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VARIOUS TANK ACTIONS AND GROUNDWATER SAMPLING AT BUILDING 1279 CNC  
CHARLESTON SC  
3/1/2009  
ADVENT ENVIRONMENTAL INC

**VARIOUS TANK ACTIONS  
GROUNDWATER SAMPLING AT BUILDING 1279**

**FORMER CHARLESTON NAVAL COMPLEX  
NORTH CHARLESTON, SOUTH CAROLINA**

**Prepared for:**



**Naval Facilities Engineering Command – Southeast**

**and**



**BRAC Program Management Office – Southeast**

**Contract Number  
N62467-06-D-0125**

**Task Order  
0048**

**ADVENT Project 09-500  
March 2009**

**Various Tank Actions  
Groundwater Sampling at Building 1279**

Former Charleston Naval Complex  
North Charleston, South Carolina

Contract N62467-06-D-0125  
Task Order 0048  
ADVENT Project 09-500  
March 2009

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**Prepared by:**



**ADVENT**  
Environmental Consulting and Design

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**CERTIFICATION PAGE**

**REGISTERED SOUTH CAROLINA PROFESSIONAL GEOLOGIST  
CERTIFICATION**

By affixing my seal to this report, I certify the data and interpretations stated in the *Various Tank Actions, Groundwater Sampling at Building 1279, Former Charleston Naval Complex (CNC)* are true and accurate to the best of my knowledge. I further certify that I am registered to practice geology in the state of South Carolina and that it is within my professional expertise to verify the correctness of this information.

---

James W. Weeg

Date

Registration Number: 2494 (South Carolina)

## LIST OF ACRONYMS AND ABBREVIATIONS

µg/kg	micro-grams per kilogram
µg/L	micro-grams per liter
AST	Aboveground Storage Tank
bgs	below ground surface
BRAC	Base Realignment and Closure Commission
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CNC	Charleston Naval Complex
CTF	Chicora Tank Farm
DPT	Direct Push Technology
DTW	Depth to Water
FFP	Free Floating Product
MCLs	Maximum Contaminant Levels (derived from US EPA's Region-3 Risk Assessment Table, September 2008)
MNA	Monitored Natural Attenuation
MSL	Mean Sea Level
NAVFAC	Naval Facilities Engineering Command – Southeast
ND	Not Detected
OVA	Organic Vapor Analyzer
PAH	Poly-nuclear Aromatic Hydrocarbons
PID	Photo-Ionization Device (a type of OVA)
ppm	Parts Per Million
PMO	Program Management Office
RBSL	Risk Base Screening Level (derived from <i>South Carolina Risk- Based Corrective Action for Petroleum Releases, May 15, 2001</i> )
RL	Reporting Limit (derived from SCDHEC's <i>Underground Storage Tank Assessment Guidelines, February 14, 2006</i> )
SAS	Surficial Aquifer System
SB	Soil Boring
SCDHEC	South Carolina Department of Health and Environmental Control
TMW	Temporary Monitoring Wells
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

## **1.0 INTRODUCTION**

ADVENT Environmental, Inc. (ADVENT) was retained by the Naval Facilities Engineering Command – Southeast (NAVFAC) and the Base Realignment and Closure (BRAC) Program Management Office (PMO) – Southeast to conduct groundwater sampling at Building 1279, as part of the task order to provide service for *Various Tank Actions at the Chicora Tank Farm (CTF), Buildings 236, and 1279, and the Reserve Training Center located at the former Charleston Naval Complex (CNC)*, in North Charleston, South Carolina. A Work Plan for *Various Tank Actions at the Chicora Tank Farm, Buildings 236, 1279, and the Reserve Training Center* was submitted to the BRAC Office and approved in January 2009. Building 1279 is located near the intersection of North Hobson Avenue and Reynolds Avenue at the former CNC in North Charleston, South Carolina. A site location map is presented as Figure 1.

### **1.1 LOCAL SITE DESCRIPTION**

The former CNC is located in North Charleston, South Carolina. Building 1279 is a storage facility that was used by the CNC and is currently used for the same purpose by commercial firms at the Port of Charleston.

Local site conditions were assessed by analyzing the topography, geology, hydrogeology, and the overall visual appearance of the property. The following section describes the local site conditions at Building 1279.

### **1.2 TOPOGRAPHY AND SITE CONDITIONS**

Topographic relief at the CTF is moderate. Mean elevation at the site is approximately 7 feet above mean sea level (MSL), with a minimum elevation of approximately 5 feet (1279MW003) and a maximum elevation of approximately 9 feet (1279MW002).

At present, Building 1279 is a fenced storage facility that provides both covered and open storage of bulk products. The building was formerly utilized as an administration building, and is joined to an overhead, open, cover system for bulk storage that occupies the southern portion of the site.

Building 1279 is bordered to the north by the Building 25 (a former administration building), to the east by Detyens Shipyards, Inc., to the south by Reynolds Avenue, and to the west by Kephart Street. A site map is presented as Figure 2.

### **1.3 GEOLOGY AND HYDROGEOLOGY**

Charleston County, South Carolina, is located within the Coastal Plain Physiographic Province. The Coastal Plain extends along the Atlantic seaboard from Florida to southern New Jersey. The Coastal Plain is characterized by sediments that overlay basement rocks, thickening from just a few feet near the Fall Line to approximately 3,800 feet at the southernmost corner of South Carolina (Hydrologic Investigations Atlas 730-G).

Charleston County overlies the Surficial Aquifer System (SAS) which extends from Southern Florida to North Carolina. The SAS consists mostly of unconsolidated sand and minor beds of shells and oolitic limestone. At depth these formations are generally confined above and below by impermeable clay layers. SAS sediments range in age from late Miocene to Holocene. The SAS is typically less than 50 feet thick; however the system thickens coastward.

Groundwater flow in the SAS is mostly unconfined. Locally, thin clay beds create semi-confined conditions within the system. Water that enters the SAS moves quickly along short flow paths and discharges as baseflow to streams. Generally, groundwater flows

southeast towards the coast. The transmissivity of the SAS is extremely variable depending on location. Well yields in South Carolina average 50 gallons per minute (Hydrologic Investigations Atlas 730-G).

Site specific groundwater flow is generally from the both the north and south towards the topographic low in the center of the site. This area is a designed drainage easement that runs east-west across the site. The groundwater interface is generally encountered at approximately 4 feet below ground surface (bgs) (Figure 3).

#### **1.4 HISTORICAL SUMMARY**

Groundwater monitoring wells at Building 1279 were installed by ADVENT in November 2004 using a South Carolina Certified Well Driller, as part of a Tier-I investigation (Figure 2). The wells were developed and initially sampled on November 11, 2004 as part of a Tier-I investigation. Additional sampling took place on November 4, 2005 as part of the Monitored Natural Attenuation Program (MNA). Historical analytical data are presented in Table 1.

Analytical results from the Tier-I investigation detected contaminants of concern (COCs) above the Risk Based Screening Level (RBSL) established by the South Carolina Department of Health and Environmental Control (SCDHEC). Sample 1279MW002 exceeded the RBSL for naphthalene (25 µg/L) with a concentration of 57 µg/L. Sample 1279MW003 exceeded the RBSL for Benzene (5 µg/L) with a concentration of 10 µg/L. During the first round of MNA sampling, concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) and naphthalene were reported below detection level (BDL) or below the RBSL in the samples from all monitoring wells except 1279MW003. The sample collected from monitoring well 1279MW003 exceeded the RBSL for both Benzene (5 µg/L ) with a concentration of 28 µg/L, and Naphthalene (25 µg/L) with a concentration of 100 µg/L.

As part of the MNA program, three (3) monitoring wells (1279MW001, 1279MW002, and 1279MW003) were sampled on August 4, 2008 at Building 1279.

Sample 1279MW002 exceeded the RBSL for benzene (5 µg/L) with a concentration of 6.5 µg/L. Additionally ethyl-benzene was detected in the sample from 1279MW002 and naphthalene was detected in both 1279MW001 and 1279MW002. However, these detections were below the RBSL. Table 1 presents a summary of the historical analytical results for each groundwater sample.

## **2.0 BUILDING 1279 GROUNDWATER SAMPLING**

As part of the MNA program, three (3) monitoring wells (1279MW001, 1279MW002, and 1279MW003) were sampled on February 19, 2009 at Building 1279. Field activities were conducted in accordance with the approved workplan (January 2009). Well purge data and sample log sheets are included in Appendix A of this report.

### **2.1 SAMPLE COLLECTION**

Groundwater monitoring wells were sampled in accordance with methods defined in the *EPA Ground Water Issue, Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, dated April 1996. Once purging was completed, samples were collected and analyzed by a South Carolina certified laboratory for VOCs (EPA Method 8260). Prior to sampling, water-level measurements were made at each well. Figure 3 shows the potentiometric surface for the February 2009 monitoring event. Groundwater samples were collected using a low-flow method, preserved on ice, and submitted to a South Carolina certified laboratory for analysis.

Groundwater samples were collected at three locations (1279MW001, 1279MW002, and 1279MW003) as indicated on Figure 2 and analyzed for BTEX and naphthalene using EPA Method 8260.

### **2.2 ANALYTICAL RESULTS**

Analytical results for the three monitoring wells did not exceed RBSLs. However, Benzene, ethylbenzene, naphthalene, and o-xylene were all detected in the sample from 1279MW003, but at levels below RBSL. Analytical results for the groundwater sampling are presented in Table 2 and included in Appendix B.

### **3.0 CONCLUSIONS AND RECOMMENDATIONS**

Sampling has been conducted at Building 1279 since the installation of groundwater monitoring wells in 2005. Historical data shows that COCs have been present in all sampling events performed. However, each progressive sampling event has shown lower levels of contamination, and in fewer monitoring wells. This appears to indicate that monitored natural attenuation (MNA) is occurring at Building 1279. The groundwater sample collected from 1279MW003 did not exceed any RBSLs, but was very close to the RBSL for benzene. Therefore, ADVENT recommends that at least two more rounds of semi-annual sampling to monitor conditions at the site, with a long term goal for the site to be recommended for “no further action” (NFA) status to SCDHEC.

## **TABLES**

**Table-1**  
**Historical Analytical Results**  
**Bldg 1279, Former CNC**  
**North Charleston, South Carolina**

COC/Method	1279MW001			1279MW002			1279MW003			RBSL
	Date	11/4/2004	11/4/2005	8/4/2008	11/4/2004	11/4/2005	8/4/2008	11/4/2004	11/4/2005	
8260 MSV Low Level	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Benzene	ND	ND	ND	<b>3.5</b>	ND	<b>6.4</b>	<b>10</b>	<b>28</b>	ND	5
Ethylbenzene	ND	ND	ND	<b>76</b>	<b>1.5</b>	<b>11.2</b>	16	11	ND	700
Naphthalene	ND	ND	<b>1.6</b>	<b>57</b>	ND	<b>5.1</b>	22	<b>100</b>	ND	25
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,000
Total Xylenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	10,000

Created By: JWW, 03/23/09

Checked By: ECS, 03/23/09

*COC = Constituent of Concern*

*ug/L = micrograms per liter*

*ND = Not Detected*

*RBSL = Risk Based Screening Level (from Table-B1, South Carolina Risk-Based Corrective Action For Petroleum Releases, May 15, 2001)*

*Red = Value exceeds the RBSL*

*Bold = Constituent of Concern detected*

*J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.*

**Table 2**  
**Groundwater Analytical Results**  
**Building 1279, Former CNC**  
**North Charleston, South Carolina**  
**February 19, 2009**

<b>COC/Method</b>	<b>1279MW001</b>	<b>1279MW002</b>	<b>1279MW003</b>	<b>RBSL</b>
<b>8260 MSV Low Level</b>	<b>µg/L</b>	<b>µg/L</b>	<b>µg/L</b>	<b>µg/L</b>
Benzene	ND	ND	<b>4.4</b>	5
Ethylbenzene	ND	ND	<b>1.5</b>	700
Naphthalene	ND	ND	<b>8.2</b>	25
Toluene	ND	ND	ND	1,000
m&p -xylene	ND	ND	ND	5,000
o-xylene	ND	ND	<b>0.24J</b>	5,000

Created By: JWW, 03/23/09

Checked By: ECS, 03/23/09

*COC = Constituent of Concern*

*ug/L = micrograms per liter*

*ND = Not Detected*

*RBSL = Risk Based Screening Level (from Table-B1, South Carolina Risk-Based Corrective Action For Petroleum Releases, May 15, 2001)*

*Red = Value exceeds the RBSL*

*Bold = Constituent of Concern detected*

*J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.*

## **FIGURES**



Prepared for:



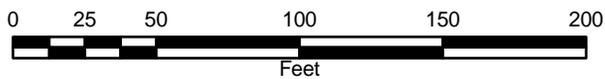
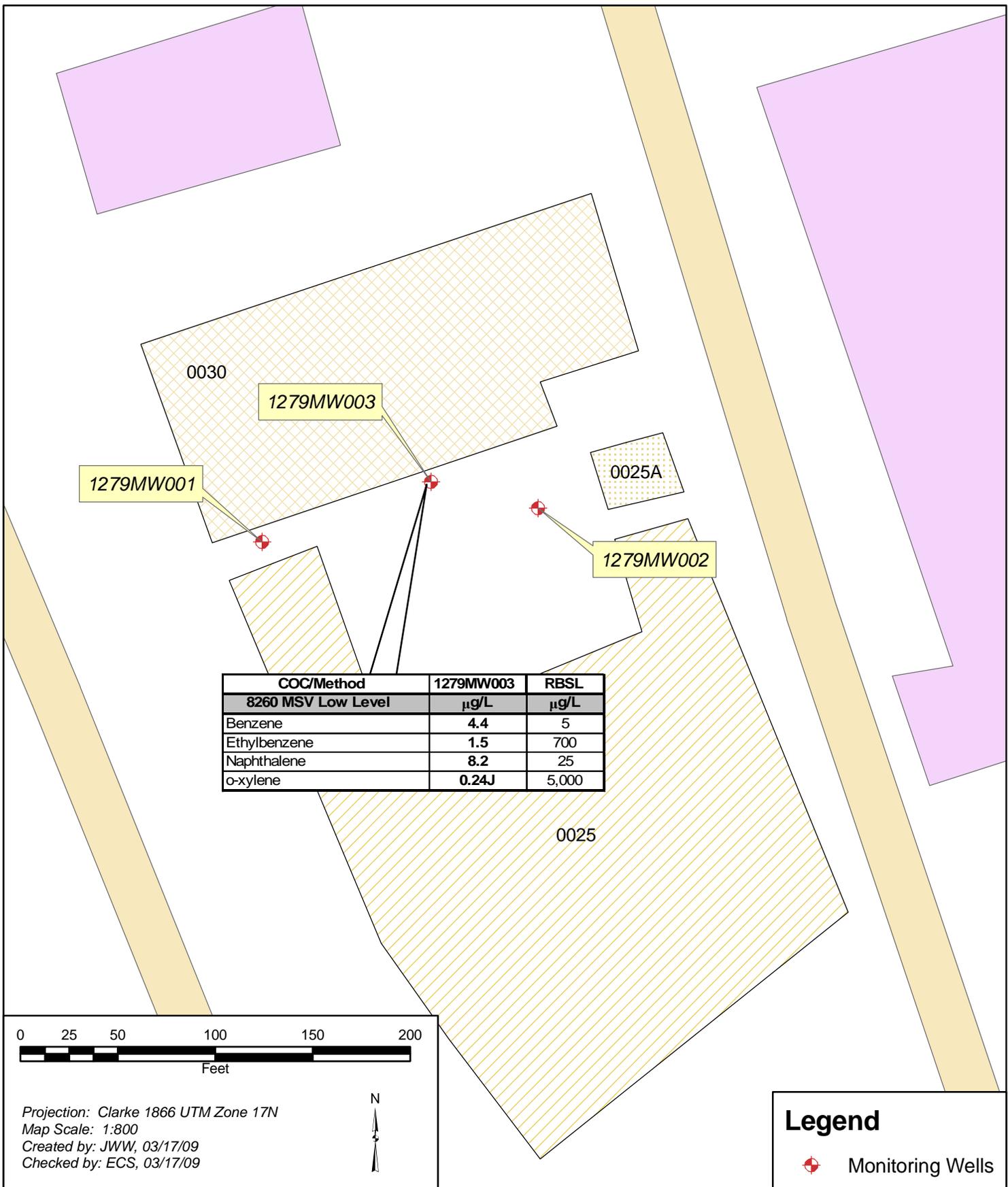
Prepared by:



## Figure 1

Site Location Map  
Building 1279, Former CNC  
Charleston, South Carolina  
ADVENT Project 09-500  
March 2009

Source: SC GIS Data Clearinghouse



Projection: Clarke 1866 UTM Zone 17N  
 Map Scale: 1:800  
 Created by: JWW, 03/17/09  
 Checked by: ECS, 03/17/09



**Legend**

 Monitoring Wells

Prepared for:



Prepared by:

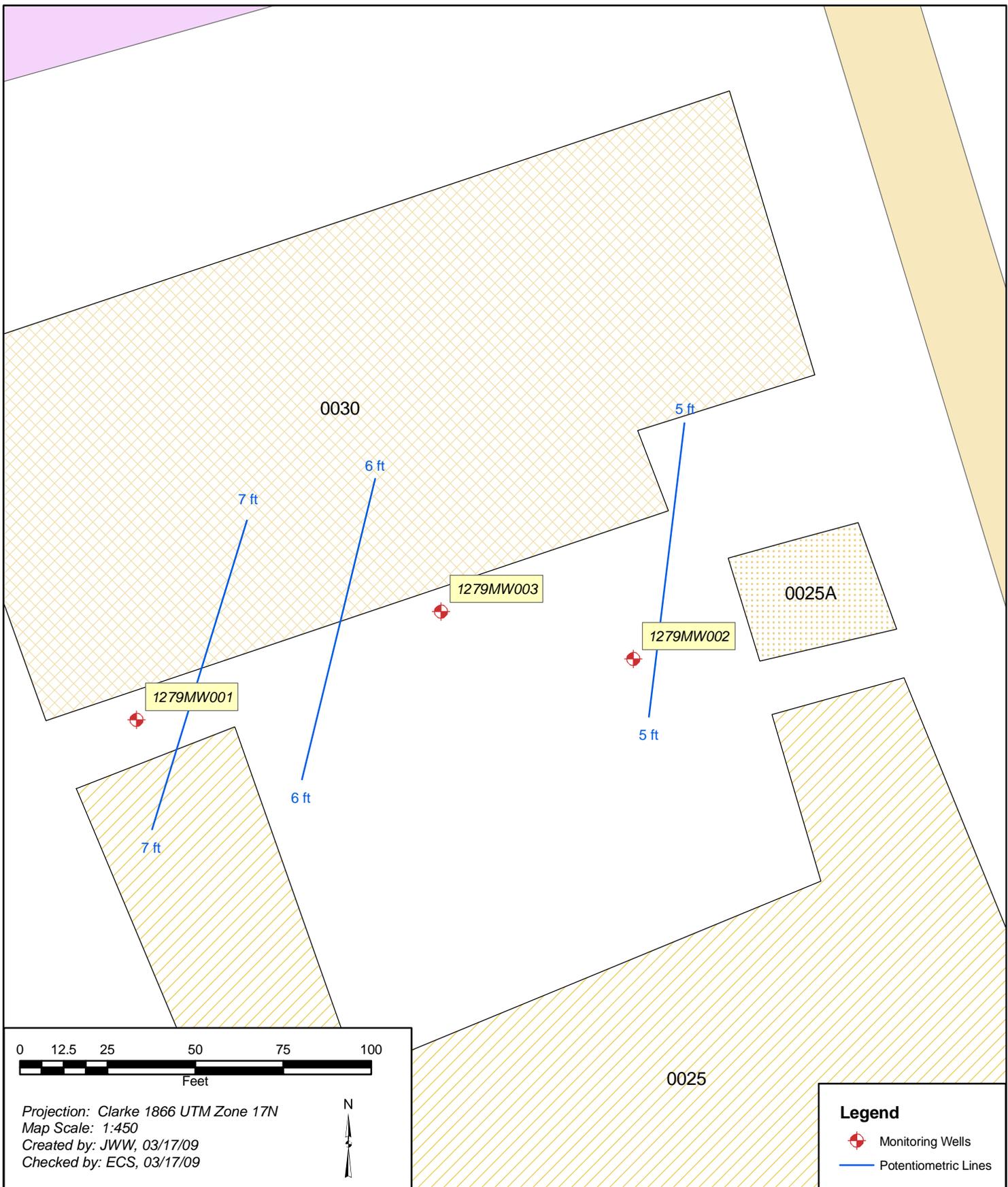


ADVENT Environmental, Inc.  
 498 Wando Park Blvd., Ste. 500  
 Mt. Pleasant, SC 29464

**Figure 2**

Site Map/Concentration Map  
 Building-1279, Former CNC  
 North Charleston, SC  
 ADVENT Project 09-500  
 March 2009

Source: SC GIS Data Clearinghouse



Prepared for:



Prepared by:



### Figure 3

**Potentiometric Map  
 Bldg-1279, Former CNC  
 North Charleston, SC  
 ADVENT Project 09-500  
 March 2009**

Source: SC GIS Data Clearinghouse

## **APPENDIX A**

Date 2/14/09  
 TOT 0800  
 Location Bldg 1271, CNC  
 Weather CLR 60°F  
 Pres. Juv

0800 - Onsite facility is locked up -  
 moving offsite to track down  
 manager

1015 - Back onsite with facility now  
 open for sampling

- Set up 01 1279 MW 002 for  
 sampling

1112 - Sampled 1279 MW 002

1115 - Collected duplicate

- moved to 1271 MW 001

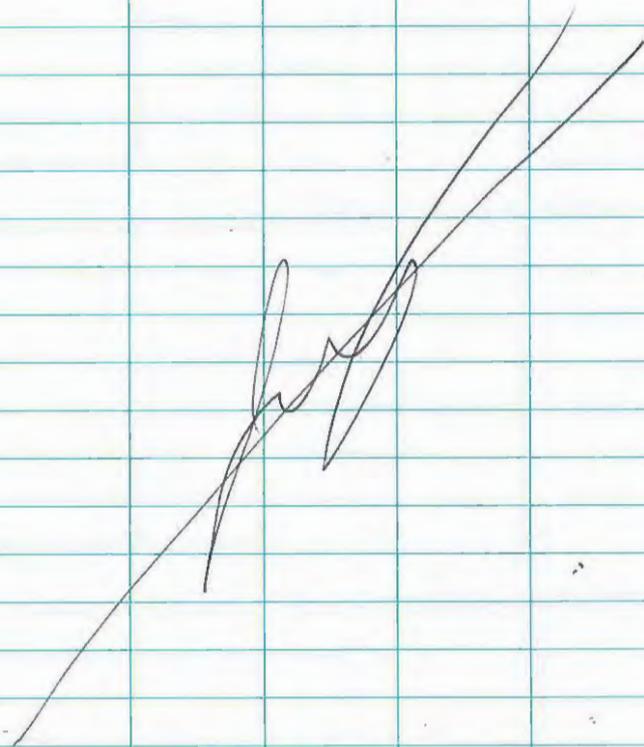
1240 - Sampled 1279 MW 002

- Moved to 1279 MW 003

1305 - Sampled 1279 MW 003

1310 - Collected Equipment  
 Blank.

1430 - Offsite to Felix





## LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Bldg 1279  
 PROJECT NUMBER: 09-500  
 Depth to Water: 3.52

WELL ID: 1279 NW 001  
 DATE: 2/19/09  
 DTB: 15.7

Well Volume: (DTB - DTW) x 0.17 = Well Volume: (15.4 - 3.52) x 0.17 = 2.02 gal.

Time (Hrs)	Water Level (Ft below TOC)	Volume (gal)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP (mV)	Comments
1150	4.15	0.25	6.30	0.131	4.9	1.39	18.59	121	
1155	4.15	0.50	6.46	0.130	5.2	0.01	18.33	112	
1200	4.15	0.75	6.53	0.129	6.1	0.00	18.32	104	
1205	4.15	1.00	6.59	0.129	6.9	0.00	18.31	99	
1210	4.15	1.25	6.63	0.128	4.8	0.00	18.30	92	
1215	4.15	1.50	6.65	0.129	5.1	0.00	18.20	90	
1220	4.15	1.75	6.65	0.129	4.5	0.00	18.20	90	
1225	4.15	2.00	6.66	0.129	7.7	0.00	18.20	89	
1230	4.15	2.25	6.66	0.129	5.0	0.00	18.18	88	

Sample Time: 1240

Total Vol. Purged: 2.25 gal.

Fe<sup>2+</sup>: NA  
 H<sub>2</sub>S: NA  
 Diss. CO<sub>2</sub>: NA

**Stabilization Factors**  
 pH ± 0.1                      DO ± 10%  
 Conductivity ± 3%        Turbidity ± 10%  
 ORP ± 10Mv



## LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Bldg 1279  
 PROJECT NUMBER: 09-500  
 Depth to Water: 4.83

WELL ID: 1279 NW 002  
 DATE: 2/11/09  
 DTB: 12.95

Well Volume: (DTB - DTW) x 0.17 = Well Volume: (12.95 - 4.83) x 0.17 = 1.38

Time (Hrs)	Water Level (Ft below TOC)	Volume (gal)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP (mV)	Comments
1050	4.45	0.25	5.80	0.318	45.0	0.65	20.81	127	
1053	4.95	0.50	5.37	0.304	25.8	0.07	20.91	147	
1056	4.45	0.75	5.21	0.294	24.7	0.00	20.83	160	
1059	4.45	1.00	5.12	0.283	21.8	0.00	20.81	173	
1102	4.45	1.25	<del>5.22</del> 5.04	0.278	13.8	0.00	20.77	168	
1105	4.45	1.50	5.04	0.278	11.1	0.00	20.71	165	
1108	4.45	1.75	5.02	0.276	11.7	0.00	20.70	160	

Sample Time: 1112

Total Vol. Purged: 1.75 gal.

Fe<sup>2+</sup>: NA  
 H<sub>2</sub>S: NA  
 Diss. CO<sub>2</sub>: NA

**Stabilization Factors**  
 pH ± 0.1      DO ± 10%  
 Conductivity ± 3%      Turbidity ± 10%  
 ORP ± 10Mv

Collected Dup at: 1115



## LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Bldg 1279  
 PROJECT NUMBER: 09-500  
 Depth to Water: 4.08

WELL ID: 1279MW D03  
 DATE: 2/12/09  
 DTB: 13.20

Well Volume: (DTB - DTW) x 0.17 = Well Volume: (13.2 - 4.08) x 0.17 = 1.55 gal.

Time (Hrs)	Water Level (Ft below TOC)	Volume (gal)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP (mV)	Comments
1245	4.17	0.25	5.08	0.186	5.4	0.59	20.64	194	
1248	4.17	0.50	5.15	0.197	4.2	0.00	20.76	133	
1251	4.17	0.75	5.29	0.209	3.1	0.00	20.59	80	
1254	4.17	1.00	5.40	0.221	3.8	0.00	20.51	55	
1257	4.17	1.25	5.50	0.236	3.1	0.00	20.57	27	
1300	4.17	1.50	5.56	0.246	3.1	0.00	20.58	13	
1303	4.17	1.75	5.56	0.246	3.0	0.00	20.52	14	

Sample Time: 1305

Total Vol. Purged: 1.75 gal.

Fe<sup>2+</sup>: NA  
 H<sub>2</sub>S: NA  
 Diss. CO<sub>2</sub>: NA

**Stabilization Factors**  
 pH ± 0.1                      DO ± 10%  
 Conductivity ± 3%        Turbidity ± 10%  
 ORP ± 10Mv

**FIELD SAMPLING REPORT**



**ADVENT**

498 Wando Park Blvd Suite 500  
Mt. Pleasant, SC 29464  
(843) 388-1851

JOB NUMBER 09-500  
JOB NAME Bldg 1279 Sampling  
SAMPLING POINT  
(LOCATION) Bldg 1279  
DATE 2/19/09 TIME 1240

**SAMPLING INFORMATION**

SAMPLE I.D. NUMBER: 1279 MW 001 HAZARDOUS?:  YES  NO  UNKNOWN

**SOIL SAMPLING DATA:**

SAMPLING DATE: NA SAMPLER TYPE & MATERIAL NA  
TIME: NA SAMPLING DEPTH NA  
SAMPLE DESCRIPTION NA

**WELL SAMPLING DATA:**

SAMPLING DATE: 2/19/09 PURGE METHOD & MATERIALS: Low Flow/Low Stress Peristaltic Pump with Teflon Lined Tubing  
TIME: 1240 WELL VOLUME ((DTB - DTW) x Constant = Well Volume): (15.4 - 3.52) x 0.17 = 2.02 gal.  
VOLUME OF WATER PURGED: 2.25 gal  
PURGE DATE: 2/19/09 START TIME: 1150 END TIME: 1230  
SAMPLER TYPE & MATERIAL: Geopump-II using flex tubing and teflon lined tubing  
SAMPLE DESCRIPTION: NA  
DEPTH TO GROUND WATER (ft): 3.52 TOTAL WELL DEPTH (ft): 15.40

**CONTAINER**

TYPE	VOLUME	PRESERVATIVE/ANALYSIS METHOD	NUMBER	FILTERING	COC
Glass	40ml Amber	HCl / EPA SW-846 Method 8260B	3	No	BTEX, Naphthalene

**FIELD MEASUREMENTS**

PARAMETER	FINAL MEASUREMENT	COMMENTS
pH (STO UNITS)	<u>6.66</u>	
SPEC. COND (um/sm)	<u>6.129</u>	
Turbidity (NTU)	<u>5.0</u>	
Dissolved Oxygen (mg/L)	<u>0.00</u>	
Temperature @	<u>18.18</u>	
ORP (mV)	<u>88</u>	

**GENERAL INFORMATION**

WEATHER CLR AIR TEMP. 65°F  
SAMPLES COLLECTED BY: JWW  
PARAMETERS MEASURED WITH (EQUIPMENT TYPE & SER. NUM): Honibe U-22 SM# 8153004  
MODE OF SHIPMENT:  CAR/TRUCK  BUS  PLANE  COMMER VEH.  
COMMENTS (FIELD MODIFICATIONS, INSTRUMENT PROBLEMS, SAMPLE DUPLICATE, ETC.): NA

**FIELD SAMPLING REPORT**



**ADVENT**

498 Wando Park Blvd Suite 500  
Mt. Pleasant, SC 29464  
(843) 388-1851

JOB NUMBER 09-500  
JOB NAME Bldg 1279 Sampling  
SAMPLING POINT  
(LOCATION) Bldg 1279  
DATE 2/19/09 TIME 1112

**SAMPLING INFORMATION**

SAMPLE I.O. NUMBER: 1279 MW 002 HAZARDOUS?:  YES  NO  UNKNOWN

**SOIL SAMPLING DATA:**

SAMPLING DATE: NA SAMPLER TYPE & MATERIAL NA  
TIME: NA SAMPLING DEPTH NA  
SAMPLE DESCRIPTION NA

**WELL SAMPLING DATA:**

SAMPLING DATE: 2/19/09 PURGE METHOD & MATERIALS: Low Flow/Low Stress Peristaltic Pump with Teflon Lined Tubing  
TIME: 1112 WELL VOLUME [(DTB - DTW) x Constant = Well Volume]: (12.95 - 4.83) x 0.17 = 1.38  
VOLUME OF WATER PURGED: 1.75 gal.  
PURGE DATE: 2/19/09 START TIME: 1050 END TIME: 1108  
SAMPLER TYPE & MATERIAL: Geopump-II using flex tubing and teflon lined tubing  
SAMPLE DESCRIPTION: None  
DEPTH TO GROUND WATER (ft): 4.83 TOTAL WELL DEPTH (ft): 12.95

**CONTAINER**

TYPE	VOLUME	PRESERVATIVE/ANALYSIS METHOD	NUMBER	FILTERING	COC
Glass	40ml Amber	HCl / EPA SW-846 Method 8260B	3	No	BTEX, Naphthalene

**FIELD MEASUREMENTS**

PARAMETER	FINAL MEASUREMENT	COMMENTS
pH (STO UNITS)	<u>5.02</u>	
SPEC. COND (um/sm)	<u>0.276</u>	
Turbidity (NTU)	<u>11.7</u>	
Dissolved Oxygen (mg/L)	<u>0.00</u>	
Temperature @	<u>20.70</u>	
ORP (mV)	<u>160</u>	

**GENERAL INFORMATION**

WEATHER CLR AIR TEMP. 65°F  
SAMPLES COLLECTED BY: JWW  
PARAMETERS MEASURED WITH (EQUIPMENT TYPE & SER. NUM): Horiba U-22 SM# 8153004  
MODE OF SHIPMENT:  CAR/TRUCK  BUS  PLANE  COMMER VEH.  
COMMENTS (FIELD MODIFICATIONS, INSTRUMENT PROBLEMS, SAMPLE DUPLICATE, ETC.): Collected duplicate a 1115

**FIELD SAMPLING REPORT**



**ADVENT**

498 Wando Park Blvd Suite 500  
Mt. Pleasant, SC 29464  
(843) 388-1851

JOB NUMBER 09-500  
JOB NAME Bldg 1279 Sampling  
SAMPLING POINT  
(LOCATION) Bldg 1279  
DATE 2/19/09 TIME 1305

**SAMPLING INFORMATION**

SAMPLE I.D. NUMBER: 1279 MW 003 HAZARDOUS?:  YES  NO  UNKNOWN

**SOIL SAMPLING DATA:**

SAMPLING DATE: NA SAMPLER TYPE & MATERIAL: NA  
TIME: NA SAMPLING DEPTH: NA  
SAMPLE DESCRIPTION: NA

**WELL SAMPLING DATA:**

SAMPLING DATE: 2/19/09 PURGE METHOD & MATERIALS: Low Flow/Low Stress Peristaltic Pump with Teflon Lined Tubing  
TIME: 1305 WELL VOLUME [(DTB - DTW) x Constant = Well Volume]: (13.2 - 4.08) x 0.17 = 1.55 gal.  
VOLUME OF WATER PURGED: 1.75 gal.  
PURGE DATE: 2/19/09 START TIME: 1245 END TIME: 1303  
SAMPLER TYPE & MATERIAL: Geopump-II using flex tubing and teflon lined tubing  
SAMPLE DESCRIPTION: NA  
DEPTH TO GROUND WATER (ft): 4.08 TOTAL WELL DEPTH (ft): 13.20

**CONTAINER**

TYPE	VOLUME	PRESERVATIVE/ANALYSIS METHOD	NUMBER	FILTERING	COC
Glass	40ml Amber	HCl / EPA SW-846 Method 8260B	3	No	BTEX, Naphthalene

**FIELD MEASUREMENTS**

PARAMETER	FINAL MEASUREMENT	COMMENTS
pH (STO UNITS)	<u>5.56</u>	
SPEC. COND (um/sm)	<u>0.246</u>	
Turbidity (NTU)	<u>3.0</u>	
Dissolved Oxygen (mg/L)	<u>0.00</u>	
Temperature @	<u>20.52</u>	
ORP (mV)	<u>14</u>	

**GENERAL INFORMATION**

WEATHER CLR AIR TEMP. 65°F  
SAMPLES COLLECTED BY: JWW  
PARAMETERS MEASURED WITH (EQUIPMENT TYPE & SER. NUM): Haniba U-22 SN# 8153004  
MODE OF SHIPMENT:  CAR/TRUCK  BUS  PLANE  COMMER VEH.  
COMMENTS (FIELD MODIFICATIONS, INSTRUMENT PROBLEMS, SAMPLE DUPLICATE, ETC.): NA

## **APPENDIX B**

March 06, 2009

Mr. James Weeg  
ADVENT ENVIRONMENTAL  
498 Wando Park Blvd  
Mount Pleasant, SC 29464

RE: Project: 90-500 BLDG 1279 7759  
Pace Project No.: 9238445

Dear Mr. Weeg:

Enclosed are the analytical results for sample(s) received by the laboratory on February 20, 2009. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

Inorganic Wet Chemistry and Metals analyses were performed at our Pace Asheville laboratory and Organic testing was performed at our Pace Huntersville laboratory unless otherwise footnoted. All Microbiological analyses were performed at the laboratory where the samples were received.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Bonnie McKee

bonnie.mckee@pacelabs.com  
Project Manager

Enclosures

cc: Larry Fowler, ADVENT ENVIRONMENTAL

**REPORT OF LABORATORY ANALYSIS**

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..



## CERTIFICATIONS

Project: 90-500 BLDG 1279 7759

Pace Project No.: 9238445

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### Charlotte Certification IDs

West Virginia Certification #: 357

Virginia Certification #: 00213

Tennessee Certification #: 04010

South Carolina Drinking Water Cert. #: 990060003

South Carolina Certification #: 990060001

Pennsylvania Certification #: 68-00784

Connecticut Certification #: PH-0104

North Carolina Field Services Certification #: 5342

North Carolina Drinking Water Certification #: 37706

New Jersey Certification #: NC012

Louisiana/LELAP Certification #: 04034

Kentucky UST Certification #: 84

Florida/NELAP Certification #: E87627

North Carolina Wastewater Certification #: 12

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### Asheville Certification IDs

West Virginia Certification #: 356

Virginia Certification #: 00072

Connecticut Certification #: PH-0106

Florida/NELAP Certification #: E87648

Tennessee Certification #: 2980

South Carolina Certification #: 99030001

South Carolina Bioassay Certification #: 99030002

Pennsylvania Certification #: 68-03578

North Carolina Wastewater Certification #: 40

North Carolina Drinking Water Certification #: 37712

North Carolina Bioassay Certification #: 9

New Jersey Certification #: NC011

Massachusetts Certification #: M-NC030

Louisiana/LELAP Certification #: 03095

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### Eden Certification IDs

North Carolina Wastewater Certification #: 633

Virginia Drinking Water Certification #: 00424

North Carolina Drinking Water Certification #: 37738

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## REPORT OF LABORATORY ANALYSIS

### SAMPLE SUMMARY

Project: 90-500 BLDG 1279 7759

Pace Project No.: 9238445

Lab ID	Sample ID	Matrix	Date Collected	Date Received
9238445001	1279MW001	Water	02/19/09 12:40	02/20/09 09:15
9238445002	1279MW002	Water	02/19/09 11:12	02/20/09 09:15
9238445003	1279MW003	Water	02/19/09 13:05	02/20/09 09:15
9238445004	DUPLICATE	Water	02/19/09 11:15	02/20/09 09:15
9238445005	EQUIPMENT BLANK	Water	02/19/09 13:10	02/20/09 09:15
9238445006	TRIP BLANK	Water	02/19/09 00:00	02/20/09 09:15

### REPORT OF LABORATORY ANALYSIS

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without the written consent of Pace Analytical Services, Inc..

### SAMPLE ANALYTE COUNT

Project: 90-500 BLDG 1279 7759

Pace Project No.: 9238445

Lab ID	Sample ID	Method	Analysts	Analytes Reported
9238445001	1279MW001	EPA 8260	AW	10
9238445002	1279MW002	EPA 8260	AW	10
9238445003	1279MW003	EPA 8260	AW	10
9238445004	DUPLICATE	EPA 8260	AW	10
9238445005	EQUIPMENT BLANK	EPA 8260	AW	10
9238445006	TRIP BLANK	EPA 8260	AW	10

### REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: 90-500 BLDG 1279 7759

Pace Project No.: 9238445

Sample: 1279MW001		Lab ID: 9238445001		Collected: 02/19/09 12:40		Received: 02/20/09 09:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Low Level</b>		Analytical Method: EPA 8260							
Benzene	ND	ug/L	1.0	0.25	1		02/28/09 18:36	71-43-2	
Ethylbenzene	ND	ug/L	1.0	0.30	1		02/28/09 18:36	100-41-4	
Naphthalene	ND	ug/L	1.0	0.24	1		02/28/09 18:36	91-20-3	
Toluene	ND	ug/L	1.0	0.26	1		02/28/09 18:36	108-88-3	
m&p-Xylene	ND	ug/L	2.0	0.66	1		02/28/09 18:36	1330-20-7	
o-Xylene	ND	ug/L	1.0	0.23	1		02/28/09 18:36	95-47-6	
4-Bromofluorobenzene (S)	99	%	87-109		1		02/28/09 18:36	460-00-4	
Dibromofluoromethane (S)	104	%	85-115		1		02/28/09 18:36	1868-53-7	
1,2-Dichloroethane-d4 (S)	104	%	79-120		1		02/28/09 18:36	17060-07-0	
Toluene-d8 (S)	100	%	70-120		1		02/28/09 18:36	2037-26-5	

## ANALYTICAL RESULTS

Project: 90-500 BLDG 1279 7759

Pace Project No.: 9238445

**Sample: 1279MW002**      **Lab ID: 9238445002**      Collected: 02/19/09 11:12      Received: 02/20/09 09:15      Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
<b>8260 MSV Low Level</b>		Analytical Method: EPA 8260							
Benzene	ND ug/L		1.0	0.25	1		02/28/09 18:59	71-43-2	
Ethylbenzene	ND ug/L		1.0	0.30	1		02/28/09 18:59	100-41-4	
Naphthalene	ND ug/L		1.0	0.24	1		02/28/09 18:59	91-20-3	
Toluene	ND ug/L		1.0	0.26	1		02/28/09 18:59	108-88-3	
m&p-Xylene	ND ug/L		2.0	0.66	1		02/28/09 18:59	1330-20-7	
o-Xylene	ND ug/L		1.0	0.23	1		02/28/09 18:59	95-47-6	
4-Bromofluorobenzene (S)	98 %		87-109		1		02/28/09 18:59	460-00-4	
Dibromofluoromethane (S)	106 %		85-115		1		02/28/09 18:59	1868-53-7	
1,2-Dichloroethane-d4 (S)	104 %		79-120		1		02/28/09 18:59	17060-07-0	
Toluene-d8 (S)	100 %		70-120		1		02/28/09 18:59	2037-26-5	

### ANALYTICAL RESULTS

Project: 90-500 BLDG 1279 7759

Pace Project No.: 9238445

Sample: 1279MW003		Lab ID: 9238445003		Collected: 02/19/09 13:05	Received: 02/20/09 09:15	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Low Level</b>		Analytical Method: EPA 8260							
Benzene	4.4	ug/L	1.0	0.25	1		02/28/09 19:23	71-43-2	
Ethylbenzene	1.5	ug/L	1.0	0.30	1		02/28/09 19:23	100-41-4	
Naphthalene	8.2	ug/L	1.0	0.24	1		02/28/09 19:23	91-20-3	
Toluene	ND	ug/L	1.0	0.26	1		02/28/09 19:23	108-88-3	
m&p-Xylene	ND	ug/L	2.0	0.66	1		02/28/09 19:23	1330-20-7	
o-Xylene	0.24J	ug/L	1.0	0.23	1		02/28/09 19:23	95-47-6	
4-Bromofluorobenzene (S)	100	%	87-109		1		02/28/09 19:23	460-00-4	
Dibromofluoromethane (S)	104	%	85-115		1		02/28/09 19:23	1868-53-7	
1,2-Dichloroethane-d4 (S)	103	%	79-120		1		02/28/09 19:23	17060-07-0	
Toluene-d8 (S)	100	%	70-120		1		02/28/09 19:23	2037-26-5	

## ANALYTICAL RESULTS

Project: 90-500 BLDG 1279 7759

Pace Project No.: 9238445

Sample: DUPLICATE		Lab ID: 9238445004		Collected: 02/19/09 11:15		Received: 02/20/09 09:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Low Level</b>		Analytical Method: EPA 8260							
Benzene	ND	ug/L	1.0	0.25	1		02/28/09 19:47	71-43-2	
Ethylbenzene	ND	ug/L	1.0	0.30	1		02/28/09 19:47	100-41-4	
Naphthalene	<b>0.46J</b>	ug/L	1.0	0.24	1		02/28/09 19:47	91-20-3	
Toluene	ND	ug/L	1.0	0.26	1		02/28/09 19:47	108-88-3	
m&p-Xylene	ND	ug/L	2.0	0.66	1		02/28/09 19:47	1330-20-7	
o-Xylene	ND	ug/L	1.0	0.23	1		02/28/09 19:47	95-47-6	
4-Bromofluorobenzene (S)	98	%	87-109		1		02/28/09 19:47	460-00-4	
Dibromofluoromethane (S)	106	%	85-115		1		02/28/09 19:47	1868-53-7	
1,2-Dichloroethane-d4 (S)	107	%	79-120		1		02/28/09 19:47	17060-07-0	
Toluene-d8 (S)	100	%	70-120		1		02/28/09 19:47	2037-26-5	

## ANALYTICAL RESULTS

Project: 90-500 BLDG 1279 7759

Pace Project No.: 9238445

**Sample: EQUIPMENT BLANK**      **Lab ID: 9238445005**      Collected: 02/19/09 13:10      Received: 02/20/09 09:15      Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
<b>8260 MSV Low Level</b>									
Analytical Method: EPA 8260									
Benzene	ND ug/L		1.0	0.25	1		02/28/09 13:51	71-43-2	
Ethylbenzene	ND ug/L		1.0	0.30	1		02/28/09 13:51	100-41-4	
Naphthalene	ND ug/L		1.0	0.24	1		02/28/09 13:51	91-20-3	
Toluene	<b>0.63J</b> ug/L		1.0	0.26	1		02/28/09 13:51	108-88-3	
m&p-Xylene	ND ug/L		2.0	0.66	1		02/28/09 13:51	1330-20-7	
o-Xylene	ND ug/L		1.0	0.23	1		02/28/09 13:51	95-47-6	
4-Bromofluorobenzene (S)	98 %		87-109		1		02/28/09 13:51	460-00-4	
Dibromofluoromethane (S)	108 %		85-115		1		02/28/09 13:51	1868-53-7	
1,2-Dichloroethane-d4 (S)	108 %		79-120		1		02/28/09 13:51	17060-07-0	
Toluene-d8 (S)	100 %		70-120		1		02/28/09 13:51	2037-26-5	

## ANALYTICAL RESULTS

Project: 90-500 BLDG 1279 7759

Pace Project No.: 9238445

Sample: TRIP BLANK		Lab ID: 9238445006		Collected: 02/19/09 00:00		Received: 02/20/09 09:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV Low Level</b>		Analytical Method: EPA 8260							
Benzene	ND ug/L		1.0	0.25	1		02/28/09 13:04	71-43-2	
Ethylbenzene	ND ug/L		1.0	0.30	1		02/28/09 13:04	100-41-4	
Naphthalene	ND ug/L		1.0	0.24	1		02/28/09 13:04	91-20-3	
Toluene	ND ug/L		1.0	0.26	1		02/28/09 13:04	108-88-3	
m&p-Xylene	ND ug/L		2.0	0.66	1		02/28/09 13:04	1330-20-7	
o-Xylene	ND ug/L		1.0	0.23	1		02/28/09 13:04	95-47-6	
4-Bromofluorobenzene (S)	98 %		87-109		1		02/28/09 13:04	460-00-4	
Dibromofluoromethane (S)	107 %		85-115		1		02/28/09 13:04	1868-53-7	
1,2-Dichloroethane-d4 (S)	107 %		79-120		1		02/28/09 13:04	17060-07-0	
Toluene-d8 (S)	100 %		70-120		1		02/28/09 13:04	2037-26-5	

**QUALITY CONTROL DATA**

Project: 90-500 BLDG 1279 7759

Pace Project No.: 9238445

QC Batch: MSV/6247 Analysis Method: EPA 8260  
 QC Batch Method: EPA 8260 Analysis Description: 8260 MSV Low Level  
 Associated Lab Samples: 9238445001, 9238445002, 9238445003, 9238445004, 9238445005, 9238445006

METHOD BLANK: 243190 Matrix: Water  
 Associated Lab Samples: 9238445001, 9238445002, 9238445003, 9238445004, 9238445005, 9238445006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Benzene	ug/L	ND	1.0	02/28/09 12:40	
Ethylbenzene	ug/L	ND	1.0	02/28/09 12:40	
m&p-Xylene	ug/L	ND	2.0	02/28/09 12:40	
Naphthalene	ug/L	ND	1.0	02/28/09 12:40	
o-Xylene	ug/L	ND	1.0	02/28/09 12:40	
Toluene	ug/L	ND	1.0	02/28/09 12:40	
1,2-Dichloroethane-d4 (S)	%	107	79-120	02/28/09 12:40	
4-Bromofluorobenzene (S)	%	99	87-109	02/28/09 12:40	
Dibromofluoromethane (S)	%	105	85-115	02/28/09 12:40	
Toluene-d8 (S)	%	99	70-120	02/28/09 12:40	

LABORATORY CONTROL SAMPLE: 243191

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Benzene	ug/L	50	50.5	101	78-128	
Ethylbenzene	ug/L	50	51.7	103	80-127	
m&p-Xylene	ug/L	100	107	107	82-127	
Naphthalene	ug/L	50	63.3	127	52-136	
o-Xylene	ug/L	50	52.0	104	83-124	
Toluene	ug/L	50	49.3	99	76-126	
1,2-Dichloroethane-d4 (S)	%			101	79-120	
4-Bromofluorobenzene (S)	%			100	87-109	
Dibromofluoromethane (S)	%			98	85-115	
Toluene-d8 (S)	%			98	70-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 243201 243202

Parameter	Units	9238391002		MSD		MS		MSD		% Rec Limits	RPD	Max RPD	Qual
		Result	Conc.	Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec				
Benzene	ug/L	ND	50	50	53.6	49.2	107	98	74-136	8	30		
Toluene	ug/L	ND	50	50	53.4	49.2	107	98	73-131	8	30		
1,2-Dichloroethane-d4 (S)	%						102	102	79-120				
4-Bromofluorobenzene (S)	%						97	97	87-109				
Dibromofluoromethane (S)	%						100	100	85-115				
Toluene-d8 (S)	%						97	97	70-120				

## QUALIFIERS

Project: 90-500 BLDG 1279 7759

Pace Project No.: 9238445

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### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

U - Indicates the compound was analyzed for, but not detected.



**Sample Condition Upon Receipt**



Client Name: Advent

Project # 9238445

Courier:  Fed Ex  UPS  USPS  Client  Commercial  Pace Other \_\_\_\_\_

Custody Seal on Cooler/Box Present:  yes  no    Seals intact:  yes  no

Packing Material:  Bubble Wrap  Bubble Bags  None  Other \_\_\_\_\_

Thermometer Used T060    Type of Ice:  Wet  Blue  None  Samples on ice, cooling process has begun

Cooler Temperature: 3.8

Biological Tissue is Frozen: Yes No N/A

Temp should be above freezing to 6°C

Comments:

Optional  
Proj. Due Date: N/A  
Proj. Name: N/A

Date and Initials of person examining contents: MAJ

Chain of Custody Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	4.
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	5.
Short Hold Time Analysis (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	6.
Rush Turn Around Time Requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	7.
Sufficient Volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8.
Correct Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	9.
-Pace Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers Intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	10.
Filtered volume received for Dissolved tests	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	11.
Sample Labels match COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12.
-Includes date/time/ID/Analysis Matrix:		
All containers needing preservation have been checked.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	<input type="checkbox"/> Yes <input type="checkbox"/> No	Initial when completed
Samples checked for dechlorination:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14.
Headspace in VOA Vials (>6mm):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	15.
Trip Blank Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	16.
Trip Blank Custody Seals Present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace Trip Blank Lot # (if purchased):	<u>N/A</u>	

Client Notification/ Resolution:

Field Data Required? Y / N / N/A

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution: \_\_\_\_\_

Project Manager Review: PLS

Date: 2/20/09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)