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MCAS CHERRY POINT
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FINAL TECHNICAL MEMORANDUM NUMBER 18 SECOND QUARTER REPORT AUGUST 2009 SAMPLING EVENT SITE 29 MCAS CHERRY PT NC

10/1/2009

RHEA

FINAL
TECHNICAL MEMORANDUM NO. 18
SITE 29 2009 SECOND QUARTER REPORT
AUGUST 2009 SAMPLING EVENT

LTM AT OUTLYING BOGUE FIELD, SITE 29
MCAS CHERRY POINT, NORTH CAROLINA

CONTRACT NO. N40085-08-D-1409
CTO: 0006

RHĒA PROJECT NO. 398.03

OCTOBER 2009

PREPARED FOR:

Ms. Janice Nielsen, OPNCEV
NAVFAC Mid-Atlantic
NC IPT, Code OPCEV
6506 Hampton Blvd.
Norfolk, Virginia 23508-1278
C/O LRA Building C

DISTRIBUTED TO:

Mr. Jeff Christopher, MCAS EAD
Mr. George Lane, NCDENR

PREPARED BY:

Rhēa Engineers & Consultants, Inc.
4975 William Flynn Highway
Suite 14
Gibsonia, PA 15044

FINAL
TECHNICAL MEMORANDUM No. 18
SITE 29 2009 SECOND QUARTER REPORT
AUGUST 2009 SAMPLING EVENT
LTM AT OUTLYING BOGUE FIELD, SITE 29
MCAS CHERRY POINT, NORTH CAROLINA

TO: Janice Nielsen DATE: October 21, 2009

FM: Rhēa Engineers & Consultants, Inc.

CC: Jeff Christopher (MCAS EAD) / George Lane (NCDENR)

RE: Site 29 2009 Second Quarter Report – August 2009 Sampling Event

1.0 INTRODUCTION

Site 29 is located in the eastern portion of Bogue Field (Figure 1). Until 1985, the site was used as a crash crew training area. In 1985, site use was discontinued, and the bermed pit area was graded and revegetated. In September 1997, an Air Sparge/Soil Vapor Extraction (AS/SVE) system was installed and operated to remediate the sources of petroleum-based free product in the groundwater. The system operated for four years and was successful in eliminating the free product. The system was shut off in September 2001 and was removed in the fall of 2003. In October 2003, a Corrective Action Plan (CAP) (Tetra Tech NUS, 2003) for the site was completed. The plan recommended that a non-time critical removal of soils contaminated with total petroleum hydrocarbons (TPHs) be conducted, followed by long term monitoring (LTM) of the groundwater for benzene, toluene, ethylbenzene, and xylene (BTEX) related contaminants. Specifically, the CAP indicated that quarterly samples were to be collected for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) and annual samples were to be collected for manganese. In April 2004, the soil removal was completed, and in May 2004, the first round of quarterly groundwater LTM was conducted.

This Technical Memorandum (Technical Memo No. 18) summarizes the groundwater sampling and analysis from the second quarter 2009 and presents the following:

- Summary of Sampling Activities;

- Summary of Analytical Testing;
- Brief discussion of the comparison of sampling results to North Carolina regulatory groundwater standards;
- Recommendations;
- Figure 1 – Site Location Map;
- Figure 2 – Site Layout;
- Table 1 – Summary of Quarterly Analytical Sampling; and
- Appendix A – 2009 Second Quarter Sampling Laboratory Data.

2.0 HISTORICAL LTM SAMPLING

The Site 29 CAP designated wells 29GW02, 29GW04, 29GW09A, and 29GW10 for inclusion in the groundwater LTM, and indicated that monitoring would begin once the 'hot spot' soil was removed/disposed of, and new clean soil was put in place. Prior to the soil removal, well 29GW02 (located within the excavation area) was properly abandoned in accordance with North Carolina Administrative Code, Subchapter 2C Standards. A new monitoring well 29GW07A was installed following the backfill event. The locations of the monitoring wells are shown on Figure 2. Well 29GW07A is located in the excavation area and down gradient of the former burn pit. Wells 29GW10 and 29GW09A are located down gradient of both the excavation area, and the former burn pit. Well 29GW04 is located upgradient of the excavation area and former burn pit.

2004

Based on the absence of exceedances above the North Carolina Ground Water Quality Standards (GWQS) for four or more consecutive quarterly samples in monitoring wells 29GW04 and 29GW09A during the 2004 Annual LTM Report (Technical Memo No. 4), it was concluded that the upgradient area of the site was not affected by contamination from historic burn pit activities. It was recommended that sampling be discontinued at upgradient wells 29GW04 and 29GW09A, with LTM continuing at downgradient wells 29GW07A and 29GW10. These recommendations were accepted, and quarterly groundwater LTM continued at locations 29GW07A and 29GW10 between May 2005 and February 2006.

2005

The 2005 Annual LTM Report (Technical Memo No. 5) recommended that sampling be discontinued at well 29GW07A because no exceedances had been detected in that well during the previous seven quarters. The 2005 Annual LTM report was produced in October 2006; therefore, well 29GW07A was sampled in May and August 2006. The results of sampling well 29GW07A were below the standard; therefore, as recommended, only monitoring well 29GW10 was sampled in November 2006 and February 2007.

2006

The 2006 LTM results indicated that manganese and naphthalene remained at the site in well 29GW10 in excess of the GWQS. Naphthalene was detected in 29GW10 in the May and August 2006 sampling events and exceeded the GWQS in the August 2006 event. Manganese was detected above the GWQS in the August 2006 event; the lone 2006 event where manganese was analyzed. The 2006 Annual LTM Report (Technical Memo No. 8) recommended that quarterly naphthalene monitoring continue to be performed at 29GW10 using United States Environmental Protection Agency (USEPA) Method 8270 until analytical data indicates concentrations are below the GWQS for four consecutive quarters. In addition, manganese would be analyzed on an annual basis until the manganese concentrations stabilize below the GWQS, or until naphthalene concentrations are below the GWQS for four consecutive quarters, which is in accordance with the CAP. The recommendations identified in the 2006 Annual LTM Report were accepted, and the 2007 LTM sampling was conducted quarterly between May 2007 and February 2008.

2007

Naphthalene was detected in 29GW10 during all four quarters of 2007 LTM sampling, and exceeded the GWQS in the August and November 2007 events. The annual manganese sample (collected during the August 2007 event) exceeded the GWQS. Due to these findings, it was recommended in the 2007 Annual LTM Report (Technical Memo No. 12) that quarterly naphthalene monitoring continue to be performed at 29GW10 (USEPA Method 8270) until analytical data indicates concentrations are below the GWQS for four consecutive quarters. In addition, manganese would be analyzed on an annual basis until manganese concentrations are consistently below the GWQS, or until naphthalene concentrations are below the GWQS for four consecutive quarters. The recommendations identified in the 2007 Annual LTM Report were accepted, and the 2008 LTM sampling was conducted quarterly between May 2008 and February 2009.

2008

The 2008 LTM results indicated that naphthalene and manganese remained at the site in excess of the GWQS in well 29GW10. Naphthalene was detected below the GWQS in May 2008, November 2008, and February 2009, but exceeded the GWQS in August 2008. The annual manganese sample (collected during the August 2008 event) exceeded the GWQS. It was recommended in the 2008 Annual LTM Report (Technical Memo No. 16) that quarterly naphthalene monitoring continue to be performed at 29GW10 (USEPA Method 8270) until analytical data indicates concentrations are below the GWQS for four consecutive quarters. Manganese would be analyzed on an annual basis until manganese concentrations are consistently below the GWQS, or until naphthalene concentrations are below the GWQS for four consecutive quarters.

2009 LTM – First Quarter
Naphthalene was detected below the GWQS in well 29GW10 during the May 2009 sampling.

3.0 2009 SECOND QUARTER LTM SAMPLING

Rhēa Engineers & Consultants, Inc. (Rhēa) conducted the second quarterly 2009 LTM groundwater sampling event on August 3, 2009. The LTM sampling included the collection of a groundwater sample from monitoring well 29GW10, a duplicate quality control sample, and a field blank sample.

Monitoring well 29GW10 was purged at a maximum flow rate of approximately 0.5 liters per minute using a peristaltic pump. Field parameters, including dissolved oxygen (DO), pH, specific conductance, temperature, redox potential, and turbidity, were monitored and recorded approximately every five minutes during purging using an YSI Model 566 multi-meter in conjunction with a flow thru cell. Samples were collected once field parameters stabilized. Field parameters were considered stable when three consecutive measurements met the following criteria; DO (+/- 3 percent), pH (+/- 0.1 units), specific conductance (+/- 10 percent), turbidity (+/- 10 percent or as low as practicable), and redox potential (+/- 10 percent).

Individual water samples were collected into laboratory supplies bottles for naphthalene and manganese analysis. The field blank sample was collected by pouring laboratory supplied de-ionized water directly into the sampling bottle.

3.1 ANALYTICAL TESTING

The water samples were submitted to TestAmerica Laboratories, Inc. in Savannah, Georgia for naphthalene (USEPA Method 8270C) and manganese (USEPA 6010B) analysis. A summary of analytical results is shown in Table 1. The detailed analytical sampling result report is included in Appendix A.

TestAmerica provided the Site 29 analytical sampling data to Rhēa in electronic pdf and EDD formats. Rhēa performed data validation as described in the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review and SW-846.

3.2 COMPARISON TO GROUNDWATER STANDARDS

Analytical results were compared with the GWQS as specified in 15A North Carolina Administrative Code (NCAC) 2L.0202 (g) and (h).

Naphthalene was detected below the GWQS at 29GW10 (13 µg/l) and the duplicate (i.e., 29GW10P0809) (13 µg/l) during the August 2009 sampling event. Naphthalene concentrations have been below the GWQS for four consecutive sampling quarters (i.e., November 2008, February 2009, May 2009, and August 2009). The annual manganese samples exceeded the GWQS in 29GW10 (770 µg/l) and the duplicate (810 µg/l). The GWQS values for naphthalene and manganese are 21µg/l and 50 µg/l, respectively.

3.3 RECOMMENDATIONS

The approved corrective action presented in the CAP for Site 29 groundwater included the collection of VOC and SVOC groundwater samples until four consecutive results were below the NCDENR Action Levels. In addition, manganese sampling was to be conducted annually until the action levels for VOCs and SVOCs were achieved.

Naphthalene concentrations have been below the GWQS for four consecutive sampling quarters at the lone remaining well location (i.e., 29GW10) at Site 29; therefore analytical data indicates that the site is in compliance with the CAP. Although manganese concentrations remain in excess of the GWQS at well 29GW10, manganese was not a constituent present in materials used at the burn pit and should not be treated as a primary contaminant at Site 29 (CAP, 2003). It is recommended that Site 29 proceed toward site closure.

TABLE

TABLE 1
Summary of Analytical Results
Technical Memorandum No. 18
LTM at Outlying Bogue Field, Site 29
MCAS Cherry Point, North Carolina

Constituent (ug/L)	N.C. Groundwater Quality Standards (GWQS) (ug/L) [1]	First Quarter 5/25/05			Second Quarter 8/1/05			Third Quarter 11/7/05			Fourth Quarter 2/13/06			First Quarter 5/11/06		
		29GW07A	Duplicate for 29GW10	29GW10	29GW07A	29GW10	Duplicate for 29GW10	29GW07A	29GW10	Duplicate for 29GW07A	29GW07A	29GW10	Duplicate for 29GW10	29GW07A	Duplicate for 29GW07A	29GW10
VOLATILES (Method 8260)																
Benzene	1	ND	ND	ND	ND	ND	ND	0.23J	ND	0.22J	ND	ND	ND	ND	ND	ND
n-Butylbenzene	70	1.19	1.46	1.53	ND	1.59	1.54	1.38	3.96J	1.37	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	70	1.27	1.73	1.76	1.23	2.15	2.10	1.54	2.60J	1.55	ND	ND	ND	1.18	1.19	1.00
tert-Butylbenzene	70	ND	ND	ND	ND	ND	ND	0.19J	ND	0.21J	ND	ND	ND	ND	ND	ND
Ethylbenzene	29	1.07	ND	ND	ND	ND	ND	0.98J	ND	0.97J	ND	ND	ND	ND	ND	ND
Isopropylbenzene	70	ND	2.23	2.24	ND	2.56	2.47	0.060J	2.84J	0.60J	ND	ND	ND	3.33	3.31	3.53
4-Isopropyltoluene	NA	ND	ND	ND	ND	ND	ND	0.62J	3.00J	0.63J	ND	ND	ND	ND	ND	ND
Methylene chloride	5	ND	ND	ND	ND	ND	ND	0.20J	2.04J	ND	ND	ND	ND	ND	ND	ND
Naphthalene	21	5.71	**76.2**	ND	9.10	**48.0**	**48.0**	7.02	**38.9**	8.57J	3.63	2.82	2.67	7.02	6.62	7.94
n-Propylbenzene	70	ND	2.91	2.93	ND	2.67	2.58	0.66J	3.04J	0.68J	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	350	1.94	1.17	1.20	ND	ND	ND	1.98	0.84J	2.00	ND	ND	ND	6.48	6.46	5.73
1,3,5-Trimethylbenzene	350	ND	ND	ND	ND	ND	ND	0.58J	ND	0.58J	ND	ND	ND	2.52	2.49	2.27
m-,p-Xylene	530	ND	ND	ND	ND	ND	ND	0.41J	ND	0.44J	ND	ND	ND	2.79	2.76	2.67
SEMI-VOLATILES (Method 8270)																
Bis(2-ethylhexyl)phthalate	2.5	ND	ND	ND	ND	ND	ND	6.1J	ND	9.5J	3.6J	ND	ND	ND	ND	ND
Diethylphthalate	5000	ND	ND	ND	ND	ND	ND	ND	9.6J	ND	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	14	ND	**16.4**	**16.9**	ND	ND	ND	ND	**16.1**	1.5J	ND	ND	ND	ND	ND	ND
Naphthalene	21	ND	**47.1**	**48.7**	ND	**22.9**	15.2	2.1J	**38.4**	3.6J	ND	ND	1.2J	ND	ND	ND
METALS (Method 6010)																
Manganese A183	50	**240**	**271**	**284**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
FIELD DATA																
Dissolved Oxygen (mg/L)		6.50	--	4.10	1.57	2.48	--	0.63[2]	0.70[2]	--	0.00	0.00	--	0.00	--	0.00
pH		6.15	--	7.05	5.70	6.30	--	5.84	6.40	--	5.92	6.62	--	5.96	--	6.55
Specific Conductance (S/m)		91.20	--	33.80	74	31	--	90	30	--	86	22	--	79	--	43
Redox Potential (mV)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Temperature (^{o}C)		17.59	--	17.09	26.00	25.60	--	19.90	19.68	--	12.76	12.51	--	14.38	--	14.61
Total Dissolved Solids (g/L)		0.58	--	0.22	0.60	0.20	--	0.57	0.19	--	0.55	0.15	--	0.46	--	0.11
Turbidity (ntu)		150	--	67	42.5	40.2	--	0.00	91	--	29	92	--	31	--	77
Groundwater Elevation (ft)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

Bold text indicates that the analyte exceeded the N.C. Groundwater Quality Standard (GWQS)

ND - Not detected
NS - Not sampled

TABLE 1
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MCAS Cherry Point, North Carolina

Constituent (ug/L)	N.C. Groundwater Quality Standards (GWQS) (ug/L) [1]	Second Quarter 8/10/06			Third Quarter 11/9/06		Fourth Quarter 2/27/07		First Quarter 5/9/07		Second Quarter 8/8/07		Third Quarter 11/14//07		Fourth Quarter 2/8/08	
		29GW07A	29GW10	Duplicate for 29GW10	29GW10	Duplicate for 29GW10	29GW10	Duplicate for 29GW10	29GW10	Duplicate for 29GW10	29GW10	Duplicate for 29GW10	29GW10	Duplicate for 29GW10	29GW10	Duplicate for 29GW10
VOLATILES (Method 8260)																
Benzene	1	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
n-Butylbenzene	70	1.29	1.09	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
sec-Butylbenzene	70	2.00	1.52	1.49	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
tert-Butylbenzene	70	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
Ethylbenzene	29	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
Isopropylbenzene	70	ND	1.47	1.48	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
4-Isopropyltoluene	NA	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
Methylene chloride	5	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
Naphthalene	21	16.40	**37.50**	**26.70**	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
n-Propylbenzene	70	ND	1.04	1.02	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
1,2,4-Trimethylbenzene	350	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
1,3,5-Trimethylbenzene	350	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
m-,p-Xylene	530	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
SEMI-VOLATILES (Method 8270)																
Bis(2-ethylhexyl)phthalate	NA	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
Diethylphthalate	5000	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
2-Methylnaphthalene	14	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS
Naphthalene	21	ND	**23.1**	**24.2**	ND	ND	ND	ND	20.9	18.0	**61.7**	**69.7**	**33.3**	**32.9**	4.1J	4.3J
METALS (Method 6010)																
Manganese A183	50	**409**	**711**	**665**	NS	NS	NS	NS	NS	NS	**1310**	**1360**	NS	NS	NS	NS
FIELD DATA																
Dissolved Oxygen (mg/L)		0.59	0.65	NS	0.11	--	0.11	--	0.09	--	0.56	--	0.48	--	0.61	--
pH		6.08	5.80	NS	6.94	--	6.33	--	6.81	--	4.42	--	7.16	--	6.66	--
Specific Conductance (S/m)		86.9	59.1	NS	12.59	--	0.22	--	0.034	--	0.0458	--	0.00	--	0.023	--
Redox Potential (mV)		--	--	NS	--	--	--	--	-108.3	--	9.8	--	367.1	--	-61	--
Temperature (^{o}C)		22.7	21.4	NS	19.20	--	13.33	--	16.60	--	20.81	--	19.70	--	15.09	--
Total Dissolved Solids (g/L)		0.57	0.39	NS	0.16	--	--	--	0.13	--	0.12	--	--	--	--	--
Turbidity (ntu)		160	52.3	NS	13.29	--	2.32	--	4.88	--	7.46	--	0.54	--	5.50	--
Groundwater Elevation (ft)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

Bold text indicates that the analyte exceeded the N.C. Groundwater Quality Standard (GWQS)

ND - Not detected
NS - Not sampled

TABLE 1
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Technical Memorandum No. 18
LTM at Outlying Bogue Field, Site 29
MCAS Cherry Point, North Carolina

Constituent (ug/L)	N.C. Groundwater Quality Standards (GWQS) (ug/L) [1]	First Quarter 5/12/08		Second Quarter 8/11/08		Third Quarter 11/6/08		Fourth Quarter 2/5/09		First Quarter 5/6/09		Second Quarter 8/3/09	
		29GW10	Duplicate for 29GW10	29GW10	Duplicate for 29GW10	29GW10	Duplicate for 29GW10	29GW10	Duplicate for 29GW10	29GW10	Duplicate for 29GW10	29GW10	Duplicate for 29GW10
VOLATILES (Method 8260)													
Benzene	1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
n-Butylbenzene	70	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
sec-Butylbenzene	70	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
tert-Butylbenzene	70	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Ethylbenzene	29	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Isopropylbenzene	70	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Isopropyltoluene	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Methylene chloride	5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Naphthalene	21	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
n-Propylbenzene	70	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,2,4-Trimethylbenzene	350	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,3,5-Trimethylbenzene	350	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
m-,p-Xylene	530	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SEMI-VOLATILES (Method 8270)													
Bis(2-ethylhexyl)phthalate	2.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Diethylphthalate	5000	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Methylnaphthalene	14	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Naphthalene	21	3.6J	3.9J	**31.9**	**30.4**	0.59J	0.59J	ND	0.49J	9.4J	10	13	13
METALS (Method 6010)													
Manganese A183	50	NS	NS	**1030**	**1030**	NS	NS	NS	NS	NS	NS	**770**	**810**
FIELD DATA													
Dissolved Oxygen (mg/L)		0.33	--	0.384	--	0.56	--	0.28	--	0.93	--	0.92	--
pH		6.22	--	6.78	--	6.61	--	6.74	--	7.49	--	6.38	--
Specific Conductance (S/m)		0.021	--	0.035	--	0.020	--	0.216	--	0.037	--	0.102	--
Redox Potential (mV)		-61.8	--	-146.7	--	-80.4	--	-35.6	--	-101.5	--	-115.8	--
Temperature (oC)		17.25	--	20.18	--	19.94	--	14.81	--	16.59	--	19.85	--
Total Dissolved Solids (g/L)		--	--	--	--	--	--	--	--	--	--	--	--
Turbidity (ntu)		0.00	--	0.00	--	2.25	--	6.22	--	8.7	--	0.00	--
Groundwater Elevation (ft)		6.74	--	4.52	--	5.75	--	6.40	--	4.96	--	4.29	--

Notes:

Bold text indicates that the analyte exceeded the N.C. Groundwater Quality Standard (GWQS)

ND - Not detected
NS - Not sampled

FIGURES

OFFICE: Gibsonia, PA

DRAWING NUMBER: 316-F1-A1

REVISIONS

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

RHEA Engineers & Consultants, Inc.

DESIGNED BY		CHECKED BY	--
DRAWN BY		APPROVED BY	--
			-/-/--
			-/-/--

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION ATLANTIC DIVISION NORFOLK, VIRGINIA
MCALF BOGUE, NORTH CAROLINA

SITE 29
LONG TERM MONITORING
GENERAL LOCATION MAP

SCALE: AS SHOWN
SIZE: A

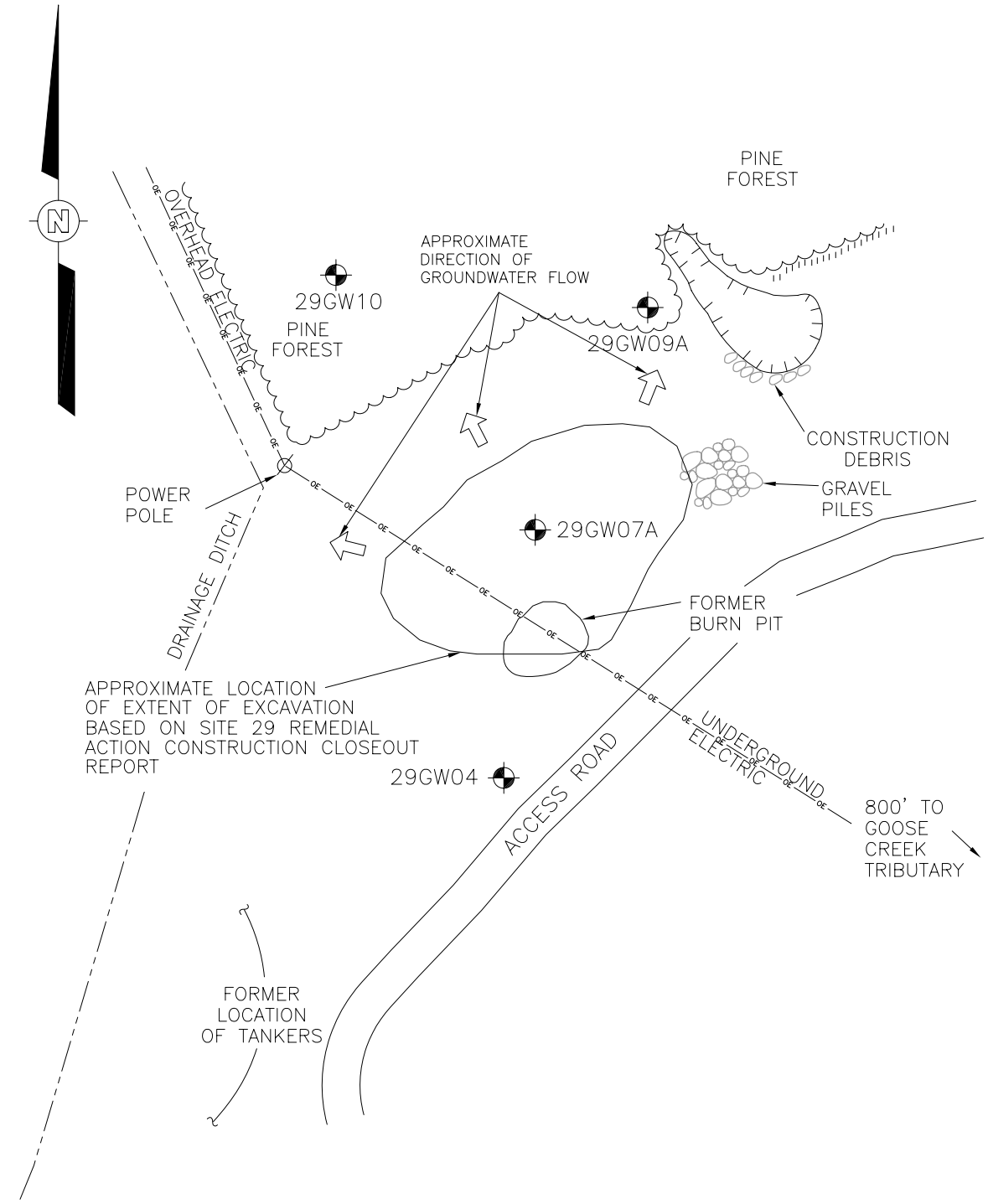
DELIVERY ORDER NO.

CONSTR. CONTRACT NO.

NAVFAC DRAWING NO.
--

SHEET I.D.
FIGURE 1

Clients/TMS/316/R16/Figures



LEGEND:

29GW04 ⊕ MONITORING WELL

TREE LINE

SCALE

0 100 200

OFFICE: Gibsonia, PA

DRAWING NUMBER: 316-F2-A1

REVISIONS

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

RHEA Engineers & Consultants, Inc.

DESIGNED BY		CHECKED BY	--	-/-/--
DRAWN BY		APPROVED BY	--	-/-/--

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION MCALF
ATLANTIC DIVISION
NORFOLK, VIRGINIA
BOGUE, NORTH CAROLINA

SITE 29
LONG TERM MONITORING
SITE LAYOUT

SCALE: AS SHOWN
SIZE: A

DELIVERY ORDER NO.

CONSTR. CONTRACT NO.

NAVFAC DRAWING NO.
--

SHEET I.D.
FIGURE 2

Clients/TMS/316/R16/Figures

APPENDIX A

2009 SECOND QUARTER SAMPLING LABORATORY DATA

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

Job Number: 680-49561-1

SDG Number: CHP49561

Job Description: MCAS - Cherry Point, Site 29

For:
Rhea Engineers & Consultants, Inc.
4975 William Flynn Hwy
Suite 14
Gibsonia, PA 15044

Attention: Mr. Brad McCalla

Approved for release.
Kathryn Smith
Project Manager I
8/31/2009 2:39 PM

Kathryn Smith
Project Manager I
kathye.smith@testamericainc.com
08/31/2009

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory. All questions regarding this report should be directed to the TestAmerica Project Manager who signed this report.

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

GC/MS Semi VOA
No analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

Organic Prep
No analytical or quality issues were noted.

METHOD SUMMARY

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-49561-1
Sdg Number: CHP49561

Description	Lab Location	Method	Preparation Method
Matrix Water			
Semivolatile Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	TAL SAV	SW846 8270C	
Liquid-Liquid Extraction (Continuous)	TAL SAV		SW846 3520C
Metals (ICP)	TAL SAV	SW846 6010B	
Preparation, Extractable Metals	TAL SAV		SM 3030C

Lab References:

TAL SAV = TestAmerica Savannah

Method References:

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

METHOD / ANALYST SUMMARY

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-49561-1
Sdg Number: CHP49561

Method	Analyst	Analyst ID
SW846 8270C	Haynes, Carion	CRH
SW846 6010B	Bland, Brian	BCB

SAMPLE SUMMARY

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-49561-1
Sdg Number: CHP49561

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
680-49561-1	29GW10	Water	08/03/2009 1005	08/04/2009 0916
680-49561-2	29GW10P080309	Water	08/03/2009 0000	08/04/2009 0916
680-49561-3	29-FB080309	Water	08/03/2009 1010	08/04/2009 0916

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-49561-1
Sdg Number: CHP49561

Client Sample ID: **29GW10**

Lab Sample ID: 680-49561-1
Client Matrix: Water

Date Sampled: 08/03/2009 1005
Date Received: 08/04/2009 0916

8270C Semivolatile Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)

Method:	8270C	Analysis Batch: 680-145324		Instrument ID:	MST
Preparation:	3520C	Prep Batch: 680-144559		Lab File ID:	t2761.d
Dilution:	1.0			Initial Weight/Volume:	1030 mL
Date Analyzed:	08/12/2009 2038			Final Weight/Volume:	1 mL
Date Prepared:	08/05/2009 1355			Injection Volume:	1.0 uL

Analyte	Result (ug/L)	Qualifier	MDL	RL
Naphthalene	13		0.49	9.7

Surrogate	%Rec	Qualifier	Acceptance Limits
2,4,6-Tribromophenol	94		40 - 139
2-Fluorobiphenyl	101		50 - 113
2-Fluorophenol	40		36 - 110
Nitrobenzene-d5	87		45 - 112
Phenol-d5	80		38 - 116
Terphenyl-d14	50		10 - 121

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-49561-1
Sdg Number: CHP49561

Client Sample ID: **29GW10P080309**

Lab Sample ID: 680-49561-2
Client Matrix: Water

Date Sampled: 08/03/2009 0000
Date Received: 08/04/2009 0916

8270C Semivolatile Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)

Method:	8270C	Analysis Batch: 680-145324		Instrument ID:	MST
Preparation:	3520C	Prep Batch: 680-144559		Lab File ID:	t2762.d
Dilution:	1.0			Initial Weight/Volume:	1030 mL
Date Analyzed:	08/12/2009 2103			Final Weight/Volume:	1 mL
Date Prepared:	08/05/2009 1355			Injection Volume:	1.0 uL

Analyte	Result (ug/L)	Qualifier	MDL	RL
Naphthalene	13		0.49	9.7

Surrogate	%Rec	Qualifier	Acceptance Limits
2,4,6-Tribromophenol	91		40 - 139
2-Fluorobiphenyl	105		50 - 113
2-Fluorophenol	39		36 - 110
Nitrobenzene-d5	88		45 - 112
Phenol-d5	79		38 - 116
Terphenyl-d14	42		10 - 121

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-49561-1
Sdg Number: CHP49561

Client Sample ID: **29-FB080309**

Lab Sample ID: 680-49561-3
Client Matrix: Water

Date Sampled: 08/03/2009 1010
Date Received: 08/04/2009 0916

8270C Semivolatile Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)

Method:	8270C	Analysis Batch: 680-145324		Instrument ID:	MST
Preparation:	3520C	Prep Batch: 680-144559		Lab File ID:	t2763.d
Dilution:	1.0			Initial Weight/Volume:	1060 mL
Date Analyzed:	08/12/2009 2129			Final Weight/Volume:	1 mL
Date Prepared:	08/05/2009 1355			Injection Volume:	1.0 uL

Analyte	Result (ug/L)	Qualifier	MDL	RL
Naphthalene	0.47	U	0.47	9.4

Surrogate	%Rec	Qualifier	Acceptance Limits
2,4,6-Tribromophenol	89		40 - 139
2-Fluorobiphenyl	108		50 - 113
2-Fluorophenol	78		36 - 110
Nitrobenzene-d5	91		45 - 112
Phenol-d5	86		38 - 116
Terphenyl-d14	75		10 - 121

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-49561-1
Sdg Number: CHP49561

Client Sample ID: **29GW10**

Lab Sample ID: 680-49561-1
Client Matrix: Water

Date Sampled: 08/03/2009 1005
Date Received: 08/04/2009 0916

6010B Metals (ICP)

Method:	6010B	Analysis Batch: 680-144972		Instrument ID:	ICPD
Preparation:	3030C	Prep Batch: 680-144612		Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Date Analyzed:	08/07/2009 1933			Final Weight/Volume:	50 mL
Date Prepared:	08/05/2009 1325				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Manganese	770		2.0	10

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-49561-1
Sdg Number: CHP49561

Client Sample ID: **29GW10P080309**

Lab Sample ID: 680-49561-2
Client Matrix: Water

Date Sampled: 08/03/2009 0000
Date Received: 08/04/2009 0916

6010B Metals (ICP)

Method:	6010B	Analysis Batch: 680-144972		Instrument ID:	ICPD
Preparation:	3030C	Prep Batch: 680-144612		Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Date Analyzed:	08/07/2009 1948			Final Weight/Volume:	50 mL
Date Prepared:	08/05/2009 1325				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Manganese	810		2.0	10

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-49561-1
Sdg Number: CHP49561

Client Sample ID: **29-FB080309**

Lab Sample ID: 680-49561-3
Client Matrix: Water

Date Sampled: 08/03/2009 1010
Date Received: 08/04/2009 0916

6010B Metals (ICP)

Method:	6010B	Analysis Batch: 680-144972		Instrument ID:	ICPD
Preparation:	3030C	Prep Batch: 680-144612		Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Date Analyzed:	08/07/2009 1953			Final Weight/Volume:	50 mL
Date Prepared:	08/05/2009 1325				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Manganese	2.0	U	2.0	10

DATA REPORTING QUALIFIERS

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-49561-1
Sdg Number: CHP49561

Lab Section	Qualifier	Description
GC/MS Semi VOA		
	U	Undetected at the Limit of Detection.
Metals		
	U	Undetected at the Limit of Detection.

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-49561-1
Sdg Number: CHP49561

Method Blank - Batch: 680-144559

Method: 8270C
Preparation: 3520C

Lab Sample ID: MB 680-144559/8-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 08/11/2009 1242
Date Prepared: 08/05/2009 1355

Analysis Batch: 680-145181
Prep Batch: 680-144559
Units: ug/L

Instrument ID: GC/MS SemiVolatiles - T
Lab File ID: t2701.d
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 1 mL
Injection Volume: 1.0 uL

Analyte	Result	Qual	MDL	RL
Naphthalene	0.50	U	0.50	10

Surrogate	% Rec	Acceptance Limits
2,4,6-Tribromophenol	86	40 - 139
2-Fluorobiphenyl	90	50 - 113
2-Fluorophenol	72	36 - 110
Nitrobenzene-d5	87	45 - 112
Phenol-d5	76	38 - 116
Terphenyl-d14	74	10 - 121

Lab Control Sample - Batch: 680-144559

Method: 8270C
Preparation: 3520C

Lab Sample ID: LCS 680-144559/9-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 08/11/2009 1308
Date Prepared: 08/05/2009 1355

Analysis Batch: 680-145181
Prep Batch: 680-144559
Units: ug/L

Instrument ID: GC/MS SemiVolatiles - T
Lab File ID: t2702.d
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 1 mL
Injection Volume: 1.0 uL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Naphthalene	100	81.8	82	41 - 110	

Surrogate	% Rec	Acceptance Limits
2,4,6-Tribromophenol	81	40 - 139
2-Fluorobiphenyl	95	50 - 113
2-Fluorophenol	76	36 - 110
Nitrobenzene-d5	93	45 - 112
Phenol-d5	79	38 - 116
Terphenyl-d14	77	10 - 121

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-49561-1
Sdg Number: CHP49561

Method Blank - Batch: 680-144612

Method: 6010B
Preparation: 3030C

Lab Sample ID: MB 680-144612/17-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 08/07/2009 1923
Date Prepared: 08/05/2009 1340

Analysis Batch: 680-144972
Prep Batch: 680-144612
Units: ug/L

Instrument ID: ICP/AES - D
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

Analyte	Result	Qual	MDL	RL
Manganese	2.0	U	2.0	10

Lab Control Sample - Batch: 680-144612

Method: 6010B
Preparation: 3030C

Lab Sample ID: LCS 680-144612/18-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 08/07/2009 1928
Date Prepared: 08/05/2009 1352

Analysis Batch: 680-144972
Prep Batch: 680-144612
Units: ug/L

Instrument ID: ICP/AES - D
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Manganese	500	488	98	80 - 120	

Calculations are performed before rounding to avoid round-off errors in calculated results.

Serial Number 020915

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Savannah
5102 LaRoche Avenue
Savannah, GA 31404

Website: www.testamericainc.com
Phone: (912) 354-7858
Fax: (912) 352-0165

Alternate Laboratory Name/Location

Phone:
Fax:

PROJECT REFERENCE	PROJECT NO.	PROJECT LOCATION (STATE)
S'Tc 29		
TAL (LAB) PROJECT MANAGER	P.O. NUMBER	CONTRACT NO.
CLIENT (SITE) PM	CLIENT PHONE	CLIENT FAX
Brad	724-443-4111	724-443-4187
CLIENT NAME	CLIENT E-MAIL	
Rhea		
CLIENT ADDRESS		
4975 William Flynn Hwy Suite 14, Gibsonia PA 15044		
COMPANY CONTRACTING THIS WORK (if applicable)		

PAGE 1 OF 1

STANDARD REPORT DELIVERY (X)

DATE DUE

EXPEDITED REPORT DELIVERY (SURCHARGE) ( )

DATE DUE

NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	MATRIX TYPE: AQUEOUS (WATER)	MATRIX TYPE: SOLID OR SEMISOLID	MATRIX TYPE: AIR	MATRIX TYPE: NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	REQUIRED ANALYSIS: 8270 naphthalene	REQUIRED ANALYSIS: 6010B manganese	NUMBER OF CONTAINERS SUBMITTED: none	NUMBER OF CONTAINERS SUBMITTED: HNO3	REMARKS
8/3/09	10:05	29GW10	G	X						2	1	
8/3/09	—	29GW10P080309	G	X						2	1	
8/3/09	10:10	29-FB080309	G	X						2	1	

PRESERVATIVE

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
	8/7/09	11:00						
RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	SAVANNAH LOG NO.	LABORATORY REMARKS
Ruth A Daughtry	8/4/9	0916	YES ( ) NO ( )		49561	TEMPERATURE 5.4

TAL8240-680 (1207)

Login Sample Receipt Check List

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-49561-1
SDG Number: CHP49561

Login Number: 49561
List Source: TestAmerica Savannah
Creator: Daughtry, Beth
List Number: 1

Question	T / F/ NA	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	N/A	
Is the Field Sampler's name present on COC?	True	
Sample Preservation Verified	True	