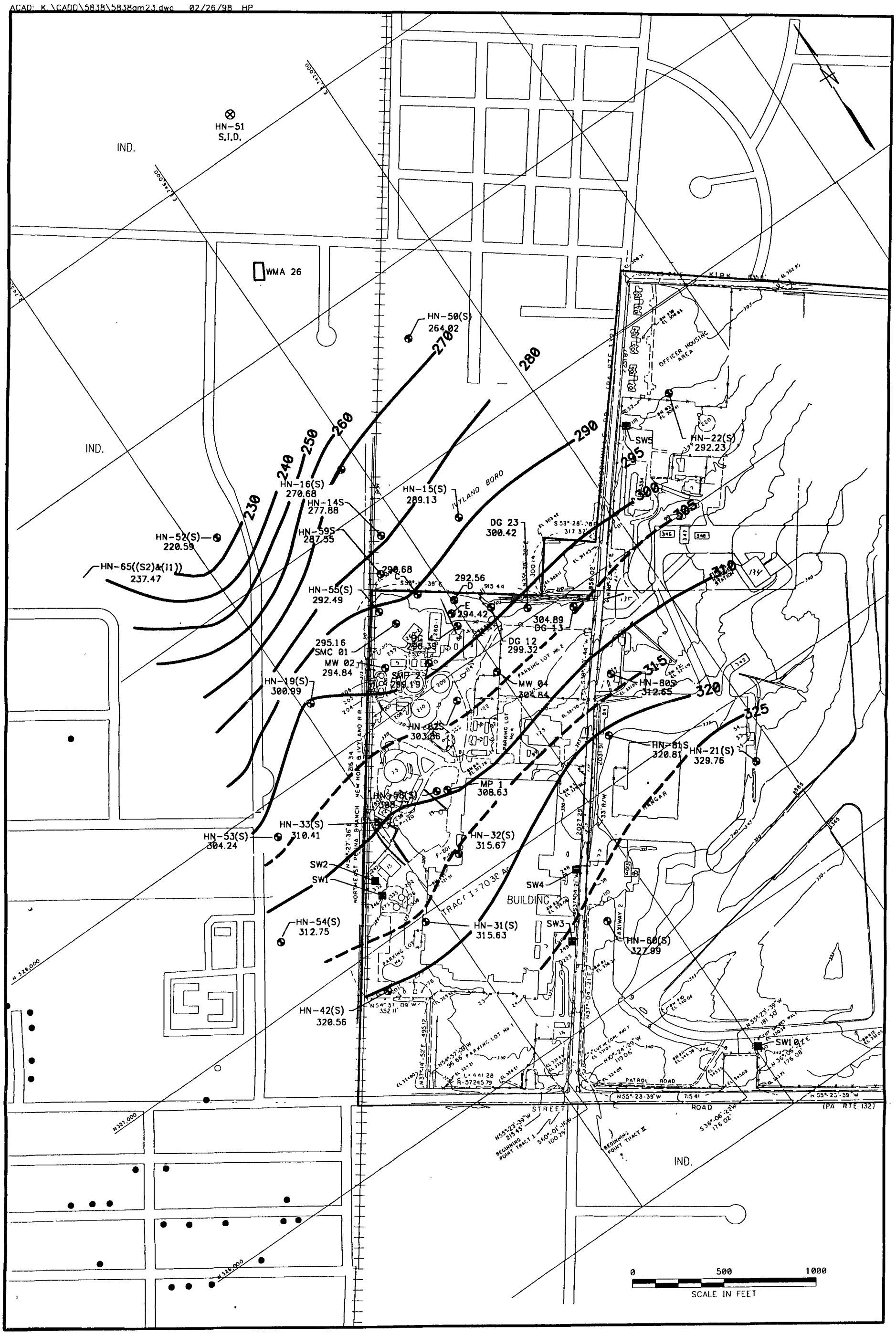

POTENTIOMETRIC SURFACE MAP
SHALLOW WELLS (<75 FEET DEEP)
DECEMBER 3, 1997
AREAS A AND D
NAWC WARMINSTER, PA

FIGURE 2-1

Brown & Root Environmental

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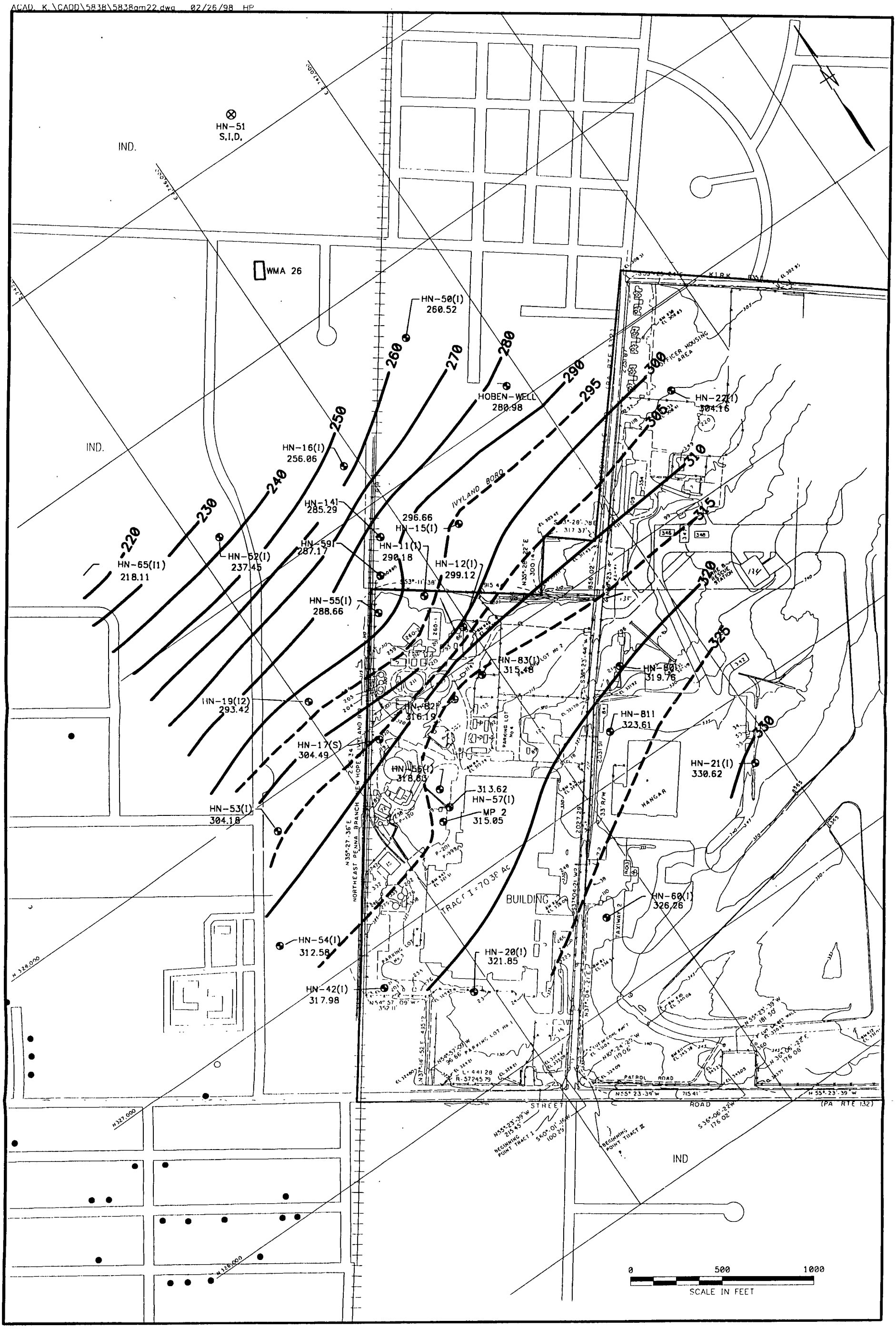

POTENTIOMETRIC SURFACE MAP
INTERMEDIATE WELLS (75-150 FEET DEEP)
DECEMBER 3, 1997
AREAS A AND D
NAWC WARMINSTER, PA

FIGURE 2-2

Brown & Root Environmental

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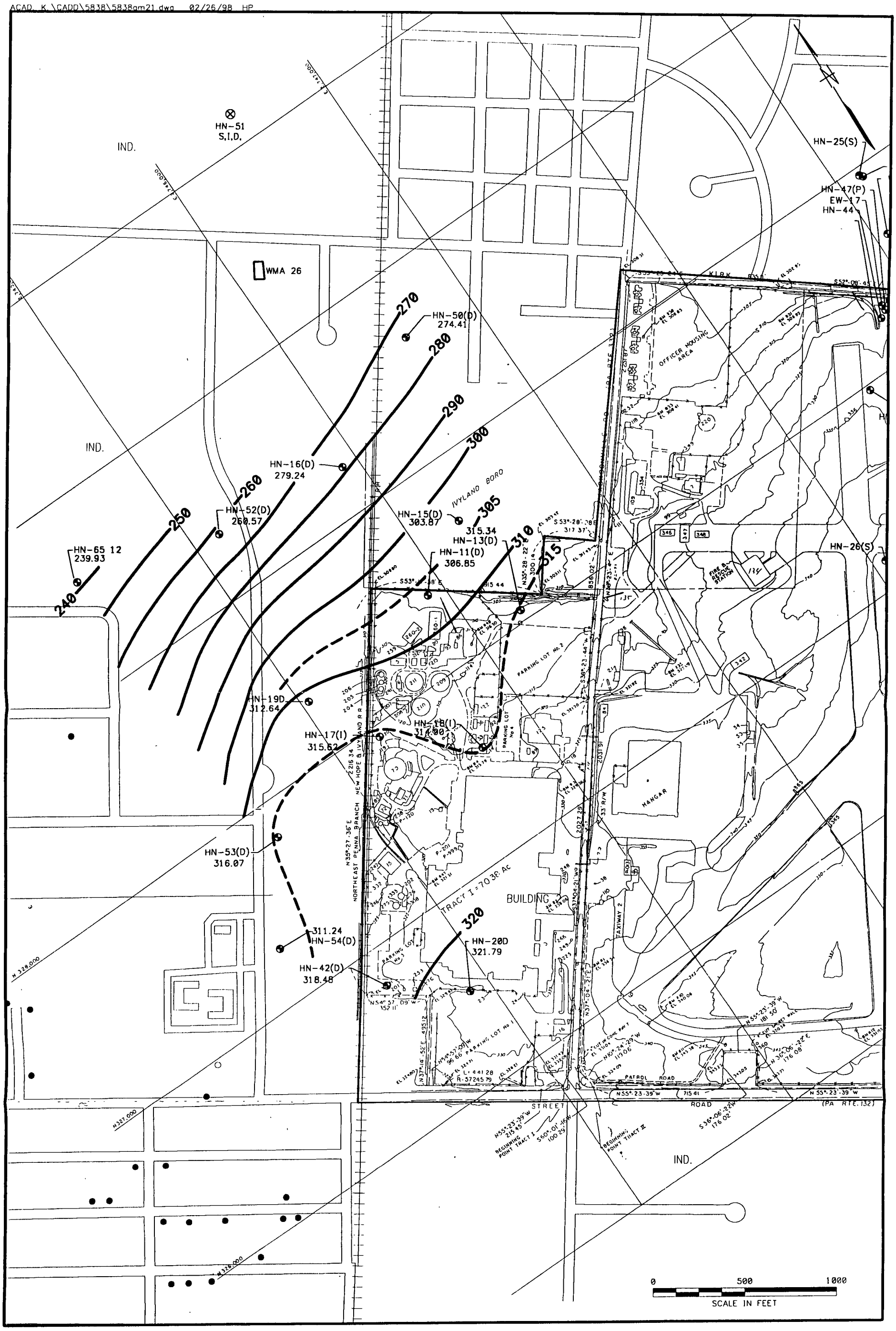

POTENTIOMETRIC SURFACE MAP
DEEP WELLS (150-250 FEET DEEP)
DECEMBER 3, 1997
AREAS A AND D
NAWC WARMINSTER, PA

FIGURE 2-3

Brown & Root Environmental

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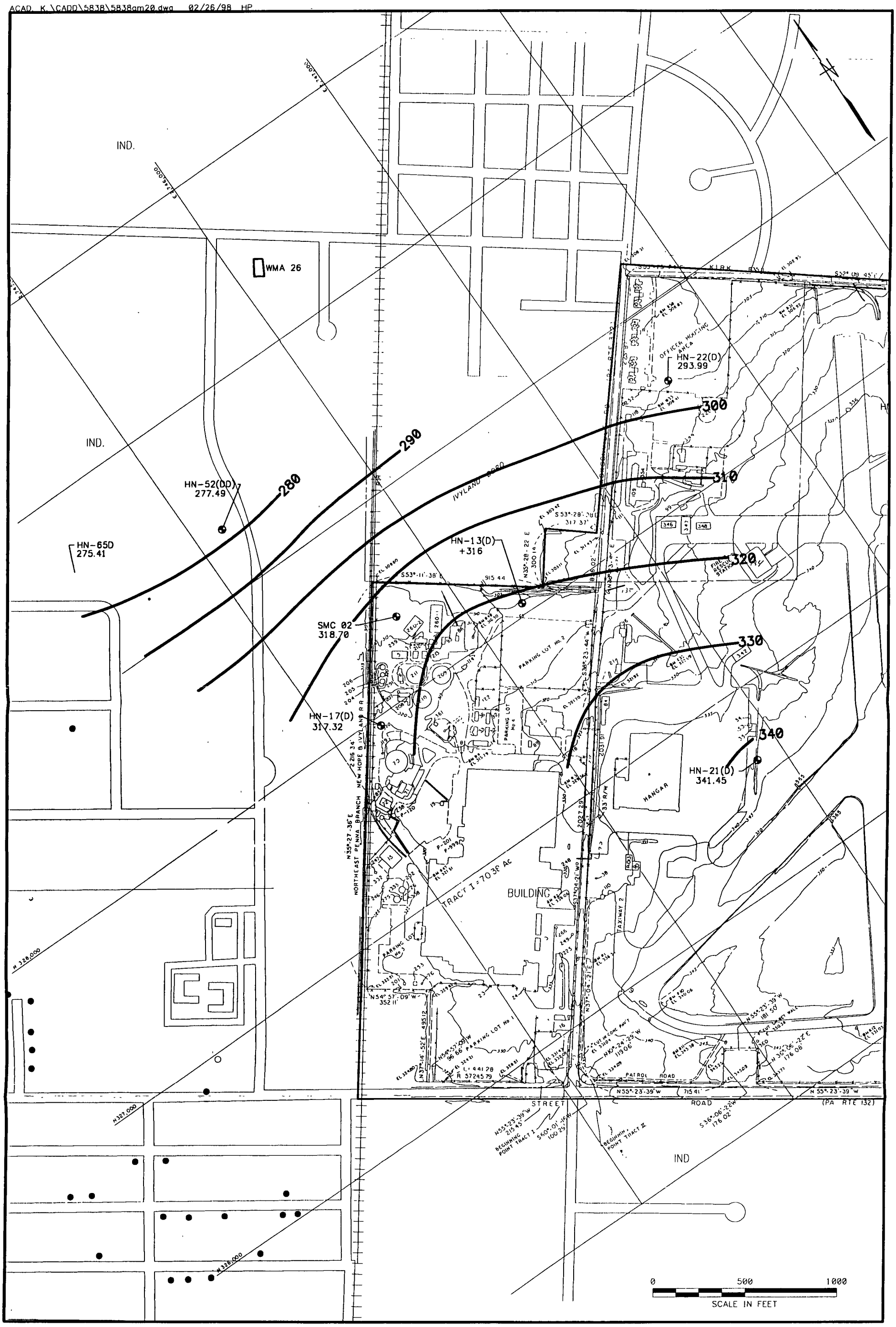

POTENTIOMETRIC SURFACE MAP
DEEP WELLS (>250 FEET DEEP)
DECEMBER 3, 1997
AREAS A AND D
NAWC WARMINSTER, PA

FIGURE 2-4

Brown & Root Environmental

municipal well [Warminster Township Municipal Authority (WTMA) No. 26], and one WTMA open borehole. Additional wells included in this discussion, located near Area A, include well cluster HN-22.

Based on the December 1997 water-level data (Appendix B), a generally pronounced upward vertical hydraulic gradient was noted from deep to shallow water-bearing zones. Water levels in several deep wells ranged from about 10 to 35 feet higher than levels measured in shallow and intermediate wells at the same well cluster.

The deep wells with noteworthy positive hydraulic head differentials (i.e., greater than 10 feet) in comparison to shallow and intermediate wells included

- HN-11D
- HN-12D (also artesian or flowing well)
- HN-16D
- HN-19D
- HN-21D (flowing well)
- HN-50D
- HN-52D
- HN-53D
- HN-65D
- SMC-02 (flowing well)

In addition, several intermediate-depth wells exhibited positive head differentials greater than 10 feet when compared to groundwater elevations for shallower wells. The intermediate wells included

- HN-17I
- HN-52I
- HN-65I2
- HN-80I
- HN-81I
- HN-82I (flowing well)

The upward vertical hydraulic gradients from deeper to shallow water-bearing zones may act to limit the depth (or vertical component) of hazardous substance migration from potential sources.

2.3.1 Area A Shallow Groundwater

Table 2-3 provides a summary of analytical results for positively detected analytes in shallow Area A groundwater. Plate 1 displays the sample results for shallow wells (less than 75 feet below the ground surface) within Area A. Table 3-1 shows the representative concentrations and screening criteria for shallow Area A groundwater.

2.3.1.1 Organic Results

VOCs were detected in samples from most of the overburden and shallow monitoring well samples from Area A, including those from on-base and off-base wells. Within Area A, trichloroethene (TCE) was detected at the highest concentrations and with the greatest frequency of all target compounds. Tetrachloroethene (PCE), carbon tetrachloride (CCl_4), cis-1,2-dichloroethane(cis-1,2-DCE), 1,1-dichloroethene(1,1-DCE), 1,1-dichloroethane(1,1-DCA), and 1,2-dichloroethane(1,2-DCA) were also detected in multiple well samples. In Area A, the majority of the organic contamination appears to be centered north and northwest of site 1 and the former wastewater treatment lagoons and Building 86. However, all well water samples taken from wells located between Building 2 and the base property boundary west of Jacksonville Road had at least one positive VOC detection.

PCE concentrations from shallow groundwater samples were not as frequently detected as TCE in Area A monitoring wells. Among the Area A on-base well samples, PCE concentrations ranged from non-detect to 135 ug/l (MW-E). The highest levels of PCE were found in on-base monitoring well samples from wells immediately north of Building 86. The sample from well SMC-01 contained PCE at 91 ug/l; this well is west of the fuel storage area.

Plate 2 displays PCE isoconcentrations based on analytical results from shallow Area A monitoring well samples. To improve the clarity of Plate 2, isopleths associated with the sample result for well SMC-01 were not drawn for this plate. For Area A shallow groundwater, two areas of elevated PCE levels were identified. The first area appears to extend from near Building 86 north to beyond the base property boundary. Wells HN-12S, MW-E, and MW-D are all present in this general area. The second general area or isolated anomaly is in the vicinity of well HN-52S. The sample from this well contained PCE at 420 ug/l. The extent of the PCE plume near this well cannot be precisely determined based on available data. It is unlikely that elevated PCE levels found in on-base Area A shallow wells are related to the PCE found in off-base well sample HN-52S based on the significantly higher level found off-base and since PCE was not detected at significant concentrations in well samples collected between these two areas.

Tabl 2-3
Summary of Analytical R sults for Shallow Ar a A Groundwater
NAWC Warminster, Pennsylvania

Substance	Frequency of Detection	Range of Positive Detection	Mean of All Data	Location of Maximum	Representative Concentration
antimony	1/4	4	1.64	HN-14S	4
barium	2/2	40.7 - 54.1	47.4	HN-11S	54.1
calcium	4/4	27600 - 64400	42700	HN-59S	64400
chromium	4/4	7.5 - 72.1	30.3	HN-55S	72.1
iron	1/1	29500	29500	HN-11S	29500
lead	1/4	5.7	2.03	HN-11S	5.7
magnesium	4/4	10700 - 22900	15800	HN-59S	22900
manganese	1/1	154	154	HN-11S	154
mercury	1/4	0.56	0.185	HN-11S	0.56
nickel	2/4	7.8 - 9.8	5.98	HN-11S	9.8
potassium	3/3	2490 - 3720	2910	HN-55S	3720
silver	2/4	2 - 3	1.55	HN-14S	2.93
sodium	4/4	12200 - 45700	27800	HN-11S	45700
1,1,1-trichloroethane	11/28	0.6 - 340	16.7	HN-52S	10.2
1,1,2-trichloroethane	1/28	0.7	1.21	HN-14S	0.7
1,1-dichloroethane	14/28	0.5 - 190	8	HN-52S	4.75
1,1-dichloroethene	13/28	0.5 - 210	9.03	HN-52S	5.76
1,2-dichloroethane	3/28	0.7 - 1.5	1.27	MW-E	1.43
1,2-dichloroethene (cis)	14/28	0.6 - 72	7.5	HN-12S	14.7
1,2-dichloroethene (trans)	1/28	0.6	1.21	SMP-02	0.6
carbon disulfide	1/28	5	1.37	HN-13X	1.6
carbon tetrachloride	9/28	2 - 12	2.89	SMC-01	5.44
chloroform	2/18	2 - 2	1.89	HN-14S	2
tetrachloroethene	20/28	0.8 - 420	35.4	HN-52S	181
trichloroethene	24/28	0.7 - 410	68	HN-11S	410
vinyl chloride	3/28	1 - 4	1.37	SMP-02	1.62

Notes:

Units are ug/L.

Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result.

Mean of all data includes positive detections and non-detected results. Detection limits are divided by two for non-detected results.

The determination of representative concentrations is based on comparison of maximum to the 95 % UCL.

Frequency of detection refers to number of times substance was detected among all samples versus total number of samples (minus number of unusable results).

Number of samples may vary based on the number of usable results. Rejected or blank-qualified results were not considered valid samples.

Among the Area A on-base shallow groundwater samples, TCE levels ranged from non-detect (HN-13X) to 410 ug/l (HN-11S). Samples from most on-base overburden wells (i.e., monitored intervals less than 20 feet below the ground surface) did not contain TCE or any other VOC contamination above MCLs, except for the well sample from DG-26 (TCE at 10 ug/l). These wells include HN-11X, HN-13X, DG-3, DG-12 and DG-13.

Plate 3 displays TCE isoconcentrations based on analytical results from shallow Area A and off-site well samples. For Area A shallow groundwater, three areas of elevated of TCE levels were noted. The first area lies in the northwestern corner of the Navy property and is centered on HN-11S. The well sample from HN-11S showed TCE at 410 ug/l. The second area or isolated anomaly is in the vicinity of well HN-52S. The sample from this well revealed TCE at 140 ug/l. The extent of the TCE plume near well HN-52S cannot be determined based on available data. The third area surrounds well HN-50S, where TCE was detected at 360 ug/l in shallow groundwater. For this anomaly, the extent of TCE contamination in shallow groundwater is more uncertain than for the first two areas. The relationship between the two anomalies and the first area regarding TCE contamination is uncertain at this time.

Among the shallow Area A monitoring well samples, CCl_4 was detected at levels ranging from non-detect to 12 ug/l (wells MW-D and SMC-01). Positive detections of this compound were not found among shallow monitoring well samples collected in the eastern portion of Area A. All Area A shallow well samples that showed CCl_4 also contained of cis-1,2-DCE, TCE, and PCE, except for the sample from MW-02. None of the off-base well samples detected CCl_4 at levels higher than on-base well water concentrations.

1,1,1-Trichloroethane(1,1,1-TCA) was detected in samples from shallow well samples within Area A at levels ranging from 0.9J to 2 ug/l. The highest 1,1,1-TCA levels in shallow groundwater were detected in samples from off-base wells HN-16S (104 ug/l) and HN-52S (340 ug/l), which suggests that these 1,1,1-TCA concentrations may not be attributable to Navy property. 1,1,1-TCA was not detected in well samples HN-14S or HN-55S; these wells lie between the on-base portion of Area A and wells HN-16S and HN-52S.

Chemicals occasionally associated with the degradation of TCE and PCE (e.g., 1,1-DCA, 1,1-DCE, 1,2-DCE) were detected in samples from most monitoring wells (e.g., HN-11X, HN-11S, HN-13X, E, HN-12X, HN-15S, HN-16S, SMP-02, ,DG-3, DG-12, DG-13, and MW-04). Vinyl chloride (purported to be a terminal product of the degradation process) was detected in three shallow groundwater samples, including those from wells SMP-02 (4 ug/l), HN-12S (1 ug/l), and HN-15X (1 ug/l).

Detections of monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene, and xylenes) were not found in any shallow Area A monitoring well sample. There were no positive detections for the Area A shallow groundwater samples that were analyzed for SVOCs, pesticides, or PCBs.

2.3.1.2 Inorganic Results

Within Area A, groundwater samples from wells HN-11S, HN-14S, HN-55S, and HN-59S were analyzed for total inorganics. Plate 1 displays the positive metal concentrations that were found above background levels in these well water samples. Chromium (total) was detected in all four well samples, ranging from 14.5 to 72.1 ug/l. The sample from HN-55S showed the highest chromium concentration. This well is located adjacent to the former wastewater treatment lagoons. Low levels of nickel, silver, and antimony were also detected in at least one shallow Area A well.

2.3.2 Area A Intermediate Groundwater

Samples from intermediate monitoring wells within Area A contained the highest levels of groundwater contamination observed at the base. As in shallow Area A groundwater, TCE was detected at the highest concentrations and with the greatest frequency of all target compounds. Table 2-4 provides a summary of analytical results for positively detected analytes in intermediate Area A groundwater. Plate 4 displays the sample results for intermediate-depth (generally between 75 to 150 feet below the ground surface) groundwater within Area A. Table 3-2 provides the representative concentrations for intermediate Area A groundwater.

2.3.2.1 Organic Results

Among the intermediate Area A wells sampled, all but one well sample (MW-11) contained detectable VOC amounts. The highest VOC levels were found in samples from monitoring wells HN-11I, HN-55I, and HN-59I. The groundwater sample collected from HN-11I, located near Site 1, contained the highest concentrations of chloroform (40J ug/l), CCl_4 (990J ug/l), TCE (32,000 ug/l), and 1,1,2-trichloroethane (1,1,2-TCA) (67J ug/l) detected during the December 1997 sampling event for Area A wells. The highest concentration of PCE was detected in the sample from HN-55I (160 ug/l).

Unlike shallow Area A groundwater, VOC contamination for intermediate groundwater appears to be confined to Sites 1, 2, 3, which are located along the base property boundary. The monitoring well samples collected from intermediate-depth wells between Building 2 and Sites 1, 2, and 3 did not TCE or PCE.

Table 2-4
Summary of Analytical Results for Interm diate Ar a A Groundwat r
NAWC Warminster, Pennsylvania

Substance	Frequency of Detection	Range of Positive Detection	Mean of All Data	Location of Maximum	Representative Concentration
aluminum	1/2	479	249	HN-55I	479
barium	2/2	85.3 - 112	98.7	HN-14I	112
calcium	3/3	63100 - 66350	64900	HN-59I	66400
chromium	3/3	14.05 - 43.9	24.6	HN-14I	43.9
cyanide	1/3	6	3.67	HN-14I	6
iron	2/2	291 - 405	348	HN-55I	405
magnesium	3/3	18500 - 21100	19900	HN-14I	21100
manganese	1/1	201	201	HN-55I	201
nickel	1/3	18.7	8.33	HN-14I	18.7
potassium	3/3	1780 - 9930	5430	HN-59I	9930
silver	2/3	1.4 - 1.9	1.3	HN-14I	1.9
sodium	3/3	17200 - 25900	22300	HN-14I	25900
zinc	1/2	60.7	31.3	HN-14I	60.7
1,1,1-trichloroethane	6/20	0.6 - 12	4.29	HN-65I1	6.54
1,1,2-trichloroethane	4/20	4 - 67	9.15	HN-11I	33.6
1,1-dichloroethane	6/20	0.4 - 16	4.45	HN-65I1	6.9
1,1-dichloroethene	8/20	0.8 - 25	6.11	HN-65I1	18.6
1,2-dichloroethane	1/20	1	3.63	HN-59I	1
1,2-dichloroethene (cis)	9/20	0.6 - 13	5.31	HN-14I	12.9
benzene	2/20	1 - 10	4.1	HN-11I	5.82
carbon disulfide	1/20	2	6.79	HN-11I	2
carbon tetrachloride	4/20	52 - 990	85.8	HN-11I	990
chloroform	6/18	2 - 40	8.58	HN-11I	40
ethylbenzene	1/20	4	6.89	HN-11I	4
tetrachloroethene	16/20	0.6 - 160	23.6	HN-55I	160
toluene	1/20	16	7.49	HN-11I	16
trichloroethene	17/20	0.6 - 32000	3000	HN-11I	32000
vinyl chloride	1/20	0.9	6.73	HN-11I	0.9
xylene (total)	1/20	9	4.03	HN-11I	5.55

Notes:

Units are ug/L.

Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result.

Mean of all data includes positive detections and non-detected results. Detection limits are divided by two for non-detected results.

The determination of representative concentrations is based on comparison of maximum to the 95 % UCL

Frequency of detection refers to number of times substance was detected among all samples versus total number of samples (minus number of unusable results).

Number of samples may vary based on the number of usable results. Rejected or blank-qualified results were not considered valid samples.

PCE concentrations from intermediate groundwater samples were not as high or as frequently detected as TCE in Area A intermediate-depth wells. Among the Area A on-base well samples, PCE concentrations ranged from non-detect to 160 ug/l (HN-55I). However, only samples from on-base wells immediately adjacent to the northwestern corner of the base showed PCE levels greater than the MCL (5 ug/l).

Plate 5 displays PCE isoconcentrations based on analytical results from intermediate Area A and off-site monitoring well samples. For Area A intermediate groundwater, one area of elevated PCE levels was identified. This plume appears to extend northwest from the wastewater treatment plant area, with PCE concentrations ranging from 34 ug/l (HN-14I) to 160 ug/l (HN-55I).. The PCE concentrations (ranging from non-detect to 25 ug/l) found in samples from well cluster HN-65 (HN-65I1, HN-65I2) and HN-52 (PCE at 12 ug/l) may not be related to the same source of PCE contamination. The extent of the intermediate-depth PCE plume near well clusters HN-65 and HN52 cannot be precisely determined based on available data.

Plate 6 displays TCE isoconcentrations based on groundwater analytical results from intermediate-depth well samples. Aside from the sample from HN-11I, the highest TCE levels for Area A intermediate groundwater were detected in well samples from HN-59I (15,000 ug/l), HN-55I (7,800 ug/l), HN-16I (2,300 ug/l), and HN-14I (2,300 ug/l). These wells are within about 800 feet of one another, with TCE concentrations generally decreasing in the downgradient direction.

Among the Area A intermediate-depth groundwater samples, CCl_4 was detected at levels ranging from non-detect to 990J ug/l (HN-11I). CCl_4 was only found in those samples with the highest TCE levels, with the exception of the sample from HN-16I. All Area A intermediate well samples that had CCl_4 also contained 1,1,2-TCA, TCE, PCE, and chloroform.

1,1,1-TCA was detected infrequently in intermediate-depth well samples at levels ranging from 0.7J to 12 ug/l. This compound was not found above 1 ug/l in any on-base Area A intermediate monitoring wells. As with shallow groundwater, the highest 1,1,1-TCA levels were noted in samples from off-base wells HN-65I1 (12 ug/l) and HN-65I2 (2 ug/l). This suggests that 1,1,1-TCA concentrations may not be attributable to the Navy, since samples from wells HN-14I, HN-52I, and HN-55I did not contain this substance.

Vinyl chloride was found in one on-base intermediate groundwater sample. The sample from HN-11I showed this substance at 0.9J ug/l. There were no vinyl chloride detections among the other Area A intermediate well samples.

The well sample from HN-11I had positive detections of all four BTEX compounds, ranging from 4J ug/l

(ethylbenzene) to 16J ug/l (toluene). BTEX compounds were not found in any other Area A intermediate groundwater samples, except for benzene, which was detected in HN-59I at 1 ug/l. There were no positive detections for intermediate-depth samples that were analyzed for SVOCs, pesticides, or PCBs. Samples from wells HN-14I, HN-55I, and HN-59I were tested for these organic substances.

2.3.2.2 Inorganic Results

Groundwater samples from intermediate Area A wells HN-14I, HN-55I, and HN-59I were analyzed for total inorganics. Plate 4 displays the positive metal concentrations that were found above background levels. Chromium (total) was detected in all three well samples, ranging from 14.1K to 43.9 ug/l. The sample from HN-14I had the highest chromium concentration. All three wells are downgradient of the former wastewater treatment lagoons.

Low levels of nickel, cyanide, silver, and zinc were also detected in at least one intermediate-depth Area A well. The farthest downgradient well (HN-14I) sampled contained all these inorganics.

2.3.3 Area A Deep Groundwater

Table 2-5 provides a summary of analytical results for positively detected analytes in deep Area A groundwater. Plate 7 displays the sample results for deeper wells (generally greater than 150 feet below the ground surface) within Area A. Because of the limited number of deep wells sampled within Area A and the relatively low levels of VOCs found, isoconcentration maps were not prepared for deeper groundwater. Table 3-3 shows the representative concentrations calculated for Area A deep groundwater.

The deep wells sampled within Area A included screened wells HN-11D, HN-12D, HN-13I, HN-13D, HN-15D, HN-16D, HN-19D, HN-22D, HN-50D, HN-52D, HN-52DD, HN-65I2, HN-65D, open Well 93, and open Well BK-1059. These well locations are mostly within and downgradient of Area A; the farthest well sampled (BK-1059) is about 3,100 feet from the base property boundary. Because of confining pressures observed in many of these wells that result in significant upward hydraulic gradients, downward migration of dissolved contaminants from shallower portions of the bedrock aquifer at these locations is generally unlikely.

2.3.3.1 Organic Results

Most deep Area A well samples contained at least trace levels of VOCs, except for samples collected from HN-12D and HN-65D, for which no VOCs were found. The on-base Area A deep groundwater samples did not have any VOC concentrations greater than MCLs. The greatest amount and variety of VOCs were in the

Tabl 2-5
Summary of Analytical R sults for Deeper Ar a A Groundwater
NAWC Warminster, Pennsylvania

Substance	Frequency of Detection	Range of Positive Detection	Mean of All Data	Location of Maximum	Representative Concentration
1,1,1-trichloroethane	2/14	2 - 24	2.32	93D	3.21
1,1-dichloroethane	4/14	0.6 - 19	1.97	93D	2.77
1,1-dichloroethene	4/14	1 - 22	2.43	93D	4.27
1,2-dichloroethene (cis)	3/14	0.5 - 3	0.786	HN-52D	1.06
acetone	3/3	2 - 16	8.67	93D	16
carbon disulfide	1/14	1	0.571	HN-52DD	0.649
carbon tetrachloride	2/14	1 - 4	0.786	93D	1.01
chloroform	1/13	2	0.615	HN-52D	0.747
tetrachloroethene	6/14	0.7 - 39	4.76	93D	15.3
toluene	1/14	0.7	0.55	HN-52DD	0.607
trichloroethene	9/14	0.5 - 460	46.9	HN-52D	460

Notes:

Units are ug/L.

Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result.

Mean of all data includes positive detections and non-detected results. Detection limits are divided by two for non-detected results.

The determination of representative concentrations is based on comparison of maximum to the 95 % UCL.

Frequency of detection refers to number of times substance was detected among all samples versus total number of samples (minus number of unusable results).

Number of samples may vary based on the number of usable results. Rejected or blank-qualified results were not considered valid samples.

samples from HN-52D and Well No. 93, which both contained TCE, PCE, 1,1-DCA, 1,1-DCE, CCl_4, and cis-1,2-DCE. The sample from BK-1059, an open borehole approximately 400 feet deep, also had trace levels of these same VOCs, except for the absence of CCl_4.

TCE and PCE were the most pervasive VOCs found in deep groundwater samples collected within Area A. Positive TCE levels ranged from 0.5J to a maximum of 460 ug/l (well sample HN-52D), and positive PCE concentrations ranged from 5 to a maximum of 39 ug/l (the sample from Well No. 93). Well No. 93 is an active municipal supply well.

1,1,1-TCA was not detected in any on-base deep groundwater samples collected within Area A, nor was this compound found in any deep well samples within 1,800 feet of the Navy property boundary. Only samples from Well No. 93 and BK-1059, which is approximately 1,400 feet downgradient of Well No. 93, contained 1,1,1-TCA. Since both wells are open boreholes, it is possible that the 1,1,1-TCA levels are not necessarily associated with deeper groundwater quality.

BTEX compounds were not found in any deep Area A monitoring well samples. None of the Area A deep wells were tested for SVOCs, pesticides, PCBs, or inorganics during the December 1997 sampling event.

2.4 NATURE AND EXTENT OF CONTAMINATION FOR AREA D GROUNDWATER

This section discusses the nature and extent of contamination for Area D groundwater. The conclusions presented in this section are based on the analytical results for groundwater sampling performed during December 1997. Validated analytical results are presented in Appendix A.

Area D is located in the western portion of NAWC Warminster and straddles Jacksonville Road. Groundwater monitoring primarily focused on the industrial area along the western base boundary adjacent to the main building complex (Buildings 1, 2, and 3). The sample locations included on-base monitoring and production wells and off-base monitoring and drinking water wells. The production wells included SW-1, SW-2, SW-3, SW-4, and SW-10.

Similar to Area A groundwater a pronounced upward vertical hydraulic gradient from deeper to shallow water-bearing zones was observed at several well cluster locations, however vertical gradients were minimal a number of other cluster locations.

Several factors relevant to Area D groundwater may account for the patterns of contamination observed during December 1997 sampling event. The relative solubilities of the detected VOCs, the amounts released

into the environment, and the length of time available for contaminant transport are important factors in determining the distance over which a chemical is transported in groundwater. TCE is one of the more soluble organic compounds and is believed to be the most frequently detected VOC at the base because of its widespread use as a degreasing agent. Other VOCs were detected within Area D at trace levels and in isolated areas, suggesting minor, localized releases.

2.4.1 Area D Shallow Groundwater

Table 2-6 provides a summary of analytical results for positively detected analytes in shallow Area D groundwater samples. Plate 1 shows the sample results for these well water samples. Table 3-4 displays representative concentrations for shallow Area D groundwater.

2.4.1.1 Organic Results

The pattern of positive VOC detections within Area D suggests discrete source areas for various contaminants (Plate 1). TCE is pervasive throughout this study area, with detections noted at all overburden and shallow monitoring well locations, except samples collected from wells HN-21S, HN-42S, HN-61S, HN-54S, HN-81S, and HN-82S. PCE, CCl_4, cis-1,2-DCE, 1,1-DCE, 1,1-DCA, trans-1,2-dichloroethene (trans-1,2-DCE), and chloroform were also detected in more than one well sample, but typically at very low levels. In Area D, the majority of the VOC contamination appears to be located immediately adjacent to Buildings 1 and 2. A small area of elevated TCE levels was also noted just north of Building 2. All shallow groundwater samples collected from wells west of Jacksonville Road within Area D, contained at least one VOC with the exception of the sample from HN-42S.

PCE concentrations from shallow groundwater samples were not as high or as frequently detected as TCE in Area D wells. Among the Area D on-base shallow well samples, PCE concentrations ranged from non-detect to 4 ug/l (MW-E). Plate 2 displays PCE isoconcentrations based on analytical results from shallow Area D monitoring well samples. The off-base well samples (HN-53S, HN-54S, HN-19S) for shallow groundwater did not contain PCE.

Plate 3 shows TCE isoconcentrations for Area D shallow groundwater. In Area D, the majority of the TCE contamination appears to be located immediately adjacent to Buildings 1 and 2. A small area of elevated TCE levels was also noted just north of Building 2. Among the Area D on-base shallow groundwater samples, TCE levels ranged from non-detect to 480 ug/l (HN-32S). Samples with elevated TCE concentrations greater than 10 ug/l (including those from wells HN-17S, HN-18S, HN-31S, HN-32S, HN-33S, HN-56S, HN-57S, and HN-58S) also generally had positive detections of cis-1,2-DCE (ranging from 0.7J to 3

Tabl 2-6
Summary of Analytical Results for Shallow Area D Groundwater
NAWC Warminster, Pennsylvania

Substance	Frequency of Detection	Range of Positive Detection	Mean of All Data	Location of Maximum	Representative Concentration
calcium	1/1	99550	100000	HN-31S	100000
chromium	1/1	40.1	40.1	HN-31S	40.1
magnesium	1/1	37950	38000	HN-31S	38000
potassium	1/1	1250	1250	HN-31S	1250
sodium	1/1	43100	43100	HN-31S	43100
1,4-dichlorobenzene	1/27	0.6	0.504	131	0.51
1,1,1-trichloroethane	7/27	0.5 - 3	0.752	HN-53S	0.876
1,1,2,2-tetrachloroethane	2/27	0.75 - 0.8	0.52	HN-56S	0.541
1,1-dichloroethane	14/27	0.5 - 3	0.911	HN-83S	1.11
1,1-dichloroethene	7/27	0.5 - 53	2.67	HN-53S	1.91
1,2-dichloroethane	1/27	0.8	0.511	131	0.527
1,2-dichloroethene (cis)	14/27	0.7 - 14	1.63	131	2.11
1,2-dichloroethene (trans)	6/27	0.5 - 1	0.537	HN-31S	0.566
acetone	1/1	2	2	HN-54S	2
carbon tetrachloride	6/27	0.6 - 1	0.583	HN-18S	0.634
chloroform	7/25	0.5 - 1	0.576	HN-17S	0.627
tetrachloroethene	15/27	0.6 - 6	1.36	HN-83S	1.84
trichloroethene	16/27	1 - 480	63.2	HN-32S	480
vinyl chloride	1/27	2	0.556	131	0.599

Notes:

Units are ug/L.

Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result.

Mean of all data includes positive detections and non-detected results. Detection limits are divided by two for non-detected results.

The determination of representative concentrations is based on comparison of maximum to the 95 % UCL.

Frequency of detection refers to number of times substance was detected among all samples versus total number of samples (minus number of unusable results).

Number of samples may vary based on the number of usable results. Rejected or blank-qualified results were not considered valid samples.

ug/l), 1,1-DCA (ranging from 0.5J to 2 ug/l), and PCE (ranging from 1 to 4 ug/l). 1,1,1-TCA, 1,1-DCA, and 1,1-DCE were detected in two shallow, off-base well samples (HN-19S and HN-53S). The maximum concentrations were 3 ug/l (1,1,1-TCA), 4 ug/l (1-1-DCA), and 53 ug/l (1,1-DCE), respectively. These are the highest VOC concentrations for these compounds among all Area D shallow groundwater samples.

Detections of BTEX compounds were not noted for any shallow Area D well sample. Shallow groundwater samples were not analyzed for SVOCs, pesticides, or PCBs.

2.4.1.2 Inorganic Results

A sample from well HN-31S was analyzed for total inorganics. Plate 1 displays the positive metal concentration that was found above background levels in this sample. Chromium (total) was the only metal detected above background. The result was 40.1 ug/l.

2.4.2 Area D Intermediate Groundwater

Similar to shallow Area D groundwater, TCE was detected most frequently and at the highest concentrations in the intermediate groundwater samples from Area D. Table 2-7 provides a summary of analytical results for positively detected analytes in intermediate (generally between 75 to 150 feet below the ground surface) Area D groundwater. Table 3-6 shows the calculated representative concentrations. Plate 4 displays the sample results for intermediate-depth with groundwater within Area D.

2.4.2.1 Organic Results

The pattern of intermediate groundwater contamination associated with Area D shows highest VOC levels between the northwestern side of Building 2 and Building 70. TCE is the primary VOC of concern, with concentrations ranging from non-detect to 50 ug/l (well sample HN-58S2). Intermediate-depth well samples (HN-18I, HN-21I, HN-80I, HN-81I, HN-82I, and HN-83I) collected north of Building 2 did not contain VOCs, except for the sample from well HN-17I, which had toluene at 2 ug/l.

PCE concentrations in intermediate groundwater samples were non-detect or at trace levels for Area D wells. The maximum concentrations were found in off-base well sample HN-19I1 (0.6J ug/l) and on-base well sample HN-33I (also 0.6J ug/l). Plate 5 displays PCE isoconcentrations based on analytical results from intermediate Area D monitoring well samples. In general, Area D does not appear to be a significant source

Tabl 2-7
Summary of Analytical Results for Intermediate Area D Groundwater
NAWC Warminster, Pennsylvania

Substance	Frequency of Detection	Range of Positive Detection	Mean of All Data	Location of Maximum	Representative Concentration
aluminum	2/2	63.4 - 120	91.7	W-HN-20I	120
calcium	2/2	68400 - 75700	72100	W-HN-42I	75700
iron	1/1	352	352	W-HN-20I	352
lead	1/2	1.8	1.3	W-HN-20I	1.8
magnesium	2/2	16600 - 25100	20900	W-HN-42I	25100
manganese	1/1	412	412	W-HN-20I	412
potassium	2/2	3360 - 3980	3670	W-HN-20I	3980
sodium	2/2	14300 - 31000	22700	W-HN-20I	31000
1,1,1-trichloroethane	1/17	5	0.882	W-HN-53I	1.13
1,1-dichloroethane	3/17	0.8 - 1	0.694	W-HN-56I	0.838
1,1-dichloroethene	2/17	0.6 - 24	2.01	W-HN-53I	2.2
1,2-dichloroethene (cis)	3/17	1 - 4	0.941	W-HN-56I	1.29
1,2-dichloroethene (trans)	1/17	0.7	0.629	W-HN-56I	0.7
acetone	1/1	6	6	W-HN-83I	6
carbon disulfide	1/17	2	0.706	W-HN-83I	0.871
tetrachloroethene	2/17	0.5 - 0.6	0.624	W-HN-33I	0.6
toluene	3/17	0.5 - 2	0.712	W-HN-17I	0.878
trichloroethene	5/17	0.8 - 50	3.81	W-HN-58I	4.48

Notes:

Units are ug/L.

Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result.

Mean of all data includes positive detections and non-detected results. Detection limits are divided by two for non-detected results.

The determination of representative concentrations is based on comparison of maximum to the 95 % UCL.

Frequency of detection refers to number of times substance was detected among all samples versus total number of samples (minus number of unusable results).

Number of samples may vary based on the number of usable results. Rejected or blank-qualified results were not considered valid samples.

of PCE contamination for intermediate groundwater. Plate 6 displays TCE isoconcentrations based on groundwater analytical results from intermediate-depth well samples. As noted above, an area of TCE contamination was noted near the northwestern corner of Building 2 (well sample HN-58S2). This area appears to extend off base, at least to well HN-19I1. The sample from this well contained TCE at 13 ug/l. The intermediate-depth sample from well HN-17I, which lies between Building 2 and well HN-19I1, did not contain TCE, however, HN-17I is 50 feet deeper than HN-19I1. HN-17S is an intermediate-depth well (screened 84 to 102 feet below the ground surface') and the well sample contained TCE at 34 ug/l.

Other VOCs detected more than once in Area D intermediate wells were cis-1,2-DCE, 1,1-DCA, 1,1-DCE, and 1,1,1-TCA. All concentrations for these compounds were at low levels (less than 5 ug/l), except for 24 ug/l of 1,1-DCE, which was found in the sample from off-base well HN-53I. 1,1,1-TCA was only detected in two off-base intermediate groundwater samples, ranging up to 5 ug/l (sample HN-53I). The off-base 1,1,1-TCA levels in groundwater may be related to potential sources other than Navy property, when considering the combined shallow and intermediate groundwater quality data for Area D.

One BTEX compound was found in several intermediate-depth Area D well samples. Toluene was noted in samples from well HN-17I (2 ug/l), well HN-20I (0.5J ug/l), and well no. 228 (0.6J ug/l). No other BTEX compounds were detected. Intermediate groundwater samples from Area D were not analyzed for SVOCs, pesticides, or PCBs.

2.4.2.2 Inorganic Results

Samples from intermediate-depth wells HN-20I and HN-42I were analyzed for total inorganics. No metals were found above background levels in these samples.

2.4.3 Area D Deep Groundwater

Table 2-8 provides a summary of analytical results for positively detected analytes in deep Area D groundwater, while Table 3-6 shows the applicable representative concentrations. Plate 8 displays the sample results for deeper wells (generally greater than 150 feet below the ground surface) within Area D. Isoconcentration maps were not prepared for deeper groundwater.

The deep wells sampled within Area D included screened wells HN-17D, HN-19D, HN-20D, HN-21D, HN-42D, HN-53D, and HN-54D and five open-hole base supply wells (SW-1 through SW-4 and SW-10). Additional studies regarding supply wells SW-1 through SW-4 were completed in 1997 (B&R Environmental, 1998).

Table 2-8
Summary of Analytical Results for Deeper Ar a D Groundwater
NAWC Warminster, Pennsylvania

Substance	Frequency of Detection	Range of Positive Detection	Mean of All Data	Location of Maximum	Representative Concentration
aluminum	1/1	113	113	W-HN-20D	113
barium	1/1	323	323	W-HN-20D	323
calcium	1/1	40700	40700	W-HN-20D	40700
iron	1/1	539	539	W-HN-20D	539
lead	1/1	11	11	W-HN-20D	11
magnesium	1/1	11100	11100	W-HN-20D	11100
manganese	1/1	72.9	72.9	W-HN-20D	72.9
potassium	1/1	4710	4710	W-HN-20D	4710
sodium	1/1	19400	19400	W-HN-20D	19400
1,1-dichloroethane	2/11	2 - 5	1.05	W-SW1	1.78
1,2-dichloroethene (cis)	2/11	0.7 - 1	0.564	W-SW1	0.643
chloroform	2/11	5 - 6	1.41	W-SW-3	3.04
tetrachloroethene	3/11	0.8 - 3	0.782	W-HN-20D	1.09
toluene	1/11	0.8	0.527	W-SW-3	0.572
trichloroethene	3/11	0.6 - 4	1.15	W-SW1	2.14

Notes:

Units are ug/L.

Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result.

Mean of all data includes positive detections and non-detected results. Detection limits are divided by two for non-detected results.

The determination of representative concentrations is based on comparison of maximum to the 95 % UCL.

Frequency of detection refers to number of times substance was detected among all samples versus total number of samples (minus number of unusable results).

Number of samples may vary based on the number of usable results. Rejected or blank-qualified results were not considered valid samples.

2.4.3.1 Organic Results

Most deep Area D well samples contained non-detect to trace levels of VOCs. The on-base Area D deep groundwater samples did not contain any VOC levels greater than MCLs. The VOCs detected included TCE, PCE, 1,1-DCA, 1,1-DCE, cis-1,2-DCE, and chloroform. Supply well samples from SW-1, SW-2, and SW-3 were the only samples that showed the presence of more than one VOC. No VOCs were detected in off-base deep groundwater samples near Area D, except for the sample from HN-19D (0.5J ug/l).

In general, the December 1997 sampling event did not indicate the presence of elevated VOCs associated with Area D deep groundwater. The highest VOC concentrations for individual compounds were found in the following well samples:

- PCE - sample from HN-20D at 3 ug/l
- TCE - sample from SW-1 at 4 ug/l
- 1,1-DCA - sample from SW-1 at 5 ug/l
- Cis-1,2-DCE - sample from SW-1 at 1 ug/l

BTEX compounds were not found in any deep Area D monitoring well samples. None of the Area D deep wells were tested for SVOCs, pesticides, PCBs, or inorganics during the December 1997 sampling event.

3.0 SUMMARY AND CONCLUSIONS

3.1 GROUNDWATER FLOWS

Based on the results and findings of comprehensive groundwater monitoring, the following conclusions were reached regarding groundwater flows within Areas A and D:

- Shallow and intermediate groundwater flows across Areas A and D were to the north-northwest, in the general direction of the slope of ground surface topography and bedrock dip.
- For Area A, deep and deeper groundwater flows were to the north-northwest and north, respectively.
- Deep groundwater flow across Area D was to the west and north-northwest.
- Where present a significant upward head differentials between shallow and deeper bedrock flow zones is expected to act to prevent shallow dissolved contaminant migration to deeper portions of the bedrock aquifer.

3.2 AREA A GROUNDWATER

Most of the overburden and shallow monitoring well samples from Area A, including those from on-base and off-base wells, contained VOCs. Within Area A, TCE was detected at the highest concentrations and with the greatest frequency of all target compounds. In Area A, the majority of the organic contamination appears to be centered north and northwest of the former wastewater treatment lagoons and Building 86.

3.2.1 Area A Shallow Groundwater

For Area A shallow groundwater, three areas of isolated anomalies of TCE levels were noted. The first area lies in the northwest corner of the Navy property. The second anomaly is in the vicinity of well HN-52S. The extent of the TCE plume near well HN-52S cannot be determined based on available data. The third anomaly surrounds well HN-50S, where TCE was detected at 360 ug/l in shallow groundwater. For this

anomaly, the pattern of TCE contamination in shallow groundwater is more uncertain than those noted for the other two areas.

Two areas or anomalies of elevated PCE levels were identified for Area A shallow groundwater. The first appears to extend from near Building 86 north to beyond the base property boundary. The second anomaly is near well HN-52S. It is unlikely that elevated PCE levels found in on-base Area A shallow wells are related to the PCE found in off-base well sample HN-52S since PCE was not detected at significant concentrations in well samples collected between these two areas.

3.2.2 Area A Intermediate Groundwater

Samples from intermediate monitoring wells within Area A contained the highest levels of groundwater contaminants. Similar to shallow Area A groundwater, TCE was detected at the highest concentrations and with the greatest frequency of all target compounds.

Unlike shallow Area A groundwater, the highest VOC levels in intermediate Area A groundwater were detected in close proximity or along the base property boundary. The monitoring well samples collected from intermediate-depth wells between Building 2 and Area A did not contain TCE or PCE.

For Area A intermediate groundwater, one pattern of elevated PCE levels was identified. This pattern appeared to extend northwest from the wastewater treatment plant area. The PCE concentrations detected in samples from off-base well cluster HN-65 may not be related to the same source of PCE contamination.

3.2.3 Area A Deep Groundwater

Most deep Area A well samples contained trace to low levels of VOCs, except for samples collected from HN-12D and HN-65D, for which no VOCs were found. The on-base Area A deep groundwater samples did not show VOC concentrations greater than MCLs. TCE and PCE were the most pervasive VOCs found in deep groundwater samples collected within Area A.

3.3 AREA D GROUNDWATER

The pattern of positive VOC detections within Area D suggests discrete source areas for various contaminants. TCE was pervasive throughout this study area, with detections noted at several monitoring well locations. PCE, CCl_4, cis-1,2-DCE, 1,1-DCE, 1,1-DCA, trans-1,2-DCE, and chloroform were also detected in more than one well sample, but generally at very low levels.

3.3.1 Area D Shallow Groundwater

For shallow Area D groundwater, the majority of the TCE contamination appeared to be located immediately adjacent to Buildings 1 and 2. A small area of elevated TCE levels was also noted just north of Building 2. Among the Area D on-base shallow groundwater samples, TCE levels ranged from non-detect to 480 ug/l. Nearly all shallow groundwater samples collected from wells west of Jacksonville Road showed the presence of at least one VOC within Area D.

PCE concentrations in shallow Area D groundwater samples were at trace levels. The off-base well samples for shallow groundwater did not contain PCE.

3.3.2 Area D Intermediate Groundwater

Similar to shallow Area D groundwater, the intermediate groundwater samples contained TCE most frequently and at the highest concentrations within Area D. Intermediate groundwater associated with Area D contained the highest VOC levels between the northwest side of Building 2 and Building 70. TCE was the primary VOC of concern, with concentrations ranging from non-detect to 50 ug/l. This area of TCE levels appeared to extend off-base, at least to well HN-19I1. Intermediate-depth well samples collected north of Building 2 did not contain VOCs, except for one low level of toluene.

PCE concentrations in intermediate groundwater samples were non-detect or at trace levels for Area D wells. The maximum concentration detected was 0.6J ug/l. In general, Area D did not appear to be a significant source of PCE contamination for intermediate groundwater.

The other VOCs detected more than once in Area D intermediate wells were cis-1,2-DCE, 1,1-DCA, 1,1-DCE, and 1,1,1-TCA. All concentrations for these compounds were generally at low levels (less than 5 ug/l). 1,1,1-TCA was only detected in two off-base intermediate groundwater samples. These levels may be related to sources other than Navy property, when considering the combined shallow and intermediate groundwater quality for Area D.

3.3.3 Area D Deep Groundwater

In general, the December 1997 sampling event did not indicate the presence of elevated VOCs associated with Area D deep groundwater. Most deep Area D well samples contained non-detect to trace levels of VOCs. The on-base Area D deep groundwater samples did not show VOC levels greater than MCLs. The

VOCs detected included TCE, PCE, 1,1-DCA, 1,1-DCE, cis-1,2-DCE, and chloroform. Base supply-well samples (SW-1, SW-2, and SW-3) were the only samples that showed the presence of more than one VOC. No VOCs were detected in off-base deep groundwater samples within Area D at a concentration greater than 1.0 ug/l.

3.4 RECOMMENDATIONS

Recommendations for future groundwater-related work for Areas A and D include:

- The results should be reviewed and evaluated to help support interim groundwater remedial actions within Areas A and D, including the preparation of appropriate performance monitoring plans for these actions.

- The isolated, off-base VOC levels contained in groundwater, as identified in this report, should be referred to regulatory agencies for further investigation.

- The patterns of on-base groundwater contamination should be reviewed with regard to any additional source investigations contemplated for Areas A and D, if necessary.

- The data generated during this monitoring suggest that additional deep groundwater investigations within Area D may be unnecessary at this time, particularly with regard to characterizing the vertical extent of potential contaminant migration.

- At a later date, the results from Areas A and D groundwater monitoring should be used to prepare appropriate sections of applicable RI and FS reports for OU-1 and OU-4. Tables 3-1 through 3-6 present information that should be evaluated in preparing risk assessments for Area A and D groundwater. These tables include the range of positive detections among well water samples, comparisons to background and other risk-based screening concentrations, and representative concentrations.

Table 3-1
Representative Concentrations - Shallow Area A Groundwater
NAWC Warminster, Pennsylvania

Substance	95 % UTL on Background Data	Site-Related Frequency of Detection	Range of Positive Detections for Site	Are Site Results Above Background ?	Representative Concentration For Site Data	Tap Water Risk-Based Concentration	Maximum Contaminant Level (MCL)	Lowest Drinking Water Health Advisory	Maximum Concentration > RBC ?
antimony	ND	1/4	4 - 4	Y	4	1.5	6	3	Y
barium	628	2/2	40.7 - 54.1	N	54 1	260	2000	2000	N
calcium	31800	4/4	27600 - 64400	Y	64400				N
chromium	5.5	4/4	7 5 - 72.1	Y	72 1	18	100	100	Y
iron	4850	1/1	29500 - 29500	N	29500	1100			N
lead	13.6	1/4	5.7 - 5.7	N	5.7	15	15		N
magnesium	11300	4/4	10700 - 22900	Y	22900				N
manganese	422	1/1	154 - 154	N	154	84			N
mercury	0.17	1/4	0.56 - 0 56	Y	0.56	1.1	2	2	N
nickel	ND	2/4	7.8 - 9.8	Y	9.8	73	100	100	N
potassium	2150	3/3	2490 - 3720	Y	3720				N
silver	ND	2/4	2 - 3	Y	2.93	18		100	N
sodium	14700	4/4	12200 - 45700	Y	45700				N
1,1,1-trichloroethane	NC	11/28	0 6 - 340	NC	10.2	79	200	200	Y
1,1,2-trichloroethane	NC	1/28	0.7 - 0.7	NC	0.7	0.19	3	3	Y
1,1-dichloroethane	NC	14/28	0.5 - 190	NC	4.75	81			Y
1,1-dichloroethene	NC	13/28	0.5 - 210	NC	5 76	0.044	7	7	Y
1,2-dichloroethane	NC	3/28	0.7 - 1.5	NC	1 43	0.12	5	700	Y
1,2-dichloroethene (cis)	NC	14/28	0.6 - 72	NC	14.7	6.1	70	70	Y
1,2-dichloroethene (trans)	NC	1/28	0.6 - 0.6	NC	0.6	12	100	100	N
carbon disulfide	NC	1/28	5 - 5	NC	1 6	100			N
carbon tetrachloride	NC	9/28	2 - 12	NC	5.44	0.16	5	70	Y
chloroform	NC	2/18	2 - 2	NC	2	0.15	100	100	Y
tetrachloroethene	NC	20/28	0.8 - 420	NC	181	1.1	5	1000	Y
trichloroethene	NC	24/28	0 7 - 410	NC	410	1.6	5		Y
vinyl chloride	NC	3/28	1 - 4	NC	1.62	0.019	2	10	Y

Notes:

Units are ug/L.
Metals are selected as COPCs if maximum values exceed upper 95 % tolerance limits (UTLs) on background and if maximum values exceed one of the health-based benchmarks: risk-based screening levels (RBCs), MCLs, or Health Advisories.
Minerals that are essential nutrients (calcium, magnesium, sodium, potassium) are not included as COPCs.
The determination of site results exceeding background is based on 95 % upper tolerance limits (UTLs).
NC -- Not calculated; organic analytes are assumed to be anthropogenic in origin.
Selection of organic COPCs is based solely on exceedance of RBCs, MCLs, or Health Advisories.
RBCs represent concentrations associated with a 10^{-6} cancer risk level or a non-cancer hazard index of 0.1.
Applicable RBCs originate from EPA Region III RBCs for residential exposure, tap water ingestion, with non-cancer risk adjusted to 0.1 hazard index (EPA, 1997).
An RBC for lead based on cancer risk or hazard index is not available. The 15 ug/L EPA MCL is used as an applicable RBC for tap water ingestion.

Table 3-2
Representative Concentrations - Intermediate Area A Groundwater
NAWC Warminster, Pennsylvania

Substance	95 % UTL on Background Data	Site-Related Frequency of Detection	Range of Positive Detections for Site	Are Site Results Above Background ?	Representative Concentration For Site Data	Tap Water Risk-Based Concentration	Maximum Contaminant Level (MCL)	Lowest Drinking Water Health Advisory	Maximum Concentration > RBC ?
aluminum	8220	1/2	479 - 479	N	479	3700			N
barium	628	2/2	85 3 - 112	N	112	260	2000	2000	N
calcium	31800	3/3	63100 - 66350	Y	66400				N
chromium	5.5	3/3	14.05 - 43 9	Y	43 9	18	100	100	Y
cyanide	ND	1/3	6 - 6	Y	6	73	200	200	N
iron	4850	2/2	291 - 405	N	405	1100			N
magnesium	11300	3/3	18500 - 21100	Y	21100				N
manganese	422	1/1	201 - 201	N	201	84			N
nickel	ND	1/3	18.7 - 18 7	Y	18 7	73	100	100	N
potassium	2150	3/3	1780 - 9930	Y	9930				N
silver	ND	2/3	1.4 - 1 9	Y	1.9	18		100	N
sodium	14700	3/3	17200 - 25900	Y	25900				N
zinc	11000	1/2	60 7 - 60 7	N	60 7	1100		2000	N
1,1,1-trichloroethane	NC	6/20	0 6 - 12	NC	6 54	79	200	200	N
1,1,2-trichloroethane	NC	4/20	4 - 67	NC	33 6	0 19	3	3	Y
1,1-dichloroethane	NC	6/20	0.4 - 16	NC	6 9	81			N
1,1-dichloroethene	NC	8/20	0 8 - 25	NC	18 6	0 044	7	7	Y
1,2-dichloroethane	NC	1/20	1 - 1	NC	1	0 12	5	700	Y
1,2-dichloroethene (cis)	NC	9/20	0 6 - 13	NC	12 9	6 1	70	70	Y
benzene	NC	2/20	1 - 10	NC	5 82	0 36	5	200	Y
carbon disulfide	NC	1/20	2 - 2	NC	2	100			N
carbon tetrachloride	NC	4/20	52 - 990	NC	990	0 16	5	70	Y
chloroform	NC	6/18	2 - 40	NC	40	0 15	100	100	Y
ethylbenzene	NC	1/20	4 - 4	NC	4	130	700	700	N
tetrachloroethene	NC	16/20	0.6 - 160	NC	160	1 1	5	1000	Y
toluene	NC	1/20	16 - 16	NC	16	75	1000	1000	N
trichloroethene	NC	17/20	0 6 - 32000	NC	32000	1 6	5		Y
vinyl chloride	NC	1/20	0 9 - 0 9	NC	0.9	0 019	2	10	Y
xylene (total)	NC	1/20	9 - 9	NC	5 55	1200	10000	10000	N

Notes:

Units are ug/L
Metals are selected as COPCs if maximum values exceed upper 95 % tolerance limits (UTLs) on background and if maximum values exceed one of the health-based benchmarks risk-based screening levels (RBCs), MCLs, or Health Advisories
Minerals that are essential nutrients (calcium, magnesium, sodium, potassium) are not included as COPCs
The determination of site results exceeding background is based on 95 % upper tolerance limits (UTLs)
NC -- Not calculated, organic analytes are assumed to be anthropogenic in origin
Selection of organic COPCs is based solely on exceedance of RBCs, MCLs, or Health Advisories
RBCs represent concentrations associated with a 10^{-6} cancer risk level or a non-cancer hazard index of 0 1
Applicable RBCs originate from EPA Region III RBCs for residential exposure, tap water ingestion, with non-cancer risk adjusted to 0 1 hazard index (EPA, 1997)
An RBC for lead based on cancer risk or hazard index is not available The 15 ug/L EPA MCL is used as an applicable RBC for tap water ingestion

Table 3-3
Representative C ncentrations - Deeper Area A Groundwater
NAWC Warminster, Pennsylvania

Substance	95 % UTL on Background Data	Site-Related Frequency of Detection	Range of Positive Detections for Site	Are Site Results Above Background ?	Representative Concentration For Site Data	Tap Water Risk-Based Concentration	Maximum Contaminant Level (MCL)	Lowest Drinking Water Health Advisory	Maximum Concentration > RBC ?
1,1,1-trichloroethane	NC	2/14	2 - 24	NC	3.21	79	200	200	N
1,1-dichloroethane	NC	4/14	0.6 - 19	NC	2.77	81			N
1,1-dichloroethene	NC	4/14	1 - 22	NC	4.27	0.044	7	7	Y
1,2-dichloroethene (cis)	NC	3/14	0.5 - 3	NC	1.06	6.1	70	70	N
acetone	NC	3/3	2 - 16	NC	16	370			N
carbon disulfide	NC	1/14	1 - 1	NC	0.649	100			N
carbon tetrachloride	NC	2/14	1 - 4	NC	1.01	0.16	5	70	Y
chloroform	NC	1/13	2 - 2	NC	0.747	0.15	100	100	Y
tetrachloroethene	NC	6/14	0.7 - 39	NC	15.3	1.1	5	1000	Y
tolu n	NC	1/14	0.7 - 0.7	NC	0.607	75	1000	1000	N
trichloroethene	NC	9/14	0.5 - 460	NC	460	1.6	5		Y

Notes:

Units are ug/L.
Metals are selected as COPCs if maximum values exceed upper 95 % tolerance limits (UTLs) on background and if maximum values exceed one of the health-based benchmarks: risk-based screening levels (RBCs), MCLs, or Health Advisories.
Minerals that are essential nutrients (calcium, magnesium, sodium, potassium) are not included as COPCs.
Th d termination of site results exceeding background is based on 95 % upper tolerance limits (UTLs).
NC -- Not calculated; organic analytes are assumed to be anthropogenic in origin.
Selection of organic COPCs is based solely on exceedance of RBCs, MCLs, or Health Advisories.
RBCs represent concentrations associated with a 10^{-6} cancer risk level or a non-cancer hazard index of 0.1.
Applicabl RBCs originate from EPA Region III RBCs for residential exposure, tap water ingestion, with non-cancer risk adjusted to 0.1 hazard index (EPA, 1997).
An RBC for lead based on cancer risk or hazard index is not available. The 15 ug/L EPA MCL is used as an applicable RBC for tap water ingestion.

Table 3-4
Representative Concentrations - Shallow Area D Groundwater
NAWC Warminster, P nnsylvania

Substance	95 % UTL on Background Data	Site-Related Frequency of Detection	Range of Positive Detections for Site	Are Site Results Above Background ?	Representative Concentration For Site Data	Tap Water Risk-Based Concentration	Maximum Contaminant Level (MCL)	Lowest Drinking Water Health Advisory	Maximum Concentration > RBC ?
calcium	31800	1/1	99550 - 99550	Y	100000				N
chromium	5.5	1/1	40.1 - 40.1	Y	40.1	18	100	100	Y
magnesium	11300	1/1	37950 - 37950	Y	38000				N
potassium	2150	1/1	1250 - 1250	N	1250				N
sodium	14700	1/1	43100 - 43100	Y	43100				N
1,4-dichlorobenzene	NC	1/27	0.6 - 0.6	N	0.51	0.44	75	75	Y
1,1,1-trichloroethane	NC	7/27	0.5 - 3	Y	0.876	79	200	200	N
1,1,2,2-tetrachloroethane	NC	2/27	0.75 - 0.8	Y	0.541	0.052			Y
1,1-dichloroethane	NC	14/27	0.5 - 3	Y	1.11	81			N
1,1-dichloroethene	NC	7/27	0.5 - 53	Y	1.91	0.044	7	7	Y
1,2-dichloroethane	NC	1/27	0.8 - 0.8	N	0.527	0.12	5	700	Y
1,2-dichloroethene (cis)	NC	14/27	0.7 - 14	Y	2.11	6.1	70	70	Y
1,2-dichloroethene (trans)	NC	6/27	0.5 - 1	Y	0.566	12	100	100	N
acetone	NC	1/1	2 - 2	N	2	370			N
carbon tetrachloride	NC	6/27	0.6 - 1	Y	0.634	0.16	5	70	Y
chloroform	NC	7/25	0.5 - 1	Y	0.627	0.15	100	100	Y
tetrachloroethene	NC	15/27	0.6 - 6	Y	1.84	1.1	5	1000	Y
trichloroethene	NC	16/27	1 - 480	Y	480	1.6	5		Y
vinyl chloride	NC	1/27	2 - 2	N	0.599	0.019	2	10	Y

Notes:

Units are ug/L.
Metals are selected as COPCs if maximum values exceed upper 95 % tolerance limits (UTLs) on background and if maximum values exceed one of the health-based benchmarks: risk-based screening levels (RBCs), MCLs, or Health Advisories.
Minerals that are essential nutrients (calcium, magnesium, sodium, potassium) are not included as COPCs.
The determination of site results exceeding background is based on 95 % upper tolerance limits (UTLs).
NC -- Not calculated; organic analytes are assumed to be anthropogenic in origin.
Selection of organic COPCs is based solely on exceedance of RBCs, MCLs, or Health Advisories.
RBCs represent concentrations associated with a 10^{-6} cancer risk level or a non-cancer hazard index of 0.1.
Applicable RBCs originate from EPA Region III RBCs for residential exposure, tap water ingestion, with non-cancer risk adjusted to 0.1 hazard index (EPA, 1997).
An RBC for lead based on cancer risk or hazard index is not available. The 15 ug/L EPA MCL is used as an applicable RBC for tap water ingestion.

Tabl 3-5
Repres ntativ Concentrations - Intermediate Area D Groundwater
NAWC Warminster, Pennsylvania

Substance	95 % UTL on Background Data	Site-Related Frequency of Detection	Range of Positive Detections for Site	Are Site Results Above Background ?	Representative Concentration For Site Data	Tap Water Risk-Based Concentration	Maximum Contaminant Level (MCL)	Lowest Drinking Water Health Advisory	Maximum Concentration > RBC ?
aluminum	8220	2/2	63.4 - 120	N	120	3700			N
calcium	31800	2/2	68400 - 75700	Y	75700				N
iron	4850	1/1	352 - 352	N	352	1100			N
lead	13.6	1/2	1.8 - 1.8	N	1.8	15	15		N
magnesium	11300	2/2	16600 - 25100	Y	25100				N
manganese	422	1/1	412 - 412	N	412	84			N
potassium	2150	2/2	3360 - 3980	Y	3980				N
sodium	14700	2/2	14300 - 31000	Y	31000				N
1,1,1-trichloroethane	NC	1/17	5 - 5	NC	1.13	79	200	200	N
1,1-dichloroethane	NC	3/17	0.8 - 1	NC	0.838	81			N
1,1-dichloroethene	NC	2/17	0.6 - 24	NC	2.2	0.044	7	7	Y
1,2-dichloroethene (cis)	NC	3/17	1 - 4	NC	1.29	6.1	70	70	N
1,2-dichloroethene (trans)	NC	1/17	0.7 - 0.7	NC	0.7	12	100	100	N
acetone	NC	1/1	6 - 6	NC	6	370			N
carbon disulfide	NC	1/17	2 - 2	NC	0.871	100			N
tetrachloroethene	NC	2/17	0.5 - 0.6	NC	0.6	1.1	5	1000	N
toluene	NC	3/17	0.5 - 2	NC	0.878	75	1000	1000	N
trichloroethene	NC	5/17	0.8 - 50	NC	4.48	1.6	5		Y

Notes:

Units are ug/L.
Metals are selected as COPCs if maximum values exceed upper 95 % tolerance limits (UTLs) on background and if maximum values exceed one of the health-based benchmarks: risk-based screening levels (RBCs), MCLs, or Health Advisories.
Minerals that are essential nutrients (calcium, magnesium, sodium, potassium) are not included as COPCs.
The determination of site results exceeding background is based on 95 % upper tolerance limits (UTLs).
NC -- Not calculated; organic analytes are assumed to be anthropogenic in origin.
Selection of organic COPCs is based solely on exceedance of RBCs, MCLs, or Health Advisories.
RBCs represent concentrations associated with a 10^{-6} cancer risk level or a non-cancer hazard index of 0.1.
Applicable RBCs originate from EPA Region III RBCs for residential exposure, tap water ingestion, with non-cancer risk adjusted to 0.1 hazard index (EPA, 1997).
An RBC for lead based on cancer risk or hazard index is not available. The 15 ug/L EPA MCL is used as an applicable RBC for tap water ingestion.

Table 3-6
Representative Concentrations - D eper Area D Groundwater
NAWC Warminster, Pennsylvania

Substance	95 % UTL on Background Data	Site-Related Frequency of Detection	Range of Positive Detections for Site	Are Site Results Above Background ?	Representative Concentration For Site Data	Tap Water Risk-Based Concentration	Maximum Contaminant Level (MCL)	Lowest Drinking Water Health Advisory	Maximum Concentration > RBC ?
aluminum	8220	1/1	113 - 113	N	113	3700			N
barium	628	1/1	323 - 323	N	323	260	2000	2000	N
calcium	31800	1/1	40700 - 40700	Y	40700				N
iron	4850	1/1	539 - 539	N	539	1100			N
lead	13.6	1/1	11 - 11	N	11	15	15		N
magnesium	11300	1/1	11100 - 11100	N	11100				N
manganese	422	1/1	72.9 - 72 9	N	72.9	84			N
potassium	2150	1/1	4710 - 4710	Y	4710				N
sodium	14700	1/1	19400 - 19400	Y	19400				N
1,1-dichloroethane	NC	2/11	2 - 5	N	1.78	81			N
1,2-dichloroethene (cis)	NC	2/11	0.7 - 1	N	0.643	6.1	70	70	N
chloroform	NC	2/11	5 - 6	N	3.04	0.15	100	100	Y
tetrachloroethene	NC	3/11	0.8 - 3	N	1.09	1.1	5	1000	Y
toluene	NC	1/11	0.8 - 0.8	N	0.572	75	1000	1000	N
trichloroethene	NC	3/11	0.6 - 4	N	2.14	1.6	5		Y

Notes:

Units are ug/L.
Metals ar selected as COPCs if maximum values exceed upper 95 % tolerance limits (UTLs) on background and if maximum values exceed one of the health-based benchmarks: risk-based screening levels (RBCs), MCLs, or Health Advisories.
Minerals that are essential nutrients (calcium, magnesium, sodium, potassium) are not included as COPCs.
The determination of site results exceeding background is based on 95 % upper tolerance limits (UTLs).
NC -- Not calculated; organic analytes are assumed to be anthropogenic in origin.
Selection of organic COPCs is based solely on exceedance of RBCs, MCLs, or Health Advisories.
RBCs represent concentrations associated with a 10^{-6} cancer risk level or a non-cancer hazard index of 0.1.
Applicabl RBCs originate from EPA Region III RBCs for residential exposure, tap water ingestion, with non-cancer risk adjusted to 0.1 hazard index (EPA, 1997).
An RBC for lead based on cancer risk or hazard index is not available. The 15 ug/L EPA MCL is used as an applicable RBC for tap water ingestion.

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APPENDIX A

ANALYTICAL DATABASE

TABLE 2-3

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-DG-12	W-DG-13	W-DG-13-D	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
LOCATION:	W-DG-12	W-DG-13	W-DG-13	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
SCREENED INTERVAL:	18.0 - 75.0	18 0 - 22 0	18 0 - 22.0	3 0 - 15.0	7.0 - 15.0	35.0 - 40.0	10.0 - 19.0	17.0 - 47.0
SAMPLE DATE:	12/22/97	12/22/97	12/22/97	12/22/97	12/22/97	12/23/97	12/23/97	12/23/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-DG-13-D	W-DG-13					
INORGANICS	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Aluminum	n/a	n/a	n/a	n/a	n/a	179 B	n/a	n/a
Antimony	n/a	n/a	n/a	n/a	n/a	1.7 U	n/a	n/a
Arsenic	n/a	n/a	n/a	n/a	n/a	2.4 U	n/a	n/a
Barium	n/a	n/a	n/a	n/a	n/a	54.1	n/a	n/a
Beryllium	n/a	n/a	n/a	n/a	n/a	0.58 U	n/a	n/a
Cadmium	n/a	n/a	n/a	n/a	n/a	0.3 U	n/a	n/a
Calcium	n/a	n/a	n/a	n/a	n/a	42000	n/a	n/a
Chromium	n/a	n/a	n/a	n/a	n/a	14.5 K	n/a	n/a
Cobalt	n/a	n/a	n/a	n/a	n/a	6 U	n/a	n/a
Copper	n/a	n/a	n/a	n/a	n/a	5.8 U	n/a	n/a
Cyanide	n/a	n/a	n/a	n/a	n/a	5 U	n/a	n/a
Iron	n/a	n/a	n/a	n/a	n/a	29500	n/a	n/a
Lead	n/a	n/a	n/a	n/a	n/a	5.7 L	n/a	n/a
Magnesium	n/a	n/a	n/a	n/a	n/a	16000	n/a	n/a
Manganese	n/a	n/a	n/a	n/a	n/a	154	n/a	n/a
Mercury	n/a	n/a	n/a	n/a	n/a	0.56	n/a	n/a
Nickel	n/a	n/a	n/a	n/a	n/a	9.8	n/a	n/a
Potassium	n/a	n/a	n/a	n/a	n/a	2490	n/a	n/a
Selenium	n/a	n/a	n/a	n/a	n/a	4.7 U	n/a	n/a
Silver	n/a	n/a	n/a	n/a	n/a	1.2 U	n/a	n/a
Sodium	n/a	n/a	n/a	n/a	n/a	45700	n/a	n/a
Thallium	n/a	n/a	n/a	n/a	n/a	1.9 U	n/a	n/a
Vanadium	n/a	n/a	n/a	n/a	n/a	6.8 U	n/a	n/a
Zinc	n/a	n/a	n/a	n/a	n/a	32.9 B	n/a	n/a

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-DG-12	W-DG-13	W-DG-13-D	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
LOCATION:	W-DG-12	W-DG-13	W-DG-13	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
SCREENED INTERVAL:	18.0 - 75.0	18 0 - 22 0	18.0 - 22.0	3.0 - 15 0	7 0 - 15 0	35 0 - 40 0	10 0 - 19.0	17 0 - 47 0
SAMPLE DATE:	12/22/97	12/22/97	12/22/97	12/22/97	12/22/97	12/23/97	12/23/97	12/23/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-DG-13-D	W-DG-13					
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,2'-Oxybis(1-chloropropane)	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
2,4,5-Trichlorophenol	25 U	25 U	25 U	n/a	n/a	25 U	n/a	n/a
2,4,6-Trichlorophenol	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
2,4-Dichlorophenol	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
2,4-Dimethylphenol	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
2,4-Dinitrophenol	25 U	25 U	25 U	n/a	n/a	25 U	n/a	n/a
2,4-Dinitrotoluene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
2,6-Dinitrotoluene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
2-Chloronaphthalene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
2-Chlorophenol	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
2-Methylnaphthalene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
2-Methylphenol	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
2-Nitroaniline	25 U	25 U	25 U	n/a	n/a	25 U	n/a	n/a
2-Nitrophenol	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
3,3'-Dichlorobenzidine	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
3-Nitroaniline	25 U	25 U	25 UJ	n/a	n/a	25 U	n/a	n/a
4,6-Dinitro-2-methylphenol	25 U	25 U	25 U	n/a	n/a	25 U	n/a	n/a
4-Bromophenyl-phenylether	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-DG-12	W-DG-13	W-DG-13-D	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
LOCATION:	W-DG-12	W-DG-13	W-DG-13	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
SCREENED INTERVAL:	18 0 - 75.0	18 0 - 22.0	18.0 - 22.0	3.0 - 15.0	7 0 - 15.0	35.0 - 40.0	10.0 - 19.0	17 0 - 47.0
SAMPLE DATE:	12/22/97	12/22/97	12/22/97	12/22/97	12/22/97	12/23/97	12/23/97	12/23/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-DG-13-D	W-DG-13					
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
4-Chloro-3-methylphenol	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
4-Chloroaniline	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
4-Chlorophenyl Phenyl Ether	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
4-Methylphenol	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
4-Nitroaniline	25 U	25 U	25 U	n/a	n/a	25 U	n/a	n/a
4-Nitrophenol	25 U	25 U	25 U	n/a	n/a	25 U	n/a	n/a
Acenaphthene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Acenaphthylene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Anthracene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Benzo(a)anthracene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Benzo(a)pyrene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Benzo(b)fluoranthene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Benzo(g,h,i)perylene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Benzo(k)fluoranthene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Bis(2-chloroethoxy)methane	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Bis(2-chloroethyl)ether	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Bis(2-ethylhexyl)phthalate	10 U	10 U	10 U	n/a	n/a	2 B	n/a	n/a
Butylbenzylphthalate	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Carbazole	10 UJ	10 UJ	10 U	n/a	n/a	10 U	n/a	n/a
Chrysene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Di-n-butylphthalate	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Di-n-octylphthalate	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Dibenz(a,h)anthracene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Dibenzofuran	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a

TABLE 2-3

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-DG-12	W-DG-13	W-DG-13-D	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
LOCATION:	W-DG-12	W-DG-13	W-DG-13	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
SCREENED INTERVAL:	18 0 - 75 0	18 0 - 22.0	18 0 - 22.0	3 0 - 15 0	7 0 - 15 0	35.0 - 40.0	10 0 - 19.0	17.0 - 47.0
SAMPLE DATE:	12/22/97	12/22/97	12/22/97	12/22/97	12/22/97	12/23/97	12/23/97	12/23/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-DG-13-D	W-DG-13					
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Diethylphthalate	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Dimethylphthalate	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Fluoranthene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Fluorene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Hexachlorobenzene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Hexachlorobutadiene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Hexachlorocyclopentadiene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Hexachloroethane	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Isophorone	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
N-Nitroso-di-n-propylamine	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
N-Nitrosodiphenylamine (1)	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Naphthalene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Nitrobenzene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Pentachlorophenol	25 U	25 U	25 U	n/a	n/a	25 U	n/a	n/a
Phenanthrene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Phenol	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
Pyrene	10 U	10 U	10 U	n/a	n/a	10 U	n/a	n/a
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1,1-Trichloroethane	1 U	1	1	1 U	2	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	0.8 J	1	1	0.7 J	1	1 U	1 U	0.6 J

TABLE 2-3

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-DG-12	W-DG-13	W-DG-13-D	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
LOCATION:	W-DG-12	W-DG-13	W-DG-13	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
SCREENED INTERVAL:	18.0 - 75.0	18.0 - 22.0	18.0 - 22.0	3.0 - 15.0	7.0 - 15.0	35.0 - 40.0	10.0 - 19.0	17.0 - 47.0
SAMPLE DATE:	12/22/97	12/22/97	12/22/97	12/22/97	12/22/97	12/23/97	12/23/97	12/23/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-DG-13-D	W-DG-13					
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1-Dichloroethene	0.5 J	0.7 J	0.8 J	1 U	0.8 J	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 UR	1 UR	1 UR	1 UR	1 U	1 UR	1 U	1 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (cis)	0.6 J	1 U	1 U	1	1 U	1	1 U	72
1,2-Dichloroethene (trans)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 U
2-Hexanone	5 UR	5 UR	5 UR	5 UR	5 UR	5 U	5 UR	5 U
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1 U	1 U	1 U	1 U	1 U	3	1 U	2
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	1 U	1 U	1 U	1 U	1 U	5 B	2 B	11 B
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-DG-12	W-DG-13	W-DG-13-D	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
LOCATION:	W-DG-12	W-DG-13	W-DG-13	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
SCREENED INTERVAL:	18 0 - 75.0	18 0 - 22.0	18.0 - 22 0	3 0 - 15.0	7.0 - 15.0	35.0 - 40 0	10 0 - 19 0	17 0 - 47 0
SAMPLE DATE:	12/22/97	12/22/97	12/22/97	12/22/97	12/22/97	12/23/97	12/23/97	12/23/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-DG-13-D	W-DG-13					
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Methylene Chloride	2 B	2 B	2 B	2 B	1 B	2 B	1 B	2 B
Styrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.8 J	2	3	2	3	6	1 U	110
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	5	2	2	10	2	410	0.7 J	59
Vinyl Chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1
Xylene (Total)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
PESTICIDES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
4,4'-DDD	0.1 U	0.1 U	0.1 U	n/a	n/a	0.1 U	n/a	n/a
4,4'-DDE	0.1 U	0.1 U	0.1 U	n/a	n/a	0.1 U	n/a	n/a
4,4'-DDT	0.1 U	0.1 U	0.1 U	n/a	n/a	0.1 U	n/a	n/a
Aldrin	0.05 U	0.05 U	0.05 U	n/a	n/a	0.05 U	n/a	n/a
Alpha-BHC	0.05 U	0.05 U	0.05 U	n/a	n/a	0.05 U	n/a	n/a
Alpha-Chlordane	0.05 U	0.05 U	0.05 U	n/a	n/a	0.05 U	n/a	n/a
Aroclor-1016	1 U	1 U	1 U	n/a	n/a	1 U	n/a	n/a
Aroclor-1221	2 U	2 U	2 U	n/a	n/a	2 U	n/a	n/a
Aroclor-1232	1 U	1 U	1 U	n/a	n/a	1 U	n/a	n/a
Aroclor-1242	1 U	1 U	1 U	n/a	n/a	1 U	n/a	n/a
Aroclor-1248	1 U	1 U	1 U	n/a	n/a	1 U	n/a	n/a
Aroclor-1254	1 U	1 U	1 U	n/a	n/a	1 U	n/a	n/a
Aroclor-1260	1 U	1 U	1 U	n/a	n/a	1 U	n/a	n/a

TABLE 2-3

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-DG-12	W-DG-13	W-DG-13-D	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
LOCATION:	W-DG-12	W-DG-13	W-DG-13	W-DG-26	W-DG-3	W-HN-11S	W-HN-11X	W-HN-12S
SCREENED INTERVAL:	18.0 - 75.0	18.0 - 22.0	18.0 - 22.0	3 0 - 15.0	7.0 - 15 0	35 0 - 40.0	10 0 - 19.0	17 0 - 47 0
SAMPLE DATE:	12/22/97	12/22/97	12/22/97	12/22/97	12/22/97	12/23/97	12/23/97	12/23/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-DG-13-D	W-DG-13					
PESTICIDES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Beta-BHC	0.05 U	0.05 U	0.05 U	n/a	n/a	0.05 U	n/a	n/a
Delta-BHC	0.05 U	0.05 U	0.05 U	n/a	n/a	0.05 U	n/a	n/a
Dieldrin	0.1 U	0.1 U	0.1 U	n/a	n/a	0.1 U	n/a	n/a
Endosulfan I	0.05 U	0.05 U	0.05 U	n/a	n/a	0.05 U	n/a	n/a
Endosulfan II	0.1 U	0.1 U	0.1 U	n/a	n/a	0.1 U	n/a	n/a
Endosulfan Sulfate	0.1 U	0.1 U	0.1 U	n/a	n/a	0.1 U	n/a	n/a
Endrin	0.1 U	0.1 U	0.1 U	n/a	n/a	0.1 U	n/a	n/a
Endrin Aldehyde	0.1 U	0.1 U	0.1 U	n/a	n/a	0.1 U	n/a	n/a
Endrin Ketone	0.1 U	0.1 U	0.1 U	n/a	n/a	0.1 U	n/a	n/a
Gamma-BHC (Lindane)	0.05 U	0.05 U	0.05 U	n/a	n/a	0.05 U	n/a	n/a
Gamma-Chlordane	0.05 U	0.05 U	0.05 U	n/a	n/a	0.05 U	n/a	n/a
Heptachlor	0.05 U	0.05 U	0.05 U	n/a	n/a	0.05 U	n/a	n/a
Heptachlor Epoxide	0.05 U	0.05 U	0.05 U	n/a	n/a	0.05 U	n/a	n/a
Methoxychlor	0.5 U	0.5 U	0.5 U	n/a	n/a	0.5 U	n/a	n/a
Toxaphene	5 U	5 U	5 U	n/a	n/a	5 U	n/a	n/a

TABLE 2-3

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-13S	W-HN-13X	W-HN-14S	W-HN-15S	W-HN-15X	W-HN-16S	W-HN-16S-DUP	W-HN-19S
LOCATION:	W-HN-13S	W-HN-13X	W-HN-14S	W-HN-15S	W-HN-15X	W-HN-16S	W-HN-16S	W-HN-19S
SCREENED INTERVAL:	24.0 - 47.0	8.0 - 18 0	30 0 - 44 0	30.0 - 44.0	7 0 - 14 0	51.0 - 65 0	51 0 - 65 0	30 0 - 44.0
SAMPLE DATE:	12/19/97	12/19/97	12/17/97	12/10/97	12/10/97	12/05/97	12/05/97	12/08/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I D.:						W-HN-16S-DUP	W-HN-16S	
INORGANICS	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Aluminum	n/a	n/a	74.4 B	n/a	n/a	n/a	n/a	n/a
Antimony	n/a	n/a	4	n/a	n/a	n/a	n/a	n/a
Arsenic	n/a	n/a	2.4 U	n/a	n/a	n/a	n/a	n/a
Barium	n/a	n/a	32.9 B	n/a	n/a	n/a	n/a	n/a
Beryllium	n/a	n/a	0.58 U	n/a	n/a	n/a	n/a	n/a
Cadmium	n/a	n/a	0.3 U	n/a	n/a	n/a	n/a	n/a
Calcium	n/a	n/a	27600	n/a	n/a	n/a	n/a	n/a
Chromium	n/a	n/a	27.1	n/a	n/a	n/a	n/a	n/a
Cobalt	n/a	n/a	6 U	n/a	n/a	n/a	n/a	n/a
Copper	n/a	n/a	5.8 U	n/a	n/a	n/a	n/a	n/a
Cyanide	n/a	n/a	5 U	n/a	n/a	n/a	n/a	n/a
Iron	n/a	n/a	136 B	n/a	n/a	n/a	n/a	n/a
Lead	n/a	n/a	1.6 UL	n/a	n/a	n/a	n/a	n/a
Magnesium	n/a	n/a	10700	n/a	n/a	n/a	n/a	n/a
Manganese	n/a	n/a	5.3 B	n/a	n/a	n/a	n/a	n/a
Mercury	n/a	n/a	0.12 U	n/a	n/a	n/a	n/a	n/a
Nickel	n/a	n/a	6.3 U	n/a	n/a	n/a	n/a	n/a
Potassium	n/a	n/a	960 B	n/a	n/a	n/a	n/a	n/a
Selenium	n/a	n/a	4.7 U	n/a	n/a	n/a	n/a	n/a
Silver	n/a	n/a	3	n/a	n/a	n/a	n/a	n/a
Sodium	n/a	n/a	12200	n/a	n/a	n/a	n/a	n/a
Thallium	n/a	n/a	3.7 B	n/a	n/a	n/a	n/a	n/a
Vanadium	n/a	n/a	6.8 U	n/a	n/a	n/a	n/a	n/a
Zinc	n/a	n/a	39.2 B	n/a	n/a	n/a	n/a	n/a

TABLE 2-3

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-13S	W-HN-13X	W-HN-14S	W-HN-15S	W-HN-15X	W-HN-16S	W-HN-16S-DUP	W-HN-19S
LOCATION:	W-HN-13S	W-HN-13X	W-HN-14S	W-HN-15S	W-HN-15X	W-HN-16S	W-HN-16S	W-HN-19S
SCREENED INTERVAL:	24.0 - 47.0	8.0 - 18.0	30.0 - 44.0	30 0 - 44.0	7.0 - 14.0	51.0 - 65.0	51 0 - 65.0	30 0 - 44.0
SAMPLE DATE:	12/19/97	12/19/97	12/17/97	12/10/97	12/10/97	12/05/97	12/05/97	12/08/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:						W-HN-16S-DUP	W-HN-16S	
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,2,4-Trichlorobenzene	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1,1-Trichloroethane	1	1 U	1 U	10 U	1 U	98	110	3
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	0.7 J	10 U	1 U	5 U	1 U	1 U
1,1-Dichloroethane	2	1 U	1 U	10 U	1 U	4 J	4	4
1,1-Dichloroethene	1	1 U	1 U	10 U	1 U	9	11	11
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
1,2-Dibromoethane	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
1,2-Dichloroethene (cis)	1	1 U	1	7	5	5 U	1 U	1 U
1,2-Dichloroethene (trans)	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
1,2-Dichloropropane	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
2-Butanone	5 UR	5 UR	5 UR	50 UR	5 UR	25 UR	5 UR	5 UR
2-Hexanone	5 U	5 UR	5 UR	50 UR	5 UR	25 UR	5 UR	5 UR
4-Methyl-2-pentanone	5 U	5 U	5 U	50 U	5 U	25 U	5 U	5 U
Acetone	5 UR	5 UR	5 UR	50 UR	5 UR	25 UR	5 UR	5 UR
Benzene	1 U	1 U	1 U	10 U	1 U	5 UL	1 U	1 U
Bromochloromethane	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-13S	W-HN-13X	W-HN-14S	W-HN-15S	W-HN-15X	W-HN-16S	W-HN-16S-DUP	W-HN-19S
LOCATION:	W-HN-13S	W-HN-13X	W-HN-14S	W-HN-15S	W-HN-15X	W-HN-16S	W-HN-16S	W-HN-19S
SCREENED INTERVAL:	24 0 - 47 0	8 0 - 18.0	30 0 - 44 0	30 0 - 44.0	7.0 - 14.0	51 0 - 65.0	51 0 - 65 0	30 0 - 44 0
SAMPLE DATE:	12/19/97	12/19/97	12/17/97	12/10/97	12/10/97	12/05/97	12/05/97	12/08/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:						W-HN-16S-DUP	W-HN-16S	
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Bromodichloromethane	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
Bromoform	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
Carbon Disulfide	1 U	5 J	1 U	10 U	1 U	5 U	1 U	1 U
Carbon Tetrachloride	1 U	1 U	6	10 U	1 U	5 U	1 U	1 U
Chlorobenzene	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
Chloroform	1 U	1 U	2	10 U	1 U	5 U	1 U	1 U
Chloromethane	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	10 U	1 U	5 UL	1 U	1 U
Methylene Chloride	2 B	2 B	2 B	18 B	2 B	9 B	2 B	2 B
Styrene	1 U	1 U	1 U	10 U	1 U	5 UL	1 U	1 U
Tetrachloroethene	3	1 U	3	15	1 U	15	17	1 U
Toluene	1 U	0.7 B	1 U	10 U	1 U	5 UL	1 U	1 U
Trichloroethene	13	1 U	290	150	4	13	14	1 U
Vinyl Chloride	1 U	1 U	1 U	10 U	1	5 U	1 U	1 U
Xylene (Total)	1 U	1 U	1 U	10 U	1 U	5 UL	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	1 U	1 U	10 U	1 U	5 U	1 U	1 U

TABLE 2-3

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-22S	W-HN-50S	W-HN-50S-DUP	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-02
LOCATION:	W-HN-22S	W-HN-50S	W-HN-50S	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-2
SCREENED INTERVAL:	38.0 - 55.0	67.0 - 83.0	67 0 - 83.0	73.0 - 87.0	24 0 - 44.0	48 0 - 62.0	37 0 - 52 0	18.0 - 90.0
SAMPLE DATE:	12/09/97	12/08/97	12/08/97	12/11/97	12/11/97	12/23/97	12/04/97	12/18/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-HN-50S-DUP	W-HN-50S					
INORGANICS	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Aluminum	n/a	n/a	n/a	n/a	38.1 U	69.4 B	n/a	n/a
Antimony	n/a	n/a	n/a	n/a	1.7 U	1.7 U	n/a	n/a
Arsenic	n/a	n/a	n/a	n/a	2.4 U	2.4 U	n/a	n/a
Barium	n/a	n/a	n/a	n/a	9.7 B	40.7	n/a	n/a
Beryllium	n/a	n/a	n/a	n/a	0.58 U	0.58 U	n/a	n/a
Cadmium	n/a	n/a	n/a	n/a	0.3 U	0.3 U	n/a	n/a
Calcium	n/a	n/a	n/a	n/a	36900	64400	n/a	n/a
Chromium	n/a	n/a	n/a	n/a	72.1	7.5 K	n/a	n/a
Cobalt	n/a	n/a	n/a	n/a	6 U	6 U	n/a	n/a
Copper	n/a	n/a	n/a	n/a	5.8 U	5.8 U	n/a	n/a
Cyanide	n/a	n/a	n/a	n/a	5 U	5 U	n/a	n/a
Iron	n/a	n/a	n/a	n/a	68.2 B	121 B	n/a	n/a
Lead	n/a	n/a	n/a	n/a	1.6 UL	1.6 UL	n/a	n/a
Magnesium	n/a	n/a	n/a	n/a	13400	22900	n/a	n/a
Manganese	n/a	n/a	n/a	n/a	30.2 B	9.6 B	n/a	n/a
Mercury	n/a	n/a	n/a	n/a	0.12 U	0.12 UL	n/a	n/a
Nickel	n/a	n/a	n/a	n/a	6.3 UL	7.8	n/a	n/a
Potassium	n/a	n/a	n/a	n/a	3720	2510	n/a	n/a
Selenium	n/a	n/a	n/a	n/a	4.7 U	4.7 U	n/a	n/a
Silver	n/a	n/a	n/a	n/a	1.2 U	2	n/a	n/a
Sodium	n/a	n/a	n/a	n/a	40100	13200	n/a	n/a
Thallium	n/a	n/a	n/a	n/a	1.9 U	1.9 U	n/a	n/a
Vanadium	n/a	n/a	n/a	n/a	6.8 UL	6.8 U	n/a	n/a
Zinc	n/a	n/a	n/a	n/a	42.8 B	9.1 B	n/a	n/a

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-22S	W-HN-50S	W-HN-50S-DUP	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-02
LOCATION:	W-HN-22S	W-HN-50S	W-HN-50S	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-2
SCREENED INTERVAL:	38 0 - 55.0	67.0 - 83.0	67.0 - 83.0	73.0 - 87.0	24 0 - 44 0	48.0 - 62.0	37.0 - 52.0	18.0 - 90.0
SAMPLE DATE:	12/09/97	12/08/97	12/08/97	12/11/97	12/11/97	12/23/97	12/04/97	12/18/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-HN-50S-DUP	W-HN-50S					
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,2,4-Trichlorobenzene	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
2,2'-Oxybis(1-chloropropane)	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
2,4,5-Trichlorophenol	n/a	n/a	n/a	n/a	n/a	25 U	n/a	n/a
2,4,6-Trichlorophenol	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
2,4-Dichlorophenol	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
2,4-Dimethylphenol	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
2,4-Dinitrophenol	n/a	n/a	n/a	n/a	n/a	25 U	n/a	n/a
2,4-Dinitrotoluene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
2,6-Dinitrotoluene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
2-Chloronaphthalene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
2-Chlorophenol	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
2-Methylnaphthalene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
2-Methylphenol	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
2-Nitroaniline	n/a	n/a	n/a	n/a	n/a	25 U	n/a	n/a
2-Nitrophenol	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
3,3'-Dichlorobenzidine	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
3-Nitroaniline	n/a	n/a	n/a	n/a	n/a	25 U	n/a	n/a
4,6-Dinitro-2-methylphenol	n/a	n/a	n/a	n/a	n/a	25 U	n/a	n/a
4-Bromophenyl-phenylether	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a

TABLE 2-3

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-22S	W-HN-50S	W-HN-50S-DUP	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-02
LOCATION:	W-HN-22S	W-HN-50S	W-HN-50S	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-2
SCREENED INTERVAL:	38 0 - 55 0	67.0 - 83.0	67.0 - 83.0	73.0 - 87.0	24.0 - 44.0	48.0 - 62.0	37.0 - 52 0	18.0 - 90.0
SAMPLE DATE:	12/09/97	12/08/97	12/08/97	12/11/97	12/11/97	12/23/97	12/04/97	12/18/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-HN-50S-DUP	W-HN-50S					
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
4-Chloro-3-methylphenol	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
4-Chloroaniline	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
4-Chlorophenyl Phenyl Ether	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
4-Methylphenol	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
4-Nitroaniline	n/a	n/a	n/a	n/a	n/a	25 U	n/a	n/a
4-Nitrophenol	n/a	n/a	n/a	n/a	n/a	25 U	n/a	n/a
Acenaphthene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Acenaphthylene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Anthracene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Benzo(a)anthracene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Benzo(a)pyrene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Benzo(b)fluoranthene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Benzo(g,h,i)perylene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Benzo(k)fluoranthene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Bis(2-chloroethoxy)methane	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Bis(2-chloroethyl)ether	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Bis(2-ethylhexyl)phthalate	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Butylbenzylphthalate	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Carbazole	n/a	n/a	n/a	n/a	n/a	10 UJ	n/a	n/a
Chrysene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Di-n-butylphthalate	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Di-n-octylphthalate	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Dibenz(a,h)anthracene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Dibenzofuran	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-22S	W-HN-50S	W-HN-50S-DUP	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-02
LOCATION:	W-HN-22S	W-HN-50S	W-HN-50S	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-2
SCREENED INTERVAL:	38.0 - 55.0	67.0 - 83.0	67.0 - 83.0	73.0 - 87.0	24 0 - 44.0	48 0 - 62 0	37 0 - 52 0	18.0 - 90 0
SAMPLE DATE:	12/09/97	12/08/97	12/08/97	12/11/97	12/11/97	12/23/97	12/04/97	12/18/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-HN-50S-DUP	W-HN-50S					
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Diethylphthalate	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Dimethylphthalate	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Fluoranthene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Fluorene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Hexachlorobenzene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Hexachlorobutadiene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Hexachlorocyclopentadiene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Hexachloroethane	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Indeno(1,2,3-cd)pyrene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Isophorone	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
N-Nitroso-di-n-propylamine	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
N-Nitrosodiphenylamine (1)	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Naphthalene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Nitrobenzene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Pentachlorophenol	n/a	n/a	n/a	n/a	n/a	25 U	n/a	n/a
Phenanthrene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Phenol	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
Pyrene	n/a	n/a	n/a	n/a	n/a	10 U	n/a	n/a
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1,1-Trichloroethane	1 U	10 U	0.6 J	340	1 U	1 U	1	1 U
1,1,2,2-Tetrachloroethane	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	1 U	10 U	1 U	190	1 U	0.6 J	1 U	1 U

TABLE 2-3

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-22S	W-HN-50S	W-HN-50S-DUP	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-02
LOCATION:	W-HN-22S	W-HN-50S	W-HN-50S	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-2
SCREENED INTERVAL:	38.0 - 55.0	67.0 - 83.0	67 0 - 83.0	73.0 - 87.0	24.0 - 44.0	48.0 - 62.0	37 0 - 52.0	18 0 - 90.0
SAMPLE DATE:	12/09/97	12/08/97	12/08/97	12/11/97	12/11/97	12/23/97	12/04/97	12/18/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-HN-50S-DUP	W-HN-50S					
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1-Dichloroethene	1 U	10 U	1 U	210	1 U	0.6 J	1 U	0.5 J
1,2-Dibromo-3-chloropropane	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	10 U	1 U	25 U	1 U	1	1 U	1 U
1,2-Dichloroethene (cis)	1 U	10 U	2	25 U	1 U	1	1 U	1 U
1,2-Dichloroethene (trans)	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
2-Butanone	5 UR	50 UR	5 UR	120 UR	5 UR	5 UR	5 UR	5 UR
2-Hexanone	5 UR	50 UR	5 UR	120 UR	5 UR	5 UR	5 UR	5 UR
4-Methyl-2-pentanone	5 U	50 U	5 U	120 U	5 U	5 U	5 U	5 U
Acetone	5 UR	50 UR	5 UR	120 UR	5 UR	5 UR	5 UR	5 B
Benzene	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
Bromochloromethane	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
Bromoform	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1 U	6 J	7	25 U	1 U	3	1 U	2
Chlorobenzene	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
Chloroform	1 U	10 U	2 B	25 U	2	4 B	1 U	2 B
Chloromethane	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-22S	W-HN-50S	W-HN-50S-DUP	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-02
LOCATION:	W-HN-22S	W-HN-50S	W-HN-50S	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-2
SCREENED INTERVAL:	38.0 - 55 0	67.0 - 83.0	67.0 - 83.0	73.0 - 87.0	24.0 - 44.0	48 0 - 62 0	37.0 - 52 0	18 0 - 90.0
SAMPLE DATE:	12/09/97	12/08/97	12/08/97	12/11/97	12/11/97	12/23/97	12/04/97	12/18/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-HN-50S-DUP	W-HN-50S					
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Methylene Chloride	2 U	15 B	0.5 B	44 B	2 B	2 B	2 B	2 B
Styrene	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	5 J	6	420	1 U	1	7	9
Toluene	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
Trichloroethene	1 U	360	360	140	12	160	0.8 J	5
Vinyl Chloride	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
Xylene (Total)	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	10 U	1 U	25 U	1 U	1 U	1 U	1 U
PESTICIDES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
4,4'-DDD	n/a	n/a	n/a	n/a	n/a	0.1 U	n/a	n/a
4,4'-DDE	n/a	n/a	n/a	n/a	n/a	0.1 U	n/a	n/a
4,4'-DDT	n/a	n/a	n/a	n/a	n/a	0.1 U	n/a	n/a
Aldrin	n/a	n/a	n/a	n/a	n/a	0.05 U	n/a	n/a
Alpha-BHC	n/a	n/a	n/a	n/a	n/a	0.05 U	n/a	n/a
Alpha-Chlordane	n/a	n/a	n/a	n/a	n/a	0.05 U	n/a	n/a
Aroclor-1016	n/a	n/a	n/a	n/a	n/a	1 U	n/a	n/a
Aroclor-1221	n/a	n/a	n/a	n/a	n/a	2 U	n/a	n/a
Aroclor-1232	n/a	n/a	n/a	n/a	n/a	1 U	n/a	n/a
Aroclor-1242	n/a	n/a	n/a	n/a	n/a	1 U	n/a	n/a
Aroclor-1248	n/a	n/a	n/a	n/a	n/a	1 U	n/a	n/a
Aroclor-1254	n/a	n/a	n/a	n/a	n/a	1 U	n/a	n/a
Aroclor-1260	n/a	n/a	n/a	n/a	n/a	1 U	n/a	n/a

TABLE 2-3

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-22S	W-HN-50S	W-HN-50S-DUP	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-02
LOCATION:	W-HN-22S	W-HN-50S	W-HN-50S	W-HN-52S	W-HN-55S	W-HN-59S	W-HN-65S2	W-MW-2
SCREENED INTERVAL:	38.0 - 55.0	67.0 - 83.0	67 0 - 83 0	73 0 - 87.0	24.0 - 44.0	48.0 - 62.0	37 0 - 52.0	18 0 - 90.0
SAMPLE DATE:	12/09/97	12/08/97	12/08/97	12/11/97	12/11/97	12/23/97	12/04/97	12/18/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-HN-50S-DUP	W-HN-50S					
PESTICIDES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Beta-BHC	n/a	n/a	n/a	n/a	n/a	0.05 U	n/a	n/a
Delta-BHC	n/a	n/a	n/a	n/a	n/a	0.05 U	n/a	n/a
Dieldrin	n/a	n/a	n/a	n/a	n/a	0.1 U	n/a	n/a
Endosulfan I	n/a	n/a	n/a	n/a	n/a	0.05 U	n/a	n/a
Endosulfan II	n/a	n/a	n/a	n/a	n/a	0.1 U	n/a	n/a
Endosulfan Sulfate	n/a	n/a	n/a	n/a	n/a	0.1 U	n/a	n/a
Endrin	n/a	n/a	n/a	n/a	n/a	0.1 U	n/a	n/a
Endrin Aldehyde	n/a	n/a	n/a	n/a	n/a	0.1 U	n/a	n/a
Endrin Ketone	n/a	n/a	n/a	n/a	n/a	0.1 U	n/a	n/a
Gamma-BHC (Lindane)	n/a	n/a	n/a	n/a	n/a	0.05 U	n/a	n/a
Gamma-Chlordane	n/a	n/a	n/a	n/a	n/a	0.05 U	n/a	n/a
Heptachlor	n/a	n/a	n/a	n/a	n/a	0.05 U	n/a	n/a
Heptachlor Epoxide	n/a	n/a	n/a	n/a	n/a	0.05 U	n/a	n/a
Methoxychlor	n/a	n/a	n/a	n/a	n/a	0.5 U	n/a	n/a
Toxaphene	n/a	n/a	n/a	n/a	n/a	5 U	n/a	n/a

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-MW-03	W-MW-11	W-MW-D	W-MW-E	W-MW-E-DUP	W-SMC-01	W-SMP-02	---
LOCATION:	W-MW-3	W-MW-11	W-MW-D	W-MW-E	W-MW-E	W-SMC-01	W-SMP-02	---
SCREENED INTERVAL:	18.0 - 100	5.0 - 10 0	30.0 - 40 0	30.0 - 40.0	30.0 - 40.0	20.0 - 60.0	20.0 - 40.0	
SAMPLE DATE:	12/19/97	12/22/97	12/22/97	12/19/97	12/19/97	12/22/97	12/19/97	
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	
MATCHING DUPLICATE I.D.:				W-MW-E-DUP	W-MW-E			
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
2,2'-Oxybis(1-chloropropane)	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
2,4,5-Trichlorophenol	n/a	n/a	25 U	n/a	n/a	n/a	n/a	
2,4,6-Trichlorophenol	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
2,4-Dichlorophenol	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
2,4-Dimethylphenol	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
2,4-Dinitrophenol	n/a	n/a	25 U	n/a	n/a	n/a	n/a	
2,4-Dinitrotoluene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
2,6-Dinitrotoluene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
2-Chloronaphthalene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
2-Chlorophenol	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
2-Methylnaphthalene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
2-Methylphenol	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
2-Nitroaniline	n/a	n/a	25 U	n/a	n/a	n/a	n/a	
2-Nitrophenol	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
3,3'-Dichlorobenzidine	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
3-Nitroaniline	n/a	n/a	25 U	n/a	n/a	n/a	n/a	
4,6-Dinitro-2-methylphenol	n/a	n/a	25 U	n/a	n/a	n/a	n/a	
4-Bromophenyl-phenylether	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
4-Chloro-3-methylphenol	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
4-Chloroaniline	n/a	n/a	10 U	n/a	n/a	n/a	n/a	

TABLE 2-3

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-MW-03	W-MW-11	W-MW-D	W-MW-E	W-MW-E-DUP	W-SMC-01	W-SMP-02	---
LOCATION:	W-MW-3	W-MW-11	W-MW-D	W-MW-E	W-MW-E	W-SMC-01	W-SMP-02	---
SCREENED INTERVAL:	18 0 - 100	5 0 - 10.0	30.0 - 40.0	30 0 - 40.0	30 0 - 40.0	20.0 - 60.0	20 0 - 40 0	
SAMPLE DATE:	12/19/97	12/22/97	12/22/97	12/19/97	12/19/97	12/22/97	12/19/97	
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	
MATCHING DUPLICATE I.D.:				W-MW-E-DUP	W-MW-E			
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	
4-Chlorophenyl Phenyl Ether	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
4-Methylphenol	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
4-Nitroaniline	n/a	n/a	25 U	n/a	n/a	n/a	n/a	
4-Nitrophenol	n/a	n/a	25 U	n/a	n/a	n/a	n/a	
Acenaphthene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Acenaphthylene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Anthracene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Benzo(a)anthracene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Benzo(a)pyrene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Benzo(b)fluoranthene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Benzo(g,h,i)perylene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Benzo(k)fluoranthene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Bis(2-chloroethoxy)methane	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Bis(2-chloroethyl)ether	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Bis(2-ethylhexyl)phthalate	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Butylbenzylphthalate	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Carbazole	n/a	n/a	10 UJ	n/a	n/a	n/a	n/a	
Chrysene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Di-n-butylphthalate	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Di-n-octylphthalate	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Dibenz(a,h)anthracene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Dibenzofuran	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Diethylphthalate	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Dimethylphthalate	n/a	n/a	10 U	n/a	n/a	n/a	n/a	

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-MW-03	W-MW-11	W-MW-D	W-MW-E	W-MW-E-DUP	W-SMC-01	W-SMP-02	---
LOCATION:	W-MW-3	W-MW-11	W-MW-D	W-MW-E	W-MW-E	W-SMC-01	W-SMP-02	---
SCREENED INTERVAL:	18.0 - 100	5 0 - 10 0	30 0 - 40.0	30 0 - 40 0	30 0 - 40 0	20 0 - 60.0	20.0 - 40 0	
SAMPLE DATE:	12/19/97	12/22/97	12/22/97	12/19/97	12/19/97	12/22/97	12/19/97	
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	
MATCHING DUPLICATE I.D.:				W-MW-E-DUP	W-MW-E			
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	
Fluoranthene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Fluorene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Hexachlorobenzene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Hexachlorobutadiene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Hexachlorocyclopentadiene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Hexachloroethane	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Indeno(1,2,3-cd)pyrene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Isophorone	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
N-Nitroso-di-n-propylamine	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
N-Nitrosodiphenylamine (1)	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Naphthalene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Nitrobenzene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Pentachlorophenol	n/a	n/a	25 U	n/a	n/a	n/a	n/a	
Phenanthrene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Phenol	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
Pyrene	n/a	n/a	10 U	n/a	n/a	n/a	n/a	
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	
1,1,1-Trichloroethane	1 U	1 U	1	0.8 J	1	1 U	1 U	
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,1-Dichloroethane	1 U	1 U	2	2	2	1 U	0.5 J	
1,1-Dichloroethene	1 U	1 U	1	1	1	1 U	0.8 J	
1,2-Dibromo-3-chloropropane	1 U	1 U	1 UR	1 U	1 U	1 UR	1 UR	

TABLE 2-3

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-MW-03	W-MW-11	W-MW-D	W-MW-E	W-MW-E-DUP	W-SMC-01	W-SMP-02	---
LOCATION:	W-MW-3	W-MW-11	W-MW-D	W-MW-E	W-MW-E	W-SMC-01	W-SMP-02	---
SCREENED INTERVAL:	18 0 - 100	5.0 - 10.0	30 0 - 40.0	30 0 - 40 0	30.0 - 40.0	20 0 - 60.0	20.0 - 40 0	
SAMPLE DATE:	12/19/97	12/22/97	12/22/97	12/19/97	12/19/97	12/22/97	12/19/97	
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	
MATCHING DUPLICATE I.D.:				W-MW-E-DUP	W-MW-E			
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
1,2-Dichloroethane	1 U	1 U	0.7 J	1	2	1 U	1 U	
1,2-Dichloroethene (cis)	1 U	1 U	18	35	36	0.9 J	44	
1,2-Dichloroethene (trans)	1 U	1 U	1 U	1 U	1 U	1 U	0.6 J	
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
2-Butanone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	
2-Hexanone	5 U	5 UR	5 U	5 U	5 U	5 U	5 UR	
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Acetone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Carbon Disulfide	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Carbon Tetrachloride	1 U	1 U	12	7	8	12	1 U	
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Chloroform	2 B	0.6 B	8 B	9 B	10 B	4 B	1 U	
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Methylene Chloride	2 B	1 B	2 B	2 B	2 B	1 B	2 B	
Styrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-MW-03	W-MW-11	W-MW-D	W-MW-E	W-MW-E-DUP	W-SMC-01	W-SMP-02	- - - -
LOCATION:	W-MW-3	W-MW-11	W-MW-D	W-MW-E	W-MW-E	W-SMC-01	W-SMP-02	- - -
SCREENED INTERVAL:	18 0 - 100	5 0 - 10 0	30.0 - 40.0	30.0 - 40 0	30 0 - 40 0	20.0 - 60.0	20.0 - 40 0	
SAMPLE DATE:	12/19/97	12/22/97	12/22/97	12/19/97	12/19/97	12/22/97	12/19/97	
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	
MEDIA DESCRIPTION.	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	
MATCHING DUPLICATE I.D.:				W-MW-E-DUP	W-MW-E			
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	
Tetrachloroethene	1 U	1 U	130	130	140	91	25	
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Trichloroethene	20	1 U	92	99	110	38	9	
Vinyl Chloride	1 U	1 U	1 U	1 U	1 U	1 U	4	
Xylene (Total)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
PESTICIDES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	
4,4'-DDD	n/a	n/a	0.1 U	n/a	n/a	n/a	n/a	
4,4'-DDE	n/a	n/a	0.1 U	n/a	n/a	n/a	n/a	
4,4'-DDT	n/a	n/a	0.1 U	n/a	n/a	n/a	n/a	
Aldrin	n/a	n/a	0.05 U	n/a	n/a	n/a	n/a	
Alpha-BHC	n/a	n/a	0.05 U	n/a	n/a	n/a	n/a	
Alpha-Chlordane	n/a	n/a	0.05 U	n/a	n/a	n/a	n/a	
Aroclor-1016	n/a	n/a	1 U	n/a	n/a	n/a	n/a	
Aroclor-1221	n/a	n/a	2 U	n/a	n/a	n/a	n/a	
Aroclor-1232	n/a	n/a	1 U	n/a	n/a	n/a	n/a	
Aroclor-1242	n/a	n/a	1 U	n/a	n/a	n/a	n/a	
Aroclor-1248	n/a	n/a	1 U	n/a	n/a	n/a	n/a	
Aroclor-1254	n/a	n/a	1 U	n/a	n/a	n/a	n/a	
Aroclor-1260	n/a	n/a	1 U	n/a	n/a	n/a	n/a	
Beta-BHC	n/a	n/a	0.05 U	n/a	n/a	n/a	n/a	
Delta-BHC	n/a	n/a	0.05 U	n/a	n/a	n/a	n/a	

TABLE 2-3

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-MW-03	W-MW-11	W-MW-D	W-MW-E	W-MW-E-DUP	W-SMC-01	W-SMP-02	---
LOCATION:	W-MW-3	W-MW-11	W-MW-D	W-MW-E	W-MW-E	W-SMC-01	W-SMP-02	---
SCREENED INTERVAL:	18.0 - 100	5.0 - 10.0	30.0 - 40.0	30.0 - 40.0	30.0 - 40 0	20.0 - 60.0	20 0 - 40 0	
SAMPLE DATE:	12/19/97	12/22/97	12/22/97	12/19/97	12/19/97	12/22/97	12/19/97	
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	
MATCHING DUPLICATE I.D.:				W-MW-E-DUP	W-MW-E			
PESTICIDES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	
Dieldrin	n/a	n/a	0.1 U	n/a	n/a	n/a	n/a	
Endosulfan I	n/a	n/a	0.05 U	n/a	n/a	n/a	n/a	
Endosulfan II	n/a	n/a	0.1 U	n/a	n/a	n/a	n/a	
Endosulfan Sulfate	n/a	n/a	0.1 U	n/a	n/a	n/a	n/a	
Endrin	n/a	n/a	0.1 U	n/a	n/a	n/a	n/a	
Endrin Aldehyde	n/a	n/a	0.1 U	n/a	n/a	n/a	n/a	
Endrin Ketone	n/a	n/a	0.1 U	n/a	n/a	n/a	n/a	
Gamma-BHC (Lindane)	n/a	n/a	0.05 U	n/a	n/a	n/a	n/a	
Gamma-Chlordane	n/a	n/a	0.05 U	n/a	n/a	n/a	n/a	
Heptachlor	n/a	n/a	0.05 U	n/a	n/a	n/a	n/a	
Heptachlor Epoxide	n/a	n/a	0.05 U	n/a	n/a	n/a	n/a	
Methoxychlor	n/a	n/a	0.5 U	n/a	n/a	n/a	n/a	
Toxaphene	n/a	n/a	5 U	n/a	n/a	n/a	n/a	

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

NOTES:

J	--	Value is considered estimated due to exceedance of technical quality control criteria or because result is less than the Contract Required Quantitation Limit (CRQL).
U	--	Value is a non-detected result as reported by the laboratory.
UJ	--	Non-detected result is considered estimated due to exceedance of technical quality control criteria.
UL	--	Non-detected result is considered biased low due to exceedance of technical quality control criteria.
UR	--	Non-detected result is considered unusable due to exceedance of technical quality control criteria.
L	--	Positive result is considered biased low due to exceedance of technical quality control criteria.
K	--	Positive result is considered biased high due to exceedance of technical quality control criteria.
B	--	Positive result is considered to be an artifact of blank contamination, and should not be considered present.
R	--	Positive result is considered unusable due to exceedance of technical quality control criteria.
n/a	--	No result is available/applicable for this parameter in this sample.
ND	--	Value is a non-detected result as reported by the laboratory. Detection limit not available.

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-11I	W-HN-12I	W-HN-13I	W-HN-14I	W-HN-15I	W-HN-16I	W-HN-19I2	W-HN-22I
LOCATION:	W-HN-11I	W-HN-12I	W-HN-13I	W-HN-14I	W-HN-15I	W-HN-16I	W-HN-19I2	W-HN-22I
SCREENED INTERVAL:	70.0 - 88 0	65.0 - 86.0	153 - 172	86.0 - 100	96.0 - 113	101 - 120	87.0 - 110	138 - 152
SAMPLE DATE:	12/23/97	12/19/97	12/19/97	12/17/97	12/10/97	12/05/97	12/08/97	12/09/97
WELL CLUSTER:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:								
INORGANICS	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Aluminum	n/a	n/a	n/a	38.1 U	n/a	n/a	n/a	n/a
Antimony	n/a	n/a	n/a	1.7 U	n/a	n/a	n/a	n/a
Arsenic	n/a	n/a	n/a	2.4 U	n/a	n/a	n/a	n/a
Barium	n/a	n/a	n/a	112	n/a	n/a	n/a	n/a
Beryllium	n/a	n/a	n/a	0.58 U	n/a	n/a	n/a	n/a
Cadmium	n/a	n/a	n/a	0.3 U	n/a	n/a	n/a	n/a
Calcium	n/a	n/a	n/a	65200	n/a	n/a	n/a	n/a
Chromium	n/a	n/a	n/a	43.9	n/a	n/a	n/a	n/a
Cobalt	n/a	n/a	n/a	6 U	n/a	n/a	n/a	n/a
Copper	n/a	n/a	n/a	5.8 U	n/a	n/a	n/a	n/a
Cyanide	n/a	n/a	n/a	6	n/a	n/a	n/a	n/a
Iron	n/a	n/a	n/a	291	n/a	n/a	n/a	n/a
Lead	n/a	n/a	n/a	1.6 UL	n/a	n/a	n/a	n/a
Magnesium	n/a	n/a	n/a	21100	n/a	n/a	n/a	n/a
Manganese	n/a	n/a	n/a	13.5 B	n/a	n/a	n/a	n/a
Mercury	n/a	n/a	n/a	0.12 U	n/a	n/a	n/a	n/a
Nickel	n/a	n/a	n/a	18.7	n/a	n/a	n/a	n/a
Potassium	n/a	n/a	n/a	1780	n/a	n/a	n/a	n/a
Selenium	n/a	n/a	n/a	4.7 U	n/a	n/a	n/a	n/a
Silver	n/a	n/a	n/a	1.9	n/a	n/a	n/a	n/a
Sodium	n/a	n/a	n/a	25900	n/a	n/a	n/a	n/a
Thallium	n/a	n/a	n/a	1.9 U	n/a	n/a	n/a	n/a
Vanadium	n/a	n/a	n/a	6.8 U	n/a	n/a	n/a	n/a
Zinc	n/a	n/a	n/a	60.7	n/a	n/a	n/a	n/a

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-11I	W-HN-12I	W-HN-13I	W-HN-14I	W-HN-15I	W-HN-16I	W-HN-19I2	W-HN-22I
LOCATION:	W-HN-11I	W-HN-12I	W-HN-13I	W-HN-14I	W-HN-15I	W-HN-16I	W-HN-19I2	W-HN-22I
SCREENED INTERVAL:	70 0 - 88.0	65 0 - 86 0	153 - 172	86 0 - 100	96.0 - 113	101 - 120	87 0 - 110	138 - 152
SAMPLE DATE:	12/23/97	12/19/97	12/19/97	12/17/97	12/10/97	12/05/97	12/08/97	12/09/97
WELL CLUSTER:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:								
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,2,4-Trichlorobenzene	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
1,2-Dichlorobenzene	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
1,3-Dichlorobenzene	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
1,4-Dichlorobenzene	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1,1-Trichloroethane	0.7 J	1 U	1 U	1 U	1 U	100 U	0.7 J	1 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	100 U	1 U	1 U
1,1,2-Trichloroethane	67 J	1 U	1 U	4	1 U	100 U	1 U	1 U
1,1-Dichloroethane	1 J	1 U	1 U	0.4 J	1 U	100 U	1 U	1 U
1,1-Dichloroethene	11 J	1 U	1 U	0.8 J	1 U	100 U	0.9 J	1 U
1,2-Dibromo-3-chloropropane	1 UR	1 UR	1 UR	1 UR	1 U	100 U	1 U	1 U
1,2-Dibromoethane	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
1,2-Dichloroethane	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
1,2-Dichloroethene (cis)	7 J	1 U	1 U	13	0.7 J	100 U	1 U	1 U
1,2-Dichloroethene (trans)	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
1,2-Dichloropropane	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
2-Butanone	5 UR	5 UR	5 UR	5 UR	5 UR	500 UR	5 UR	5 UR
2-Hexanone	5 UJ	5 U	5 U	5 U	5 UR	500 U	5 UR	5 UR
4-Methyl-2-pentanone	5 UJ	5 U	5 U	5 U	5 U	500 U	5 U	5 U
Acetone	5 UR	5 UR	5 UR	5 UR	5 UR	500 UR	5 UR	5 UR
Benzene	10 J	1 U	1 U	1 U	1 U	100 U	1 U	1 U
Bromochloromethane	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-11I	W-HN-12I	W-HN-13I	W-HN-14I	W-HN-15I	W-HN-16I	W-HN-19I2	W-HN-22I
LOCATION:	W-HN-11I	W-HN-12I	W-HN-13I	W-HN-14I	W-HN-15I	W-HN-16I	W-HN-19I2	W-HN-22I
SCREENED INTERVAL:	70.0 - 88.0	65.0 - 86.0	153 - 172	86.0 - 100	96.0 - 113	101 - 120	87.0 - 110	138 - 152
SAMPLE DATE:	12/23/97	12/19/97	12/19/97	12/17/97	12/10/97	12/05/97	12/08/97	12/09/97
WELL CLUSTER:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:								
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Bromodichloromethane	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
Bromoform	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
Bromomethane	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
Carbon Disulfide	2 J	1 U	1 U	1 U	1 U	100 U	1 U	1 U
Carbon Tetrachloride	990 J	1 U	1 U	52	1 U	100 U	1 U	1 U
Chlorobenzene	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
Chloroethane	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
Chloroform	40 J	1 U	1 U	5	1 U	100 U	1 U	1 U
Chloromethane	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
Dibromochloromethane	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
Ethylbenzene	4 J	1 U	1 U	1 U	1 U	100 U	1 U	1 U
Methylene Chloride	3 B	2 B	1 B	1 B	3 B	200 U	1 B	3 B
Styrene	1 U	1 U	1 U	1 U	1 U	100 U	1 U	1 U
Tetrachloroethene	42 J	1	1	34	1	100 U	1 U	3
Toluene	16 J	1 U	1 U	1 U	1 U	100 U	1 U	1 U
Trichloroethene	32000	3	1 U	2300	18	2300	0.6 J	1 U
Vinyl Chloride	0.9 J	1 U	1 U	1 U	1 U	100 U	1 U	1 U
Xylene (Total)	9 J	1 U	1 U	1 U	1 U	100 U	1 U	1 U
cis-1,3-Dichloropropene	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U
trans-1,3-Dichloropropene	1 UJ	1 U	1 U	1 U	1 U	100 U	1 U	1 U

TABLE 2-4

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-50I	W-HN-52I	W-HN-55I	W-HN-59I	W-HN-59I-DUP	W-HN-65I1	W-HN-65I2	W-HN-65S1
LOCATION:	W-HN-50I	W-HN-52I	W-HN-55I	W-HN-59I	W-HN-59I	W-HN-65I1	W-HN-65I2	W-HN-65S1
SCREENED INTERVAL:	105 - 122	115 - 132	79.0 - 94.0	74 0 - 88 0	74.0 - 88.0	102 - 123	158 - 171	78 0 - 103
SAMPLE DATE:	12/08/97	12/11/97	12/11/97	12/18/97	12/18/97	12/04/97	12/04/97	12/04/97
WELL CLUSTER:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:				W-HN-59I-DUP	W-HN-59I			
INORGANICS	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Aluminum	n/a	n/a	479	63.4 B	66.8 B	n/a	n/a	n/a
Antimony	n/a	n/a	1.7 U	1.7 U	1.7 U	n/a	n/a	n/a
Arsenic	n/a	n/a	2.4 U	2.4 U	2.4 U	n/a	n/a	n/a
Barium	n/a	n/a	109 B	87.4	83.2	n/a	n/a	n/a
Beryllium	n/a	n/a	0.58 U	0.58 U	0.58 U	n/a	n/a	n/a
Cadmium	n/a	n/a	0.3 U	0.3 U	0.3 U	n/a	n/a	n/a
Calcium	n/a	n/a	63100	69300	63400	n/a	n/a	n/a
Chromium	n/a	n/a	15.7 L	15.9 K	12.2 K	n/a	n/a	n/a
Cobalt	n/a	n/a	6 U	6 U	6 U	n/a	n/a	n/a
Copper	n/a	n/a	5.8 U	5.8 U	5.8 U	n/a	n/a	n/a
Cyanide	n/a	n/a	5 U	5 U	5 U	n/a	n/a	n/a
Iron	n/a	n/a	405	77.8 B	47.3 B	n/a	n/a	n/a
Lead	n/a	n/a	1.6 UL	1.6 UL	1.6 UL	n/a	n/a	n/a
Magnesium	n/a	n/a	20000	18900	18100	n/a	n/a	n/a
Manganese	n/a	n/a	201	3.9 B	2.9 B	n/a	n/a	n/a
Mercury	n/a	n/a	0.12 U	0.13 U	0.12 U	n/a	n/a	n/a
Nickel	n/a	n/a	6.3 UL	6.3 U	6.3 U	n/a	n/a	n/a
Potassium	n/a	n/a	4570	11100	8760	n/a	n/a	n/a
Selenium	n/a	n/a	4.7 U	4.7 U	4.7 U	n/a	n/a	n/a
Silver	n/a	n/a	1.2 U	1.2 U	2.2	n/a	n/a	n/a
Sodium	n/a	n/a	23700	18100	16300	n/a	n/a	n/a
Thallium	n/a	n/a	1.9 U	1.9 U	1.9 U	n/a	n/a	n/a
Vanadium	n/a	n/a	6.8 UL	6.8 U	6.8 U	n/a	n/a	n/a
Zinc	n/a	n/a	29.7 B	8.5 B	3.9 U	n/a	n/a	n/a

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-50I	W-HN-52I	W-HN-55I	W-HN-59I	W-HN-59I-DUP	W-HN-65I1	W-HN-65I2	W-HN-65S1
LOCATION:	W-HN-50I	W-HN-52I	W-HN-55I	W-HN-59I	W-HN-59I	W-HN-65I1	W-HN-65I2	W-HN-65S1
SCREENED INTERVAL:	105 - 122	115 - 132	79 0 - 94.0	74.0 - 88 0	74.0 - 88 0	102 - 123	158 - 171	78 0 - 103
SAMPLE DATE:	12/08/97	12/11/97	12/11/97	12/18/97	12/18/97	12/04/97	12/04/97	12/04/97
WELL CLUSTER:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:				W-HN-59I-DUP	W-HN-59I			
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,2,4-Trichlorobenzene	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1,1-Trichloroethane	1 U	2 U	25 U	250 U	0.8 J	12	2	1 U
1,1,2,2-Tetrachloroethane	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	2 U	25	250 U	29 J	1 U	1 U	1 U
1,1-Dichloroethane	1 U	2 U	25 U	250 U	0.9 J	16	0.9 J	1 U
1,1-Dichloroethene	1 U	2	25 U	250 U	6	25	8	1 U
1,2-Dibromo-3-chloropropane	1 U	2 U	25 U	250 U	1 UR	1 U	1 U	1 U
1,2-Dibromoethane	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	2 U	25 U	250 U	1	1 U	1 U	1 U
1,2-Dichloroethene (cis)	1 U	2	25 U	250 U	13	1	1	1 U
1,2-Dichloroethene (trans)	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
2-Butanone	5 UR	12 UR	120 UR	1200 UR	5 UR	5 UR	5 UR	5 UR
2-Hexanone	5 UR	12 UR	120 UR	1200 UR	5 U	5 UR	5 UR	5 UR
4-Methyl-2-pentanone	5 U	12 U	120 U	1200 U	5 U	5 U	5 U	5 U
Acetone	5 UR	12 UR	120 UR	800 B	5 UR	5 UR	5 UR	5 UR
Benzene	1 U	2 U	25 U	250 U	1	1 U	1 U	1 U
Bromochloromethane	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-50I	W-HN-52I	W-HN-55I	W-HN-59I	W-HN-59I-DUP	W-HN-65I1	W-HN-65I2	W-HN-65S1
LOCATION:	W-HN-50I	W-HN-52I	W-HN-55I	W-HN-59I	W-HN-59I	W-HN-65I1	W-HN-65I2	W-HN-65S1
SCREENED INTERVAL:	105 - 122	115 - 132	79.0 - 94.0	74.0 - 88.0	74.0 - 88.0	102 - 123	158 - 171	78.0 - 103
SAMPLE DATE:	12/08/97	12/11/97	12/11/97	12/18/97	12/18/97	12/04/97	12/04/97	12/04/97
WELL CLUSTER:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:				W-HN-59I-DUP	W-HN-59I			
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Bromodichloromethane	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
Bromoform	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1 U	2 U	220	370	420 J	1 U	1 U	1 U
Chlorobenzene	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
Chloroform	1 U	2	25	250 U	25	1 U	0.8 B	2 B
Chloromethane	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
Methylene Chloride	2 U	5 B	46 B	660 B	1 B	2 B	2 B	2 B
Styrene	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.8 J	12	160	150 J	110 J	25	5	1 U
Toluene	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
Trichloroethene	40	300	7800	15000	15000	61	92	1
Vinyl Chloride	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
Xylene (Total)	1 U	2 U	25 U	740 B	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	2 U	25 U	250 U	1 U	1 U	1 U	1 U

TABLE 2-4

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN19I1	W-HOBEN	W-OS-764	W-WW-1	W-WW-1-D	---	---	---
LOCATION:	W-HN-19I1	W-241I	W-96I	W-WW-1	W-WW-1	---	---	---
SCREENED INTERVAL:	138 - 155	? - 130	? - 100	81 0 - 105	81.0 - 105			
SAMPLE DATE:	12/08/97	12/09/97	12/17/97	12/23/97	12/23/97			
WELL CLUSTER:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate			
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	--		
MATCHING DUPLICATE I.D.:				W-WW-1-D	W-WW-1			
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**			
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U			
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U			
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U			
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U			
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**			
1,1,1-Trichloroethane	0.6 J	1 U	1 U	1 U	1 U			
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U			
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U			
1,1-Dichloroethane	0.8 J	1 U	1 U	1 U	1 U			
1,1-Dichloroethene	1	1 U	1 U	1 U	1 U			
1,2-Dibromo-3-chloropropane	1 U	1 U	1 UR	1 U	1 U			
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U			
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U			
1,2-Dichloroethene (cis)	0.8 J	1 U	1 U	0.6 J	1 U			
1,2-Dichloroethene (trans)	1 U	1 U	1 U	1 U	1 U			
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U			
2-Butanone	5 UR	5 UR	5 UR	5 UR	5 UR			
2-Hexanone	5 UR	5 U	5 U	5 UR	5 UR			
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U			
Acetone	5 UR	5 UR	5 UR	5 UR	5 UR			
Benzene	1 U	1 U	1 U	1 U	1 U			
Bromochloromethane	1 U	1 U	1 U	1 U	1 U			
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U			

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN19I1	W-HOBEN	W-OS-764	W-WW-1	W-WW-1-D	---	---	---
LOCATION:	W-HN-19I1	W-241I	W-96I	W-WW-1	W-WW-1	---	---	---
SCREENED INTERVAL:	138 - 155	? - 130	? - 100	81 0 - 105	81.0 - 105			
SAMPLE DATE:	12/08/97	12/09/97	12/17/97	12/23/97	12/23/97			
WELL CLUSTER:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate			
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater			
MATCHING DUPLICATE I.D.:				W-WW-1-D	W-WW-1			
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**			
Bromoform	1 U	1 U	1 U	1 U	1 U			
Bromomethane	1 U	1 U	1 U	1 U	1 U			
Carbon Disulfide	1 U	1 U	1 U	1 U	1 U			
Carbon Tetrachloride	1 U	1 U	1 U	1 U	1 U			
Chlorobenzene	1 U	1 U	1 U	1 U	1 U			
Chloroethane	1 U	1 U	1 U	1 U	1 U			
Chloroform	1 U	2	1 U	1 U	1 U			
Chloromethane	1 U	1 U	1 U	1 U	1 U			
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U			
Ethylbenzene	1 U	1 U	1 U	1 U	1 U			
Methylene Chloride	2 B	2 U	1 B	2 B	2 B			
Styrene	1 U	1 U	1 U	1 U	1 U			
Tetrachloroethene	0.6 J	2	1 U	2	2			
Toluene	1 U	1 U	1 U	1 U	1 U			
Trichloroethene	13	12	1 U	31	21			
Vinyl Chloride	1 U	1 U	1 U	1 U	1 U			
Xylene (Total)	1 U	1 U	1 U	1 U	1 U			
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U			
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U			

TABLE 2-4

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

NOTES:

J	--	Value is considered estimated due to exceedance of technical quality control criteria or because result is less than the Contract Required Quantitation Limit (CRQL).
U	--	Value is a non-detected result as reported by the laboratory.
UJ	--	Non-detected result is considered estimated due to exceedance of technical quality control criteria.
UL	--	Non-detected result is considered biased low due to exceedance of technical quality control criteria.
UR	--	Non-detected result is considered unusable due to exceedance of technical quality control criteria.
L	--	Positive result is considered biased low due to exceedance of technical quality control criteria.
K	--	Positive result is considered biased high due to exceedance of technical quality control criteria.
B	--	Positive result is considered to be an artifact of blank contamination, and should not be considered present.
R	--	Positive result is considered unusable due to exceedance of technical quality control criteria.
n/a	--	No result is available/applicable for this parameter in this sample.
ND	--	Value is a non-detected result as reported by the laboratory. Detection limit not available.

SUMMARY OF ANALYTICAL RESULTS FOR DEEPER AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-BK-1059	W-HN-11D	W-HN-12D	W-HN-13D	W-HN-15D	W-HN-16D	W-HN-22D	W-HN-50D
LOCATION:	W-BK-1059	W-HN-11D	W-HN-12D	W-HN-13D	W-HN-15D	W-HN-16D	W-HN-22D	W-HN-50D
SCREENED INTERVAL:	66.0 - 400	151 - 170	278 - 301	220 - 243	185 - 202	168 - 200	254 - 271	160 - 174
SAMPLE DATE:	01/02/98	12/18/97	12/18/97	12/19/97	12/11/97	12/05/97	12/08/97	12/09/97
WELL CLUSTER:	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:								
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1,1-Trichloroethane	2	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	0.6 J	1 U	1 U	1 U	1 U	1	1 U	1 U
1,1-Dichloroethene	1	1 U	1 U	1 U	1 U	2	1 U	1 U
1,2-Dibromo-3-chloropropane	1 UR	1 U	1 U	1 U	1 UR	1 U	1 U	1 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (cis)	1 U	1 U	1 U	1 U	1 U	0.5 J	1 U	1 U
1,2-Dichloroethene (trans)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
2-Hexanone	5 U	5 UR	5 UR	5 U	5 U	5 UR	5 UR	5 U
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	2 J	8 L
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

TABLE 2-5

SUMMARY OF ANALYTICAL RESULTS FOR DEEPER AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-BK-1059	W-HN-11D	W-HN-12D	W-HN-13D	W-HN-15D	W-HN-16D	W-HN-22D	W-HN-50D
LOCATION:	W-BK-1059	W-HN-11D	W-HN-12D	W-HN-13D	W-HN-15D	W-HN-16D	W-HN-22D	W-HN-50D
SCREENED INTERVAL:	66.0 - 400	151 - 170	278 - 301	220 - 243	185 - 202	168 - 200	254 - 271	160 - 174
SAMPLE DATE:	01/02/98	12/18/97	12/18/97	12/19/97	12/11/97	12/05/97	12/08/97	12/09/97
WELL CLUSTER:	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:								
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene Chloride	1 B	2 B	2 B	2 B	2 B	2 B	1 B	2 U
Styrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1	1 U	1 U	5	1 U	1 U	0.7 J	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1	2	1 U	1 U	0.7 J	4	1 U	2
Vinyl Chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene (Total)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR DEEPER AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-52D	W-HN-52DD	W-HN-65D	W-HN19D	W-OS-757	W-SMC-02	---	---
LOCATION:	W-HN-52D	W-HN-52DD	W-HN-65D	W-HN-19D	W-93D	W-SMC-02	---	---
SCREENED INTERVAL:	178 - 194	266 - 283	274 - 303	181 - 204	75 0 - 250	276 - 298		
SAMPLE DATE:	12/12/97	12/11/97	12/04/97	12/08/97	12/17/97	12/18/97		
WELL CLUSTER:	Deep	Deep	Deep	Deep	Deep	Deep		
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater		
MATCHING DUPLICATE I.D.:								
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**		
1,2,4-Trichlorobenzene	2 U	1 U	1 U	1 U	1 U	1 U		
1,2-Dichlorobenzene	2 U	1 U	1 U	1 U	1 U	1 U		
1,3-Dichlorobenzene	2 U	1 U	1 U	1 U	1 U	1 U		
1,4-Dichlorobenzene	2 U	1 U	1 U	1 U	1 U	1 U		
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**		
1,1,1-Trichloroethane	2 U	1 U	1 U	1 U	24	1 U		
1,1,2,2-Tetrachloroethane	2 U	1 U	1 U	1 U	1 U	1 U		
1,1,2-Trichloroethane	2 U	1 U	1 U	1 U	1 U	1 U		
1,1-Dichloroethane	2	1 U	1 U	1 U	19	1 U		
1,1-Dichloroethene	4	1 U	1 U	1 U	22	1 U		
1,2-Dibromo-3-chloropropane	2 UR	1 U	1 U	1 U	1 UR	1 U		
1,2-Dibromoethane	2 U	1 U	1 U	1 U	1 U	1 U		
1,2-Dichloroethane	2 U	1 U	1 U	1 U	1 U	1 U		
1,2-Dichloroethene (cis)	3	1 U	1 U	1 U	2	1 U		
1,2-Dichloroethene (trans)	2 U	1 U	1 U	1 U	1 U	1 U		
1,2-Dichloropropane	2 U	1 U	1 U	1 U	1 U	1 U		
2-Butanone	10 UR	5 UR	5 UR	5 UR	5 U	5 UR		
2-Hexanone	10 U	5 UR	5 UR	5 UR	5 UR	5 UR		
4-Methyl-2-pentanone	10 U	5 U	5 U	5 U	5 U	5 U		
Acetone	10 UR	5 UR	5 UR	5 UR	16 L	5 UR		
Benzene	2 U	1 U	1 U	1 U	1 U	1 U		
Bromochloromethane	2 U	1 U	1 U	1 U	1 U	1 U		
Bromodichloromethane	2 U	1 U	1 U	1 U	1 U	1 U		

SUMMARY OF ANALYTICAL RESULTS FOR DEEPER AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-52D	W-HN-52DD	W-HN-65D	W-HN19D	W-OS-757	W-SMC-02	---	---
LOCATION:	W-HN-52D	W-HN-52DD	W-HN-65D	W-HN-19D	W-93D	W-SMC-02	---	---
SCREENED INTERVAL:	178 - 194	266 - 283	274 - 303	181 - 204	75.0 - 250	276 - 298		
SAMPLE DATE:	12/12/97	12/11/97	12/04/97	12/08/97	12/17/97	12/18/97		
WELL CLUSTER:	Deep	Deep	Deep	Deep	Deep	Deep		
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater		
MATCHING DUPLICATE I.D.:								
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**		
Bromoform	2 U	1 U	1 U	1 U	1 U	1 U		
Bromomethane	2 U	1 U	1 U	1 U	1 U	1 U		
Carbon Disulfide	2 U	1	1 U	1 U	1 U	1 U		
Carbon Tetrachloride	1	1 U	1 U	1 U	4	1 U		
Chlorobenzene	2 U	1 U	1 U	1 U	1 U	1 U		
Chloroethane	2 U	1 U	1 U	1 U	1 U	1 U		
Chloroform	2	1 U	1 U	1 U	0.8 B	1 U		
Chloromethane	2 U	1 U	1 U	1 U	1 U	1 U		
Dibromochloromethane	2 U	1 U	1 U	1 U	1 U	1 U		
Ethylbenzene	2 U	1 U	1 U	1 U	1 U	1 U		
Methylene Chloride	3 B	2 B	2 B	2 B	2 B	2 B		
Styrene	2 U	1 U	1 U	1 U	1 U	1 U		
Tetrachloroethene	14	1 U	1 U	1 U	39	3		
Toluene	2 U	0.7 J	1 U	1 U	1 U	1 U		
Trichloroethene	460	4	1 U	0.5 J	180	1 U		
Vinyl Chloride	2 U	1 U	1 U	1 U	1 U	1 U		
Xylene (Total)	2 U	1 U	1 U	1 U	1 U	1 U		
cis-1,3-Dichloropropene	2 U	1 U	1 U	1 U	1 U	1 U		
trans-1,3-Dichloropropene	2 U	1 U	1 U	1 U	1 U	1 U		

SUMMARY OF ANALYTICAL RESULTS FOR DEEPER AREA A GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

NOTES:

J	--	Value is considered estimated due to exceedance of technical quality control criteria or because result is less than the Contract Required Quantitation Limit (CRQL).
U	--	Value is a non-detected result as reported by the laboratory.
UJ	--	Non-detected result is considered estimated due to exceedance of technical quality control criteria.
UL	--	Non-detected result is considered biased low due to exceedance of technical quality control criteria.
UR	--	Non-detected result is considered unusable due to exceedance of technical quality control criteria.
L	--	Positive result is considered biased low due to exceedance of technical quality control criteria.
K	--	Positive result is considered biased high due to exceedance of technical quality control criteria.
B	--	Positive result is considered to be an artifact of blank contamination, and should not be considered present.
R	--	Positive result is considered unusable due to exceedance of technical quality control criteria.
n/a	--	No result is available/applicable for this parameter in this sample.
ND	--	Value is a non-detected result as reported by the laboratory. Detection limit not available.

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-17S	W-HN-18S	W-HN-20S	W-HN-21S	W-HN-31S	W-HN-31S-DUP	W-HN-32S	W-HN-33S
LOCATION:	W-HN-17S	W-HN-18S	W-HN-20S	W-HN-21S	W-HN-31S	W-HN-31S	W-HN-32S	W-HN-33S
SCREENED INTERVAL:	84 0 - 102	82.0 - 100	76 0 - 96.0	28 0 - 52.0	43 0 - 69.0	43 0 - 69.0	66 0 - 84.0	48.0 - 66.0
SAMPLE DATE:	12/11/97	12/15/97	12/12/97	12/04/97	12/12/97	12/12/97	12/12/97	12/17/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:					W-HN-316S-DUP	W-HN-316S		
INORGANICS	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Aluminum	n/a	n/a	n/a	n/a	38.1 U	38.1 U	n/a	n/a
Antimony	n/a	n/a	n/a	n/a	1.7 U	1.9 B	n/a	n/a
Arsenic	n/a	n/a	n/a	n/a	2.4 U	2.4 U	n/a	n/a
Barium	n/a	n/a	n/a	n/a	100 B	104 B	n/a	n/a
Beryllium	n/a	n/a	n/a	n/a	0.58 U	0.58 U	n/a	n/a
Cadmium	n/a	n/a	n/a	n/a	0.3 U	0.3 U	n/a	n/a
Calcium	n/a	n/a	n/a	n/a	96100	103000	n/a	n/a
Chromium	n/a	n/a	n/a	n/a	38.7	41.5	n/a	n/a
Cobalt	n/a	n/a	n/a	n/a	6 U	6 U	n/a	n/a
Copper	n/a	n/a	n/a	n/a	5.8 U	5.8 U	n/a	n/a
Cyanide	n/a	n/a	n/a	n/a	5 U	5 U	n/a	n/a
Iron	n/a	n/a	n/a	n/a	8.8 U	8.8 U	n/a	n/a
Lead	n/a	n/a	n/a	n/a	1.6 UL	1.6 UL	n/a	n/a
Magnesium	n/a	n/a	n/a	n/a	36600	39300	n/a	n/a
Manganese	n/a	n/a	n/a	n/a	1.5 UL	1.5 UL	n/a	n/a
Mercury	n/a	n/a	n/a	n/a	0.12 U	0.12 U	n/a	n/a
Nickel	n/a	n/a	n/a	n/a	6.3 UL	6.3 UL	n/a	n/a
Potassium	n/a	n/a	n/a	n/a	1170	1330	n/a	n/a
Selenium	n/a	n/a	n/a	n/a	4.7 U	4.7 U	n/a	n/a
Silver	n/a	n/a	n/a	n/a	1.2 U	1.2 U	n/a	n/a
Sodium	n/a	n/a	n/a	n/a	41600	44600	n/a	n/a
Thallium	n/a	n/a	n/a	n/a	1.9 U	1.9 UL	n/a	n/a
Vanadium	n/a	n/a	n/a	n/a	6.8 UL	6.8 U	n/a	n/a
Zinc	n/a	n/a	n/a	n/a	18 B	17.6 B	n/a	n/a

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-17S	W-HN-18S	W-HN-20S	W-HN-21S	W-HN-31S	W-HN-31S-DUP	W-HN-32S	W-HN-33S
LOCATION:	W-HN-17S	W-HN-18S	W-HN-20S	W-HN-21S	W-HN-31S	W-HN-31S	W-HN-32S	W-HN-33S
SCREENED INTERVAL:	84.0 - 102	82.0 - 100	76 0 - 96.0	28.0 - 52.0	43.0 - 69.0	43 0 - 69 0	66 0 - 84 0	48 0 - 66 0
SAMPLE DATE:	12/11/97	12/15/97	12/12/97	12/04/97	12/12/97	12/12/97	12/12/97	12/17/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:					W-HN-316S-DUP	W-HN-316S		
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1,1-Trichloroethane	0.9 J	1 U	1 U	1 U	1 U	1 U	1 U	2
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	2	1	1 U	1 U	1 U	1 U	1 U	2
1,1-Dichloroethene	2	1 U	1 U	1 U	1 U	1 U	1 U	2
1,2-Dibromo-3-chloropropane	1 U	1 UR	1 U	1 U	1 UR	1 UR	1 UR	1 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (cis)	1	2	1 U	1 U	2	2	2	0.7 J
1,2-Dichloroethene (trans)	1 U	1 U	1 U	1 U	1	1	0 8 J	1 U
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	5 UR	5 U	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
2-Hexanone	5 UR	5 UR	5 UR	5 UR	5 UR	5 U	5 U	5 UR
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-17S	W-HN-18S	W-HN-20S	W-HN-21S	W-HN-31S	W-HN-31S-DUP	W-HN-32S	W-HN-33S
LOCATION:	W-HN-17S	W-HN-18S	W-HN-20S	W-HN-21S	W-HN-31S	W-HN-31S	W-HN-32S	W-HN-33S
SCREENED INTERVAL:	84.0 - 102	82.0 - 100	76.0 - 96.0	28.0 - 52.0	43 0 - 69 0	43.0 - 69 0	66 0 - 84.0	48 0 - 66 0
SAMPLE DATE:	12/11/97	12/15/97	12/12/97	12/04/97	12/12/97	12/12/97	12/12/97	12/17/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:					W-HN-316S-DUP	W-HN-316S		
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1 U	1	1 U	1 U	1	0.9 J	1	1 U
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	1	0.6 B	1 U	1 U	0.5 J	0.5 J	1	1 U
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene Chloride	3 B	2 B	2 B	2 B	2 B	2 B	2 B	2 B
Styrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	2	2	1 U	1 U	3	2	2	1
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	34	76	1	1 U	160	180	480	22
Vinyl Chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene (Total)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-42S	W-HN-53S	W-HN-54S	W-HN-56S	W-HN-57S	W-HN-58S	W-HN-58S-DUP	W-HN-60S
LOCATION:	W-HN-42S	W-HN-53S	W-HN-54S	W-HN-56S	W-HN-57S	W-HN-58S	W-HN-58S	W-HN-60S
SCREENED INTERVAL:	52 0 - 65.0	40.0 - 60 0	55 5 - 71 0	33.0 - 50.0	58 0 - 89 0	24.0 - 46.0	24 0 - 46 0	49 0 - 63 0
SAMPLE DATE:	12/11/97	12/05/97	12/05/97	12/15/97	12/18/97	12/15/97	12/15/97	12/09/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:						W-HN-58S-DUP	W-HN-58S	
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1,1-Trichloroethane	1 U	3	1 U	1 U	1 U	0.5 J	1 U	1 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	0.8 J	1 U	0.8 J	0.7 J	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	1 U	0.7 J	1 U	1	0.5 J	0.9 J	0 8 J	1 U
1,1-Dichloroethene	1 U	53	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 UR	1 UR	1 UR	1 UR	1 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (cis)	1 U	1 U	1 U	0.8 J	3	1 U	1 U	1 U
1,2-Dichloroethene (trans)	1 U	1 U	1 U	1 U	0.6 J	1 U	1 U	1 U
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	5 UR	5 UR	5 UR	5 U	5 UR	5 U	5 U	5 UR
2-Hexanone	5 U	5 UR	5 UR	5 UR	5 U	5 UR	5 UR	5 UR
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	5 UR	5 UR	2 L	5 UR	5 UR	5 UR	5 UR	5 UR
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

TABLE 2-6

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-42S	W-HN-53S	W-HN-54S	W-HN-56S	W-HN-57S	W-HN-58S	W-HN-58S-DUP	W-HN-60S
LOCATION:	W-HN-42S	W-HN-53S	W-HN-54S	W-HN-56S	W-HN-57S	W-HN-58S	W-HN-58S	W-HN-60S
SCREENED INTERVAL:	52.0 - 65.0	40.0 - 60.0	55 5 - 71.0	33 0 - 50.0	58 0 - 89.0	24.0 - 46 0	24 0 - 46.0	49.0 - 63.0
SAMPLE DATE:	12/11/97	12/05/97	12/05/97	12/15/97	12/18/97	12/15/97	12/15/97	12/09/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:						W-HN-58S-DUP	W-HN-58S	
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1 U	1 U	1 U	1 U	0.6 J	1 U	1 U	1 U
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	1 U	1 U	1 U	1 U	0.6 J	1 U	1 U	1 U
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene Chloride	0.6 B	2 B	2 B	2 B	2 B	2 B	2 B	2 U
Styrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	4	1	4	4	1 U
Toluene	1 U	1 U	1 U	2 B	1 U	1 U	1 U	1 U
Trichloroethene	1 U	1 U	1 U	45	270	22	20	1 U
Vinyl Chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene (Total)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-80S	W-HN-81S	W-HN-81S-DUP	W-HN-82S	W-HN-83S	W-HN-83X	W-MP-01	W-MP-03
LOCATION:	W-HN-80S	W-HN-81S	W-HN-81S	W-HN-82S	W-HN-83S	W-HN-83X	W-MP-1	W-MP-3
SCREENED INTERVAL:	27.0 - 44 0	69.0 - 85.0	69.0 - 85.0	40 0 - 56 0	22 0 - 60.0	8 0 - 13 0	18 0 - 101	38 0 - 132
SAMPLE DATE:	12/08/97	12/09/97	12/09/97	12/15/97	12/09/97	12/09/97	12/18/97	12/17/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-HN-81S-DUP	W-HN-81S					
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	2	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	2	0.7 J	0.7 J	1 U	3	1 U	0.7 J	1
1,1-Dichloroethene	1 U	0.5 J	1 U	1 U	3	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 UR	1 U	1 U	1 UR	1 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (cis)	0.9 J	1 U	1 U	1 U	1	1 U	1	4
1,2-Dichloroethene (trans)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.6 J
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	5 UR	5 UR	5 UR	5 U	5 UR	5 UR	5 UR	5 UR
2-Hexanone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 U	5 UR
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-80S	W-HN-81S	W-HN-81S-DUP	W-HN-82S	W-HN-83S	W-HN-83X	W-MP-01	W-MP-03
LOCATION:	W-HN-80S	W-HN-81S	W-HN-81S	W-HN-82S	W-HN-83S	W-HN-83X	W-MP-1	W-MP-3
SCREENED INTERVAL:	27.0 - 44.0	69 0 - 85 0	69.0 - 85.0	40.0 - 56.0	22 0 - 60.0	8.0 - 13 0	18.0 - 101	38.0 - 132
SAMPLE DATE:	12/08/97	12/09/97	12/09/97	12/15/97	12/09/97	12/09/97	12/18/97	12/17/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:		W-HN-81S-DUP	W-HN-81S					
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1 U	1 U	1 U	1	1 U	1 U	1 U	0.7 J
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	1 U	1 U	1 U	0.9 B	1	1 U	1 U	0.8 J
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene Chloride	2 B	2 U	0.6 B	1 B	3 B	3 B	2 B	2 B
Styrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1	1 U	1 U	1 U	6	0.6 J	2	1
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	2	1 U	1 U	1 U	13	1 U	71	220
Vinyl Chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene (Total)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-MP-2	W-MP-2-DUP	W-OS-758	W-OS-759	W-OS-759-DUP	W-OS-762	W-OS-765	W-OS-766
LOCATION:	W-MP-2	W-MP-2	W-131	W-135	W-135	W-230	W-229	W-242
SCREENED INTERVAL:	19 0 - 101	19 0 - 101	n/a	n/a	n/a	n/a	n/a	n/a
SAMPLE DATE:	12/16/97	12/16/97	12/17/97	12/17/97	12/17/97	12/17/97	12/17/97	12/18/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D :	W-MP-2-DUP	W-MP-2		W-OS-759-DUP	W-OS-759			
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	0.6 J	1 U	1 U	1 U	1 U	1 U
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1,1-Trichloroethane	1 U	1 U	0.9 J	1 U	1 U	1 U	1 U	1
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	0.7 J	0.6 J	1 U	1 U	1 U	1 U	1 U	2 J
1,1-Dichloroethene	1 U	1 U	1	1 U	1 U	1 U	1 U	0.6 J
1,2-Dibromo-3-chloropropane	1 UR	1 UR	1 UR	1 UR	1 UR	1 U	1 UR	1 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	0.8 J	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (cis)	3	3	14	1 U	1 U	1 U	1 U	2
1,2-Dichloroethene (trans)	0.5 B	0.5 J	0.5 J	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	5 U	5 U	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
2-Hexanone	5 UR	5 UR	5 U	5 U	5 U	5 UR	5 U	5 UR
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-MP-2	W-MP-2-DUP	W-OS-758	W-OS-759	W-OS-759-DUP	W-OS-762	W-OS-765	W-OS-766
LOCATION:	W-MP-2	W-MP-2	W-131	W-135	W-135	W-230	W-229	W-242
SCREENED INTERVAL:	19.0 - 101	19 0 - 101	n/a	n/a	n/a	n/a	n/a	n/a
SAMPLE DATE:	12/16/97	12/16/97	12/17/97	12/17/97	12/17/97	12/17/97	12/17/97	12/18/97
WELL CLUSTER:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:	W-MP-2-DUP	W-MP-2		W-OS-759-DUP	W-OS-759			
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	0.5 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene Chloride	2 B	1 B	2 B	2 B	2 B	3 B	1 B	2 B
Styrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7 J	0.7 J	1 U	1	1	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	220	240	40	1 U	1 U	1 U	1 U	5
Vinyl Chloride	1 U	1 U	2	1 U	1 U	1 U	1 U	1 U
Xylene (Total)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

NOTES:

J	--	Value is considered estimated due to exceedance of technical quality control criteria or because result is less than the Contract Required Quantitation Limit (CRQL).
U	--	Value is a non-detected result as reported by the laboratory.
UJ	--	Non-detected result is considered estimated due to exceedance of technical quality control criteria.
UL	--	Non-detected result is considered biased low due to exceedance of technical quality control criteria.
UR	--	Non-detected result is considered unusable due to exceedance of technical quality control criteria.
L	--	Positive result is considered biased low due to exceedance of technical quality control criteria.
K	--	Positive result is considered biased high due to exceedance of technical quality control criteria.
B	--	Positive result is considered to be an artifact of blank contamination, and should not be considered present.
R	--	Positive result is considered unusable due to exceedance of technical quality control criteria.
n/a	--	No result is available/applicable for this parameter in this sample.
ND	--	Value is a non-detected result as reported by the laboratory. Detection limit not available.

TABLE 2-7

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-17I	W-HN-18I	W-HN-20I	W-HN-21I	W-HN-33I	W-HN-42I	W-HN-53I	W-HN-54I
LOCATION:	W-HN-17I	W-HN-18I	W-HN-20I	W-HN-21I	W-HN-33I	W-HN-42I	W-HN-53I	W-HN-54I
SCREENED INTERVAL:	185 - 202	153 - 174	123 - 143	70.0 - 95.0	127 - 144	81.0 - 111	69.0 - 83 0	107 - 124
SAMPLE DATE:	12/10/97	12/16/97	12/12/97	12/04/97	12/12/97	12/11/97	12/05/97	12/05/97
WELL CLUSTER:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:								
INORGANICS	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Aluminum	n/a	n/a	120	n/a	n/a	63.4	n/a	n/a
Antimony	n/a	n/a	2.1 B	n/a	n/a	1.7 U	n/a	n/a
Arsenic	n/a	n/a	2.4 U	n/a	n/a	2.4 U	n/a	n/a
Barium	n/a	n/a	179 B	n/a	n/a	124 B	n/a	n/a
Beryllium	n/a	n/a	0.58 U	n/a	n/a	0.58 UL	n/a	n/a
Cadmium	n/a	n/a	0.3 U	n/a	n/a	0.3 U	n/a	n/a
Calcium	n/a	n/a	68400	n/a	n/a	75700	n/a	n/a
Chromium	n/a	n/a	4.6 UL	n/a	n/a	4.6 UL	n/a	n/a
Cobalt	n/a	n/a	6 U	n/a	n/a	6 U	n/a	n/a
Copper	n/a	n/a	5.8 U	n/a	n/a	5.8 U	n/a	n/a
Cyanide	n/a	n/a	5 U	n/a	n/a	5 U	n/a	n/a
Iron	n/a	n/a	352	n/a	n/a	104 B	n/a	n/a
Lead	n/a	n/a	1.8 L	n/a	n/a	1.6 UL	n/a	n/a
Magnesium	n/a	n/a	16600	n/a	n/a	25100	n/a	n/a
Manganese	n/a	n/a	412	n/a	n/a	36.9 B	n/a	n/a
Mercury	n/a	n/a	0.12 U	n/a	n/a	0.12 U	n/a	n/a
Nickel	n/a	n/a	6.3 UL	n/a	n/a	6.3 UL	n/a	n/a
Potassium	n/a	n/a	3980	n/a	n/a	3360	n/a	n/a
Selenium	n/a	n/a	4.7 U	n/a	n/a	4.7 U	n/a	n/a
Silver	n/a	n/a	1.2 U	n/a	n/a	1.2 U	n/a	n/a
Sodium	n/a	n/a	31000	n/a	n/a	14300	n/a	n/a
Thallium	n/a	n/a	1.9 U	n/a	n/a	1.9 U	n/a	n/a
Vanadium	n/a	n/a	6.8 UL	n/a	n/a	6.8 UL	n/a	n/a
Zinc	n/a	n/a	26.9 B	n/a	n/a	27.5 B	n/a	n/a

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-17I	W-HN-18I	W-HN-20I	W-HN-21I	W-HN-33I	W-HN-42I	W-HN-53I	W-HN-54I
LOCATION:	W-HN-17I	W-HN-18I	W-HN-20I	W-HN-21I	W-HN-33I	W-HN-42I	W-HN-53I	W-HN-54I
SCREENED INTERVAL:	185 - 202	153 - 174	123 - 143	70.0 - 95.0	127 - 144	81 0 - 111	69 0 - 83.0	107 - 124
SAMPLE DATE:	12/10/97	12/16/97	12/12/97	12/04/97	12/12/97	12/11/97	12/05/97	12/05/97
WELL CLUSTER:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:								
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	1 U	5 U	5	1 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	5 U	0.8 J	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	5 U	24	1 U
1,2-Dibromo-3-chloropropane	1 U	1 UR	1 UR	1 U	1 UR	5 U	1 U	1 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
1,2-Dichloroethene (cis)	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
1,2-Dichloroethene (trans)	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
2-Butanone	5 UR	5 U	5 UR	5 UR	5 UR	25 UR	5 UR	5 UR
2-Hexanone	5 UR	5 UR	5 U	5 UR	5 U	25 UR	5 UR	5 UR
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	25 U	5 U	5 U
Acetone	5 UR	5 UR	5 UR	5 UR	5 UR	25 UR	5 UR	5 UR
Benzene	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-17I	W-HN-18I	W-HN-20I	W-HN-21I	W-HN-33I	W-HN-42I	W-HN-53I	W-HN-54I
LOCATION:	W-HN-17I	W-HN-18I	W-HN-20I	W-HN-21I	W-HN-33I	W-HN-42I	W-HN-53I	W-HN-54I
SCREENED INTERVAL:	185 - 202	153 - 174	123 - 143	70 0 - 95.0	127 - 144	81 0 - 111	69 0 - 83.0	107 - 124
SAMPLE DATE:	12/10/97	12/16/97	12/12/97	12/04/97	12/12/97	12/11/97	12/05/97	12/05/97
WELL CLUSTER:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:								
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Bromoform	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Carbon Disulfide	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Carbon Tetrachloride	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Chloroform	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Chloromethane	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Methylene Chloride	2 B	1 B	2 B	2 B	2 B	12 B	2 B	2 B
Styrene	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	0.6 J	5 U	1 U	1 U
Toluene	2	1 U	0.5 J	1 U	1 U	5 U	1 U	1 U
Trichloroethene	1 U	1 U	1 U	1 U	6	0.8 J	1 U	1 U
Vinyl Chloride	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
Xylene (Total)	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-56I	W-HN-57I	W-HN-58I	W-HN-60I	W-HN-80I	W-HN-81I	W-HN-82I	W-HN-83I
LOCATION:	W-HN-56I	W-HN-57I	W-HN-58I	W-HN-60I	W-HN-80I	W-HN-81I	W-HN-82I	W-HN-83I
SCREENED INTERVAL:	118 - 134	107 - 133	60.0 - 76.0	142 - 157	97.0 - 115	121 - 145	145 - 159	114 - 136
SAMPLE DATE:	12/15/97	12/17/97	12/16/97	12/10/97	12/08/97	12/11/97	12/15/97	12/15/97
WELL CLUSTER:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:								
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	1	1	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	0.6 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 UR	1 U	1 UR	1 U	1 U	1 U	1 UR	1 UR
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (cis)	4	2	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (trans)	0.7 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	5 U	5 UR	5 U	5 UR	5 UR	5 UR	5 U	5 U
2-Hexanone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	6 L
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

TABLE 2-7

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-56I	W-HN-57I	W-HN-58I	W-HN-60I	W-HN-80I	W-HN-81I	W-HN-82I	W-HN-83I
LOCATION:	W-HN-56I	W-HN-57I	W-HN-58I	W-HN-60I	W-HN-80I	W-HN-81I	W-HN-82I	W-HN-83I
SCREENED INTERVAL:	118 - 134	107 - 133	60.0 - 76.0	142 - 157	97.0 - 115	121 - 145	145 - 159	114 - 136
SAMPLE DATE:	12/15/97	12/17/97	12/16/97	12/10/97	12/08/97	12/11/97	12/15/97	12/15/97
WELL CLUSTER:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:								
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 J
Carbon Tetrachloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene Chloride	1 B	2 B	2 B	2 U	2 B	2 B	2 B	2 B
Styrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	1 U	0.5 J	1 U	1 U	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1	1	50	1 U	1 U	1 U	1 U	1 U
Vinyl Chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene (Total)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-OS-763	---	---	---	---	---	---	---
LOCATION:	W-228	---	---	---	---	---	---	---
SCREENED INTERVAL:	n/a							
SAMPLE DATE:	12/17/97							
WELL CLUSTER:	Intermediate							
MEDIA DESCRIPTION:	Groundwater							
MATCHING DUPLICATE I.D.:								
SEMIVOLATILES	**ug/L**							
1,2,4-Trichlorobenzene	1 U							
1,2-Dichlorobenzene	1 U							
1,3-Dichlorobenzene	1 U							
1,4-Dichlorobenzene	1 U							
VOLATILES	**ug/L**							
1,1,1-Trichloroethane	1 U							
1,1,2,2-Tetrachloroethane	1 U							
1,1,2-Trichloroethane	1 U							
1,1-Dichloroethane	1 U							
1,1-Dichloroethene	1 U							
1,2-Dibromo-3-chloropropane	1 UR							
1,2-Dibromoethane	1 U							
1,2-Dichloroethane	1 U							
1,2-Dichloroethene (cis)	1 U							
1,2-Dichloroethene (trans)	1 U							
1,2-Dichloropropane	1 U							
2-Butanone	5 UR							
2-Hexanone	5 U							
4-Methyl-2-pentanone	5 U							
Acetone	5 UR							
Benzene	1 U							
Bromochloromethane	1 U							
Bromodichloromethane	1 U							

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-OS-763	---	---	---	---	---	---	---
LOCATION:	W-228	---	---	---	---	---	---	---
SCREENED INTERVAL:	n/a							
SAMPLE DATE:	12/17/97							
WELL CLUSTER:	Intermediate							
MEDIA DESCRIPTION:	Groundwater							
MATCHING DUPLICATE I.D.:								
VOLATILES	**ug/L**							
Bromoform	1 U							
Bromomethane	1 U							
Carbon Disulfide	1 U							
Carbon Tetrachloride	1 U							
Chlorobenzene	1 U							
Chloroethane	1 U							
Chloroform	1 U							
Chloromethane	1 U							
Dibromochloromethane	1 U							
Ethylbenzene	1 U							
Methylene Chloride	2 B							
Styrene	1 U							
Tetrachloroethene	1 U							
Toluene	0.6 J							
Trichloroethene	1 U							
Vinyl Chloride	1 U							
Xylene (Total)	1 U							
cis-1,3-Dichloropropene	1 U							
trans-1,3-Dichloropropene	1 U							

SUMMARY OF ANALYTICAL RESULTS FOR INTERMEDIATE AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

NOTES:

J	--	Value is considered estimated due to exceedance of technical quality control criteria or because result is less than the Contract Required Quantitation Limit (CRQL).
U	--	Value is a non-detected result as reported by the laboratory.
UJ	--	Non-detected result is considered estimated due to exceedance of technical quality control criteria.
UL	--	Non-detected result is considered biased low due to exceedance of technical quality control criteria.
UR	--	Non-detected result is considered unusable due to exceedance of technical quality control criteria.
L	--	Positive result is considered biased low due to exceedance of technical quality control criteria.
K	--	Positive result is considered biased high due to exceedance of technical quality control criteria.
B	--	Positive result is considered to be an artifact of blank contamination, and should not be considered present.
R	--	Positive result is considered unusable due to exceedance of technical quality control criteria.
n/a	--	No result is available/applicable for this parameter in this sample.
ND	--	Value is a non-detected result as reported by the laboratory. Detection limit not available.

TABLE 2-8

SUMMARY OF ANALYTICAL RESULTS FOR DEEPER AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-17D	W-HN-20D	W-HN-21D	W-HN-42D	W-HN-53D	W-HN-54D	W-SW-3	W-SW-4
LOCATION:	W-HN-17D	W-HN-20D	W-HN-21D	W-HN-42D	W-HN-53D	W-HN-54D	W-SW-3	W-SW-4
SCREENED INTERVAL:	252 - 289	200 - 221	278 - 300	181 - 202	189 - 206	188 - 204	30 0 - 570	29.0 - 584
SAMPLE DATE:	12/12/97	12/12/97	12/05/97	12/12/97	12/05/97	12/05/97	12/09/97	12/09/97
WELL CLUSTER:	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:								
INORGANICS	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Aluminum	n/a	113	n/a	n/a	n/a	n/a	n/a	n/a
Antimony	n/a	1.7 U	n/a	n/a	n/a	n/a	n/a	n/a
Arsenic	n/a	2.4 U	n/a	n/a	n/a	n/a	n/a	n/a
Barium	n/a	323	n/a	n/a	n/a	n/a	n/a	n/a
Beryllium	n/a	0.58 U	n/a	n/a	n/a	n/a	n/a	n/a
Cadmium	n/a	0.3 U	n/a	n/a	n/a	n/a	n/a	n/a
Calcium	n/a	40700	n/a	n/a	n/a	n/a	n/a	n/a
Chromium	n/a	4.6 UL	n/a	n/a	n/a	n/a	n/a	n/a
Cobalt	n/a	6 U	n/a	n/a	n/a	n/a	n/a	n/a
Copper	n/a	22.3 B	n/a	n/a	n/a	n/a	n/a	n/a
Cyanide	n/a	5 U	n/a	n/a	n/a	n/a	n/a	n/a
Iron	n/a	539	n/a	n/a	n/a	n/a	n/a	n/a
Lead	n/a	11	n/a	n/a	n/a	n/a	n/a	n/a
Magnesium	n/a	11100	n/a	n/a	n/a	n/a	n/a	n/a
Manganese	n/a	72.9	n/a	n/a	n/a	n/a	n/a	n/a
Mercury	n/a	0.12 U	n/a	n/a	n/a	n/a	n/a	n/a
Nickel	n/a	6.3 UL	n/a	n/a	n/a	n/a	n/a	n/a
Potassium	n/a	4710	n/a	n/a	n/a	n/a	n/a	n/a
Selenium	n/a	4.7 U	n/a	n/a	n/a	n/a	n/a	n/a
Silver	n/a	1.2 U	n/a	n/a	n/a	n/a	n/a	n/a
Sodium	n/a	19400	n/a	n/a	n/a	n/a	n/a	n/a
Thallium	n/a	1.9 U	n/a	n/a	n/a	n/a	n/a	n/a
Vanadium	n/a	6.8 UL	n/a	n/a	n/a	n/a	n/a	n/a
Zinc	n/a	26 B	n/a	n/a	n/a	n/a	n/a	n/a

SUMMARY OF ANALYTICAL RESULTS FOR DEEPER AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-17D	W-HN-20D	W-HN-21D	W-HN-42D	W-HN-53D	W-HN-54D	W-SW-3	W-SW-4
LOCATION:	W-HN-17D	W-HN-20D	W-HN-21D	W-HN-42D	W-HN-53D	W-HN-54D	W-SW-3	W-SW-4
SCREENED INTERVAL:	252 - 289	200 - 221	278 - 300	181 - 202	189 - 206	188 - 204	30.0 - 570	29.0 - 584
SAMPLE DATE:	12/12/97	12/12/97	12/05/97	12/12/97	12/05/97	12/05/97	12/09/97	12/09/97
WELL CLUSTER:	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:								
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 UR	1 UR	1 U	1 UR	1 U	1 U	1 U	1 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (cis)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (trans)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
2-Hexanone	5 U	5 U	5 UR	5 U	5 UR	5 UR	5 U	5 U
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
Benzene	1 U	1 U	1 UL	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

TABLE 2-8

SUMMARY OF ANALYTICAL RESULTS FOR DEEPER AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-HN-17D	W-HN-20D	W-HN-21D	W-HN-42D	W-HN-53D	W-HN-54D	W-SW-3	W-SW-4
LOCATION:	W-HN-17D	W-HN-20D	W-HN-21D	W-HN-42D	W-HN-53D	W-HN-54D	W-SW-3	W-SW-4
SCREENED INTERVAL:	252 - 289	200 - 221	278 - 300	181 - 202	189 - 206	188 - 204	30.0 - 570	29.0 - 584
SAMPLE DATE:	12/12/97	12/12/97	12/05/97	12/12/97	12/05/97	12/05/97	12/09/97	12/09/97
WELL CLUSTER:	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
MATCHING DUPLICATE I.D.:								
VOLATILES	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	1 U	1 U	1 U	1 U	1 U	1 U	6	5
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 UL	1 U	1 U	1 U	1 U	1 U
Methylene Chloride	2 B	2 B	2 B	2 B	2 B	2 B	2 U	2 U
Styrene	1 U	1 U	1 UL	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	3	1 U	1 U	1 U	1 U	0.8 J	1 U
Toluene	1 U	1 U	1 UL	1 U	1 U	1 U	0.8 J	1 U
Trichloroethene	1 U	1 U	1 U	0.6 J	1 U	1 U	1 U	1 U
Vinyl Chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene (Total)	1 U	1 U	1 UL	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

SUMMARY OF ANALYTICAL RESULTS FOR DEEPER AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-SW1	W-SW10	W-SW2	---	---	---	---	---
LOCATION:	W-SW-1	W-SW-10	W-SW-2	---	---	---	---	---
SCREENED INTERVAL:	26 0 - 247	62 0 - 400	30.0 - 246					
SAMPLE DATE:	12/17/97	12/17/97	12/17/97					
WELL CLUSTER:	Deep	Deep	Deep					
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater					
MATCHING DUPLICATE I.D.:								
SEMIVOLATILES	**ug/L**	**ug/L**	**ug/L**					
1,2,4-Trichlorobenzene	1 U	1 U	1 U					
1,2-Dichlorobenzene	1 U	1 U	1 U					
1,3-Dichlorobenzene	1 U	1 U	1 U					
1,4-Dichlorobenzene	1 U	1 U	1 U					
VOLATILES	**ug/L**	**ug/L**	**ug/L**					
1,1,1-Trichloroethane	1 U	1 U	1 U					
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U					
1,1,2-Trichloroethane	1 U	1 U	1 U					
1,1-Dichloroethane	5	1 U	2					
1,1-Dichloroethene	1 U	1 U	1 U					
1,2-Dibromo-3-chloropropane	1 UR	1 UR	1 UR					
1,2-Dibromoethane	1 U	1 U	1 U					
1,2-Dichloroethane	1 U	1 U	1 U					
1,2-Dichloroethene (cis)	1	1 U	0.7 J					
1,2-Dichloroethene (trans)	1 U	1 U	1 U					
1,2-Dichloropropane	1 U	1 U	1 U					
2-Butanone	5 U	5 UR	5 U					
2-Hexanone	5 UR	5 U	5 UR					
4-Methyl-2-pentanone	5 U	5 U	5 U					
Acetone	5 UR	5 UR	5 UR					
Benzene	1 U	1 U	1 U					
Bromochloromethane	1 U	1 U	1 U					
Bromodichloromethane	1 U	1 U	1 U					

TABLE 2-8

SUMMARY OF ANALYTICAL RESULTS FOR DEEPER AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

SAMPLE I.D.:	W-SW1	W-SW10	W-SW2	---	---	---	---	---
LOCATION:	W-SW-1	W-SW-10	W-SW-2	---	---	---	---	---
SCREENED INTERVAL:	26.0 - 247	62.0 - 400	30.0 - 246					
SAMPLE DATE:	12/17/97	12/17/97	12/17/97					
WELL CLUSTER:	Deep	Deep	Deep					
MEDIA DESCRIPTION:	Groundwater	Groundwater	Groundwater					
MATCHING DUPLICATE I.D.:								
VOLATILES	**ug/L**	**ug/L**	**ug/L**					
Bromoform	1 U	1 U	1 U					
Bromomethane	1 U	1 U	1 U					
Carbon Disulfide	1 U	1 U	1 U					
Carbon Tetrachloride	1 U	1 U	1 U					
Chlorobenzene	1 U	1 U	1 U					
Chloroethane	1 U	1 U	1 U					
Chloroform	1 U	1 U	1 U					
Chloromethane	1 U	1 U	1 U					
Dibromochloromethane	1 U	1 U	1 U					
Ethylbenzene	1 U	1 U	1 U					
Methylene Chloride	2 B	2 B	2 B					
Styrene	1 U	1 U	1 U					
Tetrachloroethene	1 U	1 U	0.8 J					
Toluene	1 U	1 U	1 U					
Trichloroethene	4	1 U	4					
Vinyl Chloride	1 U	1 U	1 U					
Xylene (Total)	1 U	1 U	1 U					
cis-1,3-Dichloropropene	1 U	1 U	1 U					
trans-1,3-Dichloropropene	1 U	1 U	1 U					

SUMMARY OF ANALYTICAL RESULTS FOR DEEPER AREA D GROUNDWATER

NAWC WARMINSTER, PENNSYLVANIA

NOTES:

J	--	Value is considered estimated due to exceedance of technical quality control criteria or because result is less than the Contract Required Quantitation Limit (CRQL).
U	--	Value is a non-detected result as reported by the laboratory.
UJ	--	Non-detected result is considered estimated due to exceedance of technical quality control criteria.
UL	--	Non-detected result is considered biased low due to exceedance of technical quality control criteria.
UR	--	Non-detected result is considered unusable due to exceedance of technical quality control criteria.
L	--	Positive result is considered biased low due to exceedance of technical quality control criteria.
K	--	Positive result is considered biased high due to exceedance of technical quality control criteria.
B	--	Positive result is considered to be an artifact of blank contamination, and should not be considered present.
R	--	Positive result is considered unusable due to exceedance of technical quality control criteria.
n/a	--	No result is available/applicable for this parameter in this sample.
ND	--	Value is a non-detected result as reported by the laboratory. Detection limit not available.

APPENDIX B

WATER LEVELS

TABLE B-1
AREAS A AND D GROUNDWATER ELEVATIONS
DECEMBER 3, 1997
NAWC WARMINSTER, PENNSYLVANIA

WELL NUMBER	MONITORED INTERVAL (feet bgs)	TOP OF CASING ELEVATION (feet msl)	WATER LEVEL (feet msl)	GROUNDWATER ELEVATION (feet msl)
HN-11I	70-88	308.30	18.12	290.18
HN-11D	151-170	309.28	2.43	306.85
HN-12I	65-86	315.68	16.56	299.12
HN-12D	278-301	317.06	(1.33)	318.39
HN-13I	153-172	310.86	(4.04)	314.90
HN-13D	220-243	310.34	(5.00)	315.34
HN-14S	30-44	298.57	20.69	277.88
HN-14I	86-100	299.90	14.61	285.29
HN-15X	7-14	298.64	8.41	290.23
HN-15S	30-44	299.48	10.35	289.13
HN-15I	96-113	297.08	0.42	296.66
HN-15D	185-202	297.66	(6.21)	303.87
HN-16S	51-65	294.50	23.82	270.68
HN-16I	101-120	294.73	38.67	256.06
HN-16D	168-200	294.99	15.75	279.24
HN-17S	84-102	318.99	14.50	304.49
HN-17I	185-202	318.32	2.70	315.62
HN-17D	252-289	317.00	(0.32)	317.32
HN-18S	82-100	313.85	(1.31)	315.16
HN-18I	153-174	313.11	(1.79)	314.90
HN-19S	30-44	312.97	11.98	300.99
HN-19I1	138-155	313.91	9.92	303.99
HN-19I2	87-110	312.54	19.12	293.42
HN-19D	181-204	312.70	0.06	312.64
HN-20S	76-96	329.89	3.45	326.44
HN-20I	123-143	329.91	8.06	321.85
HN-20D	200-221	329.89	8.10	321.79
HN-21S	28-52	338.90	9.14	329.76
HN-21I	70-95	339.46	8.84	330.62
HN-21D	278-300	339.40	(2.05)	341.45
HN-22S	38-55	310.57	18.34	292.23
HN-22I	138-152	311.65	7.49	304.16
HN-22D	254-271	310.39	16.40	293.99
HN-31S	43-69	326.79	11.16	315.63
HN-32S	66-84	317.12	1.45	315.67
HN-33S	48-66	320.92	10.51	310.41
HN-33I	127-144	320.90	6.58	314.32
HN-42S	52-65	326.22	5.66	320.56
HN-42I	81-111	324.59	6.61	317.98
HN-42D	181-202	325.39	6.91	318.48
HN-50S	67-83	285.04	21.02	264.02
HN-50I	105-122	285.32	24.80	260.52
HN-50D	160-174	286.13	11.72	274.41
HN-52S	73-87	285.79	65.20	220.59
HN-52I	115-132	285.92	48.47	237.45

TABLE B-1
AREAS A AND D GROUNDWATER ELEVATIONS
DECEMBER 3, 1997
NAWC WARMINSTER, PENNSYLVANIA

WELL NUMBER	MONITORED INTERVAL (feet bgs)	TOP OF CASING ELEVATION (feet msl)	WATER LEVEL (feet msl)	GROUNDWATER ELEVATION (feet msl)
HN-52D	178-194	285.90	25.33	260.57
HN-52DD	266-283	286.00	8.51	277.49
HN-53S	40-60	323.06	18.82	304.24
HN-53I	69-83	322.75	18.60	304.15
HN-53D	189-206	323.40	7.33	316.07
HN-54S	55.5-71	323.71	10.96	312.75
HN-54I	107-124	323.23	10.65	312.58
HN-54D	188-204	322.85	11.61	311.24
HN-55S	24-44	312.10	19.61	292.49
HN-55I	79-93.5	312.10	23.44	288.66
HN-56S	33-50	316.03	7.22	308.81
HN-56I	118-134	316.19	(2.44)	318.63
HN-57S	58-89	316.94	1.51	315.43
HN-57I	107-133	316.78	3.16	313.62
HN-58S	24-46	318.85	9.08	309.77
HN-58I	60-76	318.90	9.17	309.73
HN-59S	48-62	305.94	18.39	287.55
HN-59I	74-88	306.87	19.70	287.17
HN-60S	49-63	339.22	11.23	327.99
HN-60I	142-157	338.37	12.11	326.26
HN-65S1	78-103	280.54	43.12	237.42
HN-65S2	37-52	280.58	43.11	237.47
HN-65I1	102-123	280.62	62.51	218.11
HN-65I2	158-171	281.36	41.43	239.93
HN-65D	274-303	280.87	5.46	275.41
HN-80S	27-44	323.44	10.79	312.65
HN-80I	97-115	323.11	3.35	319.76
HN-81S	69-85	334.63	13.82	320.81
HN-81I	121-145	334.60	10.99	323.61
HN-82S	40-56	314.44	10.58	303.86
HN-82I	145-159	314.15	(2.04)	316.19
HN-83I	114-136	311.95	(3.53)	315.48
BG-04/HN-12S	17-47	315.62	19.28	296.34
C	35-40	309.63	18.95	290.68
D	30-40	310.13	17.57	292.56
E	30-40	310.64	16.22	294.42
DG-01/HN-11X	10-19	308.19	13.02	295.17
DG-02/HN-13X	14-18	309.93	9.01	300.92
DG-03	7-15	311.18	6.33	304.85
DG-12	18-75	308.59	9.27	299.32
DG-13	18-22	313.16	8.57	304.59
DG-23/HN-13S	24-47	310.14	9.72	300.42
DG-26	3-15	308.58	10.27	298.31
MP-1	18-101	317.11	8.48	308.63
MP-2	19-101	315.24	0.19	315.05

TABLE B-1
AREAS A AND D GROUNDWATER ELEVATIONS
DECEMBER 3, 1997
NAWC WARMINSTER, PENNSYLVANIA

WELL NUMBER	MONITORED INTERVAL (feet bgs)	TOP OF CASING ELEVATION (feet msl)	WATER LEVEL (feet msl)	GROUNDWATER ELEVATION (feet msl)
MP-3	38-132	320.88	6.68	314.20
MW-01	18-85	326.65	22.29	304.36
MW-02	18-90	317.43	22.59	294.84
MW-03	18-100	313.36	21.59	291.77
MW-04/HN-83S	22-60	312.68	8.34	304.34
MW-07HN-83X	8-13	313.32	9.69	303.63
MW-10/HN-12X	2-7	310.34	DRY	
MW-11	5-10	309.86	8.85	301.01
SMC-01	20-60	313.91	18.75	295.16
SMC-02	276-298	313.01	(5.69)	318.70
SMP-02	20-40	317.16	18.97	298.19
SW-3	30-570	N/A	13.83	
SW-4	29-584	N/A	12.81	
HOBEN	?-130	305.94	24.96	280.98

Note: Water Level readings in( ) are Artesian/Flowing wells, measurements are in feet above top of case.
N/A - Not Available

APPENDIX C

QA DIRECTIVE FOR LOW-FLOW PURGING

ESD

EPA
REGION III
QA DIRECTIVES

HWMD

Bulletin No. QAD023 August 8, 1994

RECOMMENDED PROCEDURES FOR LOW-FLOW PURGING AND SAMPLING OF GROUND-WATER MONITORING WELLS

1.0 OBJECTIVE

Recommended procedures for collection of ground-water samples in small-diameter wells with short-screened intervals using low-flow purging and sampling are provided. While these procedures pertain to the Superfund program in Region III, the low-flow purging and sampling method is not appropriate for use in all hydrogeologic regimes, and certain ground-water monitoring well installations may make the method unsuitable. Therefore, please confer with a Region III hydrologist or geologist before using these procedures at a site.

2.0 DISCUSSION

Past scientific research (Barcelona et al., 1983; Nielson and Yeates, 1985) and EPA guidance have discussed sampling devices in terms of their compatibility with contaminants being sampled, and well construction, depth, and diameter. Although some sampling devices have been used in order to provide more representative ground-water samples in certain situations, most of these incorporate high-volume withdrawal techniques (i.e., in excess of the "natural" recharge rate of ground-water flow through the well screen) for both purging and sampling.

Recent research conducted by Puls et al. (1992), Puls and Powell (1992), and Powell and Puls (1993) has shown that high-volume purging and sampling cause significant turbidity and suspended particulate artifacts that can result in high-bias metals analyses. Additionally, purging can cause pressure changes and bailing can cause aeration that can strip VOCs from the sample (Pennino, 1988). The use of low-flow pumping devices (preferably dedicated) for purging and sampling minimizes both the disturbance of water in well casing and the potential for mobilization of colloidal material (Barcelona et al., 1994). Low-flow purging with maintenance of water level in the well and stabilization of indicator parameters (especially turbidity) allows collection of ground-water samples that are more representative of truly mobile contaminants in the subsurface under natural flow conditions without filtering (U.S. EPA, 1993; Backhus et al., 1993). In many cases, use of a low-flow pump to purge and sample monitoring wells decreases sampling time, reduces the need to handle large volumes of purge water and lowers the cost associated with its disposal, and allows collection of samples for inorganic analyses without filtering.

3.0 EQUIPMENT

low-flow adjustable-rate. positive-displacement pump
generator (if needed). but not one over-sized for the pump
teflon-lined polyethylene tubing of thickness 3/8 to 1/2 inch
polyethylene sheeting
in-line. flow-through cell equipped with ph, Eh. dissolved oxygen (DO), specific conductivity, and temperature
electrodes

- turbidity meter
- photoionization detector (PID), or equivalent
- electronic water-level indicator or equivalent (marked in 0.01-foot increments)

nylon stay-ties
logbook
sampling gloves

4.0 PURGING AND SAMPLING PROCEDURES

This section describes the procedures for the low-flow purging and sampling method. Equipment calibration, logbook documentation, sample bottle filling and preservation. and shipping will be conducted in accordance with the procedures specified in the site-specific Quality Assurance Project Plan (QAPjP). Personal protective equipment will be donned in accordance with the requirements of the site-specific Health and Safety Plan. Wells will be sampled in the order of least contaminated to most contaminated.

1. Check the conditions of the well and look for any damage or evidence of tampering and record.

2. Remove the well cap.

3. Measure well headspace with a PID and record the reading in the logbook.

4. Measure the depth to water with an electronic water-level device and record the measurement in the logbook. Do not measure the depth to the bottom of the well at this time (in order to avoid disturbing any accumulated sediment and to prevent mixing of stagnant water with water in the screened interval). Obtain depth to bottom information from well installation log. Calculate standing water volume as: depth of water column times cross-sectional area of the well. [For wells where an LNAPL has been detected, a stilling tube should be inserted int the well prior to purging. Refer to Section 7.2.4 of EPA (1992) for the procedure to follow. If wells are constructed so that DNAPLs could accumulate, their detection and/or sampling should occur on a day prior to that for ground-water sampling.]

5. Lay out the polyethylene sheeting and place all equipment on the sheeting. To avoid cross-contamination, do not let any downhole equipment touch the ground surface.

6. Measure the depth to water in the well again. If the measurement has changed more than 1/100th of a foot, check and record the measurement again.

7. Attach and secure the polyethylene tubing to the low-flow pump. As the pump is slowly lowered into the well, secure the safety drop cable, tubing, and electrical lines to each other using nylon stay-ties.

8. The pump should be set at approximately the middle of the screen. If the static water table is below the top of the screen, the pump should be lowered to the middle of the water column. Place the pump intake a sufficient distance above the bottom of the well to avoid mobilization of any accumulated sediments. Start purging the well at 0.2 to 0.5 liters per minute. Avoid surging. Observe air bubbles displaced from discharge tube to assess progress of steady pumping until water arrives at the surface.

9. A water-level probe should be lowered very slowly into the well behind the pump until it just touches the water. The water level in the well should be monitored during purging and sampling, and ideally, the purge rate should not exceed the well recharge rate so that there is little or no drawdown in the well. (The water level should stabilize for the specific purge rate.) There should be at least one foot of water over the pump intake so there is no risk of the pump suction being broken, or entrainment of air in the sample. Record adjustments in the purge rate and changes in depth to water in the logbook. Purge rates should, if needed, be decreased to the minimum capabilities of the pump (0.1 to 0.2 liters per minute) to avoid affecting well drawdown. The well should not be purged dry. If the recharge rate of the well is so low that the well is purged dry, it is suggested that the contractor wait approximately four hours after water in the screened interval has recharged before collecting the appropriate volume of water for the sample with the pump (Herzog, et al., 1988). For VOC analyses, purge at least the volume of water in the screened interval, then wait for stability.

10. During well purging, use the flow-through cell to monitor the field parameters frequently (every three to five minutes) until all parameters have stabilized to within 10 percent over a minimum of three consecutive readings. Repeatedly collect water samples and assess turbidity. Turbidity is typically the last parameter to stabilize. If any parameter fails to stabilize, collect the sample after purging ~~three well volumes~~ for one hour.

11. Once the field parameters have stabilized, collect the samples directly from the end of the discharge tube. Do not filter any samples, unless a filtered sample is specifically required according to project objectives in addition to the unfiltered sample. All sample bottles should be filled by allowing the water from the discharge tube to flow gently down the inside of the bottle with minimal turbulence. Cap each bottle as it is filled.

12. The pump assembly should be carefully removed from the well. The tubing should be dedicated to each well, and should be placed in a large plastic garbage bag, sealed, and labeled with the appropriate well identification number.

13. Close and lock the well.

5.0 REFERENCES

Backhus, D.A., J.N. Ryan, D.M. Groher, J.K. MacFarlane, and P.M. Gschwend. 1993. Sampling Colloids and Colloid-Associated Contaminants in Ground Water. Ground Water, V. 31, pp. 466-479.

Barcelona, M.J., and R.A. Miller. 1983. A Guide to the Selection of Materials for Monitoring Well Construction and Ground Water Sampling. Illinois State Water Survey Contract. Report 327: 78.

APPENDIX D

DATA VALIDATION REPORTS

ORGANICS

Data Qualifier Definitions:

U- Compound is nondetected as reported by the laboratory.

B- Compound was detected in the associated method and/or field quality control blank. The associated result is a false positive.

UR- Compound was rejected due to various technical noncompliances.

J- Reported result is an estimate due to various technical noncompliances.

L- Results may be biased low due to various technical noncompliances.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

RECEIVED
FEB 5 1998
TETRA TECH INC

TO:	MR. NEIL TEAMERSON	DATE:	FEBRUARY 2, 1998
FROM:	LINDA KARSONOVICH	COPIES:	DV FILE
SUBJECT:	ORGANIC DATA VALIDATION- VOA CTO225, NAWC WARMINSTER SDG WHN21D		

SAMPLES: 19/Water/

W-HN-21D	W-HN-80I
W-HN-80S	W-HN-19S
W-HN-50S	W-HN-50I
W-HN-22D	W-HN-19I1
W-HN-19I2	W-HN-19D
W-HN-500S	W-HN-22S
W-HN-60S	W-HN-81S
W-HN-81O	W-RB-120897
W-HN-50D	W-TB-120897
W-TB-120997	

OVERVIEW

The sample set for CTO 225, SDG WHN21D, NAWC Warminster consists of sixteen (16) aqueous environmental samples, and three (3) aqueous quality control samples. The samples were analyzed for Target Compound List (TCL) volatiles. The laboratory analyzed sample W-HN-22S for MS/MSD. Two pairs of field duplicates were included, W-HN-50S/W-HN-500S and W-HN-81S/W-HN-81O.

The samples were collected by Brown and Root Environmental on December 5th, 8th, and 9th, 1997 and analyzed by Ceimic Corporation. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using CLP SOW OLC02.0 analytical and reporting protocols.

All samples were successfully analyzed with the exception of those compounds qualified as rejected. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times, GC/MS tuning and system performance, initial/continuing calibrations, laboratory method and field quality control blank results, surrogate spike recoveries, matrix spike/matrix spike duplicate results, internal standard performance, tentatively identified compounds, compound identification, compound quantitation, and detection limits. Areas of concern are listed below.

Major Problems

- Initial and/or continuing calibration relative response factor (RRFs) less than the 0.05 quality control limit were reported for acetone, 2-butanone, 2-hexanone. Nondetected and positive results were affected. Nondetected results were rejected, (UR), and positive results were qualified as biased , (L).

Minor Problems

- Sample W-HN-21D was labeled as having been preserved with HCl; however, the sample had a pH > 2. As the sample was analyzed eleven (11) days after sample collection; the aromatic results were qualified as biased low for nondetected and detected results, (UL) and (L).

- Continuing calibration percent differences (%Ds) exceeded the 25% quality control limit for methylene chloride. Positive results were qualified as estimated, (J). The direction of bias cannot be determined.

- The following table summarizes the maximum concentration of volatile compounds detected in the field quality control blanks analyzed in this SDG.

Compound	Maximum Concentration	Action Level
Methylene Chloride	2 µg/L	20 µg/L
Chloroform	3 µg/L	15 µg/L

  Dilution factors and aliquots used for analysis were taken into consideration during the application of all action levels. Positive results reported as false positives as a result of blank contamination for methylene chloride and chloroform were qualified as B.

- Positive results reported below the Contract Required Quantitation Limit (CRQL) are qualified as estimated, (J). The direction of bias cannot be determined.

Notes

Sample W-HN-50S, W-HN-50I, and W-HN-500S also had pH > 2. These samples were analyzed within the technical holding time for non-preserved samples; however, dilutions were analyzed one day beyond the technical holding time. Since the reported results from the dilutions were within a relative percent difference of 15% of the original result, no qualifiers were recommended.

Sample W-HN-500S had a surrogate recovery of 121%. Since the acceptance range is 80-120%, no action was taken as a result of this marginal non-compliance.

The following samples required dilution due to compounds exceeding the linear calibration range of the instrument. Results from the dilutions were transposed over the original sample results and used as the basis for validation for the mentioned compounds only.

Sample	Compound	DF
W-HN-500S	trichloroethene	25X
W-HN-50I	trichloroethene	2X
W-HN-50S	trichloroethene	25X

Results for sample W-HN-50S were reported from a 10X dilution.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone, 2-butanone, and 2-hexanone had initial and/or continuing calibration RRFs less than the 0.05 quality control limit. Methylene chloride and chloroform were detected in the laboratory method and/or field quality control blanks. Methylene chloride exceeded the continuing calibration percent difference criteria. Sample W-HN-21D was analyzed beyond holding time for non-preserved samples.

Other Factors Affecting Data Quality: Samples may not have been properly preserved with HCl in the field.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (2/94) and the NFESC guidelines "Navy Installation Restoration Program Laboratory Quality Assurance Guide" (February, 1996). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental

Linda Karsonovich
Chemist/Data Validator

Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Summary of Tentatively Identified Compounds (TICs)

Fraction	TIC
Volatile	Unknown(s)
	Unknown(s) trichlormonofluoromethane ethane, 1,2-dichloro-1,1,2-trifluoro- aliphatic hydrocarbon

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN21D

SAMPLE NUMBER:	W-HN-19I2			W-HN-19S			W-HN-21D			W-HN-22D			W-HN-22S		
SAMPLE DATE:	12/08/97			12/08/97			12/05/97			12/08/97			12/09/97		
LABORATORY ID:	971139-10			971139-05			971139-01			971039-08			971139-16		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0 0 %			0 0 %			0.0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	0 7	J	UG/L	3		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	4		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHENE	0 9	J	UG/L	11		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	2	J	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	UL	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	UL	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2	[redacted]	[redacted]	1	[redacted]	[redacted]	[redacted]	U	[redacted]

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN21D

SAMPLE NUMBER:	W-HN-19I2			W-HN-19S			W-HN-21D			W-HN-22D			W-HN-22S		
SAMPLE DATE:	12/08/97			12/08/97			12/05/97			12/08/97			12/09/97		
LABORATORY ID:	971139-10			971139-05			971139-01			971039-08			971139-16		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0 0 %			0 0 %			0 0 %			0.0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	UL	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	0 7	J	UG/L	1	U	UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	1	UL	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	0 6	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	UL	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN21D

SAMPLE NUMBER:	W-HN-50D			W-HN-50I			W-HN-50S			W-HN-500S			W-HN-60S		
SAMPLE DATE:	12/09/97			12/08/97			12/08/97			12/08/97			12/09/97		
LABORATORY ID:	971139-20			971139-07			971139-06			971139-12			971139-17		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:										W-HN-50S					
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	0 6	J	UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	50	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	U	UG/L	5	UR	UG/L	50	UR	UG/L	5	UR	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	50	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	8	L	UG/L	5	UR	UG/L	50	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	6	J	UG/L	7		UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	1	U	UG/L	10	U	UG/L	2	B	UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	2		UG/L	1	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	U	[illegible]

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN21D

SAMPLE NUMBER.	W-HN-50D			W-HN-50I			W-HN-50S			W-HN-500S			W-HN-60S		
SAMPLE DATE:	12/09/97			12/08/97			12/08/97			12/08/97			12/09/97		
LABORATORY ID:	971139-20			971139-07			971139-06			971139-12			971139-17		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:										W-HN-50S					
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	0.8	J	UG/L	5	J	UG/L	6		UG/L	1	U	UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	2		UG/L	40		UG/L	360		UG/L	360		UG/L	1	U	UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN21D

SAMPLE NUMBER:	W-HN-80I			W-HN-80S			W-HN-81S			W-HN-81O			W-HN19D		
SAMPLE DATE:	12/08/97			12/08/97			12/09/97			12/09/97			12/08/97		
LABORATORY ID:	971139-03			971139-04			971139-18			971139-19			971139-11		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0.0 %			0.0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:										W-HN-81S					
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	2		UG/L	0 7	J	UG/L	0 7	J	UG/L	1	U	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	0.5	J	UG/L	1	U	UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	0.9	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
[redacted]	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN21D

SAMPLE NUMBER.	W-HN-80I			W-HN-80S			W-HN-81S			W-HN-81O			W-HN19D		
SAMPLE DATE:	12/08/97			12/08/97			12/09/97			12/09/97			12/08/97		
LABORATORY ID:	971139-03			971139-04			971139-18			971139-19			971139-11		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0.0 %			0.0 %			0 0 %			0.0 %		
FIELD DUPLICATE OF:										W-HN-81S					
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	1		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	1	U	UG/L	2		UG/L	1	U	UG/L	1	U	UG/L	0 5	J	UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN21D

SAMPLE NUMBER:	W-HN19I1			W-RB-120897			W-TB-120897			W-TB-120997			
SAMPLE DATE:	12/08/97			12/08/97			12/08/97			12/09/97			/ /
LABORATORY ID:	971139-09			971139-13			971139-14			971139-15			
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			
% SOLIDS:	0.0 %			0.0 %			0 0 %			0 0 %			100.0 %
FIELD DUPLICATE OF:													
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT QUAL UNITS
VOLATILES													
1,1,1-TRICHLOROETHANE	0.6	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,1-DICHLOROETHANE	0.8	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,1-DICHLOROETHENE	1		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	
2-HEXANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CHLOROFORM	1	U	UG/L	3		UG/L	1	U	UG/L	1	U	UG/L	
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CIS-1,2-DICHLOROETHENE	0.8	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
METHYLENE CHLORIDE	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN21D

SAMPLE NUMBER:	W-HN19I1			W-RB-120897			W-TB-120897			W-TB-120997					
SAMPLE DATE:	12/08/97			12/08/97			12/08/97			12/09/97			/ /		
LABORATORY ID:	971139-09			971139-13			971139-14			971139-15					
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL					
% SOLIDS:	0.0 %			0 0 %			0.0 %			0 0 %			100.0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TETRACHLOROETHENE	0.6	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TRICHLOROETHENE	13		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			

Brown & Root Environmental

INTERNAL CORRESPONDENCE

RECEIVED
FEB - 3 1998
TETRA TECH NUS

TO: MR. NEIL TEAMERSON DATE: FEBRUARY 2, 1998

FROM: LINDA KARSONOVICH COPIES: DV FILE

SUBJECT: ORGANIC DATA VALIDATION- VOA
CTO225, NAWC WARMINSTER
SDG WSW10

SAMPLES: 19/Water/

W-SW-10	W-OS-758
W-OS-759	W-OS-760
W-OS-761	W-OS-762
W-OS-763	W-OS-764
W-OS-765	W-HN-14S
W-HN-14I	W-MP-03
W-HN-57I	W-HN-33S
W-HN-11D	W-MP-01
W-HN-57S	W-TB-121797
W-TB-121897	

OVERVIEW

The sample set for CTO 225, SDG WSW10 NAWC Warminster consists of seventeen (17) aqueous environmental samples, and two (2) aqueous quality control samples. The samples were analyzed for Target Compound List (TCL) low concentration volatiles. MS/MSD analyses was performed on sample W-HN-14S. No field-duplicate pairs were included in the SDG.

The samples were collected by Brown and Root Environmental on December 17th, and 18th, 1997 and analyzed by Ceimic Corporation. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) CLP SOW OLC02.0 analytical and reporting protocols.

All samples were successfully analyzed with the exception of those compounds qualified as rejected. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times, GC/MS tuning and system performance, initial/continuing calibrations, laboratory method and field quality control blank results, surrogate spike recoveries, matrix spike/matrix spike duplicate results, internal standard performance, tentatively identified compounds, compound identification, compound quantitation, and detection limits. Areas of concern are listed below.

Major Problems

- Initial and/or continuing calibration relative response factor (RRFs) less than the 0.05 quality control limit were reported for acetone, 2-butanone, and 1,2-dibromo-3-chloropropane. Nondetected results were rejected, (UR).

- Continuing calibration relative response factor (RRFs) less than the 0.05 quality control limit were reported for 2-hexanone. Nondetected results were rejected, (UR).

Minor Problems

- Initial calibration relative standard deviation (%RSD) 30% quality control criteria was exceeded by 1,2-dibromo-3-chloropropane. All nondetected results were qualified as estimated, (UJ). The direction of bias cannot be determined.

- The following table summarizes the maximum concentration of volatile compounds detected in the laboratory method blanks and/or field quality control blanks analyzed in this SDG.

Compound	Maximum Concentration	Action Level
Methylene Chloride	2 µg/L	20 µg/L

  Dilution factors and aliquots used for analysis were taken into consideration during the application of all action levels. Positive results reported as false positives as a result of blank contamination for methylene chloride were qualified as B.

- Positive results reported below the Contract Required Quantitation Limit (CRQL) are qualified as estimated, (J). The direction of bias cannot be determined.

Notes

The following samples required dilution due to compounds exceeding the linear calibration range of the instrument. Results from the dilution were transposed over the original sample results and used as the basis for validation for the mentioned compounds only.

Sample	Compound	DF
W-OS-758	trichloroethene	5X
W-HN-14I	trichloroethene	100X
W-HN-14S	trichloroethene	25X
W-MP-01	trichloroethene	5X
W-MP-03	trichloroethene	25X
W-HN-57S	trichloroethene	25X

An unknown siloxane was reported in one of the laboratory method blanks. The tentatively identified siloxanes reported in sample W-OS-762 should be considered as false positives.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone, 2-butanone, 1,2-dibromo-3-chloroproapne, and 2-hexanone had initial and/or continuing calibration RRFs less than the 0.05 quality control limit. 1,2-dibromo-3-chloropropane exceeded the initial calibration %RSD quality control limit. Methylene chloride was detected in the laboratory method and/or field quality control blanks. Several compounds exceeded the continuing calibration percent difference criteria.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (9/94) as modified by Region III and the NFESC guidelines "Navy Installation Restoration Program Laboratory Quality Assurance Guide" (February, 1996). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental

Linda Karsonovich
Chemist/Data Validator

Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Summary of Tentatively Identified Compounds (TICs)

Fraction	TIC
Volatile	Unknown(s)
	Unknown(s) trichloromonofluoromethane propane, 2-methoxy-2-methyl (MTBE)

2-2-98
JAV

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WSW10

SAMPLE NUMBER:	W-HN-11D			W-HN-14I			W-HN-14S			W-HN-33S			W-HN-57I		
SAMPLE DATE:	12/18/97			12/17/97			12/17/97			12/17/97			12/17/97		
LABORATORY ID:	971172-18			971172-12			971172-11			971172-15			971172-14		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %			0.0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	2		UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	4		UG/L	0.7	J	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	0.4	J	UG/L	1	U	UG/L	2		UG/L	1		UG/L
1,1-DICHLOROETHENE	1	U	UG/L	0.8	J	UG/L	1	U	UG/L	2		UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	1	UR	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	UR	UG/L	5	U	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	52		UG/L	6		UG/L	1	U	UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	5		UG/L	2		UG/L	1	U	UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	13		UG/L	1		UG/L	0.7	J	UG/L	2		UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	2	B	UG/L	1	B	UG/L	2	B	UG/L	2	B	UG/L	2	B	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WSW10

SAMPLE NUMBER:	W-HN-11D			W-HN-14I			W-HN-14S			W-HN-33S			W-HN-57I		
SAMPLE DATE:	12/18/97			12/17/97			12/17/97			12/17/97			12/17/97		
LABORATORY ID:	971172-18			971172-12			971172-11			971172-15			971172-14		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %			0.0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	34		UG/L	3		UG/L	1		UG/L	1	U	UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	2		UG/L	2300		UG/L	290		UG/L	22		UG/L	1		UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

SAMPLE NUMBER:	W-HN-57S			W-MP-01			W-MP-03			W-OS-758			W-OS-759		
SAMPLE DATE:	12/18/97			12/18/97			12/17/97			12/17/97			12/17/97		
LABORATORY ID:	971172-20			971172-19			971172-13			971172-02			971172-03		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0 0 %			0 0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	0 9	J	UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	0.5	J	UG/L	0.7	J	UG/L	1		UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1		UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	UG/L	1	UR	UG/L	1	U	UG/L	1	UR	UG/L	1	UR	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	0 8	J	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	0 6	J	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	U	UG/L	5	U	UG/L	5	UR	UG/L	5	U	UG/L	5	U	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	0.6	J	UG/L	1	U	UG/L	0.7	J	UG/L	1	U	UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	0.6	J	UG/L	1	U	UG/L	0.8	J	UG/L	1	U	UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	3		UG/L	1		UG/L	4		UG/L	14		UG/L	1	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	2	B	UG/L	2	B	UG/L	2	B	UG/L	2	B	UG/L	2	B	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WSW10

SAMPLE NUMBER:	W-HN-57S			W-MP-01			W-MP-03			W-OS-758			W-OS-759		
SAMPLE DATE:	12/18/97			12/18/97			12/17/97			12/17/97			12/17/97		
LABORATORY ID:	971172-20			971172-19			971172-13			971172-02			971172-03		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %			0.0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1		UG/L	2		UG/L	1		UG/L	1	U	UG/L	1		UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	0.6	J	UG/L	1	U	UG/L	0.6	J	UG/L	0.5	J	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	270		UG/L	71		UG/L	220		UG/L	40		UG/L	1	U	UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	2		UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WSW10

SAMPLE NUMBER:	W-OS-760			W-OS-761			W-OS-762			W-OS-763			W-OS-764		
SAMPLE DATE:	12/17/97			12/17/97			12/17/97			12/17/97			12/17/97		
LABORATORY ID:	971172-04			971172-05			971172-06			971172-07			971172-08		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:	W-OS-759														
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	UG/L	1	UR	UG/L	1	U	UG/L	1	UR	UG/L	1	UR	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	U	UG/L	5	U	UG/L	5	UR	UG/L	5	U	UG/L	5	U	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	2	B	UG/L	2	B	UG/L	3	B	UG/L	2	B	UG/L	1	B	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WSW10

SAMPLE NUMBER:	W-OS-760			W-OS-761			W-OS-762			W-OS-763			W-OS-764		
SAMPLE DATE:	12/17/97			12/17/97			12/17/97			12/17/97			12/17/97		
LABORATORY ID:	971172-04			971172-05			971172-06			971172-07			971172-08		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:	W-OS-759														
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
V LATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	0 6	J	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	1	U	UG/L	3		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WSW10

SAMPLE NUMBER:	W-OS-765			W-SW10			W-TB-121797			W-TB-121897			
SAMPLE DATE:	12/17/97			12/17/97			12/17/97			12/18/97			/ /
LABORATORY ID:	971172-09			971172-01			971172-10			971172-17			
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			
% SOLIDS:	0.0 %			0.0 %			0.0 %			0 0 %			100.0 %
FIELD DUPLICATE OF:													
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT QUAL UNITS
VOLATILES													
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	UG/L	1	UR	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	
2-HEXANONE	5	U	UG/L	5	U	UG/L	5	UR	UG/L	5	UR	UG/L	
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CHLOROFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
METHYLENE CHLORIDE	1	B	UG/L	2	B	UG/L	2	B	UG/L	2	B	UG/L	

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WSW10

SAMPLE NUMBER:	W-OS-765			W-SW10			W-TB-121797			W-TB-121897			/ /		
SAMPLE DATE:	12/17/97			12/17/97			12/17/97			12/18/97					
LABORATORY ID:	971172-09			971172-01			971172-10			971172-17					
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL					
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %			100.0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TETRACHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TRICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			

Brown & Root Environmental

INTERNAL CORRESPONDENCE

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TO: MR. NEIL TEAMERSON DATE: FEBRUARY 2, 1998

FROM: LINDA KARSONOVICH COPIES: DV FILE

SUBJECT: ORGANIC DATA VALIDATION- VOA
CTO225, NAWC WARMINSTER
SDG 121597

SAMPLES: 19/Water/

W-HN-82I	W-HN-18S
W-HN-58S	W-HN-580S
W-HN-56I	W-HN-83I
W-HN-56S	W-HN-82S
W-HN-18I	W-HN-58I
W-MP-2	W-MP-20
W-OS-757	W-SW-1
W-SW-2	W-TB-121597
W-FB-121597	W-TB-121697
W-RB-121697	

OVERVIEW

The sample set for CTO 225, SDG 120497, NAWC Warminster consists of fifteen (15) aqueous environmental samples, and four (4) aqueous quality control samples. The samples were analyzed for Target Compound List (TCL) low concentration volatiles. The field crew designated sample W-OS-757 for Matrix Spike/Matrix Spike Duplicate (MS/MSD) analyses. Two field duplicate pairs were included in the SDG: W-HN-58S/W-HN-580S and W-MP-2/W-MP-20.

The samples were collected by Brown and Root Environmental on December 15th, 16th, and 17th, 1997 and analyzed by Ceimic Corporation. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria CLP SOW OLC02.0 analytical and reporting protocols.

All samples were successfully analyzed with the exception of those compounds qualified as rejected. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times, GC/MS tuning and system performance, initial/continuing calibrations, laboratory method and field quality control blank results, surrogate spike recoveries, matrix spike/matrix spike duplicate results, internal standard performance, tentatively identified compounds, compound identification, compound quantitation, and detection limits. Areas of concern are listed below.

Major Problems

- Initial and/or continuing calibration relative response factor (RRFs) less than the 0.05 quality control limit were reported for acetone, 2-butanone, and 1,2-dibromo-3-chloropropane. Nondetected and positive results were affected. Nondetected results were rejected, (UR), and positive results were qualified as biased, (L).

Minor Problems

- Carbon disulfide exceeded the 25% continuing calibration percent difference quality control limit. The positive result for this compound in sample W-HN-83I was qualified as estimated, (J). The direction of bias cannot be determined.

- The following table summarizes the maximum concentration of volatile compounds detected in the laboratory method blanks and/or field quality control blanks analyzed in this SDG.

Compound	Maximum Concentration	Action Level
Methylene Chloride	3 µg/L	30 µg/L
Chloroform	3 µg/L	15 µg/L
Toluene	0.5 µg/L	2.5 µg/L
Xylene(total)	0.5 µg/L	2.5 µg/L

Dilution factors and aliquots used for analysis were taken into consideration during the application of all action levels. Positive results reported as false positives as a result of blank contamination for methylene chloride, chloroform, and toluene were qualified as B. No positive results were reported for xylene (total); therefore, no action was taken regarding this compound.

- Positive results reported below the Contract Required Quantitation Limit (CRQL) are qualified as estimated, (J). The direction of bias cannot be determined.

Notes

The following samples required dilution due to compounds exceeding the linear calibration range of the instrument. Results from the dilutions were transposed over the original sample results and used as the basis for validation for the mentioned compounds only.

Sample	Compound	DF
W-HN-18S	trichloroethene	10X
W-HN-56S	trichloroethene	5X
W-HN-58I	trichloroethene	5X
W-MP-2	trichloroethene	25X
W-MP-2	trichloroethene	10X
W-OS-757	tetrachloroethene	10X
	trichloroethene	10X
	1,1,1-trichloroethane	10X
	1,1-dichloroethene	10X

MS/MSD recoveries for W-OS-757 were reported at a 10X dilution. Due to the level of trichloroethene present in the unspiked sample, recoveries could not be calculated. There was good agreement between the unspiked sample, MS, and MSD for the amount of trichloroethene reported. No validation action was required on this basis.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone, 2-butanone, 2-hexanone, and 1,2-dibromo-2-chloropropane had initial and/or continuing calibration RRFs less than the 0.05 quality control limit. Methylene chloride, toluene, and chloroform were detected in the laboratory method and/or field quality control blanks. Carbon disulfide exceeded the continuing calibration percent difference criteria.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (9/94) as modified by Region III and the NFESC guidelines "Navy Installation Restoration Program Laboratory Quality Assurance Guide" (February, 1996). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental

Linda Karsonovich
Chemist/Data Validator

Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Summary of Tentatively Identified Compounds (TICs)

Fraction	TIC
Volatile	Unknown(s)
	trichloromonofluoromethane
	aliphatic hydrocarbon
	C_8H_{10} isomer

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 121597

SAMPLE NUMBER:	W-FB-121597			W-HN-18I			W-HN-18S			W-HN-56I			W-HN-56S		
SAMPLE DATE:	12/15/97			12/16/97			12/15/97			12/15/97			12/15/97		
LABORATORY ID:	971164-06			971164-13			971164-03			971164-07			971164-09		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0 0 %			0.0 %			0.0 %			0.0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	0 8	J	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1		UG/L	1		UG/L	1		UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	0.6	J	UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
2-HEXANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1		UG/L	1	U	UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	3		UG/L	1	U	UG/L	0.6	B	UG/L	1	U	UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	2		UG/L	4		UG/L	0.8	J	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	3		UG/L	1	B	UG/L	2	B	UG/L	1	B	UG/L	3	B	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 121597

SAMPLE NUMBER:	W-FB-121597			W-HN-18I			W-HN-18S			W-HN-56I			W-HN-56S		
SAMPLE DATE:	12/15/97			12/16/97			12/15/97			12/15/97			12/15/97		
LABORATORY ID:	971164-06			971164-13			971164-03			971164-07			971164-09		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	1	U	UG/L	2		UG/L	1	U	UG/L	4		UG/L
TOLUENE	0.5	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	2	B	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	0.7	J	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	1	U	UG/L	1	U	UG/L	76		UG/L	1		UG/L	45		UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	0.5	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 121597

SAMPLE NUMBER:	W-HN-58I			W-HN-58S			W-HN-580S			W-HN-82I			W-HN-82S		
SAMPLE DATE:	12/16/97			12/15/97			12/15/97			12/15/97			12/15/97		
LABORATORY ID:	971164-14			971164-04			971164-05			971164-02			971164-10		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0 0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:							W-HN-58S								
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	0.5	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	0.8	J	UG/L	0.7	J	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	0.9	J	UG/L	0.8	J	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
2-HEXANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1		UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	0 9	B	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	2	B	UG/L	2	B	UG/L	2	B	UG/L	2	B	UG/L	1	B	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 121597

SAMPLE NUMBER:	W-HN-58I			W-HN-58S			W-HN-580S			W-HN-82I			W-HN-82S		
SAMPLE DATE:	12/16/97			12/15/97			12/15/97			12/15/97			12/15/97		
LABORATORY ID:	971164-14			971164-04			971164-05			971164-02			971164-10		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0 0 %			0.0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:							W-HN-58S								
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	0.5	J	UG/L	4		UG/L	4		UG/L	1	U	UG/L	1	U	UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	50		UG/L	22		UG/L	20		UG/L	1	U	UG/L	1	U	UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 121597

SAMPLE NUMBER:	W-HN-831			W-MP-2			W-MP-20			W-OS-757			W-RB-121697		
SAMPLE DATE:	12/15/97			12/16/97			12/16/97			12/17/97			12/16/97		
LABORATORY ID:	971164-08			971164-15			971164-16			971164-18			971164-17		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0.0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:							W-MP-2								
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	24		UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	0.7	J	UG/L	0 6	J	UG/L	19		UG/L	1	U	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	22		UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
2-HEXANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	6	L	UG/L	5	UR	UG/L	5	UR	UG/L	16	L	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	2	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	4		UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	0.5	J	UG/L	1	U	UG/L	0.8	B	UG/L	2		UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	3		UG/L	3		UG/L	2		UG/L	1	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 121597

SAMPLE NUMBER:	W-HN-83I			W-MP-2			W-MP-20			W-OS-757			W-RB-121697		
SAMPLE DATE:	12/15/97			12/16/97			12/16/97			12/17/97			12/16/97		
LABORATORY ID:	971164-08			971164-15			971164-16			971164-18			971164-17		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0.0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:							W-MP-2								
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	0.7	J	UG/L	0 7	J	UG/L	39		UG/L	1	U	UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	0 5	B	UG/L	0.5	J	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	1	U	UG/L	220		UG/L	240		UG/L	180		UG/L	1	U	UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 121597

SAMPLE NUMBER:	W-SW1			W-SW2			W-TB-121597			W-TB-121697					
SAMPLE DATE:	12/17/97			12/17/97			12/15/97			12/16/97			/ /		
LABORATORY ID:	971164-19			971164-20			971164-01			971164-12					
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL					
% SOLIDS:	0.0 %			0.0 %			0.0 %			0 0 %			100.0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,1-DICHLOROETHANE	5		UG/L	2		UG/L	1	U	UG/L	1	U	UG/L			
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L			
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
2-BUTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L			
2-HEXANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L			
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L			
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L			
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CHLOROFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CIS-1,2-DICHLOROETHENE	1		UG/L	0 7	J	UG/L	1	U	UG/L	1	U	UG/L			
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
METHYLENE CHLORIDE	2	[redacted]	UG/L	[redacted]	B	[redacted]	2	[redacted]	UG/L	2	[redacted]	UG	[redacted]	[redacted]	[redacted]

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 121597

SAMPLE NUMBER:	W-SW1			W-SW2			W-TB-121597			W-TB-121697			
SAMPLE DATE:	12/17/97			12/17/97			12/15/97			12/16/97			/ /
LABORATORY ID:	971164-19			971164-20			971164-01			971164-12			
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			
% SOLIDS:	0.0 %			0.0 %			0.0 %			0 0 %			100.0 %
FIELD DUPLICATE OF:													
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT QUAL UNITS
VOLATILES													
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
TETRACHLOROETHENE	1	U	UG/L	0.8	J	UG/L	1	U	UG/L	1	U	UG/L	
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
TRICHLOROETHENE	4		UG/L	4		UG/L	1	U	UG/L	1	U	UG/L	
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	

Brown & Root Environmental

INTERNAL CORRESPONDENCE

FEB - 4 1998

TETRA

TO:	MR. NEIL TEAMERSON	DATE:	FEBRUARY 3, 1998
FROM:	LINDA KARSONOVICH	COPIES:	DV FILE

SUBJECT: ORGANIC DATA VALIDATION- VOA
CTO225, NAWC WARMINSTER
SDG WHN52I

SAMPLES: 19/Water/

W-HN-52I	W-HN-15D
W-HN-55S	W-HN-55I
W-HN-81I	W-HN-42D
W-HN-17D	W-HN-52D
W-HN-20S	W-HN-31S
W-HN-310S	W-HN-20D
W-HN-33I	W-HN-32S
W-HN-20I	W-RB-121297
W-FB-121297	W-FB-111297
W-TB-121297	

OVERVIEW

The sample set for CTO 225, SDG WHN52I, NAWC Warminster consists of fifteen (15) aqueous environmental samples, and four (4) aqueous quality control samples. The samples were analyzed for Target Compound List (TCL) volatiles. The field crew designated sample W-HN31S for Matrix Spike/Matrix Spike Duplicate (MS/MSD) analyses. One pair of field duplicates were included, W-HN-31S/W-HN-310S.

The samples were collected by Brown and Root Environmental on December 11th, and 12th, 1997 and analyzed by Ceimic Corporation. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using CLP SOW OLC02.0 analytical and reporting protocols.

Summary

All samples were successfully analyzed with the exception of those compounds qualified as rejected. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times until analysis, GC/MS tuning and calibration data, laboratory and field blank results, surrogate spike recoveries, matrix spike/matrix spike duplicate results, internal standards performance, tentatively identified compounds, compound identification and compound quantitation detection limits. Areas of concern with respect to data quality are listed below.

Major Problems

- The initial calibration relative response factors (RRFs) and the continuing calibration RRFs for acetone, 2-butanone, 2-hexanone, and 1,2-dibromo-3-chloropropane were less than 0.050. Positive and nondetected results are affected by this noncompliance. Nondetected results were qualified as rejected, (UR). Positive results for acetone and 2-butanone were qualified as biased, (L).

Minor Problems

- The continuing calibration percent differences greater than 25% were reported for chloroform, methylene chloride, and 1,1,2-trichloroethane. Positive results for these compounds were qualified as estimated, (J). The direction of bias cannot be determined.

- The following table summarizes the maximum concentration of volatile compounds detected in the field quality control blanks analyzed in the SDG. The direction of bias cannot be determined.

Compound	Maximum Concentration	Action Level
Methylene chloride	2 µg/L	20 µg/L
Acetone	18 µg/L	180 µg/L
2-Butanone	5 µg/L	50 µg/L

- Positive results reported below the Contract Required Quantitation Limit (CRQL) are considered to be estimated and are qualified, (J). The direction of bias cannot be determined.

Notes

The compound trichloroethene was present in sample W-HN-31S at a level greater than 5X the concentration of the spike used for the MS/MSD. Recoveries in the MS/MSD were 0 and 116%, respectively. No action was taken on this basis.

The following samples required dilution due to compounds exceeding the linear calibration range of the instrument. Results from the dilutions were transposed over the original sample results and used as the basis for validation for the mentioned compounds only.

Sample	Compound	DF
W-HN-31S	trichloroethene	10X
W-HN-310S	trichloroethene	10X
W-HN-32S	trichloroethene	25X
W-HN-52D	trichloroethene	25X
W-HN-52I	trichloroethene	25X
W-HN-55I	trichloroethene	500X

Results for sample W-HN-52D were reported from a 2X dilution. Results for sample W-HN-52I were reported from a 2.5X dilution. Results for sample W-HN-55I were reported from a 25X dilution.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone, 2-butanone, 2-hexanone, and 1,2-dibromo-2-chloropropane had initial and/or continuing calibration RRFs less than the 0.05 quality control limit. Methylene chloride, acetone, and 2-butanone were detected in the laboratory method and/or field quality control blanks. Several compounds exceeded the continuing calibration percent difference criteria.

Other Factors Affecting Data Quality: Problems with sample preservation, noted in earlier SDGs, were not present in this SDG.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (9/94) as modified by Region III and the NFESC guidelines "Navy Installation Restoration Program Laboratory Quality Assurance Guide" (February, 1996). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental

Linda Karsonovich
Chemist/Data Validator

Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Summary of Tentatively Identified Compounds (TICs)

Fraction	TIC
Volatile	Unknown(s)
	Unknown(s) trichlormonofluoromethane methane, dichlorofluoro

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN52I

SAMPLE NUMBER:	W-FB-111297			W-FB-121297			W-HN-15D			W-HN-17D			W-HN-20D		
SAMPLE DATE:	12/11/97			12/12/97			12/11/97			12/12/97			12/12/97		
LABORATORY ID	971160-06			971160-19			971160-02			971160-10			971160-15		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0 0 %			0 0 %			0.0 %.			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	UR	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	8	L	UG/L	14	L	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	2	B	UG/L	2	B	UG/L	2	B	UG/L	2	B	UG/L	2	B	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN52I

SAMPLE NUMBER:	W-FB-111297			W-FB-121297			W-HN-15D			W-HN-17D			W-HN-20D		
SAMPLE DATE:	12/11/97			12/12/97			12/11/97			12/12/97			12/12/97		
LABORATORY ID:	971160-06			971160-19			971160-02			971160-10			971160-15		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0 0 %			0.0 %			0.0 %			0.0 %		
FIELD DUPLICATE OF:															
VOLATILES	**RESULT**	**QUAL**	**UNITS**	**RESULT**	**QUAL**	**UNITS**	**RESULT**	**QUAL**	**UNITS**	**RESULT**	**QUAL**	**UNITS**	**RESULT**	**QUAL**	**UNITS**
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	3		UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	1	U	UG/L	1	U	UG/L	0 7	J	UG/L	1	U	UG/L	1	U	UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES; TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN52I

SAMPLE NUMBER:	W-HN-20I			W-HN-20S			W-HN-31S			W-HN-310S			W-HN-32S		
SAMPLE DATE:	12/12/97			12/12/97			12/12/97			12/12/97			12/12/97		
LABORATORY ID:	971160-18			971160-12			971160-13			971160-14			971160-17		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0.0 %			0 0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:										W-HN-316S					
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	UG/L	1	U	UG/L	1	UR	UG/L	1	UR	UG/L	1	UR	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	U	UG/L	5	UR	UG/L	5	UR	UG/L	5	U	UG/L	5	U	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1		UG/L	0 9	J	UG/L	1		UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	1	U	UG/L	0 5	J	UG/L	0 5	J	UG/L	1		UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	2		UG/L	2		UG/L	2		UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	2	B	UG/L	2	B	UG/L	2	B	UG/L	2	B	UG/L	2	B	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN52I

SAMPLE NUMBER:	W-HN-20I			W-HN-20S			W-HN-31S			W-HN-310S			W-HN-32S		
SAMPLE DATE:	12/12/97			12/12/97			12/12/97			12/12/97			12/12/97		
LABORATORY ID:	971160-18			971160-12			971160-13			971160-14			971160-17		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:										W-HN-316S					
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	1	U	UG/L	3		UG/L	2		UG/L	2		UG/L
TOLUENE	0 5	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1		UG/L	1		UG/L	0 8	J	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	1	U	UG/L	1		UG/L	160		UG/L	180		UG/L	480		UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN52I

SAMPLE NUMBER:	W-HN-33I			W-HN-42D			W-HN-52D			W-HN-52I			W-HN-55I		
SAMPLE DATE:	12/12/97			12/12/97			12/12/97			12/11/97			12/11/97		
LABORATORY ID	971160-16			971160-09			971160-11			971160-01			971160-04		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS	0 0 %			0.0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25		UG/L
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	2		UG/L	2	U	UG/L	25	U	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	4		UG/L	2		UG/L	25	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	UG/L	1	UR	UG/L	2	UR	UG/L	2	U	UG/L	25	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	10	UR	UG/L	12	UR	UG/L	120	UR	UG/L
2-HEXANONE	5	U	UG/L	5	U	UG/L	10	U	UG/L	12	UR	UG/L	120	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	10	U	UG/L	12	U	UG/L	120	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	10	UR	UG/L	12	UR	UG/L	120	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1		UG/L	2	U	UG/L	220		UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
CHLOROFORM	1	U	UG/L	1	U	UG/L	2		UG/L	2		UG/L	25		UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	3		UG/L	2		UG/L	25	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
METHYLENE CHLORIDE	2	B	UG/L	2	B	UG/L	3	B	UG/L	5	B	UG/L	46	B	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN52I

SAMPLE NUMBER:	W-HN-33I			W-HN-42D			W-HN-52D			W-HN-52I			W-HN-55I		
SAMPLE DATE:	12/12/97			12/12/97			12/12/97			12/11/97			12/11/97		
LABORATORY ID:	971160-16			971160-09			971160-11			971160-01			971160-04		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0.0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
TETRACHLOROETHENE	0 6	J	UG/L	1	U	UG/L	14		UG/L	12		UG/L	160		UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
TRICHLOROETHENE	6		UG/L	0.6	J	UG/L	460		UG/L	300		UG/L	7800		UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	2	U	UG/L	2	U	UG/L	25	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN52I

SAMPLE NUMBER:	W-HN-55S			W-HN-81I			W-RB-121297			W-TB-121297					
SAMPLE DATE:	12/11/97			12/11/97			12/12/97			12/12/97			/ /		
LABORATORY ID.	971160-03			971160-05			971160-20			971160-08					
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL					
% SOLIDS:	0 0 %			0 0 %			0.0 %			0 0 %			100 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	UR	UG/L	1	U	UG/L			
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	L	UG/L	5	UR	UG/L			
2-HEXANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L			
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L			
ACETONE	5	UR	UG/L	5	UR	UG/L	18	L	UG/L	5	UR	UG/L			
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CHLOROFORM	2		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
METHYLENE CHLORIDE	2	B	UG/L	2	B	UG/L	2	B	UG/L	2	B	UG/L			

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHN52I

SAMPLE NUMBER:	W-HN-55S			W-HN-81I			W-RB-121297			W-TB-121297			/ /
SAMPLE DATE:	12/11/97			12/11/97			12/12/97			12/12/97			
LABORATORY ID:	971160-03			971160-05			971160-20			971160-08			
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			
% SOLIDS:	0.0 %			0 0 %			0 0 %			0.0 %			100 0 %
FIELD DUPLICATE OF:													
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT QUAL UNITS
VOLATILES													
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
TETRACHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
TRICHLOROETHENE	12		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	

Brown & Root Environmental

INTERNAL CORRESPONDENCE

RECEIVED FEB - 3 1998

TO:	MR. NEIL TEAMERSON	DATE:	FEBRUARY 2, 1998
FROM:	LINDA KARSONOVICH	COPIES:	DV FILE

SUBJECT: ORGANIC DATA VALIDATION- VOA
CTO225, NAWC WARMINSTER
SDG WOS766

SAMPLES: 19/Water/

W-OS-766	W-HN-12D
W-SMC-02	W-HN-59I
W-HN-13X	W-MW-02
W-HN-13D	W-MW-E
W-MW-EE	W-HN-13S
W-MW-03	W-HN-590I
W-HN-13I	W-HN-12I
W-SMP-02	W-TB-121997
W-FB-121997	W-RB-121897
W-FB-121897	

OVERVIEW

The sample set for CTO 225, SDG WOS766 NAWC Warminster consists of fifteen (15) aqueous environmental samples, and four (4) aqueous quality control samples. The samples were analyzed for Target Compound List (TCL) low concentration volatiles. The field crew designated sample W-MW-E for Matrix Spike/Matrix Spike Duplicate (MS/MSD) analyses. Two field duplicate pairs were included in the SDG W-HN-59I/W-HN-590I and W-MW-E/W-MW-EE.

The samples were collected by Brown and Root Environmental on December 18th, and 19th, 1997 and analyzed by Ceimic Corporation. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria "Superfund Analytical Methods for Low Concentration Water for Organic Analysis, OLC02.0, October 1992" analytical and reporting protocols.

All samples were successfully analyzed with the exception of those compounds qualified as rejected. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times, GC/MS tuning and system performance, initial/continuing calibrations, laboratory method and field quality control blank results, surrogate spike recoveries, matrix spike/matrix spike duplicate results, internal standard performance, tentatively identified compounds, compound identification, compound quantitation, and detection limits. Areas of concern are listed below.

Major Problems

- Initial and/or continuing calibration relative response factor (RRFs) less than the 0.05 quality control limit were reported for acetone, 2-butanone, and 1,2-dibromo-3-chloropropane. Nondetected results were rejected, (UR).

- Continuing calibration relative response factor (RRFs) less than the 0.05 quality control limit were reported for 2-hexanone. Nondetected results were rejected, (UR).

Minor Problems

- Carbon tetrachloride, 1,1-dichloroethane, and carbon disulfide exceeded the 25% continuing calibration percent difference quality control limit. The positive results for these compounds in samples W-OS-766, W-HN-13X, and W-HN-590I were qualified as estimated, (J). The direction of bias cannot be determined.

- The following table summarizes the maximum concentration of volatile compounds detected in the laboratory method blanks and/or field quality control blanks analyzed in this SDG.

Compound	Maximum Concentration	Action Level
Methylene Chloride	3 µg/L	30 µg/L
Chloroform	3 µg/L	15 µg/L
Toluene	0.6 µg/L	3.0 µg/L
Xylene	0.6 µg/L	3.0 µg/L
Acetone	5 µg/L	50 µg/L

  Dilution factors and aliquots used for analysis were taken into consideration during the application of all action levels. Positive results reported as false positives as a result of blank contamination for methylene chloride, chloroform, toluene, xylene, and acetone were qualified as B.

- The compounds carbon tetrachloride, 1,1,2-trichloroethane, and tetrachloroethene in sample W-HN-590I were reported at a level exceeding the instrument's linear range. Positive results for these compounds were qualified as estimated, (J). The direction of bias cannot be determined.

- Positive results reported below the Contract Required Quantitation Limit (CRQL) are qualified as estimated, (J). The direction of bias cannot be determined.

Notes

Initial calibration relative standard deviation (%RSD) 30% quality control criteria was exceeded by 1,2-dibromo-3-chloropropane. All nondetected results were qualified as estimated, (UJ). The direction of bias cannot be determined.

The following samples required dilution due to compounds exceeding the linear calibration range of the instrument. Results from the dilution were transposed over the original sample results and used as the basis for validation for the mentioned compounds only.

Sample	Compound	DF
W-HN-590I	trichloroethene	1000X
W-HN-59I	trichloroethene	1250X
W-MW-E	trichloroethene	10X
	cis-1,2-dichloroethene	10X
	tetrachloroethene	10X
W-MW-EE	trichloroethene	10X
	cis-1,2-dichloroethene	10X
	tetrachloroethene	10X
W-SMP-02	cis-1,2-dichloroethene	2X

Results for samples W-HN-59I were reported at a 250X dilution.

An unknown siloxane was reported in one of the laboratory method blanks. The tentatively identified siloxane reported in sample W-SMP-02 should be considered a false positive.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone, 2-butanone, 1,2-dibromo-3-chloroproapne, and 2-hexanone had initial and/or continuing calibration RRFs less than the 0.05 quality control limit. 1,2-dibromo-3-chloropropane exceeded the initial calibration %RSD quality control limit. Methylene chloride, chloroform, toluene, xylene, and acetone were detected in the laboratory method and/or field quality control blanks. Several compounds exceeded the continuing calibration percent difference criteria.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (9/94) as modified by Region III and the NFESC guidelines "Navy Installation Restoration Program Laboratory Quality Assurance Guide" (February, 1996). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental

Linda Karsonovich
Chemist/Data Validator

Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Summary of Tentatively Identified Compounds (TICs)

Fraction	TIC
Volatile	Unknown(s)
	trichloromonofluoromethane
	aliphatic hydrocarbon

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WOS766

SAMPLE NUMBER:	W-FB-121897			W-FB-121997			W-HN-12D			W-HN-12I			W-HN-13D		
SAMPLE DATE:	12/18/97			12/19/97			12/18/97			12/19/97			12/19/97		
LABORATORY ID:	971175-08			971175-18			971175-02			971175-14			971175-10		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0 0 %			0 0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	UG/L	1	U	UG/L	1	U	UG/L	1	UR	UG/L	1	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	U	UG/L	5	U	UG/L	5	UR	UG/L	5	U	UG/L	5	U	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	3		UG/L	2		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	3		UG/L	2		UG/L	2		UG/L	2		UG/L		B	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WOS766

SAMPLE NUMBER:	W-FB-121897			W-FB-121997			W-HN-12D			W-HN-12I			W-HN-13D		
SAMPLE DATE:	12/18/97			12/19/97			12/18/97			12/19/97			12/19/97		
LABORATORY ID:	971175-08			971175-18			971175-02			971175-14			971175-10		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1		UG/L	5		UG/L
TOLUENE	0 6	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	3		UG/L	1	U	UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	0.6	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WOS766

SAMPLE NUMBER:	W-HN-13I			W-HN-13S			W-HN-13X			W-HN-59I			W-HN-590I		
SAMPLE DATE:	12/19/97			12/19/97			12/19/97			12/18/97			12/18/97		
LABORATORY ID:	971175-12			971175-15			971175-16			971175-05			971175-07		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0 0 %			0 0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:													W-HN-59I		
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1		UG/L	1	U	UG/L	250	U	UG/L	0 8	J	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	29	J	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	2		UG/L	1	U	UG/L	250	U	UG/L	0 9	J	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1		UG/L	1	U	UG/L	250	U	UG/L	6		UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	UR	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1		UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	1200	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	U	UG/L	5	U	UG/L	5	UR	UG/L	1200	UR	UG/L	5	U	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	1200	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	800	B	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1		UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	5	J	UG/L	250	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	370		UG/L	420	J	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	25		UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1		UG/L	1	U	UG/L	250	U	UG/L	13		UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	1	B	UG/L	2	B	UG/L	2	B	UG/L	660	B	UG/L	1	B	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WOS766

SAMPLE NUMBER:	W-HN-13I			W-HN-13S			W-HN-13X			W-HN-59I			W-HN-590I		
SAMPLE DATE:	12/19/97			12/19/97			12/19/97			12/18/97			12/18/97		
LABORATORY ID:	971175-12			971175-15			971175-16			971175-05			971175-07		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0.0 %			0 0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:													W-HN-59I		
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1		UG/L	3		UG/L	1	U	UG/L	150	J	UG/L	110	J	UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	0.7	B	UG/L	250	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
TRICHLOROETHENE	1	U	UG/L	13		UG/L	1	U	UG/L	15000		UG/L	15000		UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	250	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	740	B	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WOS766

SAMPLE NUMBER:	W-MW-02			W-MW-03			W-MW-E			W-MW-EE			W-OS-766		
SAMPLE DATE:	12/18/97			12/19/97			12/19/97			12/19/97			12/18/97		
LABORATORY ID:	971175-04			971175-17			971175-11			971175-13			971175-01		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0 0 %			0 0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:										W-MW-E					
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	0 8	J	UG/L	1		UG/L	1		UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	2		UG/L	2		UG/L	2	J	UG/L
1,1-DICHLOROETHENE	0.5	J	UG/L	1	U	UG/L	1		UG/L	1		UG/L	0 6	J	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1		UG/L	2		UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	UR	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	B	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	2		UG/L	1	U	UG/L	7		UG/L	8		UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	2	B	UG/L	2	B	UG/L	9	B	UG/L	10	B	UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	35		UG/L	36		UG/L	2		UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
[redacted]	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2[redacted]	[redacted]	UG[redacted]	[redacted]	B	[redacted]

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WOS766

SAMPLE NUMBER	W-MW-02			W-MW-03			W-MW-E			W-MW-EE			W-OS-766		
SAMPLE DATE:	12/18/97			12/19/97			12/19/97			12/19/97			12/18/97		
LABORATORY ID:	971175-04			971175-17			971175-11			971175-13			971175-01		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0 0 %			0 0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:										W-MW-E					
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	9		UG/L	1	U	UG/L	130		UG/L	140		UG/L	1	U	UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	5		UG/L	20		UG/L	99		UG/L	110		UG/L	5		UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WOS766

SAMPLE NUMBER:	W-RB-121897			W-SMC-02			W-SMP-02			W-TB-121997			
SAMPLE DATE:	12/18/97			12/18/97			12/19/97			12/19/97			/ /
LABORATORY ID:	971175-06			971175-03			971175-19			971175-09			
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			
% SOLIDS:	0.0 %			0 0 %			0 0 %			0 0 %			100 0 %
FIELD DUPLICATE OF:													
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT QUAL UNITS
VOLATILES													
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	0 5	J	UG/L	1	U	UG/L	
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	0.8	J	UG/L	1	U	UG/L	
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	UG/L	1	U	UG/L	1	UR	UG/L	1	U	UG/L	
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	
2-HEXANONE	5	U	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CHLOROFORM	2		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	44		UG/L	1	U	UG/L	
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	
METHYLENE CHLORIDE	2		UG/L	2	B	UG/L	2	B	UG/L	2		UG/L	

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WOS766

SAMPLE NUMBER:	W-RB-121897	W-SMC-02	W-SMP-02	W-TB-121997	/ /
SAMPLE DATE:	12/18/97	12/18/97	12/19/97	12/19/97	
LABORATORY ID:	971175-06	971175-03	971175-19	971175-09	
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL	
% SOLIDS:	0.0 %	0 0 %	0.0 %	0 0 %	100 0 %
FIELD DUPLICATE OF:					

	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TETRACHLOROETHENE	1	U	UG/L	3		UG/L	25		UG/L	1	U	UG/L			
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	0 6	J	UG/L	1	U	UG/L			
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TRICHLOROETHENE	1	U	UG/L	1	U	UG/L	9		UG/L	1	U	UG/L			
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	4		UG/L	1	U	UG/L			
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			

Brown & Root Environmental

INTERNAL CORRESPONDENCE

TETRA TECH

TO:	MR. NEIL TEAMERSON	DATE:	FEBRUARY 3, 1998
FROM:	LINDA KARSONOVICH	COPIES:	DV FILE

SUBJECT: ORGANIC DATA VALIDATION- VOA
CTO225, NAWC WARMINSTER
SDG WHOBEN

SAMPLES: 19/Water/

W-HO-BEN	W-SW-3
W-SW-4	W-HN-83S
W-HN-83X	W-HN-22I
W-HN-60I	W-HN-15S
W-HN-15X	W-HN-15I
W-HN-17I	W-HN-17S
W-HN-52S	W-HN-42S
W-HN-42I	W-HN-52DD
W-TB-111097	W-RB-121097
W-TB-121197	

OVERVIEW

The sample set for CTO 225, SDG WHOBEN, NAWC Warminster consists of sixteen (16) aqueous environmental samples, and three (3) aqueous quality control samples. The samples were analyzed for Target Compound List (TCL) low concentration volatiles. The laboratory performed MS/SMD analyses on sample W-HN-42I. No field duplicate pairs were included in the SDG.

The samples were collected by Brown and Root Environmental on December 9th, 10th, and 11th, 1997 and analyzed by Ceimic Corporation. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria CLP SOW OLC02.0 analytical and reporting protocols.

All samples were successfully analyzed with the exception of those compounds qualified as rejected. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times, GC/MS tuning and system performance, initial/continuing calibrations, laboratory method and field quality control blank results, surrogate spike recoveries, matrix spike/matrix spike duplicate results, internal standard performance, tentatively identified compounds, compound identification, compound quantitation, and detection limits. Areas of concern are listed below.

Major Problems

- Initial and/or continuing calibration relative response factors (RRFs) less than the 0.05 quality control limit were reported for acetone and 2-butanone. Nondetected and positive results were affected. Nondetected results were rejected, (UR), and positive results were qualified as biased, (L).

- Continuing calibration relative response factors (RRFs) less than the 0.05 quality control limit were reported for 2-hexanone. Nondetected results were affected in all samples **except** W-HO-BEN, W-SW-3, W-SW-4, and W-HN-42S. Nondetected results were rejected, (UR).

Minor Problems

- Initial calibration relative standard deviation (%RSD) 30% quality control criteria was exceeded by 1,2-dibromo-3-chloropropane. All nondetected results were qualified as estimated, (UJ).

- The following table summarizes the maximum concentration of volatile compounds detected in the laboratory method blanks and/or field quality control blanks analyzed in this SDG.

Compound	Maximum Concentration	Action Level
Methylene Chloride	2 µg/L	20 µg/L
Acetone	9 µg/L	90 µg/L

  Dilution factors and aliquots used for analysis were taken into consideration during the application of all action levels. Positive results reported as false positives as a result of blank contamination for methylene chloride were qualified as B. No positive results were reported in the environmental samples for acetone therefore, no action was taken regarding this compound.

- Positive results reported below the Contract Required Quantitation Limit (CRQL) are qualified as estimated, (J). The direction of bias cannot be determined.

Notes

The following sample required dilution due to compounds exceeding the linear calibration range of the instrument. Results from the dilution were transposed over the original sample results and used as the basis for validation for the mentioned compounds only.

Sample	Compound	DF
W-HN-17S	trichloroethene	2X

Samples W-HN-15S and W-HN-52S were reported at a 10X and 25X dilution, respectively, due to high levels of target compounds.

Holding time for samples with a pH greater than 2 was exceeded by samples W-HN-83S, W-HN-83X, W-HN-15S, and W-HN-15X. These samples were analyzed one day past the seven day holding time criterion. Since the samples were marked as preserved, were refrigerated, and protected from light until analysis, no action was taken regarding these samples.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone, 2-butanone, and 2-hexanone had initial and/or continuing calibration RRFs less than the 0.05 quality control limit. 1,2-dibromo-3-chloropropane exceeded the initial calibration %RSD quality control limit. Methylene chloride and acetone were detected in the laboratory method and/or field quality control blanks. Several compounds exceeded the continuing calibration percent difference criteria.

Other Factors Affecting Data Quality: As noted in previous SDGs, some samples, marked as preserved, have had pHs greater than 2.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (9/94) as modified by Region III and the NFESC guidelines "Navy Installation Restoration Program Laboratory Quality Assurance Guide" (February, 1996). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental

Linda Karsonovich
Chemist/Data Validator

Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Summary of Tentatively Identified Compounds (TICs)

Fraction	TIC
Volatile	Unknown(s)
	cyclic alkane
	aliphatic hydrocarbon
	ethane, 1,1,2-trichloro-1,2,2-trifluoro-

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHOBEN

SAMPLE NUMBER:	W-HN-15I			W-HN-15S			W-HN-15X			W-HN-17I			W-HN-17S		
SAMPLE DATE:	12/10/97			12/10/97			12/10/97			12/10/97			12/11/97		
LABORATORY ID:	971148-12			971148-10			971148-11			971148-13			971148-16		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0 0 %			0 0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	0 9	J	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	2		UG/L
1,1-DICHLOROETHENE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	2		UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	50	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	UR	UG/L	50	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	50	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	50	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1		UG/L
CHLOROMETHANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	0 7	J	UG/L	7		UG/L	5		UG/L	1	U	UG/L	1		UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	3	B	UG/L	18	B	UG/L	2	B	UG/L	2	B	UG/L	3	B	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHOBEN

SAMPLE NUMBER:	W-HN-15I			W-HN-15S			W-HN-15X			W-HN-17I			W-HN-17S		
SAMPLE DATE:	12/10/97			12/10/97			12/10/97			12/10/97			12/11/97		
LABORATORY ID:	971148-12			971148-10			971148-11			971148-13			971148-16		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0.0 %			0.0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1		UG/L	15		UG/L	1	U	UG/L	1	U	UG/L	2		UG/L
TOLUENE	1	U	UG/L	10	U	UG/L	1	U	UG/L	2		UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	18		UG/L	150		UG/L	4		UG/L	1	U	UG/L	34		UG/L
VINYL CHLORIDE	1	U	UG/L	10	U	UG/L	1		UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	10	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHOBEN

SAMPLE NUMBER:	W-HN-22I			W-HN-42I			W-HN-42S			W-HN-52DD			W-HN-52S		
SAMPLE DATE:	12/09/97			12/11/97			12/11/97			12/11/97			12/11/97		
LABORATORY ID:	971148-06			971148-19			971148-18			971148-20			971148-17		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0 0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	340		UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	190		UG/L
1,1-DICHLOROETHENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	210		UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
2-BUTANONE	5	UR	UG/L	25	UR	UG/L	5	UR	UG/L	5	UR	UG/L	120	UR	UG/L
2-HEXANONE	5	UR	UG/L	25	UR	UG/L	5	U	UG/L	5	UR	UG/L	120	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	25	U	UG/L	5	U	UG/L	5	U	UG/L	120	U	UG/L
ACETONE	5	UR	UG/L	25	UR	UG/L	5	UR	UG/L	5	UR	UG/L	120	UR	UG/L
BENZENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
BROMOFORM	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
BROMOMETHANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
CARBON DISULFIDE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1		UG/L	25	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
CHLOROBENZENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
CHLOROETHANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
CHLOROFORM	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
CHLOROMETHANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
ETHYLBENZENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
METHYLENE CHLORIDE	3	B	UG/L	12	B	UG/L	0 6	B	UG/L	2	B	UG/L	44	B	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHOBEN

SAMPLE NUMBER:	W-HN-22I			W-HN-42I			W-HN-42S			W-HN-52DD			W-HN-52S		
SAMPLE DATE:	12/09/97			12/11/97			12/11/97			12/11/97			12/11/97		
LABORATORY ID:	971148-06			971148-19			971148-18			971148-20			971148-17		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0 0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
TETRACHLOROETHENE	3		UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	420		UG/L
TOLUENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	0 7	J	UG/L	25	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
TRICHLOROETHENE	1	U	UG/L	0.8	J	UG/L	1	U	UG/L	4		UG/L	140		UG/L
VINYL CHLORIDE	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L
XYLENES, TOTAL	1	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L	25	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHOBEN

SAMPLE NUMBER.	W-HN-60I			W-HN-83S			W-HN-83X			W-HOBEN			W-RB-121097		
SAMPLE DATE:	12/10/97			12/09/97			12/09/97			12/09/97			12/10/97		
LABORATORY ID:	971148-09			971148-04			971148-05			971148-01			971148-14		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0 0 %			0 0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	2		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	3		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	3		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	U	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/l
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	1		UG/L	1	U	UG/L	2		UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	2	U	UG/L	3	B	UG/L	3	B	UG/L	2	U	UG/L	0 7		UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHOBEN

SAMPLE NUMBER:	W-HN-60I			W-HN-83S			W-HN-83X			W-HOBEN			W-RB-121097		
SAMPLE DATE:	12/10/97			12/09/97			12/09/97			12/09/97			12/10/97		
LABORATORY ID:	971148-09			971148-04			971148-05			971148-01			971148-14		
QC_TYPE.	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	6		UG/L	0 6	J	UG/L	2		UG/L	1	U	UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	1	U	UG/L	13		UG/L	1	U	UG/L	12		UG/L	1	U	UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHOBEN

SAMPLE NUMBER	W-SW-3			W-SW-4			W-TB-111097			W-TB-121197					
SAMPLE DATE:	12/09/97			12/09/97			12/10/97			12/11/97			/ /		
LABORATORY ID	971148-02			971148-03			971148-08			971148-15					
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL					
% SOLIDS:	0 0 %			0 0 %			0.0 %			0 0 %			100 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L			
2-HEXANONE	5	U	UG/L	5	U	UG/L	5	UR	UG/L	5	UR	UG/L			
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L			
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	9	L	UG/L			
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CHLOROFORM	6		UG/L	5		UG/L	1	U	UG/L	1	U	UG/L			
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
METHYLENE CHLORIDE	2	U	UG/L	2	U	UG/L	2	U	UG/L	2		UG/L			

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WHOBEN

SAMPLE NUMBER.	W-SW-3			W-SW-4			W-TB-111097			W-TB-121197					
SAMPLE DATE:	12/09/97			12/09/97			12/10/97			12/11/97			/ /		
LABORATORY ID:	971148-02			971148-03			971148-08			971148-15					
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL					
% SOLIDS:	0 0 %			0 0 %			0 0 %			0.0 %			100 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TETRACHLOROETHENE	0.8	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TOLUENE	0.8	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
TRICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L			

Brown & Root Environmental

INTERNAL CORRESPONDENCE

RECEIVED
TETRA TECH NUS

TO: MR. NEIL TEAMERSON DATE: FEBRUARY 2, 1998

FROM: LINDA KARSONOVICH COPIES: DV FILE

SUBJECT: ORGANIC DATA VALIDATION- VOA
CTO225, NAWC WARMINSTER
SDG 120497

SAMPLES: 20/Water/

W-HN-65SI	W-HN-54I
W-HN-65I1	W-HN-54D
W-HN-65I2	W-HN-54S
W-HN-65D	W-HN-16I
W-HN-65S2	W-HN-16D
W-HN-21I	W-HN-16S
W-HN-21S	W-HN-16O
W-HN-53I	W-TB-120497
W-HN-53S	W-TB-12597
W-HN-53D	W-RB-120497

OVERVIEW

The sample set for CTO 225, SDG 120497, NAWC Warminster consists of seventeen (17) aqueous environmental samples, and three (3) aqueous quality control samples. The samples were analyzed for Target Compound List (TCL) low concentration volatiles. The field crew designated sample W-HN-16S for Matrix Spike/Matrix Spike Duplicate (MS/MSD) analyses. One field duplicate pair was included in the SDG: W-HN-16S/W-HN-16O.

The samples were collected by Brown and Root Environmental on December 4th, and 5th, 1997 and analyzed by Ceimic Corporation. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria CLP SOW OLC02.0 analytical and reporting protocols.

All samples were successfully analyzed with the exception of those compounds qualified as rejected. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times, GC/MS tuning and system performance, initial/continuing calibrations, laboratory method and field quality control blank results, surrogate spike recoveries, matrix spike/matrix spike duplicate results, internal standard performance, tentatively identified compounds, compound identification, compound quantitation, and detection limits. Areas of concern are listed below.

Major Problems

- Initial and/or continuing calibration relative response factor (RRFs) less than the 0.05 quality control limit were reported for acetone, and 2-butanone. Nondetected and positive results were affected. Nondetected results were rejected, (UR), and positive results were qualified as biased, (L).

Minor Problems

- The sample bottles were labeled as having been preserved with HCl; however, all samples in this SDG had a pH > 2. All of the samples, with the exception of W-HN-16S, were analyzed within 30 hours of the seven day holding time for non-preserved samples. Since the samples had been marked preserved, were refrigerated, and were kept from light until analysis, no qualifiers were applied to the samples with the exception of W-HN-16S. Sample W-HN-16S was analyzed eleven (11) days after sample collection; therefore, the aromatic results were qualified as biased low for nondetected and detected results, (UL) and (L).

- The following table summarizes the maximum concentration of volatile compounds detected in the field quality control blanks analyzed in this SDG.

Compound	Maximum Concentration	Action Level
Methylene Chloride	3 µg/L	30 µg/L
Chloroform	3 µg/L	15 µg/L

Dilution factors and aliquots used for analysis were taken into consideration during the application of all action levels. Positive results reported as false positives as a result of blank contamination for methylene chloride and chloroform were qualified as B.

- Positive results reported below the Contract Required Quantitation Limit (CRQL) are qualified as estimated, (J). The direction of bias cannot be determined.

Notes

Continuing calibration percent differences (%Ds) exceeded the 25% quality control limit for 1,2-dichloroethane, 1,1,2-trichloroethane, 1,2-dibromomethane, 1,1,2,2-tetrachloroethane, 1,2,4-trichlorobenzene, and methylene chloride. No action was taken as all the compounds were nondetected.

The following samples required dilution due to compounds exceeding the linear calibration range of the instrument. Results from the dilutions were transposed over the original sample results and used as the basis for validation for the mentioned compounds only.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (9/94) as modified by Region III and the NFESC guidelines "Navy Installation Restoration Program Laboratory Quality Assurance Guide" (February, 1996). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental

Linda Karsonovich
Chemist/Data Validator

Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Sample	Compound	DF
W-HN-16O	1,1,1-trichloroethane	5X
W-HN-16I	trichloroethene	200X
W-HN-16S	1,1,1-trichloroethane	5X
W-HN-53S	1,1-dichloroethene	5X
W-HN-65I1	trichloroethene tetrachloroethene	5X
W-HN-65I2	trichloroethene	10X

Results for sample W-HN-16I were reported at a 100X dilution.

The compound 1,1,1-trichloroethane in sample W-HN-16S was reported over the linear range of the instrument. However, as the reported result was with a relative percent difference of 11.5% of the associated field duplicate (which was diluted), no qualifiers were applied.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone, 2-butanone, and 2-hexanone had initial and/or continuing calibration RRFs less than the 0.05 quality control limit. Methylene chloride and chloroform were detected in the laboratory method and/or field quality control blanks. Several volatile compounds exceeded the continuing calibration percent difference criteria. Sample W-HN-16S was analyzed beyond holding time for non-preserved samples.

Other Factors Affecting Data Quality: Samples may not have been properly preserved with HCl in the field.

Summary of Tentatively Identified Compounds (TICs)

Fraction	TIC
Volatile	Unknown(s)
	trichloromonofluoromethane
	ethane, 1,2-dichloro-1,1,2-trifluoro-
	ethane, 1,1,2-trichloro-1,2,2-trifluoro

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 120497

SAMPLE NUMBER:	W-HN-16D			W-HN-16I			W-HN-16S			W-HN-16O			W-HN-21I		
SAMPLE DATE:	12/05/97			12/05/97			12/05/97			12/05/97			12/04/97		
LABORATORY ID:	971131-18			971131-17			971131-19			971131-20			971131-07		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %			0.0 %		
FIELD DUPLICATE OF:										W-HN-16S					
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	100	U	UG/L	98		UG/L	110		UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1		UG/L	100	U	UG/L	4	J	UG/L	4		UG/L	1	U	UG/L
1,1-DICHLOROETHENE	2		UG/L	100	U	UG/L	9		UG/L	11		UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	500	UR	UG/L	25	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	UR	UG/L	500	U	UG/L	25	UR	UG/L	5	UR	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	500	U	UG/L	25	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	500	UR	UG/L	25	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	100	U	UG/L	5	UL	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	0.5	J	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	100	U	UG/L	5	UL	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2	[redacted]	[redacted]	[redacted]	B	[redacted]

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 120497

SAMPLE NUMBER:	W-HN-16D			W-HN-16I			W-HN-16S			W-HN-16O			W-HN-21I		
SAMPLE DATE:	12/05/97			12/05/97			12/05/97			12/05/97			12/04/97		
LABORATORY ID:	971131-18			971131-17			971131-19			971131-20			971131-07		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0.0 %			0 0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:										W-HN-16S					
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	100	U	UG/L	5	UL	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	100	U	UG/L	15		UG/L	17		UG/L	1	U	UG/L
TOLUENE	1	U	UG/L	100	U	UG/L	5	UL	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	4		UG/L	2300		UG/L	13		UG/L	14		UG/L	1	U	UG/L
VINYL CHLORIDE	1	U	UG/L	100	U	UG/L	5	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	100	U	UG/L	5	UL	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 120497

SAMPLE NUMBER:	W-HN-21S			W-HN-53D			W-HN-53I			W-HN-53S			W-HN-54D		
SAMPLE DATE:	12/04/97			12/05/97			12/05/97			12/05/97			12/05/97		
LABORATORY ID:	971131-08			971131-13			971131-11			971131-12			971131-15		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	5		UG/L	3		UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	0 8	J	UG/L	0 7	J	UG/L	1	U	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	24		UG/L	53		UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	2	B	UG/L	2	B	UG/L	2	B	UG/L	2	B	UG/L	2	B	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 120497

SAMPLE NUMBER:	W-HN-21S			W-HN-53D			W-HN-53I			W-HN-53S			W-HN-54D		
SAMPLE DATE:	12/04/97			12/05/97			12/05/97			12/05/97			12/05/97		
LABORATORY ID:	971131-08			971131-13			971131-11			971131-12			971131-15		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0.0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 120497

SAMPLE NUMBER:	W-HN-54I			W-HN-54S			W-HN-65D			W-HN-65I1			W-HN-65I2		
SAMPLE DATE:	12/05/97			12/05/97			12/04/97			12/04/97			12/04/97		
LABORATORY ID:	971131-14			971131-16			971131-05			971131-03			971131-04		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0 0 %			0 0 %			0.0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	12		UG/L	2		UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	16		UG/L	0 9	J	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	25		UG/L	8		UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	2	L	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	0.8	B	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1		UG/L	1		UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
[redacted]	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2	[redacted]	[redacted]	[redacted]	B	[redacted]

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 120497

SAMPLE NUMBER:	W-HN-54I			W-HN-54S			W-HN-65D			W-HN-65I1			W-HN-65I2		
SAMPLE DATE:	12/05/97			12/05/97			12/04/97			12/04/97			12/04/97		
LABORATORY ID:	971131-14			971131-16			971131-05			971131-03			971131-04		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0.0 %			0.0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	25		UG/L	5		UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	61		UG/L	92		UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 120497

SAMPLE NUMBER:	W-HN-65S1			W-HN-65S2			W-RB-120497			W-TB-120497			W-TB-120597		
SAMPLE DATE:	12/04/97			12/04/97			12/04/97			12/04/97			12/05/97		
LABORATORY ID:	971131-02			971131-06			971131-09			971131-01			971131-10		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0 0 %			0 0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
1,1,1-TRICHLOROETHANE	1	U	UG/L	1		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2,2-TETRACHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1,2-TRICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,1-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2,4-TRICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMO-3-CHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DIBROMOETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,2-DICHLOROPROPANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,3-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
1,4-DICHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
2-BUTANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
2-HEXANONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
4-METHYL-2-PENTANONE	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L	5	U	UG/L
ACETONE	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L	5	UR	UG/L
BENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMODICHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOFORM	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
BROMOMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON DISULFIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CARBON TETRACHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CHLOROFORM	2	B	UG/L	1	U	UG/L	3		UG/L	1	U	UG/L	1	U	UG/L
CHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
CIS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
DIBROMOCHLOROMETHANE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
ETHYLBENZENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
METHYLENE CHLORIDE	2	[illegible]	UG/L	[illegible]	[illegible]	[illegible]	3	[illegible]	UG/L	2	[illegible]	UG/L	[illegible]	[illegible]	[illegible]

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 120497

SAMPLE NUMBER:	W-HN-65S1			W-HN-65S2			W-RB-120497			W-TB-120497			W-TB-120597		
SAMPLE DATE:	12/04/97			12/04/97			12/04/97			12/04/97			12/05/97		
LABORATORY ID:	971131-02			971131-06			971131-09			971131-01			971131-10		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0 0 %			0 0 %			0.0 %			0 0 %			0 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
VOLATILES															
STYRENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TETRACHLOROETHENE	1	U	UG/L	7		UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TOLUENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,2-DICHLOROETHENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRANS-1,3-DICHLOROPROPENE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
TRICHLOROETHENE	1		UG/L	0.8	J	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
VINYL CHLORIDE	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L
XYLENES, TOTAL	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L	1	U	UG/L

INORGANICS

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
UL	-	Nondetected result is considered biased low as a result of CRDL %R.
K	-	Positive result is considered biased high as a result of CRDL %R.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

C-49-01-8-131

TO:	N. TEAMERSON	DATE:	JANUARY 22, 1998
FROM:	TERRI L. SOLOMON	COPIES:	DV FILE

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS AND CYANIDE
CTO 225 - NAWC WARMINSTER, WARMINSTER, PENNSYLVANIA
SDG - WOS766

SAMPLES: 4/Aqueous/

W-FB-121897 W-HN-59I W-HN-590I W-RB-121897

Overview

The sample set for SDG WOS766, NAWC Warminster, Warminster, Pennsylvania, consists of two (2) aqueous environmental samples, one (1) field blank (W-FB-121897) and one (1) rinsate blank (W-RB-121897). One (1) field duplicate pair (W-HN-59I / W-HN-590I) was included within this SDG.

The above samples were analyzed for Target Analyte List (TAL) metals and cyanide. The samples were collected by Brown and Root Environmental on December 18, 1997 and analyzed by Ceimic Corporation under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Metals and cyanide analyses were conducted using statement of work (SOW) ILM04.0.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/field blanks, interference check sample (ICS) results, matrix spike results, laboratory duplicate results, field duplicate results, laboratory control sample (LCS) results, ICP serial dilution results, detection limits and analyte quantitation.

All analyses, with the exception of mercury, were conducted using Inductively Coupled Plasma (ICP) methodologies. Mercury analysis was conducted using cold vapor AA.

Areas of concern with respect to data quality are listed below.

Major Problems - None.

Minor Problems

- The Contract Required Detection Limit (CRDL) Percent Recoveries (%Rs) for chromium and zinc were > 110% quality control limit. Positive results < 2X CRDL reported for the aforementioned analytes were qualified as biased high, "K".

- The CRDL %R for lead was < 90% quality control limit. Nondetected results reported for the aforementioned analyte were qualified as biased low, "UL".

- The following contaminants were detected in the method/ preparation/ field blanks at the following maximum concentrations :

Analyte	Maximum Concentration	Action Level - Aqueous
aluminum	119.4 ug/L	597 ug/L
barium	7.2 ug/L	36.0 ug/L
calcium	442.9 ug/L	2214.5 ug/L
iron	36.5 ug/L	182.5 ug/L
manganese	2.9 ug/L	14.5 ug/L
potassium	243.3 ug/L	1216.5 ug/L
sodium	258.8 ug/L	1294 ug/L
thallium	2.9 ug/L	14.5 ug/L
zinc[1]	9.1 ug/L	45.5 ug/L

Samples Affected: All

[1] Maximum concentration found in a rinsate blank.

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot size, weight, percent solids, and dilution factors were taken into consideration when evaluating for blank contamination. Positive results < the action levels for aluminum, calcium, iron, manganese, sodium, thallium and zinc have been qualified, "B", as a result of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or were nondetects. It should be noted that field quality control samples are not qualified for field quality control blank contamination.

Notes

A comparison of field duplicate pair, W-HN-59I / W-HN-590I, is contained in Appendix C. However, no validation actions are required as per Region III guidance.

Executive Summary

Laboratory Performance: The CRDL Standard analysis recoveries for several analytes were outside quality control limits. Several analytes were present in the laboratory method/preparation blanks.

Other Factors Affecting Data Quality: Several analytes were present in the field quality control blanks.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Terri L. Solomon

Brown and Root Environmental
Terri L. Solomon
Chemist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WOS766

SAMPLE NUMBER:	W-FB-121897			W-HN-59I			W-HN-590I			W-RB-121897					
SAMPLE DATE:	12/18/97			12/18/97			12/18/97			12/18/97			/ /		
LABORATORY ID:	971175-08			971175-05			971175-07			971175-06					
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL					
% SOLIDS:	0 0 %			0 0 %			0 0 %			0.0 %			100 0 %		
FIELD DUPLICATE OF:							W-HN-59I								
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
INORGANICS															
ALUMINUM	43.4	B	UG/L	63 4	B	UG/L	66.8	B	UG/L	38.1	U	UG/L			
ANTIMONY	1.7	U	UG/L	1.7	U	UG/L	1.7	U	UG/L	1.7	U	UG/L			
ARSENIC	2.4	U	UG/L	2 4	U	UG/L	2 4	U	UG/L	2 4	U	UG/L			
BARIUM	3.0	U	UG/L	87.4		UG/L	83.2		UG/L	3.0	U	UG/L			
BERYLLIUM	0.58	U	UG/L	0.58	U	UG/L	0.58	U	UG/L	0.58	U	UG/L			
CADMIUM	0.30	U	UG/L	0.30	U	UG/L	0.30	U	UG/L	0.30	U	UG/L			
CALCIUM	399	B	UG/L	69300		UG/L	63400		UG/L	436	B	UG/L			
CHROMIUM	4.6	U	UG/L	15.9	K	UG/L	12 2	K	UG/L	4.6	U	UG/L			
COBALT	6 0	U	UG/L	6.0	U	UG/L	6.0	U	UG/L	6 0	U	UG/L			
COPPER	5.8	U	UG/L	5.8	U	UG/L	5 8	U	UG/L	5.8	U	UG/L			
CYANIDE	5.0	U	UG/L	5.0	U	UG/L	5.0	U	UG/L	5 0	U	UG/L			
IRON	19.7	B	UG/L	77.8	B	UG/L	47.3	B	UG/L	21.4	B	UG/L			
LEAD	1.6	UL	UG/L	1.6	UL	UG/L	1 6	UL	UG/L	1.6	UL	UG/L			
MAGNESIUM	127	U	UG/L	18900		UG/L	18100		UG/L	127	U	UG/L			
MANGANESE	1.9	B	UG/L	3.9	B	UG/L	2.9	B	UG/L	2.9	B	UG/L			
MERCURY	0 12	U	UG/L	0.13	U	UG/L	0 12	U	UG/L	0 12	U	UG/L			
NICKEL	6.3	U	UG/L	6.3	U	UG/L	6.3	U	UG/L	6.3	U	UG/L			
POTASSIUM	170	U	UG/L	11100		UG/L	8760		UG/L	170	U	UG/L			
SELENIUM	4.7	U	UG/L	4.7	U	UG/L	4.7	U	UG/L	4.7	U	UG/L			
SILVER	1.2	U	UG/L	1.2	U	UG/L	2.2		UG/L	1.2	U	UG/L			
SODIUM	221	B	UG/L	18100		UG/L	16300		UG/L	189	B	UG/L			
THALLIUM	1.9	U	UG/L	1.9	U	UG/L	1 9	U	UG/L	2.1	B	UG/L			
VANADIUM	6.8	U	UG/L	6.8	U	UG/L	6 8	U	UG/L	6.8	U	UG/L			
ZINC	4 6	B	UG/L	8.5	B	UG/L	3.9	U	UG/L	9.1	K	UG/L			

Brown & Root Environmental

INTERNAL CORRESPONDENCE

RECEIVED
FEB - 3 1998
TETRA TECH NUS

C-49-01-8-139

TO:	N. TEAMERSON	DATE:	JANUARY 22, 1998
FROM:	TERRI L. SOLOMON	COPIES:	DV FILE

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS AND CYANIDE
CTO 225 - NAWC WARMINSTER, WARMINSTER, PENNSYLVANIA
SDG - WSW10

SAMPLES: 2/Aqueous/

W-HN-14I W-HN-14S

Overview

The sample set for SDG WSW10, NAWC Warminster, Warminster, Pennsylvania, consists of two (2) aqueous environmental samples. No field duplicate pairs were included within this SDG.

The above samples were analyzed for Target Analyte List (TAL) metals and cyanide. The samples were collected by Brown and Root Environmental on December 17, 1997 and analyzed by Ceimic Corporation under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Metals and cyanide analyses were conducted using statement of work (SOW) ILM04.0.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation blanks, interference check sample (ICS) results, matrix spike results, laboratory duplicate results, laboratory control sample (LCS) results, ICP serial dilution results, detection limits and analyte quantitation.

All analyses, with the exception of mercury, were conducted using Inductively Coupled Plasma (ICP) methodologies. Mercury analysis was conducted using cold vapor AA.

Areas of concern with respect to data quality are listed below.

Major Problems - None.

Minor Problems

- The Contract Required Detection Limit (CRDL) Percent Recovery (%R) for lead was < 90% quality control limit. Nondetected results reported for the aforementioned analyte were qualified as biased low, "UL".

- The following contaminants were detected in the method/ preparation blanks at the following maximum concentrations :

Analyte	Maximum Concentration	Action Level - Aqueous
aluminum	119.4 ug/L	597 ug/L
barium	7.2 ug/L	36.0 ug/L
calcium	442.9 ug/L	2214.5 ug/L
iron	36.5 ug/L	182.5 ug/L
manganese	2.9 ug/L	14.5 ug/L
potassium	243.3 ug/L	1216.5 ug/L
sodium	258.8 ug/L	1294 ug/L
thallium	2.9 ug/L	14.5 ug/L
zinc[1]	7.840 ug/L	39.2 ug/L

Samples Affected: All

(1) Maximum concentration found in an aqueous preparation blank.

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot size, weight, percent solids, and dilution factors were taken into consideration when evaluating for blank contamination. Positive results < the action levels for aluminum, barium, iron, manganese, potassium, thallium and zinc have been qualified, "B", as a result of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or were nondetects.

Notes

The CRDL %Rs for chromium and zinc were > 110 % quality control limit. However, no validation actions were warranted as the sample results were either > 2X CRDL or were qualified as blank contamination.

Executive Summary

Laboratory Performance: The CRDL Standard analysis recoveries for several analytes were outside quality control limits. Several analytes were present in the laboratory method/preparation blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental
Terri L. Solomon
Chemist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: WSW10

SAMPLE NUMBER:	W-HN-14I			W-HN-14S								
SAMPLE DATE:	12/17/97			12/17/97			/ /			/ /		/ /
LABORATORY ID:	971172-12			971172-11								
QC_TYPE:	NORMAL			NORMAL								
% SOLIDS:	0 0 %			0 0 %			100 0 %			100 0 %		100 0 %
FIELD DUPLICATE OF:												
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
INORGANICS															
ALUMINUM	38.1	U	UG/L	74 4	B	UG/L									
ANTIMONY	1 7	U	UG/L	4.0		UG/L									
ARSENIC	2 4	U	UG/L	2.4	U	UG/L									
BARIUM	112		UG/L	32 9	B	UG/L									
BERYLLIUM	0 58	U	UG/L	0.58	U	UG/L									
CADMIUM	0 30	U	UG/L	0 30	U	UG/L									
CALCIUM	65200		UG/L	27600		UG/L									
CHROMIUM	43.9		UG/L	27.1		UG/L									
COBALT	6 0	U	UG/L	6 0	U	UG/L									
COPPER	5 8	U	UG/L	5 8	U	UG/L									
CYANIDE	6.0		UG/L	5.0	U	UG/L									
IRON	291		UG/L	136	B	UG/L									
LEAD	1 6	UL	UG/L	1.6	UL	UG/L									
MAGNESIUM	21100		UG/L	10700		UG/L									
MANGANESE	13 5	B	UG/L	5 3	B	UG/L									
MERCURY	0.12	U	UG/L	0 12	U	UG/L									
NICKEL	18.7		UG/L	6.3	U	UG/L									
POTASSIUM	1780		UG/L	960	B	UG/L									
SELENIUM	4 7	U	UG/L	4.7	U	UG/L									
SILVER	1 9		UG/L	3 0		UG/L									
SODIUM	25900		UG/L	12200		UG/L									
THALLIUM	1 9	U	UG/L	3.7	B	UG/L									
VANADIUM	6.8	U	UG/L	6.8	U	UG/L									
ZINC	60.7		UG/L	39 2	B	UG/L									

Brown & Root Environmental

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FEB - 4 1998
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INTERNAL CORRESPONDENCE

C-49-01-8-074

TO:	NEIL TEAMERSON	DATE:	JANUARY 13, 1998
FROM:	SEAN NIXON	COPIES:	DV FILE

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS and CYANIDE
CTO 225 - NAWC WARMINSTER, PENNSYLVANIA
SDG WHOBEN

SAMPLES: 1/Aqueous

W-HN-42I

Overview

The sample set for CTO 225, NAWC Warminster, Sample Delivery Group (SDG) WHOBEN, consists of one (1) aqueous environmental sample. The field crew did not specify the sample for Matrix Spike analysis.

The sample was analyzed for Target Analyte List (TAL) metals and cyanide. The sample was collected by Brown and Root Environmental on December 11, 1997 and analyzed by Ceimic Incorporated under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals and cyanide analyses were conducted according to Contract Laboratory Procedure (CLP) ILM04.0.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/ preparation blanks, interference check samples (ICS), matrix spike recoveries, laboratory duplicate results, post digestion spike recoveries, laboratory control sample (LCS) results, field duplicate results, ICP serial dilution results, detection limits, and analyte quantification.

All metals analyses, with the exception of mercury, were conducted via Inductively Coupled Plasma (ICP) methodologies. Mercury analyses were conducted via Cold Vapor Atomic Absorption (CVAA). The cyanide analyses were conducted via wet chemistry techniques.

Areas of concern with respect to data quality are listed below.

- The CRDL %R chromium was > 110% quality control limit. Positive results < 2X CRDL reported for the aforementioned analyte were qualified as biased high, "K"

- The following contaminants were detected in the method/ preparation/ rinsate blanks at the following maximum concentrations :

Analyte	Maximum Concentration	Action Level - Aqueous
aluminum	119.4 ug/L	597 ug/L
barium	7.2 ug/L	36.0 ug/L
calcium	442.9 ug/L	2214.5 ug/L
iron(2)	52.1 ug/L	260.5 ug/L
manganese	2.9 ug/L	14.5 ug/L
potassium	243.3 ug/L	1216.5 ug/L
sodium(2)	269 ug/L	1345 ug/L
thallium	2.9 ug/L	14.5 ug/L
zinc(1)	7.840 ug/L	39.2 ug/L

Samples Affected: All

(1) Maximum concentration found in an aqueous preparation blank.
(2) Maximum concentration found in a rinsate blank.

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot size, and dilution factors were taken into consideration when evaluating for blank contamination. Positive results < the action levels for aluminum, calcium, iron, manganese and zinc have been qualified, "B", as a result of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or were nondetects. It should be noted that field quality control blanks are not qualified for field blank contamination.

Notes

The CRDL %R for zinc was > 110 % quality control limit. However, no validation actions were warranted as the sample results were qualified as blank contamination.

Matrix spike, laboratory duplicate and ICP Serial Dilution analyses were not included within this SDG.

Executive Summary

Laboratory Performance: The CRDL Standard analysis recoveries for several analytes were outside quality control limits. Several analytes were present in the laboratory method/preparation blanks.

Other Factors Affecting Data Quality: Several analytes were present in the rinsate blank.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Terri L. Solomon

Brown and Root Environmental
Terri L. Solomon
Chemist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

CTO225 - NAWC WARMINSTER
WATER DATA
CEIMIC CORPORATION
SDG: 122297

SAMPLE NUMBER:	W-HN-11S			W-HN-59S			W-RB-122397								
SAMPLE DATE:	12/23/97			12/23/97			12/23/97			/ /			/ /		
LABORATORY ID:	971185-18			971185-14			971185-19								
QC_TYPE:	NORMAL			NORMAL			NORMAL								
% SOLIDS:	0 0 %			0 0 %			0 0 %			100 0 %			100 0 %		
FIELD DUPLICATE OF:															
	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS	RESULT	QUAL	UNITS
INORGANICS															
ALUMINUM	179	B	UG/L	69 4	B	UG/L	65 2	B	UG/L						
ANTIMONY	1 7	U	UG/L	1.7	U	UG/L	1 7	U	UG/L						
ARSENIC	2.4	U	UG/L	2 4	U	UG/L	2 4	U	UG/L						
BARIUM	54 1		UG/L	40.7		UG/L	3 0	U	UG/L						
BERYLLIUM	0 58	U	UG/L	0.58	U	UG/L	0 58	U	UG/L						
CADMIUM	0 30	U	UG/L	0.30	U	UG/L	0 30	U	UG/L						
CALCIUM	42000		UG/L	64400		UG/L	428	B	UG/L						
CHROMIUM	14.5	K	UG/L	7.5	K	UG/L	4.6	U	UG/L						
COBALT	6 0	U	UG/L	6 0	U	UG/L	6 0	U	UG/L						
COPPER	5.8	U	UG/L	5.8	U	UG/L	5 8	U	UG/L						
CYANIDE	5.0	U	UG/L	5.0	U	UG/L	5 0	U	UG/L						
IRON	29500		UG/L	121	B	UG/L	52 1		UG/L						
LEAD	5.7	L	UG/L	1 6	UL	UG/L	1 6	UL	UG/L						
MAGNESIUM	16000		UG/L	22900		UG/L	127	U	UG/L						
MANGANESE	154		UG/L	9.6	B	UG/L	1.9	B	UG/L						
MERCURY	0 56		UG/L	0 12	UL	UG/L	0 76		UG/L						
NICKEL	9.8		UG/L	7 8		UG/L	6 3	U	UG/L						
POTASSIUM	2490		UG/L	2510		UG/L	170	U	UG/L						
SELENIUM	4.7	U	UG/L	4 7	U	UG/L	4 7	U	UG/L						
SILVER	1 2	U	UG/L	2.0		UG/L	1 2	U	UG/L						
SODIUM	45700		UG/L	13200		UG/L	269		UG/L						
THALLIUM	1.9	U	UG/L	1.9	U	UG/L	1.9	U	UG/L						
VANADIUM	6.8	U	UG/L	6 8	U	UG/L	6 8	U	UG/L						
ZINC	32 9	B	UG/L	9.1	B	UG/L	6 5	B	UG/L						

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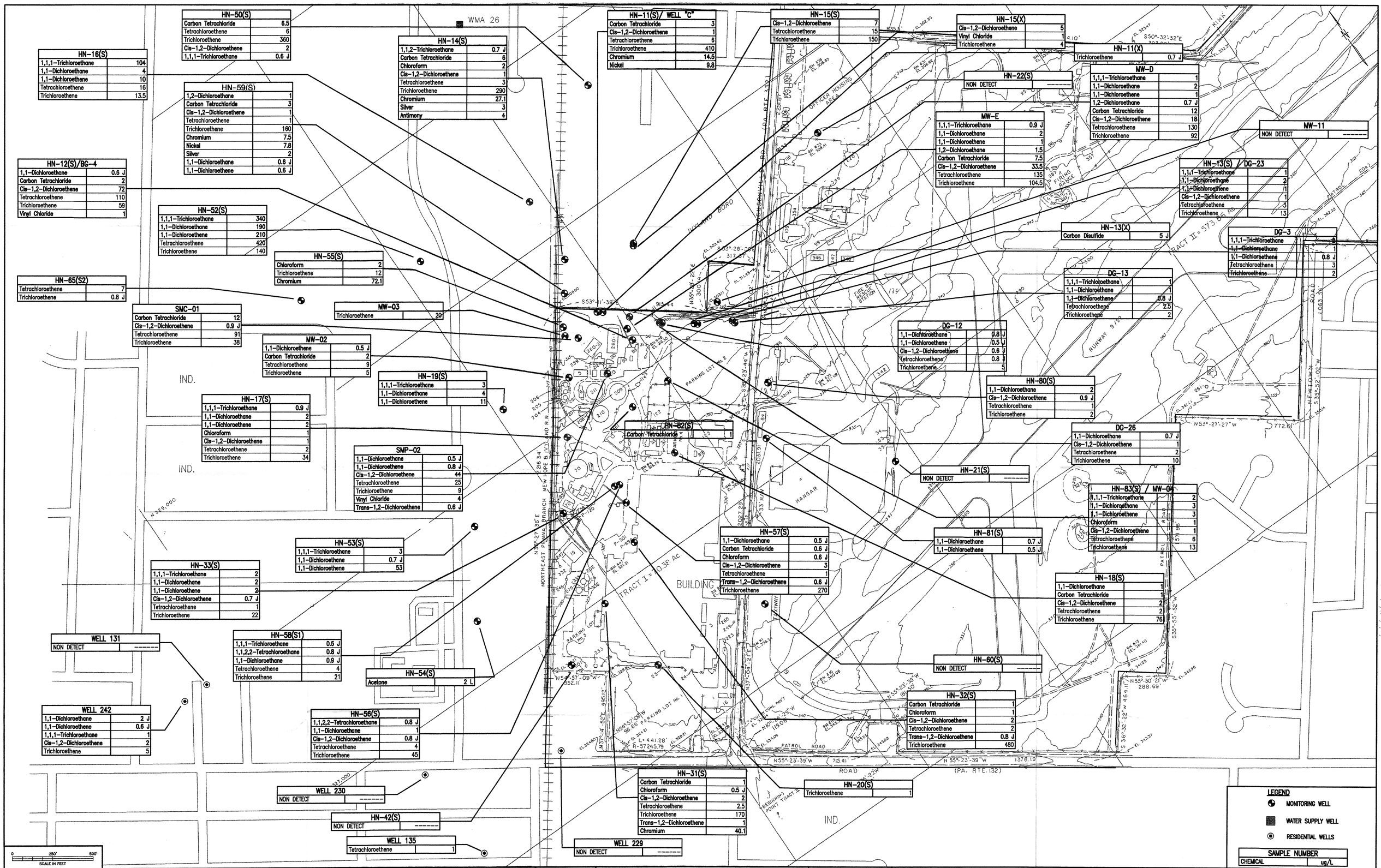

HN-50(S)	
Carbon Tetrachloride	6.5
Tetrachloroethene	6
Trichloroethene	360
Cis-1,2-Dichloroethene	2
1,1,1-Trichloroethane	0.6 J

HN-16(S)	
1,1,1-Trichloroethane	104
1,1-Dichloroethane	4
1,1-Dichloroethene	10
Tetrachloroethene	16
Trichloroethene	13.5

HN-14(S)	
1,1,2-Trichloroethane	0.7 J
Carbon Tetrachloride	6
Chloroform	2
Cis-1,2-Dichloroethene	1
Tetrachloroethene	3
Trichloroethene	290
Chromium	27.1
Silver	3
Antimony	4

HN-59(S)	
1,2-Dichloroethane	1
Carbon Tetrachloride	3
Cis-1,2-Dichloroethene	1
Tetrachloroethene	1
Trichloroethene	160
Chromium	7.5
Nickel	7.8
Silver	2
1,1-Dichloroethane	0.6 J
1,1-Dichloroethene	0.6 J

HN-12(S)/BG-4	
1,1-Dichloroethane	0.6 J
Carbon Tetrachloride	2
Cis-1,2-Dichloroethene	72
Tetrachloroethene	110
Trichloroethene	59
Vinyl Chloride	1

HN-52(S)	
1,1,1-Trichloroethane	340
1,1-Dichloroethane	190
1,1-Dichloroethene	210
Tetrachloroethene	420
Trichloroethene	140

HN-55(S)	
Chloroform	2
Trichloroethene	12
Chromium	72.1

HN-65(S2)	
Tetrachloroethene	7
Trichloroethene	0.8 J

SMC-01	
Carbon Tetrachloride	12
Cis-1,2-Dichloroethene	0.9 J
Tetrachloroethene	91
Trichloroethene	38

MW-03	
Trichloroethene	20

MW-02	
1,1-Dichloroethene	0.5 J
Carbon Tetrachloride	2
Tetrachloroethene	9
Trichloroethene	5

HN-19(S)	
1,1,1-Trichloroethane	3
1,1-Dichloroethane	4
1,1-Dichloroethene	11

HN-17(S)	
1,1,1-Trichloroethane	0.9 J
1,1-Dichloroethane	2
1,1-Dichloroethene	2
Chloroform	1
Cis-1,2-Dichloroethene	1
Tetrachloroethene	2
Trichloroethene	34

SMP-02	
1,1-Dichloroethane	0.5 J
1,1-Dichloroethene	0.8 J
Cis-1,2-Dichloroethene	44
Tetrachloroethene	25
Trichloroethene	9
Vinyl Chloride	4
Trans-1,2-Dichloroethene	0.6 J

HN-53(S)	
1,1,1-Trichloroethane	3
1,1-Dichloroethane	0.7 J
1,1-Dichloroethene	53

HN-33(S)	
1,1,1-Trichloroethane	2
1,1-Dichloroethane	2
1,1-Dichloroethene	2
Cis-1,2-Dichloroethene	0.7 J
Tetrachloroethene	1
Trichloroethene	22

WELL 131	
NON DETECT	------

HN-58(S1)	
1,1,1-Trichloroethane	0.5 J
1,1,2,2-Tetrachloroethane	0.8 J
1,1-Dichloroethane	0.9 J
Tetrachloroethene	4
Trichloroethene	21

HN-54(S)	
Acetone	2 L

WELL 242	
1,1-Dichloroethane	2 J
1,1-Dichloroethene	0.6 J
1,1,1-Trichloroethane	1
Cis-1,2-Dichloroethene	2
Trichloroethene	5

HN-56(S)	
1,1,2,2-Tetrachloroethane	0.8 J
1,1-Dichloroethane	1
Cis-1,2-Dichloroethene	0.8 J
Tetrachloroethene	4
Trichloroethene	45

WELL 230	
NON DETECT	------

HN-42(S)	
NON DETECT	------

WELL 135	
Tetrachloroethene	1

HN-11(S)/ WELL "C"	
Carbon Tetrachloride	3
Cis-1,2-Dichloroethene	1
Tetrachloroethene	6
Trichloroethene	410
Chromium	14.5
Nickel	9.8

HN-15(S)	
Cis-1,2-Dichloroethene	7
Tetrachloroethene	15
Trichloroethene	150

HN-15(X)	
Cis-1,2-Dichloroethene	5
Vinyl Chloride	1
Trichloroethene	4

HN-11(X)	
Trichloroethene	0.7 J

HN-22(S)	
NON DETECT	------

MW-D	
1,1,1-Trichloroethane	1
1,1-Dichloroethane	2
1,1-Dichloroethene	1
1,2-Dichloroethane	0.7 J
Carbon Tetrachloride	12
Cis-1,2-Dichloroethene	18
Tetrachloroethene	130
Trichloroethene	92

MW-E	
1,1,1-Trichloroethane	0.9 J
1,1-Dichloroethane	2
1,1-Dichloroethene	1
1,2-Dichloroethane	1.5
Carbon Tetrachloride	7.5
Cis-1,2-Dichloroethene	33.5
Tetrachloroethene	135
Trichloroethene	104.5

MW-11	
NON DETECT	------

HN-13(S) / DG-23	
1,1,1-Trichloroethane	1
1,1-Dichloroethane	2
1,1-Dichloroethene	1
Cis-1,2-Dichloroethene	1
Tetrachloroethene	3
Trichloroethene	13

HN-13(X)	
Carbon Disulfide	5 J

DG-3	
1,1,1-Trichloroethane	1
1,1-Dichloroethane	1
1,1-Dichloroethene	0.8 J
Tetrachloroethene	3
Trichloroethene	2

DG-13	
1,1,1-Trichloroethane	1
1,1-Dichloroethane	1
1,1-Dichloroethene	0.8 J
Tetrachloroethene	2.5
Trichloroethene	2

DG-12	
1,1-Dichloroethane	0.8 J
1,1-Dichloroethene	0.5 J
Cis-1,2-Dichloroethene	0.6 J
Tetrachloroethene	0.8 J
Trichloroethene	5

HN-80(S)	
1,1-Dichloroethane	2
Cis-1,2-Dichloroethene	0.9 J
Tetrachloroethene	1
Trichloroethene	2

DG-26	
1,1-Dichloroethane	0.7 J
Cis-1,2-Dichloroethene	1
Tetrachloroethene	2
Trichloroethene	10

HN-82(S)	
Carbon Tetrachloride	1

HN-21(S)	
NON DETECT	------

HN-83(S) / MW-04	
1,1,1-Trichloroethane	2
1,1-Dichloroethane	3
1,1-Dichloroethene	3
Chloroform	1
Cis-1,2-Dichloroethene	1
Tetrachloroethene	6
Trichloroethene	13

HN-57(S)	
1,1-Dichloroethane	0.5 J
Carbon Tetrachloride	0.6 J
Chloroform	0.6 J
Cis-1,2-Dichloroethene	3
Tetrachloroethene	1
Trans-1,2-Dichloroethene	0.6 J
Trichloroethene	270

HN-81(S)	
1,1-Dichloroethane	0.7 J
1,1-Dichloroethene	0.5 J

HN-18(S)	
1,1-Dichloroethane	1
Carbon Tetrachloride	1
Cis-1,2-Dichloroethene	2
Tetrachloroethene	2
Trichloroethene	76

HN-60(S)	
NON DETECT	------

HN-32(S)	
Carbon Tetrachloride	1
Chloroform	1
Cis-1,2-Dichloroethene	2
Tetrachloroethene	2
Trans-1,2-Dichloroethene	0.8 J
Trichloroethene	480

HN-31(S)	
Carbon Tetrachloride	1
Chloroform	0.5 J
Cis-1,2-Dichloroethene	2
Tetrachloroethene	2.5
Trichloroethene	170
Trans-1,2-Dichloroethene	1
Chromium	40.1

HN-20(S)	
Trichloroethene	1

WELL 229	
NON DETECT	------

LEGEND

- MONITORING WELL
- WATER SUPPLY WELL
- RESIDENTIAL WELLS

SAMPLE NUMBER	
CHEMICAL	ug/L

DATE	NO.	REVISION	BY

REFERENCE	DWG. NO.

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DRAWN	A.S.M. 2-18-'98
CHECKED	
DESIGN ENGINEER	
PROCESS ENGINEER	
PROJECT MANAGER	N. TEAMERSON
ENGINEERING MANAGER	J. TREPANOWSKI
CLIENT APPROVAL	

Brown & Root Environmental
600 Clark Avenue, Suite 3
King of Prussia, Penna. 19406-1433

SAMPLE RESULTS – AREAS A & D (DECEMBER 1997) SHALLOW WELLS (<75 FEET)

NAWC WARMINSTER
WARMINSTER, PENNSYLVANIA

CLIENT	U.S. NAVY	CONTRACT	5838
SCALE	1 IN. = 250 FT.	DATE	2-18-'98
SHEET	1 OF 1		
DRAWING NO.	5838TM01	ACFILE NAME	PLATE 1

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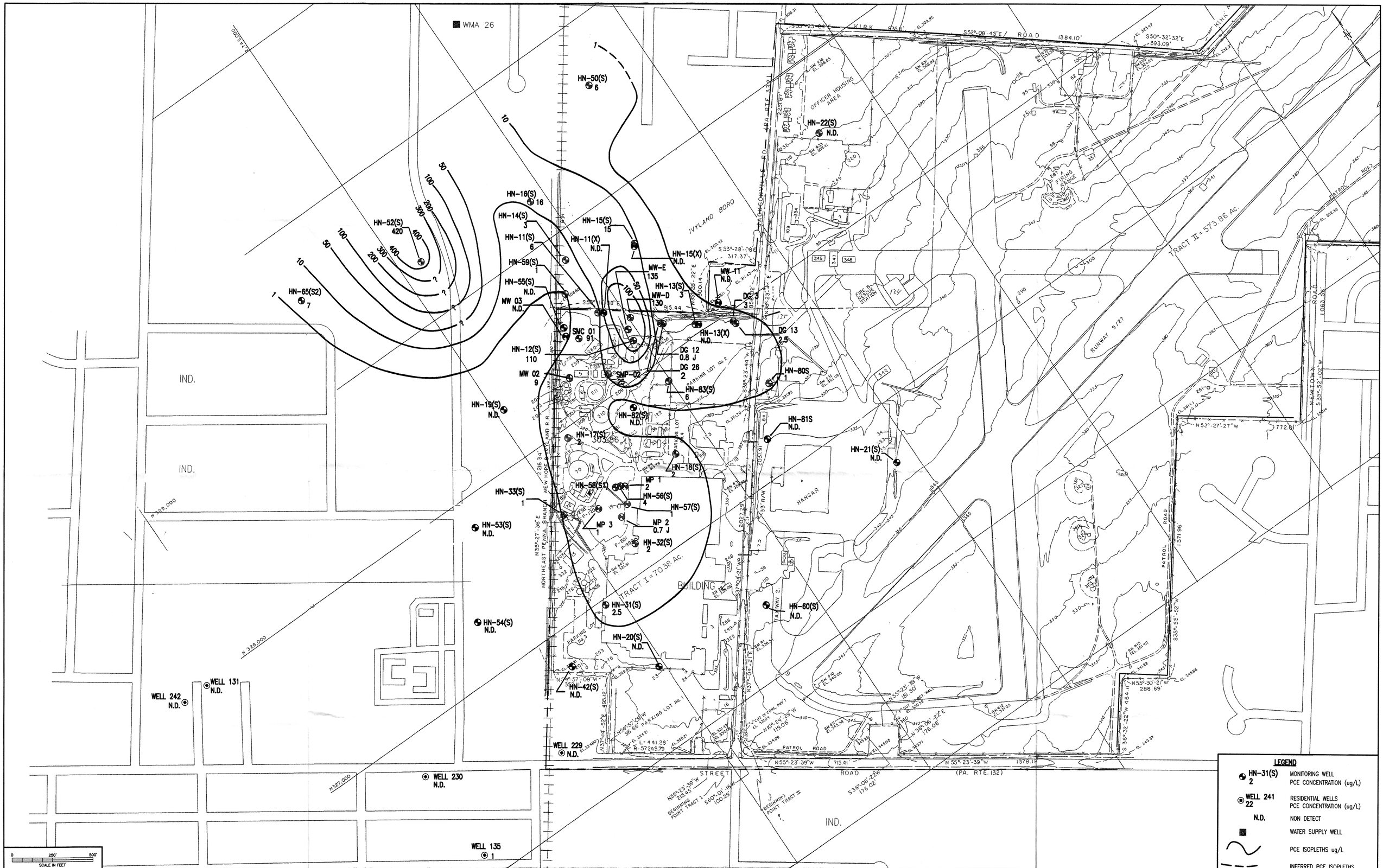

LEGEND

HN-31(S) 2	MONITORING WELL PCE CONCENTRATION (ug/L)
WELL 241 22	RESIDENTIAL WELLS PCE CONCENTRATION (ug/L)
N.D.	NON DETECT
■	WATER SUPPLY WELL
∿	PCE ISOPLETHS ug/L
- - -	INFERRED PCE ISOPLETHS

DATE	NO.	REVISION	BY

REFERENCE | DWG. NO.

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DRAWN	A.S.M.
CHECKED	
DESIGN ENGINEER	
PROCESS ENGINEER	
PROJECT MANAGER	N. TEAMERSON
ENGINEERING MANAGER	J. TREPANOWSKI
CLIENT APPROVAL	

Brown & Root Environmental
600 Clark Avenue, Suite 3
King of Prussia, Penna. 19406-1433

TETRACHLOROETHENE (PCE) ISOPLETHS - DECEMBER 1997
SHALLOW WELLS (<75 FEET)
NAWC, WARMINSTER
WARMINSTER, PENNSYLVANIA

CLIENT: U.S. NAVY		CONTRACT: 5838
SCALE: 1 IN. = 250 FT.	DATE: 2-18-1998	SHEET 2 OF
DRAWING NO.: 5838GM20		ACFILE NAME: PLATE 2

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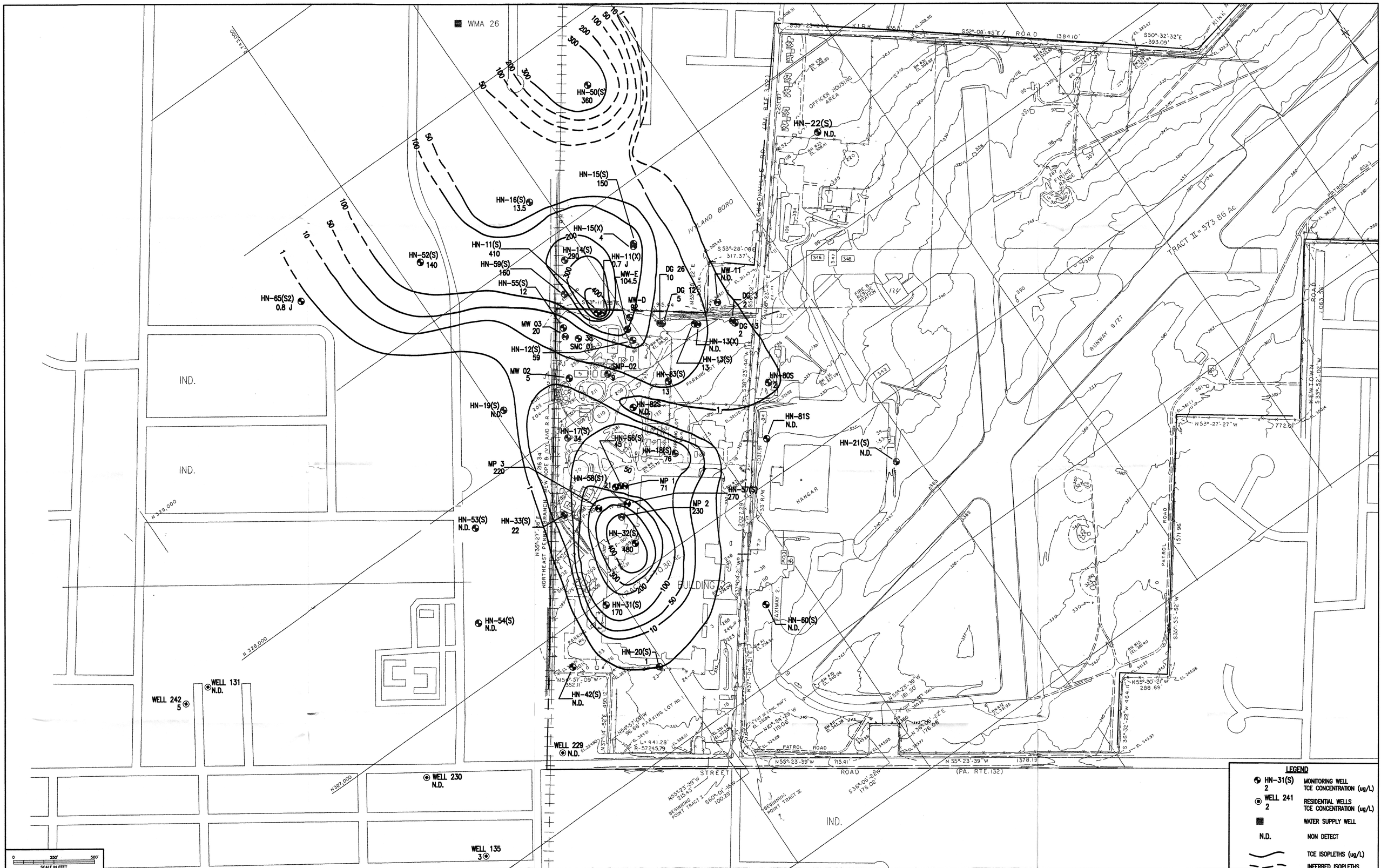

LEGEND

HN-31(S) 2	MONITORING WELL TCE CONCENTRATION (ug/L)
WELL 241 2	RESIDENTIAL WELLS TCE CONCENTRATION (ug/L)
■	WATER SUPPLY WELL
N.D.	NON DETECT
	TCE ISOPLETHS (ug/L)
	INFERRED ISOPLETHS

DATE	NO.	REVISION	BY

REFERENCE	DWG. NO.

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PROCESS ENGINEER	
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ENGINEERING MANAGER	J. TREPANOWSKI
CLIENT APPROVAL	

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TRICHLOROETHENE (TCE) ISOPLETHS – DECEMBER 1997
SHALLOW WELLS (<75 FEET)
NAWC, WARMINSTER
WARMINSTER, PENNSYLVANIA

CLIENT	U.S. NAVY	CONTRACT	5838
SCALE	1 IN. = 250 FT.	DATE	2-18-1998
SHEET	3 OF		
DRAWING NO.	5838GM21	ACFILE NAME	PLATE 3

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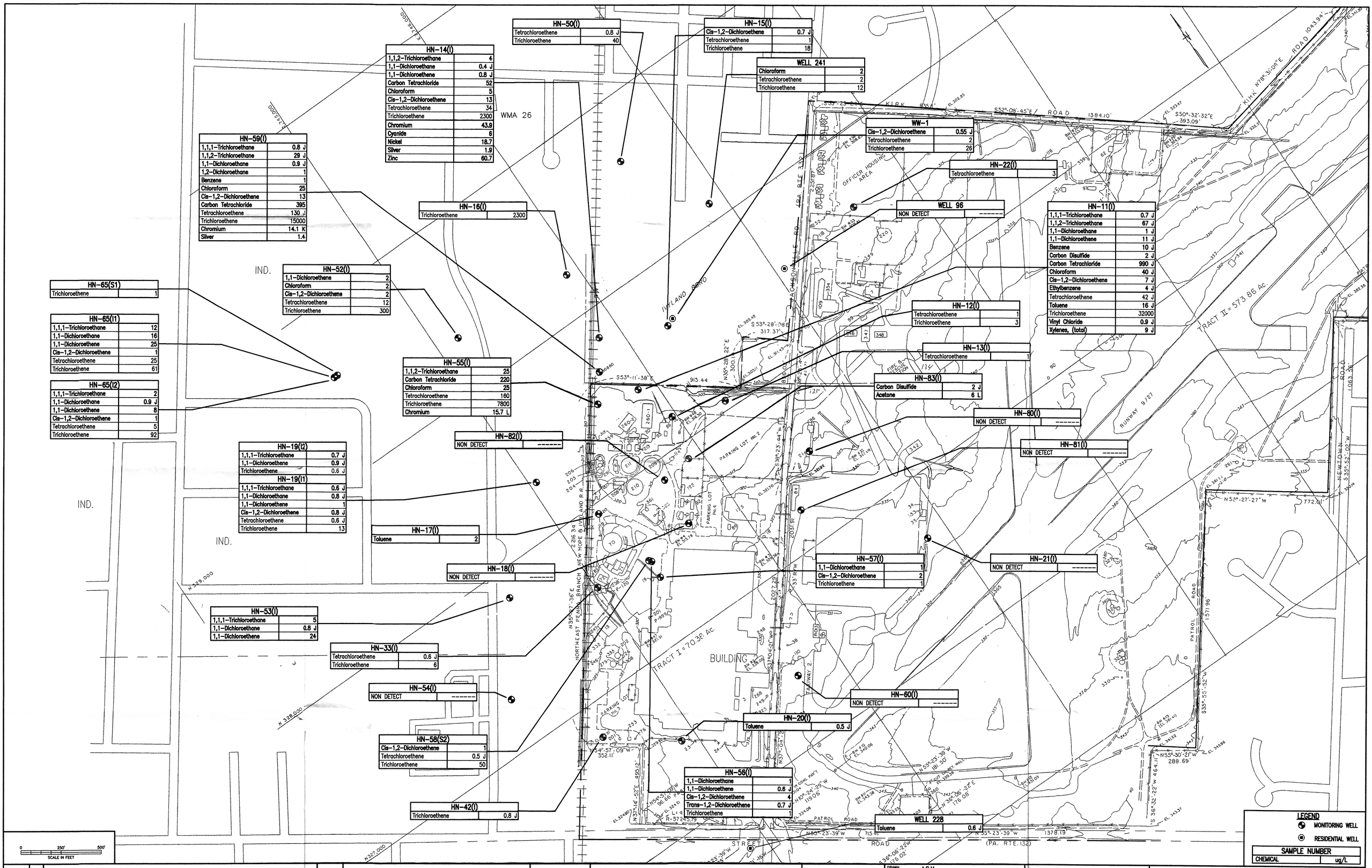

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SAMPLE RESULTS – AREAS A & D (DECEMBER 1997) INTERMEDIATE WELLS (75 – 100 FEET)

NAWC, WARMINSTER
WARMINSTER, PENNSYLVANIA

CLIENT U.S. NAVY
CONTRACT 5838
SCALE 1 IN. = 250 FT.
DATE 2-19-1998
SHEET 1 OF 1
DRAWING NO. 5838TM02
ACFILE NAME PLATE 4

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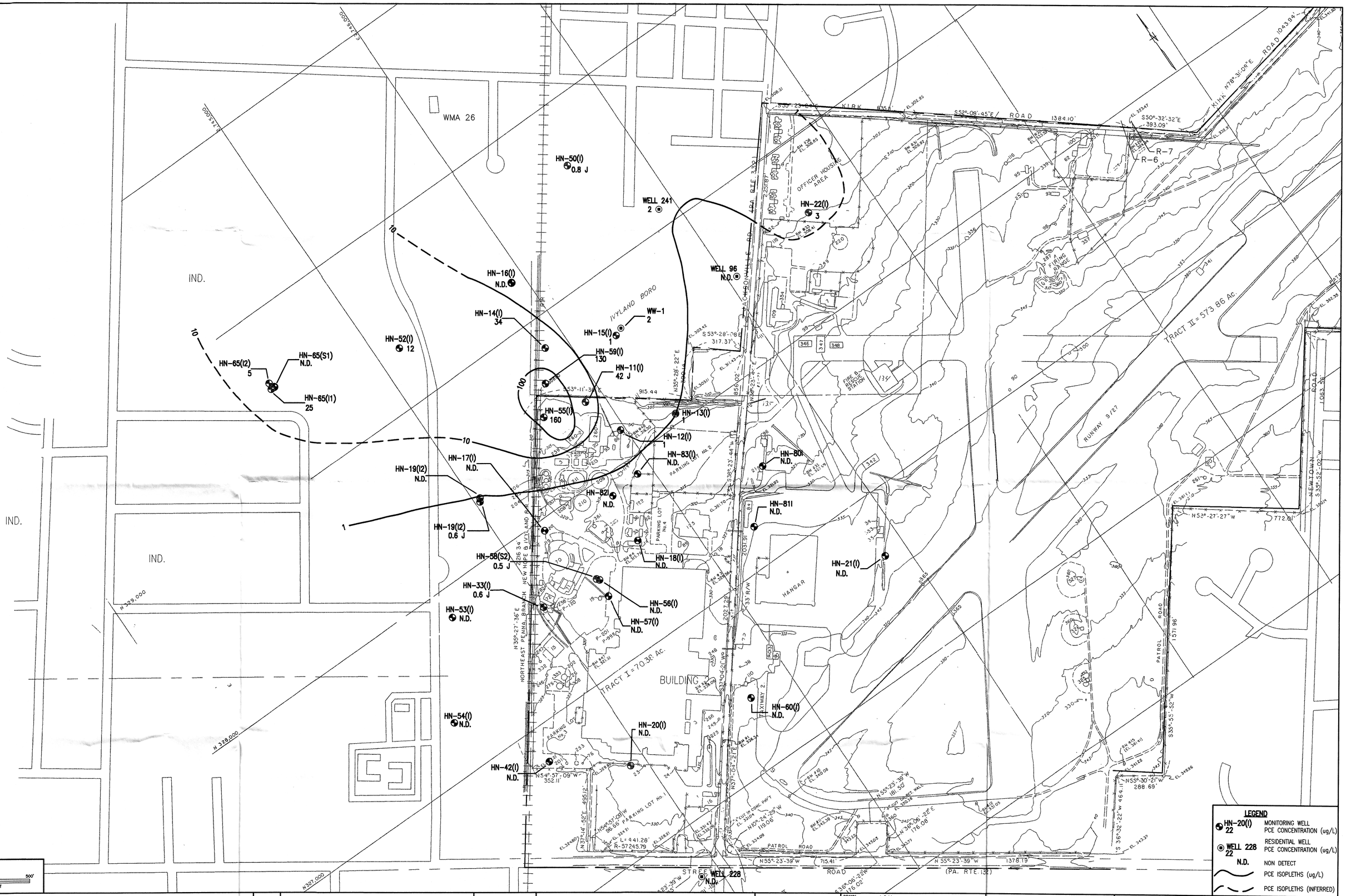

DATE	NO.	REVISION	BY

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TETRACHLOROETHENE (PCE) ISOPLETHS - DECEMBER 1997
INTERMEDIATE WELLS (75 - 100 FEET)

NAWC, WARMINSTER - AREAS A & D
WARMINSTER, PENNSYLVANIA

CLIENT: U.S. NAVY
CONTRACT: 5838
SCALE: 1 IN. = 250 FT.
DATE: 2-20-1998
SHEET 1 OF 1
DRAWING NO. 5838GM22
ACFILE NAME PLATE 5

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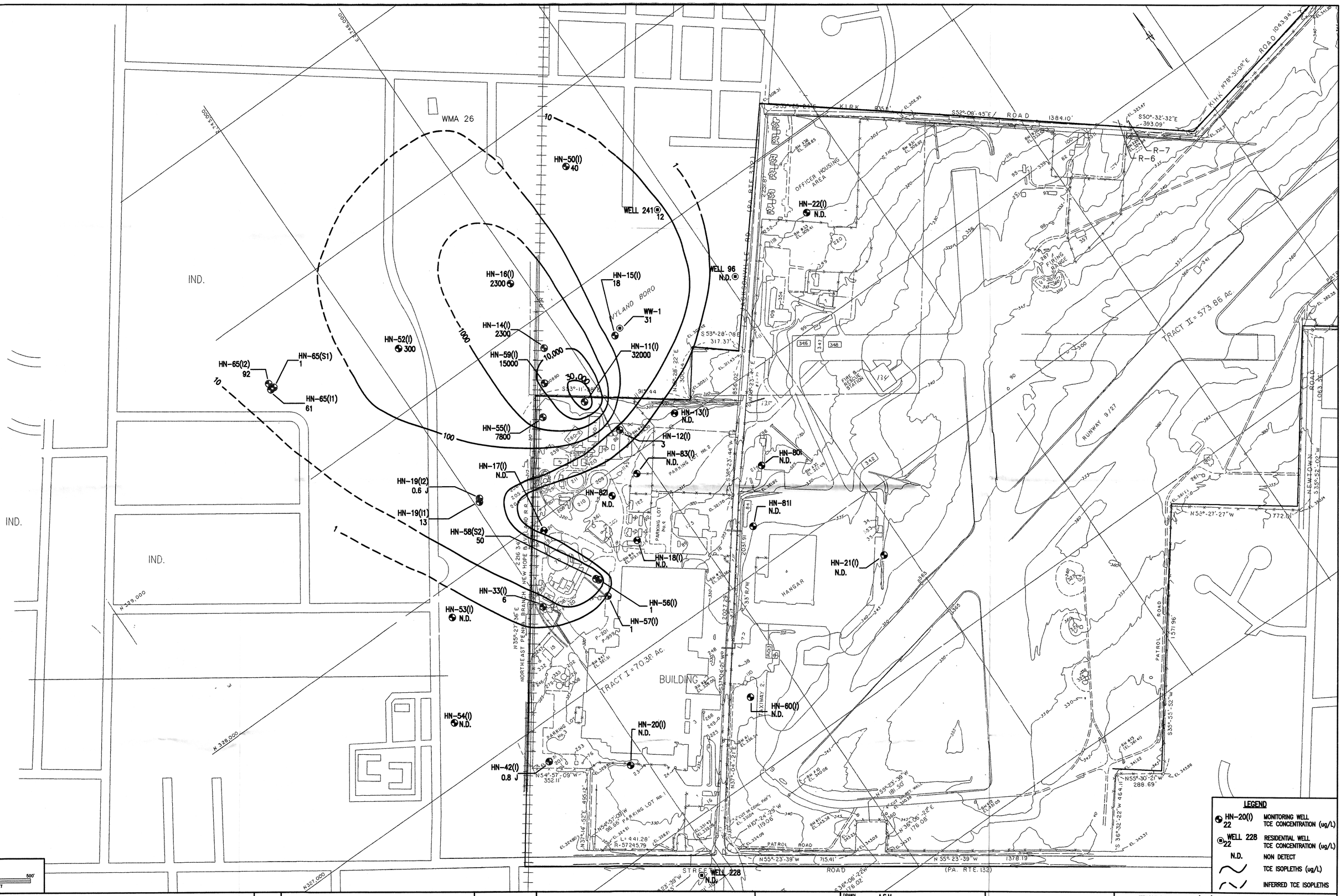

LEGEND

HN-20(I) 22	MONITORING WELL TCE CONCENTRATION (ug/L)
WELL 228 22	RESIDENTIAL WELL TCE CONCENTRATION (ug/L)
N.D.	NON DETECT
	TCE ISOPLETHS (ug/L)
	INFERRED TCE ISOPLETHS

DATE	NO.	REVISION	BY

REFERENCE	DWG. NO.

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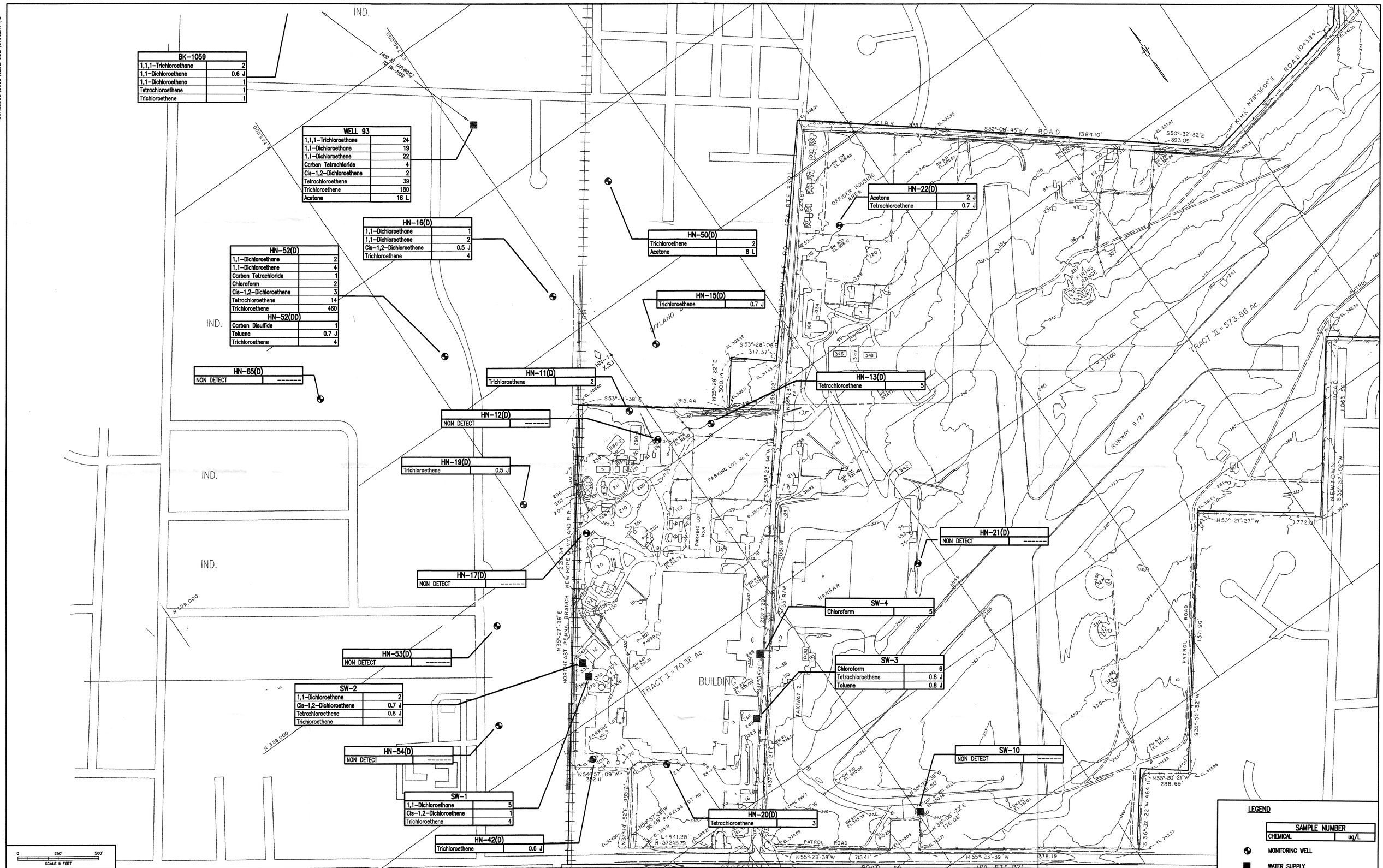
TRICHLOROETHENE (TCE) ISOPLETHS – DECEMBER 1997
INTERMEDIATE WELLS (75 – 150 FEET)
NAWC, WARMINSTER – AREAS A & D
WARMINSTER, PENNSYLVANIA

CLIENT	U.S. NAVY		CONTRACT 5838
SCALE	1 IN. = 250 FT.	DATE 2-20-1998	SHEET 1 OF 1
DRAWING NO.	5838GM23	ACFILE NAME	PLATE 6

P:\AUTOCAD\PROJECTS\5838\5838TM03



LEGEND

SAMPLE NUMBER	
CHEMICAL	ug/L

MONITORING WELL

WATER SUPPLY

DATE	NO.	REVISION	BY

REFERENCE	DWG. NO.

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ENGINEERING MANAGER	J. TREPANOWSKI
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SAMPLE RESULTS – AREAS A & D (DECEMBER 1997) DEEP WELLS (GREATER THAN 150 FT.)

NAWC, WARMINSTER
WARMINSTER, PENNSYLVANIA

CLIENT	CONTRACT
U.S. NAVY	5838
SCALE: 1 IN. = 250 FT.	DATE: 2-18-1998
DRAWING NO.: 5838TM03	ACFILE NAME: PLATE 7

SHEET 1 OF