FINAL

Year 9 Groundwater Monitoring Report
for
Remedial Action Implementation
Area of Concern R-6/7 and R-12

Naval Weapons Station Earle Waterfront Complex
Earle, NJ

March 2008

Prepared for:
Naval Facilities Mid-Atlantic
(NAVFAC)

Prepared By:
ECOR Solutions, Inc.
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West Chester, PA 19380

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Contract No. N62472-03-D-0802
Contract Task Order No. 0017

to

NAVFAC Mid-Atlantic
Environmental Business Line
9742 Maryland Ave., Bldg. A-81
Norfolk Naval Station
Norfolk, VA 23511-3095

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1.0 INTRODUCTION

1.1 General Information

ECOR Solutions, Inc. (ECOR) prepared this Year 9 Groundwater Monitoring Report for the Remedial Action Implementation at Buildings R-6/7 and R-12, for Naval Facilities Mid-Atlantic (NAVFAC) under Contract Number N62472-03-D-0802, Task Order (TO) No. 0017. The purpose of this report is to present and discuss the results of the Year 9 Annual Monitoring Program in connection with the remediation of dissolved-phase benzene in groundwater in the vicinity of Buildings R-6/7 and R-12, located at the Waterfront Complex of the Naval Weapons Station (NWS) Earle (Figure 1).

1.2 Historical Overview

The selected remedial action at Buildings R-6/7/12 is monitored natural attenuation. The New Jersey Department of Environmental Protection (NJDEP) approved the Remedial Action Work Plan (RAWP) and Classification Exception Area (CEA) documents for the Site in 1998. The CEA encompasses groundwater contamination from previously used underground storage tank (UST) systems containing gasoline, diesel fuel, and No. 2 fuel oil. The plume of contamination includes weathered free-phase fuel oil, dissolved-phase benzene, total xylenes, ethylbenzene and methyl tert-butyl ether (MTBE). The horizontal extent of the free-phase fuel oil encompasses an area of approximately 560 square feet.

Buildings R-6 and R-7 were the Waterfront Complex's vehicle refueling center. Between 1995 and 1998, the refueling center was closed, the buildings were demolished, USTs were removed, and a parking lot was constructed at the same location. Dissolved-phase petroleum-related groundwater contamination occurs within the area.

Building R-12, currently the Inshore Boat Unit (IBU) 24, is located south of the parking lot and the former location of Buildings R-6/7. In 1995, a leaking 2,000-gallon No. 2 fuel oil UST system was discovered at the northeastern corner of Building R-12. The UST was located within a few feet of the building foundation, so it was abandoned in-place. A limited area of free phase product was encountered within the vicinity of the abandoned-in-place UST.

Between 1995 and 1999, the Navy completed various investigations to delineate the extent of the contamination and evaluate appropriate remedial response actions at both areas. Due to the close proximity of the areas to each other, combined RAWP and CEA documents were established and simultaneous remedial actions are underway.

The results of the first year monitoring indicated that the plume of dissolved-phase petroleum-related groundwater contamination had not expanded, and no significant changes in groundwater quality were observed between 1998 and 1999. However, groundwater levels suggested the presence of a groundwater discharge zone, within the vicinity of the northwestern area of the CEA. At the Navy's request, TtNUS reviewed available information and identified a groundwater sump in the basement of building R-1,

which is located just outside of the northwestern boundary of the CEA. The estimated elevation of the sump is similar to the groundwater elevations observed in the monitoring wells within the CEA. TtNUS concluded that the sump in Building R-1 was intercepting groundwater within the area. The Navy subsequently included the R-1 sump in the periodic sampling program during Years 2 through 5. Sampling of the sump groundwater was discontinued in Year 6.

2.0 CEA SUMMARY

2.1 General Information

The CEA documents list the following general Area of Concern (AOC) information for the R-6/7 Site and R-12 Site:

- **Site Name/Location:**
  AOC R-6/7 and AOC R-12, Naval Weapons Station Earle; Monmouth County, New Jersey.
- **Site Identification Number**:
  AOC R-6/7 Spill Case Number: 90-09-10-1044
  AOC R-12 Spill Case Number: 95-10-18-1453-54
- **NJDEP Case Manager**: Steve Maybury
- **Site Contact Person**: Eric Helms
- **Lead Program:** NJDEP - Bureau of Federal Case Management
- **Aquifer/Formation Impacted:** Englishtown/Englishtown
- **Aquifer Classification:**
  Groundwater for the Waterfront Complex of the NWS Earle facility is classified as Class II-A.
- **Contaminants Exceeding Applicable Ground Water Quality Standards (GWQS)**: Benzene, ethylbenzene, xylene, and MTBE.
- **Projected Longevity of the CEA**: 20 years

2.2 Site Location and CEA Description

The AOC is located at the Waterfront Complex of the NWS Earle facility (Figure 1). According to the Middletown Township Tax Office, the waterfront area is designated as Block 306, Lot 45. The affected area is a parcel containing approximately three acres. Historically, the R-6/7 area has been used as a fuel dispensing station. Currently, the area is overlain by an asphalt parking lot and associated roadways. The area is bounded to the west by Buildings R-1 and R-2 and to the east by Normandy Road. The area is bounded to the north and south by asphalt parking lots. The CEA boundaries and surface features are presented in Figure 2. The approximate center of the CEA may be found at the intersection of latitude 40^{o} 25' 09.13" and longitude 74^{o} 04' 14.07".

3.0 GROUNDWATER MONITORING PROGRAM

3.1 CEA Monitoring Program Overview

The monitoring program specified in the CEA consists of the following:

- Short-term monitoring at wells R6/7-MW-102, R6/7-MW-104, R6/7-MW-105, R6/7-MW-106, R6/7-MW-107, R6/7-MW-109, R6/7-MW-112, R6/7-MW-04, R12-RC-01, and MW6-01 throughout the implementation of the free-product recovery remedial program, followed by a minimum of four and a maximum of eight consecutive quarters after the free-product recovery remedial activities commenced.

- Long-term monitoring will be conducted after sufficient data are obtained through quarterly sampling. Long-term monitoring will consist of annual sampling of groundwater from select monitoring wells until the site attains contaminant concentrations below NJDEP GWQS. At that point, groundwater monitoring will occur on a quarterly basis until the results of two consecutive quarters show no contamination above NJDEP GWQS.

- All groundwater samples will be analyzed for benzene, ethylbenzene, toluene, xylenes, and MTBE via EPA Method 624 by a New Jersey certified laboratory.

- Field analyses will be performed during sample acquisition. Dissolved oxygen (DO), pH, temperature, turbidity, Oxidation Reduction Potential (ORP), and conductivity will be measured using field instruments and recorded for all groundwater samples.

- Groundwater monitoring reports will be submitted to NJDEP on an annual basis. The reports will include a tabulation of all sample results received during the reporting period pursuant to New Jersey Administrative Code (N.J.A.C.) 7:26E-3.13(c)3 and will provide a brief narrative summarizing the data and presenting conclusions. In the event a non-compliance with the RAWP is identified (e.g., hydrocarbons are detected in a down gradient compliance well), NJDEP will be notified as soon as possible after detection.

3.2 Modifications to the CEA Monitoring Program

Site conditions observed during Year 1 necessitated some minor modifications to the monitoring program, as follows:

- Measurement of groundwater levels was expanded from 10 wells to 14 wells. The additional data were required to more accurately determine and evaluate the groundwater flow direction.

- Sampling activities at the R12 recovery wells were impacted by the Navy's ongoing passive free-product recovery operations. One of the recovery wells (RC-01, RC-02, or RC-03) will be sampled and analyzed each quarter, depending on which recovery well is in operation.

- Sampling and analysis of groundwater from the sump in the basement of Building R-1 were added to the monitoring program.

There were no modifications to the monitoring program as a result of Year 2 site conditions. However, site conditions observed during Year 3 necessitated additional modifications to the monitoring program, as follows:

- The sampling frequency of the short-term groundwater monitoring program was reduced to annual sampling with continued product recovery.

- Sentry wells MW6-01 and R6/7-MW-112 were removed from the monitoring program after approval from NJDEP. However NJDEP recommended that sentry well R6/7-MW-106 be retained as part of the ongoing monitoring program (Appendix A).

There were no modifications to the monitoring program as a result of Year 4 site conditions. Observations during Year 5 necessitated some minor modifications to the monitoring program, as follows:

- Operation of Building R-12 area passive recovery system was discontinued during the Year 5 sampling period due to diminished recoverable product. The Navy's summary report (Final Building R-12 Skimmer System Status Report, Foster Wheeler Environmental Corporation, April 17, 2003) was accepted by NJDEP.

- Monitoring well R6/7-MW-105 was removed for construction of Station security access improvements. The well was abandoned by a licensed New Jersey driller.

The Year 6 monitoring program included wells R6/7-MW-04, R6/7-MW-102, R6/7-MW-104, R6/7-MW-106, R6/7-MW-107, R6/7-MW-109, and R12-RC-03. Minor modifications to the monitoring program, were as follows:

- Recovery well R12-RC-03 was sampled rather than well R12-RC-01 or well R12-RC-02 since both have been destroyed during construction activities for the new security building.

- Napthalene analysis was discontinued for all monitoring wells.

Modifications were made to the Year 7 monitoring program as a result of site conditions. The Year 7 monitoring program included wells R6/7-MW-102, R6/7-MW-106, R6/7-MW-107, and R12-RC-03.

- Monitoring wells R6/7-MW-04, R6/7-MW-104 and R6/7-MW-109 were removed from the monitoring program. The wells were abandoned by a licensed New Jersey driller in November 2005.

The Year 8 monitoring program included wells R6/7-MW-102, R6/7-MW-106, R6/7-107 and R12-RC-03. R12-RC-03 was not sampled because product was detected during ground water gauging. There were no modifications as a result of Year 8 site conditions.

4.0 DISCUSSION OF RESULTS

4.1 Technical Overview

The Year 9 Annual Groundwater Monitoring Program at Buildings R-6/7 and R-12 was implemented in accordance with the CEA documents modified as discussed in Section 3.2. The annual samples were collected and sent to the laboratory on 14 November 2007. No modifications were made to the Year 9 monitoring program. The Year 9 monitoring program included wells R6/7-MW-102, R6/7-MW-106, R6/7-MW-107, and R12-RC-03. Well R12-RC-03 was not sampled as product was detected during the gauging event.

4.1.1 Analytical Results and Groundwater Flow Direction

Table 1 provides Year 9 analytical results. Table 2 provides a summary of the analytical results for all sampling rounds (Year 1 through Year 9). Figure 3 depicts the locations of the wells and the corresponding data for Year 9. Figure 4 depicts groundwater contours and apparent groundwater flow direction for the annual monitoring event.

In general, the analytical results (Table 1) indicate the following:

- No target analytes were detected in sentry well R-6/7-MW-102. However, MTBE was detected at a concentration of 0.58 J µg/L in sentry well R-6/7-MW-106 during the Year 9 sampling event.

- Benzene, ethylbenzene and xylenes were observed in monitoring well R-6/7-MW-107 at concentrations above the NJDEP GWQS during the Year 9 sampling event. Toluene and MTBE were detected but did not exceed the NJDEP GWQS.

- The presence of product in recovery well R-12-RC-03 prevented sampling from this monitoring well in Year 9. The product thickness was determined to be less than 0.01ft.

The groundwater elevations and contours from the Year 9 measurements changed only slightly from the Year 8 measurements. Consistent with previous data, Year 9 measurements indicated a general flow from the south to the north within the AOC as shown on Figure 4.

The laboratory analytical results for all samples are included in Appendix B. The validation reports are included in Appendix C. Sample logs and field notes are included in Appendix D.

4.2 Field Sampling and Analytical Methods

The field sampling was completed by ECOR staff. Sampling activities were conducted in accordance with the methods described in the following NJDEP guidance documents:

- August, 2005 Field Sampling Procedures Manual (FSPM)
- July, 1994 Alternative Groundwater Sampling Techniques Guide (AGSTG)
- July, 1994 Field Analysis Manual (FAM)

The sample logs (Appendix D) document sample dates and times, field analysis results, depth to groundwater measurements, purge volumes, and site-specific observations relevant to interpretation of the analytical results.

Quality assurance (QA) samples were collected during each sampling round. The QA samples included one trip blank per sample shipment group, and one rinsate blank per sampling day. Sample container and sample holding times were maintained in accordance with NJDEP guidelines.

Annual monitoring at R-6/7 and R-12 was performed concurrently with the quarterly monitoring program conducted for Buildings C-17/20/16/50. These areas have also been approved by NJDEP as CEAs with groundwater remediation monitoring programs. All samples obtained were analyzed for BTEX and MTBE by EPA Method 624. All samples for the Year 9 annual sampling event (November 2007) were analyzed by Analytical Laboratory Services in Middletown, Pennsylvania.

4.3 Data Validation

Third-party, independent data validation was performed on all of the analytical results from the Year 9 groundwater monitoring program. The data validation was performed in accordance with U. S. Environmental Protection Agency (EPA) Region 2 and NJDEP guidelines. Validated data is presented in Appendix C.

No quality problems were identified that would impact the reliability of the data and the conclusions reached based on the data.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Review of sample results and observations from the Year 9 monitoring program and review of historical data from previous investigations yield the following conclusions:

The Year 1 through Year 9 monitoring data indicate that the plume of dissolved-phase groundwater contamination is not expanding. In general, the Year 9 annual monitoring data indicate very similar groundwater quality in comparison with the conditions observed during monitoring for Year 8.

The interpreted groundwater contours for Year 9 indicate that groundwater flow direction is similar to the interpreted groundwater flow direction observed during Year 8. The groundwater flow and groundwater quality data obtained during Years 1 through 9 supports the general conclusion that the contaminants are not migrating beyond the extent of the CEA boundary. Contamination migration beyond well R-6/7-MW-102, located at the northern down gradient boundary of the CEA, is not indicated, as all target analytes were not detected at this well. At well R-6/7-MW-107 analyte levels of BTEX and MTBE were all detected at levels consistent with historical data. Benzene, ethylbenzene and xylenes were all detected above the respective NJDEP GWQS at well R-6/7-MW-107. At well R-6/7-MW-106, MTBE was detected below the GWQS at an estimated concentration of 0.58 J µg/L. All other target analytes were not detected at well R-6/7-MW-107. Recovery well R-12-RC-03 was not sampled due to the presence of product in the well.

5.2 Recommendations

ECOR recommends continuation of annual groundwater sampling. Based on site conditions observed during the ninth year of the monitoring program and levels of all contaminants being detected below the GWQS for the last nine years, ECOR recommends removal of sentry wells R6/7-MW-102, and R6/7-MW-106 from the monitoring program. Sampling and analysis at wells R6/7-MW-107 and R12-RC-03 should be maintained.

TABLES

TABLE 1
SAMPLE DATA SUMMARY
YEAR 9 GROUNDWATER MONITORING
BUILDINGS R-6/7 AND R-12
NWS EARLE, NEW JERSEY
NOVEMBER 2007

	Compounds					
	Benzene	**Ethylbenzene**	**Naphthalene**	**Toluene**	**Xylenes**	**MTBE**
	(ug/l)	**(ug/l)**	**(ug/l)**	**(ug/l)**	**(ug/l)**	**(ug/l)**
NJDEP GWQS	**1**	**700**	**300**	**1,000**	***40 / 1,000**	**70**
Well ID						
R-12-RC-03	N.S.	N.S.	N.A.	N.S.	N.S.	N.S.
R-6/7-MW-102	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.
R-6/7-MW-106	N.D.	N.D.	N.A.	N.D.	N.D.	0.58 J
DUP-2 (R-6/7-MW-106)	N.D.	N.D.	N.A.	N.D.	N.D.	0.52 J
R-6/7-MW-107	**449**	**1010**	N.A.	207	**1880**	29.1

Groundwater Quality Criteria is from the New Jersey Department of Environmental Protection (NJDEP) Groundwater Quality Criteria for Class II-A Groundwater (N.J.A.C. 7:9-6). Unless otherwise noted, the criteria used are the Higher of the Practical Quantitation Levels (PQLs) and Groundwater Quality Criteria.

Analytes with concentrations greater than the NJDEP Groundwater Quality Criteris are highlighted in bold.

*Criterion for total xylenes is NJDEP Maximum Contaminant Level (MCL) of 1,000 ug/L as of 5 February 1997. Previous reports used a value of 40 ug/L, so the limit was kept for historical reference.

N.D.: Not Detected

N.A.: Not Analyzed

N.S.: Not Sampled

TABLE 2
HISTORICAL DATA SUMMARY
YEAR 1 THROUGH YEAR 9 GROUNDWATER MONITORING
BUILDINGS R-6/7 AND R-12
NWS EARLE, NEW JERSEY

Location	Compounds						Groundwater Levels		
	Benzene (ug/l)	Ethylbenzene (ug/l)	Naphthalene (ug/l)	Toluene (ug/l)	Xylenes (ug/l)	MTBE (ug/l)	Elevation Top of Casing (feet)	Depth to GW (1) (feet)	Adjusted Groundwater Elevation (feet)
NJDEP GWQS	**1**	**700**	**300**	**1,000**	***40 / 1,000**	**70**			
R-12-RC-02									
Nov-03	N.D.	5.6	10	N.D.	9.2	N.D.	17.35	N.M.	---
Aug-01	**23**	180	**450**	59	**237**	20	17.35	N.M.	---
Nov-00	N.D.	47.5	165	N.D.	**57.8**	N.D.	17.35	9.05	8.3
Nov-00-Dup	N.D.	47.9	171	N.D.	**57.9**	N.D.	17.35	9.05	8.3
Aug-00	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	17.35	8.65	8.7
R-12-RC-03**									
Nov-07	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	17.35	9.43/+	7.91+
Nov-06	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	17.35	7.81/7.92 (1)	9.52 (2)
Dec-05*	N.D.	0.87 J	N.D.	0.21 J	3.4	ND	17.35	8.71	8.64
Nov-04*	N.D.	6.3	N.A.	N.D.	25.0	N.D.	17.35	8.88	8.47
Nov-02*	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	17.35	8.68/8.81 (1)	8.66 (2)
May-00*	**43***	59*	235*	13.1*	**179***	N.D.*	17.35	8.4	8.95
R-12-RC-02									
Feb-00	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	17.35	9.12	8.23
Nov-99	**6.2**	70.6	258	22	**258**	N.D.	17.35	9.32/9.46 (1)	8.01 (2)
Aug-99	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	17.35	---	---
May-99	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	17.35	---	---
Feb-99	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	17.35	---	---
R-12-RC-01									
Nov-03	N.S.	N.S.	N.A.	N.S.	N.S.	N.S.	17.08	8.54	8.54
Nov-01	**35.4**	75.7	183	5	**208**	N.D.	17.08	11.6 (3)	5.48
May-01	N.D.	24 J	56	N.D.	**146**	N.D.	17.08	8.43	8.65
Feb-01	N.D.	45	160	5.8	**47**	N.D.	17.08	3.11	13.97
Nov-00	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	17.08	N.M.	---
Aug-00	**10.8**	59	202	7.4	**183**	N.D.	17.08	N.M.	---
May-00	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	17.08	N.M.	---
Feb-00	**13.4**	56.9	193	N.D.	**134**	N.D.	17.08	9.2	7.88
Nov-99	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	17.08	N.M.	---
Aug-99	**26.1**	81.3	**399**	9	**306**	N.D.	17.08	9.65/12.05 (1)	7.07 (2)
May-99	**58**	102	N.A.	16.4	**291**	N.D.	17.08	8.5/10.58	8.27 (2)
Feb-99	**63.5**	83.2	N.A.	21.5	**295**	3.5	17.08	8.66/9.64 (1)	8.27 (2)
R-6/7-MW-102									
Nov-07	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	12.48	7.90	4.58
Nov-06	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	12.48	7.05	5.43
Dec-05	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.48	7.48	5.00
Nov-04	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	12.48	7.85	4.63
Nov-03	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.48	7.70	4.78
Nov-02	N.D.	N.D.	N.D.	N.D.	N.D.	0.6 J	12.48	6.66	5.82
Nov-01	N.D.	N.D.	N.D.	N.D.	N.D.	0.67 J	12.48	7.68	4.8
Aug-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.48	6.71	5.77
May-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.48	6.83	5.65
May-01-Dup	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.48	N.M.	---
Feb-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.48	6.56	5.92
Nov-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.48	7.08	5.4
Aug-00	N.D.	N.D.	N.D.	N.D.	N.D.	0.91	12.48	6.68	5.8
Aug-00-Dup	N.D.	N.D.	N.D.	N.D.	N.D.	0.86	12.48	6.68	5.8
May-00	N.D.	N.D.	N.D.	N.D.	N.D.	0.76	12.48	7.79	4.69
Feb-00	N.D.	N.D.	N.D.	N.D.	N.D.	1.7	12.48	7.14	5.34
Nov-99	N.D.	N.D.	N.D.	N.D.	N.D.	1.5	12.48	7.21	5.27
Aug-99	N.D.	N.D.	N.D.	N.D.	N.D.	1.3	12.48	7.58	4.90
May-99	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	12.48	7.12	5.36
Feb-99	N.D.	N.D.	N.A.	N.D.	N.D.	0.78	12.48	6.82	5.66

TABLE 2
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BUILDINGS R-6/7 AND R-12
NWS EARLE, NEW JERSEY

Location	Compounds						Groundwater Levels		
	Benzene (ug/l)	Ethylbenzene (ug/l)	Naphthalene (ug/l)	Toluene (ug/l)	Xylenes (ug/l)	MTBE (ug/l)	Elevation Top of Casing (feet)	Depth to GW (1) (feet)	Adjusted Groundwater Elevation (feet)
NJDEP GWQS	**1**	**700**	**300**	**1,000**	***40 / 1,000**	**70**			
R-6/7-MW-104									
Nov-04	N.D.	N.D.	N.A.	N.D.	N.D.	0.70 J	16.60	8.20	8.40
Nov-03	N.D.	N.D.	N.D.	N.D.	N.D.	3.3	16.60	8.17	8.43
Nov-02	0.6 J	N.D.	N.D.	N.D.	N.D.	3.4	16.60	8.19	8.41
Nov-01	0.73 J	N.D.	N.D.	N.D.	N.D.	2.1	16.60	9.43	7.17
Aug-01	**1 J**	N.D.	2.6	N.D.	N.D.	N.D.	16.60	8.69	7.91
May-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.60	7.84	8.76
Feb-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.60	7.87	8.73
Nov-00	N.D.	N.D.	N.D.	N.D.	N.D.	2	16.60	8.78	7.82
Aug-00	**1.4**	N.D.	N.D.	N.D.	N.D.	1.8	16.60	3.13	13.47
May-00	**1.1**	N.D.	N.D.	N.D.	N.D.	1.5	16.60	8	8.6
Feb-00	**1**	N.D.	N.D.	N.D.	N.D.	1.6	16.60	8.52	8.08
Nov-99	**4.1**	N.D.	N.D.	N.D.	N.D.	2.2	16.60	8.88	7.72
Aug-99	**7.3**	N.D.	N.D.	N.D.	N.D.	2.5	16.60	9.33	7.27
May-99	**7.7**	N.D.	N.A.	N.D.	N.D.	N.D.	16.60	8.16	8.44
Feb-99	**6.1**	N.D.	N.A.	N.D.	N.D.	2.6	16.60	8.30	8.30
R-6/7-MW-105									
Nov-03	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20.06	11.26	8.80
Nov-02	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20.06	11.3	8.76
Nov-01	N.D.	N.D.	N.D.	N.D.	N.D.	0.71 J	20.06	12.55	7.51
Aug-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20.06	11.75	8.31
May-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20.06	N.M.	---
Feb-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20.06	10.92	9.14
Nov-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20.06	11.97	8.09
Aug-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20.06	>10.34	---
May-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20.06	10.91	9.15
Feb-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20.06	11.59	8.47
Nov-99	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20.06	12.06	8.00
Aug-99	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20.06	12.5	7.56
May-99	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	20.06	11.2	8.86
Feb-99	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	20.06	>10.12	---
Feb-99-Dup	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	20.06	N.M.	---
R-6/7-MW-106									
Nov-07	N.D.	N.D.	N.A.	N.D.	N.D.	0.58 J	16.62	12.45	4.17
Nov-07-(Dup-2)	N.D.	N.D.	N.A.	N.D.	N.D.	0.52 J	16.62	12.45	4.17
Nov-06	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	16.62	10.39	6.23
Dec-05	N.D.	N.D.	N.D.	N.D.	N.D.	1.1	16.62	10.88	5.74
Nov-04	N.D.	N.D.	N.A.	N.D.	N.D.	0.83 J	16.62	10.81	5.81
Nov-03	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.62	11.43	5.19
Nov-02	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	16.62	10.64	5.98
Nov-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.62	11.66	4.96
Aug-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.62	11.26	5.36
May-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.62	10.68	5.94
Feb-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.62	10.4	6.22
Nov-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.62	11.02	5.6
Aug-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.62	10.53	6.09
May-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.62	10.63	5.99
Feb-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.62	10.98	5.64
Nov-99	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.62	11.14	5.48
Aug-99	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.62	11.53	5.09
May-99	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	16.62	11.00	5.62
May-99-Dup	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	16.62	11.00	5.62
Feb-99	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	16.62	10.59	6.03

TABLE 2
HISTORICAL DATA SUMMARY
YEAR 1 THROUGH YEAR 9 GROUNDWATER MONITORING
BUILDINGS R-6/7 AND R-12
NWS EARLE, NEW JERSEY

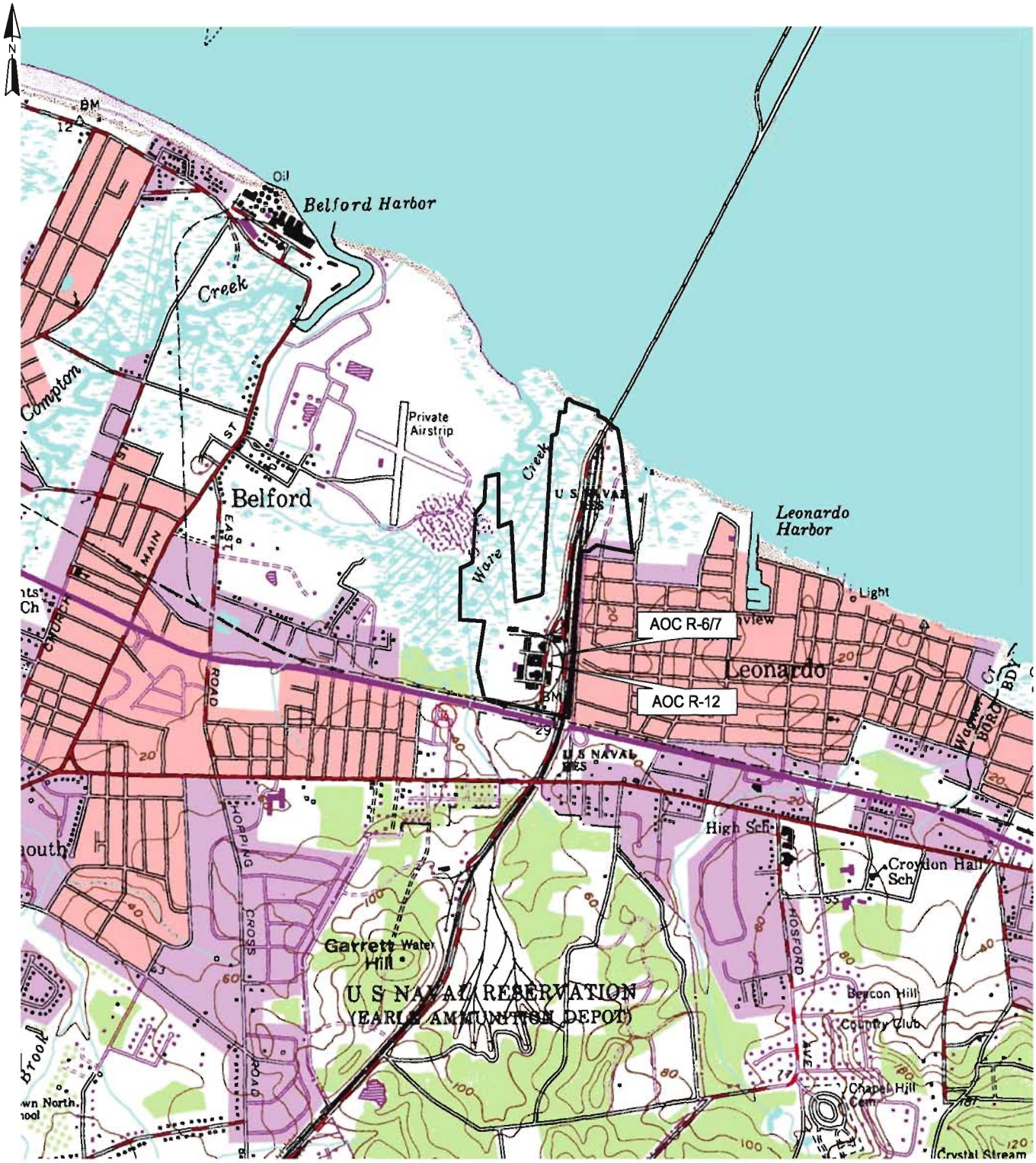
Location	Compounds						Groundwater Levels		
	Benzene (ug/l)	Ethylbenzene (ug/l)	Naphthalene (ug/l)	Toluene (ug/l)	Xylenes (ug/l)	MTBE (ug/l)	Elevation Top of Casing (feet)	Depth to GW (1) (feet)	Adjusted Groundwater Elevation (feet)
NJDEP GWQS	**1**	**700**	**300**	**1,000**	***40 / 1,000**	**70**			
R-6/7-MW-107									
Nov-07	**449**	**1010**	N.A.	207	**1880**	29.1	14.98	9.30	5.68
Nov-06	**400**	**790**	N.A.	220	**1700**	N.D.	14.98	8.93	6.05
Dec-05	**480**	**930**	160	300	**1800**	N.D.	14.98	9.32	5.66
Dec-05-Dup	**480**	**900**	160	300	**1800**	21 J	14.98	9.32	5.66
Nov-04	**543**	**880**	N.A.	263	**1530**	40.7	14.98	9.47	5.51
Nov-03	**723**	**1000**	177	365	**2360**	67	14.98	9.93	5.05
Nov-02	**999**	**961**	212	374	**2040**	**153**	14.98	9.82	5.16
Nov-01	**1090**	**1010**	**305**	432	**1920**	**156**	14.98	9.97	5.01
Nov-01-Dup	**1130**	**1030**	**316**	440	**2030**	**174**	14.98	N.M.	---
Aug-01	**470**	570	250	330	**1880**	**130**	14.98	9.58	5.4
Aug-01-Dup	**1200**	**990**	**470**	**1500**	**3900**	**170**	14.98	N.M.	---
May-01	**2000**	**1600 J**	100	**1400 J**	**5300**	**100**	14.98	9.02	5.96
Feb-01	**1100**	**1200**	**400**	710	**3160**	**140**	14.98	8.73	6.25
Feb-01-Dup	**1200**	**1300**	**410**	780	**3430**	**190**	14.98	N.M.	---
Nov-00	**1240**	**856**	232	456	**2250**	**143**	14.98	9.29	5.69
Aug-00	**1190**	**1150**	**311**	622	**3210**	**129**	14.98	8.90	6.08
May-00	**1440J**	**1460J**	**344J**	918J	**3620**	**86.5J**	14.98	8.98	6
May-00-Dup	**1380J**	**1360J**	**346J**	851J	**3880J**	**87J**	14.98	8.98	6
Feb-00	**938**	**821**	196	441	**2320**	**73.8**	14.98	9.31	5.67
Feb-00-Dup	**956**	**830**	212	448	**2350**	**72.9**	14.98	9.31	5.67
Nov-99	**1550 J**	**1080**	254	630	**2720**	**186**	14.98	9.49	5.49
Nov-99-Dup	**1260**	**846**	201	475	**4060**	**193**	14.98	9.49	5.49
Aug-99	**1380**	**964**	242	524	**2530**	**213**	14.98	9.85	5.13
Aug-99-Dup	**1190**	**857**	N.D.	504	**2370**	**249**	14.98	9.85	5.13
May-99	**1870**	**1710**	N.A.	**1150**	**5040**	N.D.	14.98	9.25	5.73
Feb-99	**1400 J**	**1200 J**	N.A.	798 J	**3510 J**	**312 J**	14.98	8.95	6.03
R-6/7-MW-109									
Nov-04	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	21.89	16.35	5.54
Nov-03	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	21.89	16.42	5.47
Nov-02	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	21.89	15.79	6.10
Nov-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	21.89	16.82	5.07
Aug-01	N.D.	N.D.	N.D.	4.6	2.8 J	N.D.	21.89	16.30	5.59
May-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	21.89	15.85	6.04
Feb-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	21.89	17.74	4.15
Nov-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	21.89	16.17	5.72
Aug-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	21.89	15.77	6.12
May-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	21.89	15.91	5.98
Feb-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	21.89	16.18	5.71
Nov-99	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	21.89	16.35	5.54
Aug-99	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	21.89	16.67	5.22
May-99	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	21.89	16.46	5.43
Feb-99	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	21.89	>15.35	---
R-6/7-MW-112									
Nov-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.02	7.02	5.00
Aug-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.02	6.69	5.33
May-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.02	6.14	5.88
Feb-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.02	5.73	6.29
Nov-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.02	6.36	5.66
Aug-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.02	5.94	6.08
May-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.02	6.06	5.96
Feb-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.02	6.37	5.65
Nov-99	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.02	6.53	5.49
Aug-99	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	12.02	6.60	5.42
May-99	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	12.02	6.30	5.72
Feb-99	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	12.02	5.95	6.07

TABLE 2
HISTORICAL DATA SUMMARY
YEAR 1 THROUGH YEAR 9 GROUNDWATER MONITORING
BUILDINGS R-6/7 AND R-12
NWS EARLE, NEW JERSEY

Location	Compounds						Groundwater Levels		
	Benzene (ug/l)	Ethylbenzene (ug/l)	Naphthalene (ug/l)	Toluene (ug/l)	Xylenes (ug/l)	MTBE (ug/l)	Elevation Top of Casing (feet)	Depth to GW (1) (feet)	Adjusted Groundwater Elevation (feet)
NJDEP GWQS	**1**	**700**	**300**	**1,000**	***40 / 1,000**	**70**			
R-6/7-MW-04									
Nov-04	0.32 J	N.D.	N.A.	N.D.	N.D.	0.26 J	16.39	9.15	7.24
Nov-03	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.39	8.23	8.16
Nov-03-Dup	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.39	N.M.	---
Nov-02	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.39	8.30	8.09
Nov-02-Dup	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.39	N.M.	---
Nov-01	**1.9**	N.D.	N.D.	0.84 J	N.D.	1.6 J	16.39	9.51	6.88
Aug-01	**1.9 J**	3.4	1.8	1.6	12.1	N.D.	16.39	9.24	7.15
May-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.39	7.93	8.46
Feb-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.39	7.74	8.65
Nov-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.39	8.95	7.44
Aug-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.39	>756	---
May-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	16.39	8.07	8.32
Feb-00	N.D.	N.D.	N.D.	N.D.	N.D.	0.54	16.39	8.53	7.86
Nov-99	N.D.	N.D.	0.88	N.D.	N.D.	N.D.	16.39	8.98	7.41
Aug-99	N.D.	N.D.	1.6	0.7	N.D.	N.D.	16.39	9.35	7.04
May-99	**4.1**	N.D.	N.A.	N.D.	N.D.	N.D.	16.39	7.82	8.57
Feb-99	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	16.39	7.32	9.07
MW-6-01									
Nov-03	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	17.75	12.49	5.26
Nov-02	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	17.75	11.84	5.91
Nov-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	17.75	13.30	4.45
Aug-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	17.75	12.47	5.28
May-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	17.75	11.81	5.94
Feb-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	17.75	11.72	6.03
Nov-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	17.75	12.38	5.37
Aug-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	17.75	11.76	5.99
May-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	17.75	11.82	5.93
Feb-00	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	17.75	12.42	5.33
Nov-99	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	17.75	12.05	5.70
Aug-99	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	17.75	12.01	5.74
May-99	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	17.75	12.22	5.53
Feb-99	N.D.	N.D.	N.A.	N.D.	N.D.	N.D.	17.75	11.96	5.79
SUMP R-1									
Nov-03	**2.4**	1.6 J	21 R	N.D.	1.3 J	6.2	---	---	---
Nov-02	N.D.	N.D.	N.D.	N.D.	N.D.	2.8	---	---	---
Nov-01	N.D.	N.D.	N.D.	N.D.	N.D.	2	---	---	---
Aug-01	N.D.	N.D.	2.7	N.D.	N.D.	N.D.	---	---	---
May-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	---	---	---
Feb-01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	---	---	---
Nov-00	N.D.	N.D.	N.D.	N.D.	N.D.	1.4	---	---	---
Aug-00	N.D.	N.D.	N.D.	N.D.	N.D.	1.6	---	---	---
May-00	N.D.	N.D.	N.D.	N.D.	N.D.	1.8	---	---	---
Feb-00	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	---	---	---

Data previous to November 2004 was provided by TtNUS.
Groundwater Quality Criteria is from the New Jersey Department of Environmental Protection (NJDEP) Groundwater Quality Criteria for Class II-A Groundwater (N.J.A.C. 7:9-6). Unless otherwise noted, the criteria used are the Higher of the Practical Quantitation Levels (PQLs) and Groundwater Quality Criteria.
Analytes with concentrations greater than the NJDEP Groundwater Quality Criteris are highlighted in bold.
*Criterion for total xylenes is NJDEP Maximum Contaminant Level (MCL) of 1,000 ug/L as of 5 February 1997. Previous reports used a value of 40 ug/L, so the bold highlight was kept for historical reference.
(1): Depth to LNAPL/Depth to Water
(2): Groundwater elevation corrected for LNAPL thickness
(3): Water level measurement may not be accurate since pump was pulled and recovery may not have been complete.
* *Recovery well R12-RC-02 could not be accessed, so well R12-RC-03 was sampled.
+ Thickness of Free Product was <0.01
N.D.: Not Detected
N.A.: Not Analyzed
N.S.: Not Sampled
N.M.: Not Measured
J: Estimated as a result of a value below the CRQL or a technical non-compliance.
R: Surrogate recovery non-compliance.

FIGURES



SITE LOCATION MAP		
BUILDINGS R-6/7 AND R-12 U.S. NAVY NWS- EARLE LEONDARDO, NJ		
ECOR Solutions 1075 Andrew Drive, Suite I, West Chester, PA 19380		
SCALE IN FEET 0 2000	DATE 01/31/06	FIGURE 1

SOURCE: USGS SANDY HOOK, NJ

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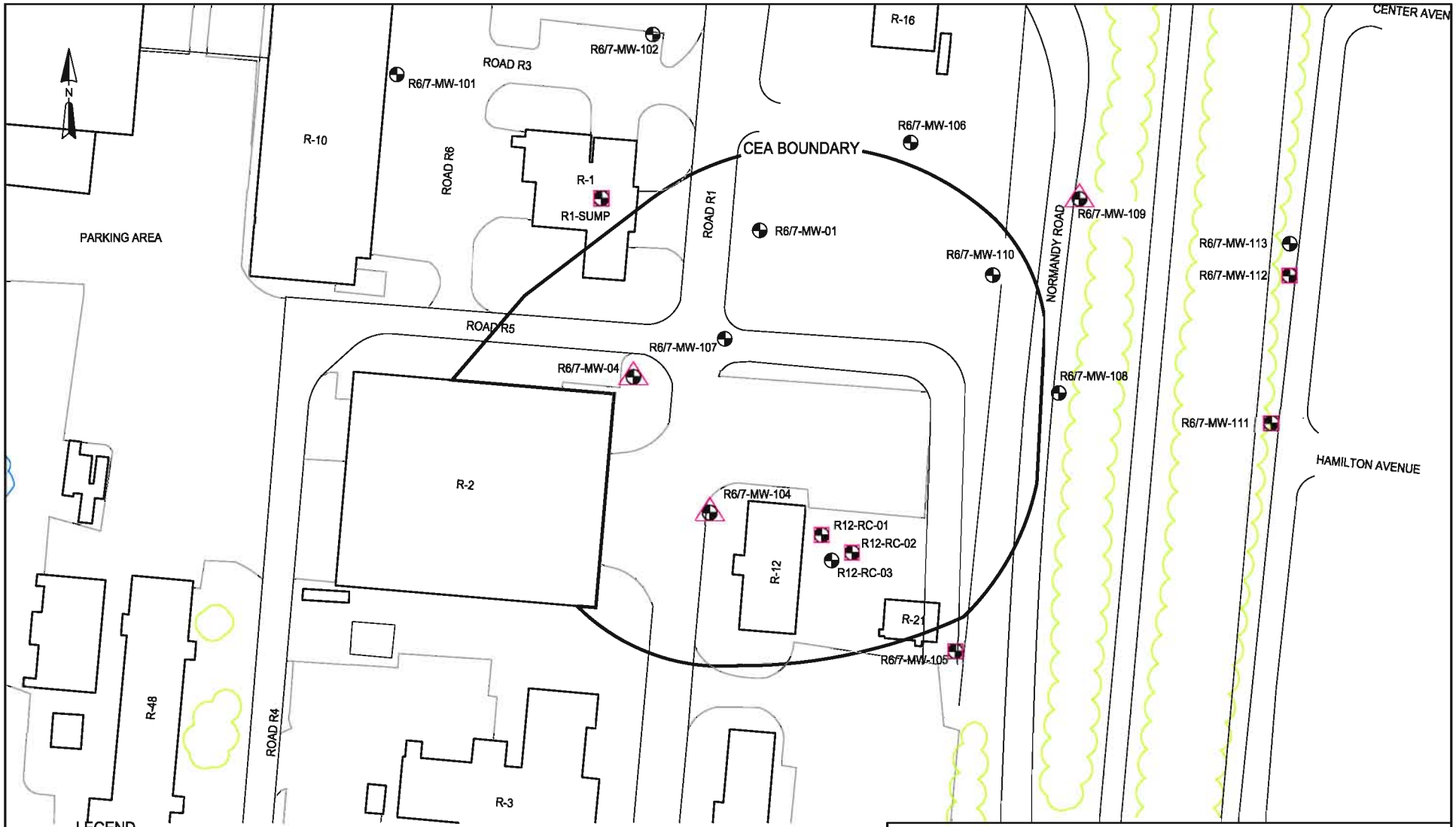


LEGEND

- FENCE
- TREELINE
- RAILROAD
- MONITORING WELL
- DESTROYED MONITORING WELL
- ABANDONED MONITORING WELL

SOURCE: TETRATECH NUS

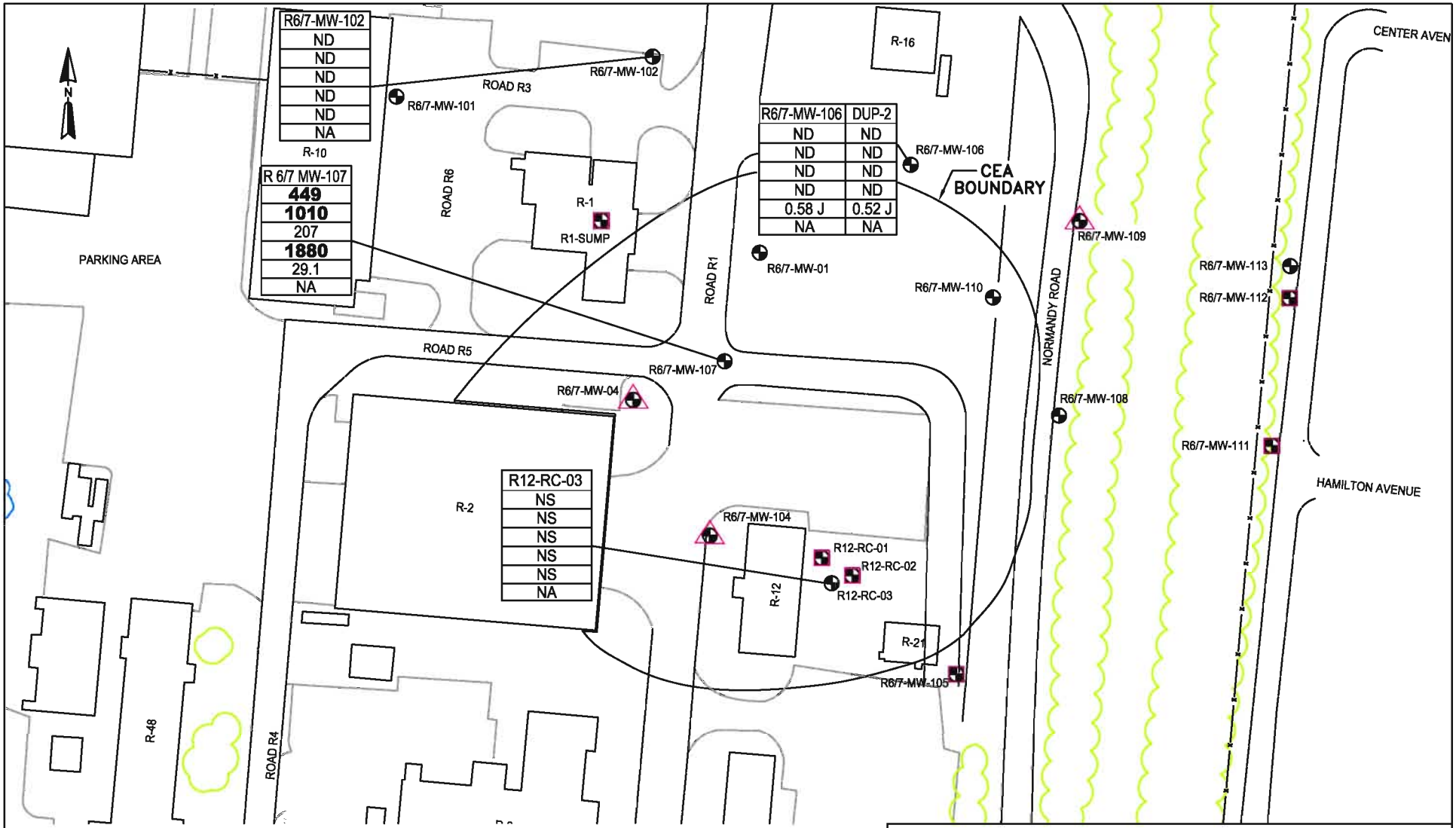
SITE MAP

BUILDINGS R-6/7 AND R-12
U.S. NAVY NWS- EARLE
COLTS NECK, NJ

ECOR Solutions
1075 Andrew Drive, Suite I, West Chester, PA 19380

SCALE IN FEET	DATE	FIGURE
0 — 100	01-31-06	2

ECOR Solutions, Inc.



LEGEND

FENCE

TREELINE

MONITORING WELL

DESTROYED MONITORING WELL

ABANDONED MONITORING WELL

R12-RC-03	WELL ID
449	BENZENE CONCENTRATION (ug/L)
1010	ETHYLBENZENE CONCENTRATION (ug/L)
207	TOLUENE CONCENTRATION (ug/L)
1880	XYLENE CONCENTRATION (ug/L)
1880	MTBE CONCENTRATION (ug/L)
29.1	NAPTHALENE (ug/L)

ND	NOT DETECTED
NA	NOT ANALYZED
NS	NOT SAMPLED
J	ESTIMATED VALUE

SOURCE: TETRATECH NUS

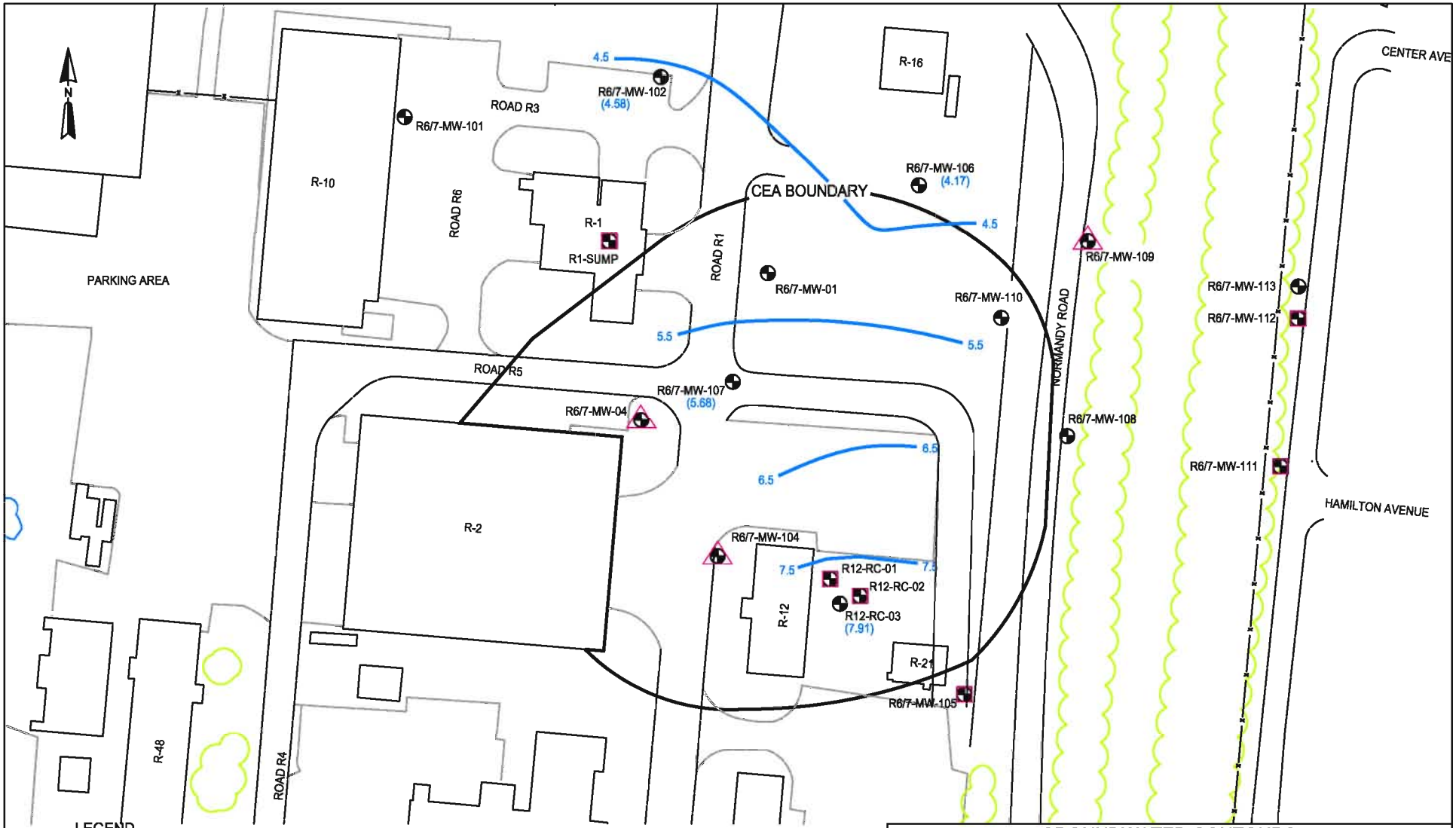
YEAR 9 GROUNDWATER MONITORING SAMPLE RESULTS NOVEMBER 2007

BUILDINGS R-6/7 AND R-12
U.S. NAVY NWS- EARLE
COLTS NECK, NJ

ECOR Solutions
1075 Andrew Drive, Suite I, West Chester, PA 19380

SCALE IN FEET	DATE	FIGURE
0 100	01-28-08	3

ECOR Solutions, Inc.



LEGEND

- FENCE
- TREELINE
- MONITORING WELL
- DESTROYED MONITORING WELL
- ABANDONED MONITORING WELL
- GROUNDWATER CONTOUR
- (9.43) GROUNDWATER ELEVATION (ft AMSL)

SOURCE: TETRATECH NUS

GROUNDWATER CONTOURS NOVEMBER 2007

BUILDINGS R-6/7 AND R-12
U.S. NAVY NWS- EARLE
COLTS NECK, NJ

ECOR Solutions
1075 Andrew Drive, Suite I, West Chester, PA 19380

SCALE IN FEET	DATE	FIGURE
0 — 100	01-28-08	4

ECOR Solutions, Inc.

APPENDICES

APPENDIX A
CORRESPONDENCE, NJDEP TO NAVY, FOR AOC R-6/7-12

State of New Jersey

James E. McGreevey
Governor

Department of Environmental Protection

Bradley M. Campbell
Commissioner

Brian Helland
Naval Facilities Engineering Command
10 Industrial Highway
Code 1821, Mail Stop 82
Lester, PA 19113-2090

APR 22 2005

Dear Mr. Helland:

Re: Year 6 Groundwater Monitoring Report - Buildings R-6/7 and R-12
Naval Weapons Station Earle
Colts Neck Twp., Monmouth Co.

The New Jersey Department of Environmental Protection (NJDEP) has reviewed the above referenced report prepared by ECOR Solutions, Inc., (ECOR) on behalf of the Navy, dated March 2005. The document is approved in its present form; no further modification is necessary.

The Department is in agreement with ECOR's recommendations to remove sampling wells R6/7-MW-109, R6/7-MW-104 and R6/7-MW-04 due to the fact that all contaminants in these wells have been below the Ground Water Quality Standards for the last four years of sampling.

Be advised that all wells shall be closed by a New Jersey Licensed well driller in accordance with N.J.A.C 7:9D.

If you have any questions, please call me at (609)-633-7237.

Sincerely,

Bob Marcolina

Bob Marcolina, Case Manager
Bureau of Federal Case Management

c: Alicia Hartmann, NWS Earle

APPENDIX B

LABORATORY ANALYTICAL RESULTS

ANALYTICAL LABORATORY SERVICES, INC.
www.analyticallab.com
NELAP Accredited
PA 22-293 NJ PA010
ACCREDITED IN ACCORDANCE WITH nelac
34 Dogwood Lane - Middletown, PA 17057 Phone: 717-944-5541 Fax: 717-944-1430

ANALYTICAL RESULTS

Workorder 9712044 EWN011|NWS EARLE LTM PROJECT

Lab ID: 9712044001 Date Collected: 11/15/2007 11:36 Matrix: Water

Sample ID: MW-102 Date Received: 11/16/2007 12:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr	RegLmt
VOLATILE ORGANICS											
Benzene	1.0 U		ug/L	1.0	EPA 624			11/29/07 04:59	DXN	B	
Ethylbenzene	1.0 U		ug/L	1.0	EPA 624			11/29/07 04:59	DXN	B	
Methyl t-Butyl Ether	1.0 U		ug/L	1.0	EPA 624			11/29/07 04:59	DXN	B	
Toluene	1.0 U		ug/L	1.0	EPA 624			11/29/07 04:59	DXN	B	
Total Xylenes	3.0 U		ug/L	3.0	EPA 624			11/29/07 04:59	DXN	B	
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*	*RegLmt*
1,2-Dichloroethane-d4 (S)	111		%	72-142	EPA 624			11/29/07 04:59	DXN	B	
4-Bromofluorobenzene (S)	84		%	73-119	EPA 624			11/29/07 04:59	DXN	B	
Dibromofluoromethane (S)	104		%	74-132	EPA 624			11/29/07 04:59	DXN	B	
Toluene-d8 (S)	105		%	75-133	EPA 624			11/29/07 04:59	DXN	B	

Sample Comments:

Raymond J. Martrano
Laboratory Manager

SMO 2/18/2008

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ANALYTICAL RESULTS

Workorder 9712044 EWN011|NWS EARLE LTM PROJECT

Lab ID: 9712044002 Date Collected: 11/15/2007 12:59 Matrix: Water

Sample ID: MW-106 Date Received: 11/16/2007 12:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr	RegLmt
VOLATILE ORGANICS											
Benzene	1.0 U		ug/L	1.0	EPA 624			11/28/07 20:20	DXN	A	
Ethylbenzene	1.0 U		ug/L	1.0	EPA 624			11/28/07 20:20	DXN	A	
Methyl t-Butyl Ether	0.58J		ug/L	1.0	EPA 624			11/28/07 20:20	DXN	A	
Toluene	1.0 U		ug/L	1.0	EPA 624			11/28/07 20:20	DXN	A	
Total Xylenes	3.0 U		ug/L	3.0	EPA 624			11/28/07 20:20	DXN	A	
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*	*RegLmt*
1,2-Dichloroethane-d4 (S)	105		%	72-142	EPA 624			11/28/07 20:20	DXN	A	
4-Bromofluorobenzene (S)	84		%	73-119	EPA 624			11/28/07 20:20	DXN	A	
Dibromofluoromethane (S)	101		%	74-132	EPA 624			11/28/07 20:20	DXN	A	
Toluene-d8 (S)	104		%	75-133	EPA 624			11/28/07 20:20	DXN	A	

Sample Comments:

Raymond J. Martrano
Laboratory Manager

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ANALYTICAL RESULTS

Workorder 9712044 EWN011|NWS EARLE LTM PROJECT

Lab ID: **9712044003** Date Collected: 11/15/2007 10:13 Matrix: Water

Sample ID: **MW-107** Date Received: 11/16/2007 12:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr	RegLmt
VOLATILE ORGANICS											
Benzene	449		ug/L	5.0	EPA 624			11/29/07 03:12	DXN	A	
Ethylbenzene	1010	1	ug/L	5.0	EPA 624			11/29/07 03:12	DXN	A	
Methyl t-Butyl Ether	29.1		ug/L	5.0	EPA 624			11/29/07 03:12	DXN	A	
Toluene	207		ug/L	5.0	EPA 624			11/29/07 03:12	DXN	A	
Total Xylenes	1880		ug/L	15.0	EPA 624			11/29/07 03:12	DXN	A	
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*	*RegLmt*
1,2-Dichloroethane-d4 (S)	101		%	72-142	EPA 624			11/29/07 03:12	DXN	A	
4-Bromofluorobenzene (S)	84		%	73-119	EPA 624			11/29/07 03:12	DXN	A	
Dibromofluoromethane (S)	98		%	74-132	EPA 624			11/29/07 03:12	DXN	A	
Toluene-d8 (S)	103		%	75-133	EPA 624			11/29/07 03:12	DXN	A	

Sample Comments:

The GCMS volatiles analysis was performed at a dilution due to the level of target compounds.

This report was modified to add ethylbenzene comment. SM 12-12-07

Raymond J. Martrano
Laboratory Manager

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ANALYTICAL RESULTS

Workorder 9712044 EWN011|NWS EARLE LTM PROJECT

Lab ID: **9712044004** Date Collected: 11/15/2007 00:00 Matrix: Water

Sample ID: **DUP-2** Date Received: 11/16/2007 12:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr	RegLmt
VOLATILE ORGANICS											
Benzene	1.0 U		ug/L	1.0	EPA 624			11/28/07 19:45	DXN	A	
Ethylbenzene	1.0 U		ug/L	1.0	EPA 624			11/28/07 19:45	DXN	A	
Methyl t-Butyl Ether	0.52J		ug/L	1.0	EPA 624			11/28/07 19:45	DXN	A	
Toluene	1.0 U		ug/L	1.0	EPA 624			11/28/07 19:45	DXN	A	
Total Xylenes	3.0 U		ug/L	3.0	EPA 624			11/28/07 19:45	DXN	A	
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*	*RegLmt*
1,2-Dichloroethane-d4 (S)	103		%	72-142	EPA 624			11/28/07 19:45	DXN	A	
4-Bromofluorobenzene (S)	81		%	73-119	EPA 624			11/28/07 19:45	DXN	A	
Dibromofluoromethane (S)	99		%	74-132	EPA 624			11/28/07 19:45	DXN	A	
Toluene-d8 (S)	103		%	75-133	EPA 624			11/28/07 19:45	DXN	A	

Sample Comments:

Raymond J. Martrano
Laboratory Manager

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ANALYTICAL RESULTS

Workorder 9712044 EWN011|NWS EARLE LTM PROJECT

Lab ID: 9712044005 Date Collected: 11/15/2007 11:15 Matrix: Water

Sample ID: FB-3 Date Received: 11/16/2007 12:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr	RegLmt
VOLATILE ORGANICS											
Benzene	1.0 U		ug/L	1.0	EPA 624			11/27/07 21:39	JAH	A	
Ethylbenzene	1.0 U		ug/L	1.0	EPA 624			11/27/07 21:39	JAH	A	
Methyl t-Butyl Ether	1.0 U		ug/L	1.0	EPA 624			11/27/07 21:39	JAH	A	
Toluene	1.0 U		ug/L	1.0	EPA 624			11/27/07 21:39	JAH	A	
Total Xylenes	3.0 U		ug/L	3.0	EPA 624			11/27/07 21:39	JAH	A	
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*	*RegLmt*
1,2-Dichloroethane-d4 (S)	100		%	72-142	EPA 624			11/27/07 21:39	JAH	A	
4-Bromofluorobenzene (S)	90		%	73-119	EPA 624			11/27/07 21:39	JAH	A	
Dibromofluoromethane (S)	98		%	74-132	EPA 624			11/27/07 21:39	JAH	A	
Toluene-d8 (S)	109		%	75-133	EPA 624			11/27/07 21:39	JAH	A	

Sample Comments:

Raymond J. Martrano
Laboratory Manager

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ANALYTICAL RESULTS

Workorder 9712044 EWN011|NWS EARLE LTM PROJECT

Lab ID: 9712044006 Date Collected: 11/16/2007 12:00 Matrix: Water

Sample ID: TB-3 Date Received: 11/16/2007 12:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr	RegLmt
VOLATILE ORGANICS											
Benzene	1.0 U		ug/L	1.0	EPA 624			11/29/07 04:23	DXN	B	
Ethylbenzene	1.0 U		ug/L	1.0	EPA 624			11/29/07 04:23	DXN	B	
Methyl t-Butyl Ether	1.0 U		ug/L	1.0	EPA 624			11/29/07 04:23	DXN	B	
Toluene	1.0 U		ug/L	1.0	EPA 624			11/29/07 04:23	DXN	B	
Total Xylenes	3.0 U		ug/L	3.0	EPA 624			11/29/07 04:23	DXN	B	
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*	*RegLmt*
1,2-Dichloroethane-d4 (S)	108		%	72-142	EPA 624			11/29/07 04:23	DXN	B	
4-Bromofluorobenzene (S)	83		%	73-119	EPA 624			11/29/07 04:23	DXN	B	
Dibromofluoromethane (S)	101		%	74-132	EPA 624			11/29/07 04:23	DXN	B	
Toluene-d8 (S)	105		%	75-133	EPA 624			11/29/07 04:23	DXN	B	

Sample Comments:

Raymond J. Martrano
Laboratory Manager

APPENDIX C

VALIDATION REPORTS

Project: Earle Long Term Monitoring
Laboratory: Analytical Laboratory Services, Inc.
Sample Delivery Group: EWN009/EWN010/EWN011
Fraction: Organic
Matrix: Aqueous
Report Date: 2/18/2008

This analytical quality assurance report is based upon a review of analytical data generated for groundwater samples. The sample locations, laboratory identification numbers, sample collection dates, sample matrix, and analyses performed are presented in Table 1.

The samples were analyzed for volatile organic compounds: benzene toluene, ethylbenzene, xylene, and methyl-tert-butyl ether and semivolatile organic compound, naphthalene. The sample analyses were performed in accordance with the procedures outlined in "40 CFR Part 136".

All sample analyses have undergone an analytical quality assurance review to ensure adherence to the required protocols. Results have been validated or qualified according to general guidance provided in the Region III modifications to "Laboratory Data Validation Functional Guidelines for Validating Organic Analyses", USEPA 9/94. This document specifies procedures for validating data generated for CLP analyses. Therefore, the quality control requirements specified in the methods and associated acceptance criteria were also used to evaluate the non-CLP data. The parameters presented on the following page were evaluated.

X	•	Data Completeness
X	•	Chain of Custody Documentation
X	•	Holding Times
X	•	Instrument Performance
X	•	Initial and Continuing Calibration Summaries
X	•	Laboratory and Field Blank Analysis Results
X	•	Surrogate Compound Recoveries
X	•	Matrix Spike/Matrix Spike Duplicate Recoveries and Reproducibility
X	•	Field Duplicate Analysis Results
X	•	Laboratory Control Sample Results
X	•	Internal Standard Performance
X	•	Qualitative Identification
X	•	Quantitation/Reporting Limits

X - Denotes parameter evaluated.

It is recommended that the data only be used according to the qualifiers presented, and discussed in this report. All other data should be considered qualitatively and quantitatively valid as reported by the laboratory, based on the items evaluated.

Report Approved By:

Shawne M. Rodgers
President

2/19/2008
Date

1.0 DATA COMPLETENESS

The data package was complete.

2.0 CHAIN OF CUSTODY DOCUMENTATION

The chain of custody documentation was complete.

3.0 HOLDING TIMES

All criteria were met. No qualifiers were applied.

4.0 INSTRUMENT PERFORMANCE

All criteria were met. No qualifiers were applied.

5.0 INITIAL AND CONTINUING CALIBRATIONS

All criteria were met. No qualifiers were applied.

6.0 LABORATORY AND FIELD BLANK ANALYSIS RESULTS

All criteria were met. No qualifiers were applied.

7.0 SURROGATE COMPOUNDS

All criteria were met. No qualifiers were applied.

8.0 *MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND REPRODUCIBILITY*

All criteria were met. No qualifiers were applied.

9.0 *FIELD DUPLICATE RESULTS*

Duplicate sample pairs 18-MW-01 and DUP-1, and MW-106 and DUP-2 were submitted to the laboratory to evaluate sampling and analytical precision for those organic compounds determined to be present. There were no positive results for samples 18-MW-01 and DUP-1. Results for samples MW-106 and DUP-2 are presented in Table 2. Precision is evaluated by calculating the relative percent difference (%RPD) between duplicate pair results. There are no USEPA-established acceptance criteria for field duplicate samples. EDQ uses internal acceptance criteria of twenty percent for volatile detected compounds (and 25 percent for extractable compounds) to evaluate field duplicate samples.

10.0 *LABORATORY CONTROL SAMPLE RESULTS*

All criteria were met. No qualifiers were applied.

11.0 *INTERNAL STANDARD PERFORMANCE*

All criteria were met. No qualifiers were applied.

12.0 *QUALITATIVE IDENTIFICATION*

All criteria were met. No qualifiers were applied.

13.0 *QUANTITATION/REPORTING LIMITS*

As required by USEPA protocol, all compounds, which were qualitatively identified at concentrations below their respective Quantitation Limits (QLs), have been marked with "J" qualifiers to indicate that they are quantitative estimates.

METHODOLOGY REFERENCES

Analysis	Reference
Volatile Organic Compounds	Method 624, "40 CFR Part 136
Semivolatile Organic Compounds	Method 625, "40 CFR Part 136

Table 1 Samples For Data Validation Review
Earle Long Term Monitoring
Groundwater Samples Collected November 2007
Analytical Laboratory Services Sample Delivery Group EWN 009

Sample Location	Laboratory ID		Date Collected	Matrix	Analyses Performed	
					VOC	SVOC
16-MW-25	EWN009	001	11/13/2007	Groundwater	X	
16-MW-24	EWN009	002	11/13/2007	Groundwater	X	
FB-1	EWN009	003	11/13/2007	Field Blank	X	X
TB-1	EWN009	004	11/14/2007	Trip Blank	X	
16-SW-01	EWN009	005	11/13/2007	Groundwater	X	
16-SW-02	EWN009	006	11/13/2007	Groundwater	X	
16-MW-11	EWN009	007	11/13/2007	Groundwater	X	X
16-MW-15	EWN009	008	11/13/2007	Groundwater	X	

VOC Methyl tert-butyl Ether, Benzene, Toluene, Ethylbenzene, total Xylenes
SVOC Naphthalene

Table 1 Samples For Data Validation Review
Earle Long Term Monitoring
Groundwater Samples Collected November 2007
Analytical Laboratory Services Sample Delivery Group EWN 010

Sample Location	Laboratory ID		Date Collected	Matrix	Analyses Performed	
					VOC	SVOC
16-MW-08	9712043	001	11/14/2007	Groundwater	X	X
16-MW-10	9712043	002	11/14/2007	Groundwater	X	X
18-MW-01	9712043	003	11/14/2007	Groundwater	X	X
DUP-1	9712043	004	11/14/2007	Groundwater	X	X
FB-2	9712043	005	11/14/2007	Field Blank	X	X
TB-2	9712043	006	11/14/2007	Trip Blank	X	

VOC Methyl tert-butyl Ether, Benzene, Toluene, Ethylbenzene, total Xylenes
SVOC Naphthalene

Table 1 Samples For Data Validation Review
Earle Long Term Monitoring
Groundwater Samples Collected November 2007
Analytical Laboratory Services Sample Delivery Group EWN 011

Sample Location	Laboratory ID		Date Collected	Matrix	Analyses Performed
					VOC
MW-102	9712043	001	11/15/2007	Groundwater	X
MW-106	9712043	002	11/15/2007	Groundwater	X
MW-107	9712043	003	11/15/2007	Groundwater	X
DUP-2	9712043	004	11/15/2007	Groundwater	X
FB-3	9712043	005	11/15/2007	Field Blank	X
TB-3	9712043	006	11/15/2007	Trip Blank	X

VOC Methyl tert-butyl Ether, Benzene, Toluene, Ethylbenzene, total Xylenes

Table 2 Field Duplicate Sample Results for Organic Analyses
Duplicate Samples MW-106 and DUP-2

	MW-106 (µg/L)		DUP-2 (µg/L)		RPD	Comments
Methyl t-Butyl Ether	0.58	J	0.52	J	10.9	

APPENDIX D

SAMPLE LOGS AND FIELD NOTES

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWS Earle Annual LTM
Project No.: N0100.177
Waterfront

Sample ID No.: R6/7-MW-107
Sample Location: Colts Neck, NJ
Sampled By: GF, JG

SAMPLING DATA:

Date: 11/15/07
Time: 1013
Purge Method: low flow

FINAL VALUES:

Color (Visual)	Ph (Standard)	S.C. (mS/cm)	Turbidity (NTU)	DO (mg/l)	Temp (°C)	ORP (MV)
Clear, colorless	6.27	1.601	2.78	0.10	19.69	-124.7

PURGE DATA:

Date: 11/15/07
Purge Method: low flow
PID Reading (ppm):
Well Casing Diameter & Material: 2" PVC
Total Well Depth (TD): 18.11
Static Water Level (DTW): 9.30
Static Product Level (DTP) ~~18.11~~
One Casing Volume (gal): ~4.8 gal = 3 vols
Start Purge (hrs): 0923
End Purge (hrs): 1013
Total Purge Time (min): 50 min
Total Vol. Purged (gal/L):

Purge Calculations:

1": 0.04080	6": 1.46869
2": 0.16319	8": 2.61101
3": 0.36717	10": 4.07970
4": 0.65275	12": 5.87477

Purge Vol = 3 × PF × (DTW - TD)

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
624 + MTBE	HCl	40 ml glass vial	2

OBSERVATIONS/NOTES:

* sheen on discharge H2O; odiferous

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Grace Fitch

ECOR Solutions Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: NWS Earle Annual LTM
Location: Colts Neck, NJ
Weather Conditions: overcast, cool
Tidally Influenced: Yes ___ No ___

Project No.: N0100.177
Personnel: GF, JG
Measuring Device: ~~S~~ interface probe
Remarks:

Monitoring Well ID	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Depth to Water (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
R12-RC-03	11/14/07	1715		19.08	9.43	<.01		do not sample; product present
MW-107	11/14/07	1722		19.11	9.30			
MW-102	↓	1725		14.59	7.90			
MW-106	↓	1729		19.59	12.45			

*All measurements to the nearest 0.01 foot

ECOR Solutions Inc.

PURGE DATA SHEET

Date: 11/15/07

Sample ID No.: R16/7-MW-107

Time (hrs)	Water Level (ft. below TOC)	Flow (mL/min)	pH (SU)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
~~9~~1023	9.82	~~#~~1300	6.58	1.512	>1200	1.28	20.10	-79.2	
9~~1~~028			6.63	1.470	43.4	0.31	20.08	-104.4	1.6 gal
9~~1~~033	9.93		6.52	1.533	15.6	0.14	20.01	-106.6	3.2
9~~1~~038			6.44	1.580	21.5	0.10	19.95	-112.7	4.8 gal
9~~1~~043			6.42	1.585	9.72	0.10	19.95	-113.9	
9~~1~~048			6.40	1.587	5.04	0.10	19.92	-116.1	
9~~1~~053			6.37	1.592	4.66	0.20	19.94	-118.1	
9~~1~~058			6.34	1.593	3.29	0.10	19.91	-119.3	
1103			6.30	1.593	2.73	0.10	19.91	-120.8	
1108			6.28	1.598	2.86	0.10	19.93	-123.4	
1113			6.27	1.601	2.78	0.10	19.69	-124.7	
GF~~1118~~									

Signature(s): Grace Fitch

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWS Earle Annual LTM
Project No.: N0100.177

Sample ID No.: R6|7-MW-102
Sample Location: Colts Neck, NJ
Sampled By: GF, JG

SAMPLING DATA:

Date: 11|15|07
Time: 1136
Purge Method: low flow

FINAL VALUES:

Color (Visual)	Ph (Standard)	S.C. (mS/cm)	Turbidity (NTU)	DO (mg/l)	Temp (°C)	ORP (MV)
clear, colorless	5.49	0.705	6.15	0.15	18.67	-4.8

PURGE DATA:

Date: 11|15|07
Purge Method: low flow
PID Reading (ppm):
Well Casing Diameter & Material: 2" PVC
Total Well Depth (TD): 14.59
Static Water Level (DTW): 7.90
Static Product Level (DTP) ~~11.59~~ GF
One Casing Volume (gal): 3.36gal = 3vols
Start Purge (hrs): 1046
End Purge (hrs): 1136
Total Purge Time (min): 50 min
Total Vol. Purged (gal/L):

Purge Calculations:

1": 0.04080	6": 1.46869
2": 0.16319	8": 2.61101
3": 0.36717	10": 4.07970
4": 0.65275	12": 5.87477

Purge Vol = 3 × PF × (DTW - TD)

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
624 + MTBE	HCl	40 ml glass vial	2

OBSERVATIONS/NOTES:

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Grace Fitch

ECOR Solutions Inc.

PURGE DATA SHEET

Date: 11/15/07

Sample ID No.: R617-MW-102

Time (hrs)	Water Level (ft. below TOC)	Flow (mL/min)	pH (SU)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
~~1046~~		1450	5.58	0.903	29.9	3.66	18.56	~~27~~ 17	
1051	~~7.95~~		5.61	0.763	26.0	0.30	18.69	3.7	
1056			5.56	0.737	26.2	0.21	18.69	1.0	~ 3½ gal
1201			5.53	0.725	16.2	0.15	18.68	-1.2	
1206	7.97		5.52	0.720	16.5	0.18	18.68	-0.7	
1111			5.51	0.716	12.1	0.16	18.65	-1.5	
1116			5.53	0.708	8.80	0.17	18.67	-2.9	
1121			5.50	0.709	7.07	0.16	18.66	-3.0	
1126			5.50	0.705	6.71	0.14	18.66	-3.6	
1131			5.49	0.704	6.53	0.14	18.66	-4.0	
1136			5.49	0.705	6.15	0.15	18.67	-4.8	

Signature(s): Grace Fitch

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWS Earle Annual LTM
Project No.: N0100.177

Sample ID No.: R6/7-MW-106
Sample Location: Colts Neck, NJ
Sampled By: GF, JG

SAMPLING DATA:

Date: 11/15/07
Time: 1259
Purge Method: low flow

FINAL VALUES:

Color (Visual)	Ph (Standard)	S.C. (mS/cm)	Turbidity (NTU)	DO (mg/l)	Temp (°C)	ORP (MV)
Clear, colorless	5.68	12.73	13.0	0.36	16.52	-21.4

PURGE DATA:

Date: 11/15/07
Purge Method: low flow
PID Reading (ppm): ———
Well Casing Diameter & Material: 2" PVC
Total Well Depth (TD): 19.59
Static Water Level (DTW): 12.45
Static Product Level (DTP) ———
One Casing Volume (gal): 3 vols = 3.53 gal
Start Purge (hrs): 1209
End Purge (hrs): 1259
Total Purge Time (min): 50 min
Total Vol. Purged (gal/L):

Purge Calculations:

1": 0.04080	6": 1.46869
2": 0.16319	8": 2.61101
3": 0.36717	10": 4.07970
4": 0.65275	12": 5.87477

Purge Vol = 3 × PF × (DTW - TD)

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
624+MTBE	HCl	40 mL glass vial	2 x 2 = 4

OBSERVATIONS/NOTES:

MS/MSD & DUP-2 collected

Circle if Applicable:
MS/MSD
Duplicate ID No.: DUP-2

Signature(s): Grace Fitch

PURGE DATA SHEET

Date: 11/15/07

Sample ID No.: K6/7-MW-106

Time (hrs)	Water Level (ft. below TOC)	Flow (mL/min)	pH (SU)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
12 [illegible]309	11.49	450	5.39	3.316	194	1.23	18.61	97.3	
12 [illegible]314			5.71	8.165	77.7	0.29	18.30	-9.8	
12 [illegible]319			5.71	9.750	42.9	0.23	18.00	-22.7	
12 [illegible]324			5.71	10.67	22.1	0.23	17.68	-27.9	
12 [illegible]329			5.70	11.16	14.2	0.24	17.49	-29.5	
12 [illegible]334	11.49		5.70	11.55	13.0	0.28	17.24	-27.7	
12 [illegible]339			5.69	11.85	18.0	0.45	17.13	-24.7	
12 [illegible]344			5.68	12.04	17.9	0.37	17.04	-23.1	3 vols reached
12 [illegible]349			5.68	12.38	14.1	0.39	16.82	-20.9	
12 [illegible]354			5.68	12.53	14.0	0.37	16.62	-20.8	
12 [illegible]359			5.68	12.73	13.0	0.36	16.52	-21.4	

Signature(s): Grace Fitch