2014-2015 OU2 GROUNDWATER INVESTIGATION BPOW6-1, BPOW6-2, BPOW6-3, BPOW6-4, BPOW6-5, BPOW6-6 (VPB 145, VPB 146, VPB 147) Installation Report

BETHPAGE, NY

Prepared for:

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List of Acronyms and Abbreviations

AOC	Area of Concern
bgs	below ground surface
COC	Contaminants of Concern
COR	Continuously Operating Reference
EPA	Environmental Protection Agency, United States
ft	feet
GOCO	Government-Owned Contractor-Operated
GPS	Global Positioning System
IDW	Investigation Derived Waste
IR	Installation Restoration
Katahdin	Katahdin Analytical Services, Inc
MWD	Massapequa Water District
NAD	North American Datum
NAVD	North American Vertical Datum
NAVFAC	Naval Facilities Engineering Command
NG	Northrop Grumman
NTU	nephlometric turbidity units
NWIRP	Naval Weapons Industrial Reserve Plant
NYSDEC	New York State Department of Environmental Conservation
OU	Operable Unit
PCBs	Polychlorinated Biphenyls
POTW	Publicly Owned Treatment Works
PPE	Personal Protective Equipment
PVC	Polyvinylchloride
SAP	Sampling and analysis plan
SVOC	Semivolatile Organic Compounds
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
UFP	United Federal Programs
US	United States
VOC	Volatile Organic Compounds
VPB	Vertical Profile Boring

1.0 PROJECT BACKGROUND

Resolution Consultants has prepared this Data Summary Report for the Naval Facilities Engineering Command (NAVFAC), Mid-Atlantic under contract task order WE15 Contract N62470-11-D-8013. This report describes the installation of six monitoring wells and two quarterly groundwater monitoring events (specifically at the Vertical Profile Boring [VPB] locations VPB 145, VPB 146, VPB 147) in 2014 and 2015 for the Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage Operable Unit (OU) 2 Site 1 offsite plume. NWIRP Bethpage is located in east-central Nassau County, Long Island, New York, approximately 30 miles east of New York City (Figure 1).

1.1 Scope and Objectives

This report provides information on the installation of BPOW6-1, BPOW6-2, BPOW6-3, BPOW6-4, BPOW6-5 and BPOW6-6. The purpose of these outpost wells is to ascertain subsurface conditions and contaminant levels upgradient of the Massapequa Water District (MWD) wells and to provide early warning of plume migration toward the MWD wellfield. The locations of BPOW6-1, BPOW6-2, BPOW6-3, BPOW6-4, BPOW6-5 and BPOW6-6, VPBs and monitoring well locations are shown in Figure 2.

The field investigation included completing six monitoring wells, well development, soil/groundwater analysis, groundwater grab samples, and surveying. The tasks also included the decommissioning and relocation of wells BPOW6-5 and BPOW6-6 when it was determined while drilling the borehole for BPOW6-6 in February 2015 that it had damaged BPOW6-5. These activities are described and documented in this report and in Appendix A.

Field tasks were conducted in 2014 and 2015 in accordance with the *United Federal Programs Sampling and Analysis Plan (UFP SAP)*, Bethpage, New York. In addition, the work adhered to the following UFP SAP Addendums: Groundwater Sampling Using Low Stress (Low Flow) Purging and Sampling Protocol (Resolution Consultants, 2013) and Installation of Vertical Profile Borings and Monitoring Wells (Resolution Consultants, 2013).

1.2 Site History

NWIRP Bethpage is in the Hamlet of Bethpage, Town of Oyster Bay, New York. Since its inception in 1941, the plant's primary mission was the research, prototyping, testing, design, engineering, fabrication, and primary assembly of military aircraft. The facilities at NWIRP included four plants used for assembly and prototype testing, a group of quality control laboratories, two warehouse

complexes (north and south), a salvage storage area, water recharge basins, the Industrial Wastewater Treatment Plant, and several smaller support buildings.

The Navy's property originally totaled 109.5 acres and was formerly a Government-Owned Contractor-Operated (GOCO) facility that was operated by Northrop Grumman (NG) until September 1998. Prior to 2002, the NWIRP property was bordered on the north, west, and south by current or former NG facilities, and on the east by a residential neighborhood. By March 2008, approximately 100 acres of NWIRP property were transferred to Nassau County in three separate actions. The remaining 9 acres and access easements were retained by the Navy to continue remedial efforts at Installation Restoration (IR) Site 1 – Former Drum Marshalling Area and Site 4 – Former Underground Storage Tanks (Area of Concern [AOC] 22). A parcel of land connecting the two sites was also retained. Currently, the 9-acre parcel of NWIRP is bordered on the east by the residential neighborhood and on the north, south, and west by Steel Equities Properties; however, a small portion near Sites 2 and 3 is still owned by Nassau County. Access to the NWIRP is from South Oyster Bay Road.

1.3 Geology and Hydrogeology

Overburden at the site consists of well over 1,000 feet (ft) of unconsolidated deposits overlying crystalline bedrock of the Hartland Formation. Overburden is divided into four geologic units: the upper Pleistocene deposits, the Magothy Formation, the clay member of the Raritan Formation ("Raritan Clay") and the Lloyd Sand member of the Raritan Formation ("Lloyd Sand") (Geraghty and Miller, 1994).

The upper Pleistocene ranges in thickness from approximately 50 to 100 ft and consists of till and outwash deposits of medium to coarse sand and gravel with lenses of fine sand, silt and clay (Smolensky and Feldman, 1990); these deposits form the Upper Glacial Aquifer. Directly underlying this unit is the Magothy Formation with a thickness of 650 to 900 ft observed onsite. The Magothy is characterized by fine to medium sands and silts interbedded with zones of clays, silty sands and sandy clays. Sand and gravel lenses are found in some areas between depths of 600 and 880 ft below ground surface (bgs); these deposits form the Magothy Aquifer.

Investigations performed by the Navy since 2012 indicate that the bottom of the Magothy (top of the Raritan Clay) can extend to depths of 700 to greater than 1,000 ft bgs. The top of the Raritan Clay deepens to the south southeast, as evidenced by clay depths of 1,000 ft bgs (or more) in borings installed offsite. The Raritan Clay Unit is of continental origin and consists of clay, silty clay, clayey silt, and fine silty sand. This member acts as a confining layer over the Lloyd Sand Unit. The

Lloyd Sand Unit is also of continental origin, having been deposited in a large fresh water lacustrine environment. The material consists of fine to coarse-grained sands, gravel, inter-bedded clay, and silty sand. These deposits form the Lloyd Aquifer.

The Upper Glacial Aquifer and the Magothy Aquifer comprise the aquifers of interest at the NWIRP. Regionally, these formations are generally considered to form a common, interconnected aquifer as the coarse nature of each unit near their contact and the lack of any regionally confining clay unit allows for the unrestricted flow of groundwater between the formations.

The Magothy Aquifer is the major source of public water in Nassau County. The most productive water bearing zones are the discontinuous lenses of sand and gravel that occur within the siltier matrix. The major water-bearing zones are coarse sand and gravel lenses located in the lower portion of the Magothy. The Magothy Aquifer is commonly regarded to function overall as an unconfined aquifer at shallow depths and a confined aquifer at deeper depths. The drilling program at the NWIRP has revealed that clay zones beneath the facility are common but laterally discontinuous. No confining clay units of facility-wide extent have been encountered. This is also the case for borings installed offsite.

Groundwater is encountered at a depth of approximately 50 ft bgs at the facility. Historically, because of pumping and recharge at the facility, groundwater depths have been measured to range from 40 to 60 ft bgs. The groundwater flow in the area is to the south-southeast.

2.0 FIELD PROGRAM

Six monitoring wells were installed in the vicinity of VPB 145, VPB 146 and VPB 147 between July 2014 and June 2015. Field investigation activities consisted of drilling, well installation, well development, sampling, soil/groundwater analysis, surveying and decommissioning and relocation of two of the monitoring wells. Drilling during this investigation was performed by Delta Well and Pump Company of Ronkonkoma, New York. A description of these tasks is provided below.

2.1 Drilling and Well Construction

Monitoring wells BPOW6-1, BPOW6-2, BPOW6-3, BPOW6-4, BPOW6-5 and BPOW6-6 were installed using mud rotary drilling techniques. Well locations are shown on Figure 2 and construction details are summarized in Table 1. Boring logs with lithologic descriptions limited to the well screen interval are included in the Appendix A. Data Summary Reports for VPB 145 (Resolution Consultants, 2014a), VPB 146 (Resolution Consultants, 2014b) and VPB 147 (Resolution Consultants, 2015) document the installation of these VPBs including detailed lithologic descriptions, continuous gamma plots and multiple VOC samples over the entire boring length.

Prior to installing each monitoring well, the results of the groundwater samples, the geophysical logs, lithology and field data from the vertical profile borings were analyzed. Screen intervals were determined based on this analysis and also to coincide with MWD wells MWD 6442 and MWD 6443. During the monitoring well installation, split spoon samples were collected every 5 ft in the screen interval. One soil sample per monitoring well was analyzed for Total Organic Carbon (TOC) via United States (US) Environmental Protection Agency (EPA) series SW-846 method 9060A by Katahdin Analytical Services (Katahdin). Data validation of TOC data was performed by Resolution Consultants. Data validation packages and analytical data tables are included in Appendix A.

Wells were constructed of 4-inch diameter, Schedule 80, National Sanitation Foundation-approved polyvinylchloride (PVC) riser pipe and .010-slot well screen. Wells were completed at the surface with a 12-inch diameter steel curb box. Well risers were set below grade and fit with lockable J plugs. Detailed monitoring well construction diagrams are included in Appendix A.

2.2 Decommissioning and Relocation of BPOW6-5 and BPOW6-6

Monitoring well BPOW6-5 was initially installed on February 11, 2015 on Crocus Street, Seaford, New York. The total depth was 795 feet bgs. On Friday, February 27, 2015, pieces of Schedule 80 PVC well casing were observed mixed with the cuttings in the drilling mud. It was determined that

borehole BPOW6-6 had intersected the casing of well BPOW6-5, located 13 feet to the west, at a depth of approximately 460 to 480 feet. Resolution Consultants and the Navy assessed the situation and concluded that well BPOW6-5 could not be salvaged. Therefore, the decision was made to decommission well BPOW6-5 and borehole BPOW6-6.

The borehole decommissioning procedure was to tremie grout both the well and the boring from the total depth of each borehole to the ground surface to prevent potential contaminants of concern (COCs) from entering the borehole or the well and migrating vertically between subsurface zones. Decommissioning of both well BPOW6-5 and borehole BPOW6-6 was successfully completed on April 9, 2015. Documentation of the implementation is provided in Appendix A. Monitoring wells BPOW6-5 and BPOW6-6 were relocated and completed on North Hickory Street, Massapequa on May 8, 2015 and May 27, 2015, respectively.

2.3 Well Development

Following installation, all monitoring wells were developed to evacuate silts and other fine-grained materials and to establish the filter pack to promote a hydraulic connection between the well and the surrounding aquifer. Well development was not initiated until at least 24 hours after well installation.

Monitoring well screens were developed using a combination of air lifting, manual surging, and pumping with a submersible pump. Turbidity was monitored during development to determine stabilization. In compliance with New York State Department of Environmental Conservation (NYSDEC) policy, wells were developed until turbidity was less than 50 nephlometric turbidity units (NTUs) if possible. Table 2 summarizes total pumped volume from air and pump development and final turbidity.

2.4 Sampling

Following development, wells were allowed to stabilize for at least 2 weeks prior to groundwater sampling in accordance with low flow sampling procedures. Wells were purged using a bladder pump with a drop tube intake placed at the approximate midpoint of the screened interval. The following water quality parameters were continuously measured: water temperature, pH, conductivity, oxidation-reduction potential, dissolved oxygen and turbidity. Groundwater analytical samples were collected when water quality parameters stabilized. Samples were analyzed for Volatile Organic Compounds (VOC)s via method 8260B and 1,4-dioxane via Method 8270C by

Katahdin. All development and purge water was managed as investigation derived waste (IDW). Groundwater sample logs are included in Appendix A.

Monitoring wells BPOW6-1, BPOW6-2, BPOW6-3, BPOW6-4, BPOW6-5 and BPOW6-6 are sampled quarterly as part of the Navy's ongoing Environmental Restoration Program. Resolution Consultants sampled BPOW6-1, BPOW6-2, BPOW6-3, and BPOW6-4 during the March 2015 quarterly monitoring event and sampled BPOW6-5 and BPOW6-6 during the June quarterly monitoring event. Analytical results and stabilized field parameters for these data are summarized in Tables 3 and 4, respectively. Data validation is documented in Appendix A.

Per an agreement between the Navy and Northrop Grumman, Northrop Grumman has taken over the quarterly sampling of BPOW6-1, BPOW6-2, BPOW6-3, and BPOW6-4 since the initial March 2015 quarterly monitoring event. Data validation and results of the June 2015 quarterly monitoring of these wells by Northrop Grumman's consultant is documented in Appendix A. Northrop Grumman will take over the quarterly sampling of BPOW6-5 and BPOW6-6 for the 2015 third quarter sampling event.

2.5 Decontamination and Investigation Derived Waste (IDW)

Resolution Consultants utilized dedicated and disposable sampling equipment when possible to avoid the potential for cross-contamination of samples. The sampling equipment included dedicated plastic scoops, disposable Teflon or polyethylene tubing, disposable gloves, and laboratory supplied sample bottles. Hand held equipment, and split spoons, were decontaminated using Liquinox and water wash, a potable water rinse, followed by a distilled water rinse. Water was collected in 5-gallon pails or 55-gallon drums. Non dedicated sampling equipment was decontaminated as outlined in the UFP SAP Addendum - Groundwater Sampling Using Low Stress (Low Flow) Purging and Sampling Protocol (Resolution Consultants, 2013).

As part of the IDW management practices and in accordance with the SAP, the investigation waste (consisting of IDW fluids and personal protective equipment [PPE]) generated during the groundwater monitoring well installation and sampling was containerized and staged at NWIRP Bethpage.

IDW solids were containerized in roll offs. Representative samples from each roll off were submitted to Katahdin for analysis of:

- Target Compound List (TCL) VOCs
- TCL Semi-volatile Organic Compounds (SVOCs)
- Toxicity Characteristic Leaching Procedure (TCLP) Metals
- Polychlorinated Biphenyls (PCBs)
- Total petroleum hydrocarbons
- Corrosivity
- Ignitability
- Reactive Cyanide
- Reactive Sulfide
- Paint Filter

IDW fluid generated during well development and purging was containerized in frac tanks and stored at NWIRP Bethpage for characterization and ultimate disposal to the Publicly Owned Treatment Works (POTW), in accordance with the facilities existing discharge permit. A representative water sample was collected from each frac tank and submitted to Katahdin for analysis of VOCs via Method SW 624, pH via Method SW 9040B, PCBs via Method 8082 and Total Metals via Method SW 846. All analytical criteria were met for disposal of water.

2.6 Surveying

A survey of the well locations was conducted at the end of fieldwork by C. T. Male, Inc., of Latham, NY, under the direct supervision of Resolution Consultants. The location was tied into the existing base map developed for this investigation. The survey elevation is referenced to the North American Vertical Datum (NAVD) 1988 and has a vertical accuracy of 0.01 foot. Vertical control is based on observations of the Continuously Operating Reference (COR) Stations Queens and Central Islip. The horizontal location is referenced to the North American Datum (NAD) 1983 (2011) N.Y. Long Island Zone 3104 and has an accuracy of 0.1 foot. Local horizontal and vertical control is based on Global Positioning System (GPS) observations using the NYS Net Real Time Network.

A table of survey data (ground, latitude/longitude and northing/easting) and a survey map is included in Appendix A.

3.0 REFERENCES

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Tables

TABLE 1
MONITORING WELL CONSTRUCTION SUMMARY
2014-2015 OU2 GROUNDWATER INVESTIGATION
NWIRP BETHPAGE, NY

MONITORING WELL	WELL COMPLETION DATE	GROUND ELEVATION (MSL)	PVC (INNER CASING) (MSL)	WELL DEPTH (ft bgs)	CASING DEPTH (ft bgs)	SCREEN INTERVAL (ft bgs)	SUMP DEPTH INTERVAL (ft bgs)	BORING DEPTH (ft bgs)
BPOW6-1	9/15/2014	43.61	42.93	580	52.5	550-575	5	595
BPOW6-2	8/18/2014	43.58	43.08	785	51.7	755-780	5	798
BPOW6-3	11/25/2014	40.34	39.96	780	52	750-775	5	795
BPOW6-4	12/16/2014	40.40	40.02	575	52.5	545-570	5	590
BPOW6-5	5/8/2015	43.27	42.58	555	54	525-550	5	567
BPOW6-6	5/27/2015	43.17	42.34	800	54	770-795	5	812

TABLE 2
MONITORING WELL DEVELOPMENT SUMMARY
2014-2015 GROUNDWATER INVESTIGATION
NWIRP BETHPAGE, NY

MONITORING WELL	AIR DEVELOPMENT		PUMP DEVELOPMENT			APPROX. TOTAL DEVELOPMENT VOLUME (GAL)	FINAL TURBIDITY (NTUs)
	DATE	APPROX. VOLUME (GAL)	DATE	FINAL PUMP DEPTH (FT BGS)	APPROX. VOLUME (GAL)		
BPOW6-1	10/7/2014	4,800	10/13/2014	550-575	10,000	14,800	4.61
BPOW6-2	10/6/2014	5,000	10/8/2014-10/10/14	755-780	10,000	15,000	60
BPOW6-3	1/5/2015	10,000	1/7/15-1/8/2015	750-775	5,000	15,000	30.03
BPOW6-4	1/6/2015	5,000	1/6/2015	545-570	4,000	9,000	0.68
BPOW6-5	6/3/2015	7,400	6/5/2015	525-550	4,700	12,100	7.76
BPOW6-6	6/4/2015	8,300	6/8/2015	770-795	4,000	12,300	30.27

Table 3. Analytical Data Summary

Location	NYSDEC Groundwater Guidance or Standard Value (Note 1)	BPOW6-1	BPOW6-2	BPOW6-3	BPOW6-4
Sample Date		3/26/2015	3/26/2015	3/26/2015	3/26/2015
Sample ID		BPOW6-1-GW-032615	BPOW6-2-GW-032615	BPOW6-3-GW-032615	BPOW6-4-GW-032615
Sample type code		N	N	N	N
VOC 8260C (ug/L)					
1,1,1-TRICHLOROETHANE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1,2,2-TETRACHLOROETHANE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1,2-TRICHLOROETHANE	1	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1-DICHLOROETHANE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1-DICHLOROETHENE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2,4-TRICHLOROBENZENE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2-DIBROMO-3-CHLOROPROPANE	0.04	***< 0.75 U***	***< 0.75 U***	***< 0.75 U***	***< 0.75 U***
1,2-DIBROMOETHANE	NL	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2-DICHLOROBENZENE	3	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2-DICHLOROETHANE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2-DICHLOROETHENE, TOTAL	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-DICHLOROPROPANE	1	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,3-DICHLOROBENZENE	3	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,4-DICHLOROBENZENE	3	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,4-DIOXANE (Method 8270D_SIM)	NL	< 0.17 U	< 0.19 U	< 0.17 U	< 0.17 U
2-BUTANONE	50	< 2.5 UJ	< 2.5 UJ	< 2.5 UJ	< 2.5 UJ
2-HEXANONE	50	< 2.5 UJ	< 2.5 UJ	< 2.5 UJ	< 2.5 UJ
4-METHYL-2-PENTANONE	NL	< 2.5 U	< 2.5 U	< 2.5 U	< 2.5 U
ACETONE	50	< 2.5 UJ	< 2.5 UJ	< 2.5 UJ	< 2.5 UJ
BENZENE	1	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
BROMODICHLOROMETHANE	50	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
BROMOFORM	50	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
BROMOMETHANE	5	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ
CARBON DISULFIDE	60	< 0.50 UJ	< 0.50 UJ	< 0.50 UJ	< 0.50 UJ
CARBON TETRACHLORIDE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
CHLOROBENZENE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
CHLOROETHANE	5	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ
CHLOROFORM	7	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
CHLOROMETHANE	5	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ
CIS-1,2-DICHLOROETHENE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
CIS-1,3-DICHLOROPROPENE	0.4	***< 0.50 U***	***< 0.50 U***	***< 0.50 U***	***< 0.50 U***
CYCLOHEXANE	NL	< 0.50 UJ	< 0.50 UJ	< 0.50 UJ	< 0.50 UJ
DIBROMOCHLOROMETHANE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
DICHLORODIFLUOROMETHANE	5	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ
ETHYLBENZENE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
ISOPROPYLBENZENE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
M- AND P-XYLENE	NL	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
METHYL ACETATE	NL	< 0.75 U	< 0.75 U	< 0.75 U	< 0.75 U
METHYL CYCLOHEXANE	NL	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
METHYL TERT-BUTYL ETHER	10	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
METHYLENE CHLORIDE	5	< 2.5 U	< 2.5 U	< 2.5 U	< 2.5 U
O-XYLENE	NL	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
STYRENE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
TETRACHLOROETHENE	5	< 0.50 UJ	< 0.50 UJ	< 0.50 UJ	< 0.50 UJ
TOLUENE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
TRANS-1,2-DICHLOROETHENE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
TRANS-1,3-DICHLOROPROPENE	0.4	***< 0.50 U***	***< 0.50 U***	***< 0.50 U***	***< 0.50 U***
TRICHLOROETHENE	5	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
TRICHLOROFLUOROMETHANE	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
VINYL CHLORIDE	2	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
XYLENES, TOTAL	5	< 1.5 U	< 1.5 U	< 1.5 U	< 1.5 U

Table 3. Analytical Data Summary

Location	NYSDEC Groundwater Guidance or Standard Value (Note 1)	BPOW6-5	BPOW6-6
Sample Date		6/25/2015	6/25/2015
Sample ID		BPOW6-5-GW-062515	BPOW6-6-GW-062515
Sample type code		N	N
VOC 8260C (ug/L)			
1,1,1-TRICHLOROETHANE	5	< 0.50 U	< 0.50 U
1,1,2,2-TETRACHLOROETHANE	5	< 0.50 U	< 0.50 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	5	< 0.50 U	< 0.50 U
1,1,2-TRICHLOROETHANE	1	< 0.50 U	< 0.50 U
1,1-DICHLOROETHANE	5	< 0.50 U	< 0.50 U
1,1-DICHLOROETHENE	5	< 0.50 U	< 0.50 U
1,2,4-TRICHLOROBENZENE	5	< 0.50 U	< 0.50 U
1,2-DIBROMO-3-CHLOROPROPANE	0.04	*< 0.75 U*	*< 0.75 U*
1,2-DIBROMOETHANE	NL	< 0.50 U	< 0.50 U
1,2-DICHLOROBENZENE	3	< 0.50 U	< 0.50 U
1,2-DICHLOROETHANE	5	< 0.50 U	< 0.50 U
1,2-DICHLOROETHENE, TOTAL	5	< 1.0 U	< 1.0 U
1,2-DICHLOROPROPANE	1	< 0.50 U	< 0.50 U
1,3-DICHLOROBENZENE	3	< 0.50 U	< 0.50 U
1,4-DICHLOROBENZENE	3	< 0.50 U	< 0.50 U
1,4-DIOXANE (Method 8270D_SIM)	NL	< 0.17 U	< 0.17 U
2-BUTANONE	50	< 2.5 U	< 2.5 U
2-HEXANONE	50	< 2.5 U	< 2.5 U
4-METHYL-2-PENTANONE	NL	< 2.5 U	< 2.5 U
ACETONE	50	< 2.5 U	< 2.5 U
BENZENE	1	< 0.50 U	< 0.50 U
BROMODICHLOROMETHANE	50	< 0.50 U	< 0.50 U
BROMOFORM	50	< 0.50 U	< 0.50 U
BROMOMETHANE	5	< 1.0 U	< 1.0 U
CARBON DISULFIDE	60	< 0.50 U	< 0.50 U
CARBON TETRACHLORIDE	5	< 0.50 U	< 0.50 U
CHLOROBENZENE	5	< 0.50 U	< 0.50 U
CHLOROETHANE	5	< 1.0 UJ	< 1.0 UJ
CHLOROFORM	7	< 0.50 U	< 0.50 U
CHLOROMETHANE	5	< 1.0 U	< 1.0 U
CIS-1,2-DICHLOROETHENE	5	< 0.50 U	< 0.50 U
CIS-1,3-DICHLOROPROPENE	0.4	*< 0.50 U*	*< 0.50 U*
CYCLOHEXANE	NL	< 0.50 U	< 0.50 U
DIBROMOCHLOROMETHANE	5	< 0.50 U	< 0.50 U
DICHLORODIFLUOROMETHANE	5	< 1.0 U	< 1.0 U
ETHYLBENZENE	5	< 0.50 U	< 0.50 U
ISOPROPYLBENZENE	5	< 0.50 U	< 0.50 U
M- AND P-XYLENE	NL	< 1.0 U	< 1.0 U
METHYL ACETATE	NL	< 0.75 U	< 0.75 U
METHYL CYCLOHEXANE	NL	< 0.50 U	< 0.50 U
METHYL TERT-BUTYL ETHER	10	< 0.50 U	< 0.50 U
METHYLENE CHLORIDE	5	< 2.5 U	< 2.5 U
O-XYLENE	NL	< 0.50 U	< 0.50 U
STYRENE	5	< 0.50 U	< 0.50 U
TETRACHLOROETHENE	5	< 0.50 U	< 0.50 U
TOLUENE	5	0.76 J	1.0
TRANS-1,2-DICHLOROETHENE	5	< 0.50 U	< 0.50 U
TRANS-1,3-DICHLOROPROPENE	0.4	*< 0.50 U*	*< 0.50 U*
TRICHLOROETHENE	5	< 0.50 U	< 0.50 U
TRICHLOROFLUOROMETHANE	5	< 1.0 U	< 1.0 U
VINYL CHLORIDE	2	< 1.0 U	< 1.0 U
XYLENES, TOTAL	5	< 1.5 U	< 1.5 U

Notes:

1 New York State Department of Environmental Conservation Division of Water Technical and Operation Guidance series (6 NYCRR 700-706, Part 703.5 summarized in TOGS 1.1.1)
Ambient water quality standards and groundwater effluent limitations, class GA; NL = Not Listed

Bold = Detected; ***Bold and Italics*** =Not detected exceeds NYS Groundwater Standards or guidance value

Yellow highlighted values exceed Groundwater Standards or guidance value

Sample type codes: N - normal environmental sample, FD - field duplicate

U = Nondetected result. The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte.

J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

M = the matrix spike or matrix spike duplicate did not meet recovery or precision requirements.

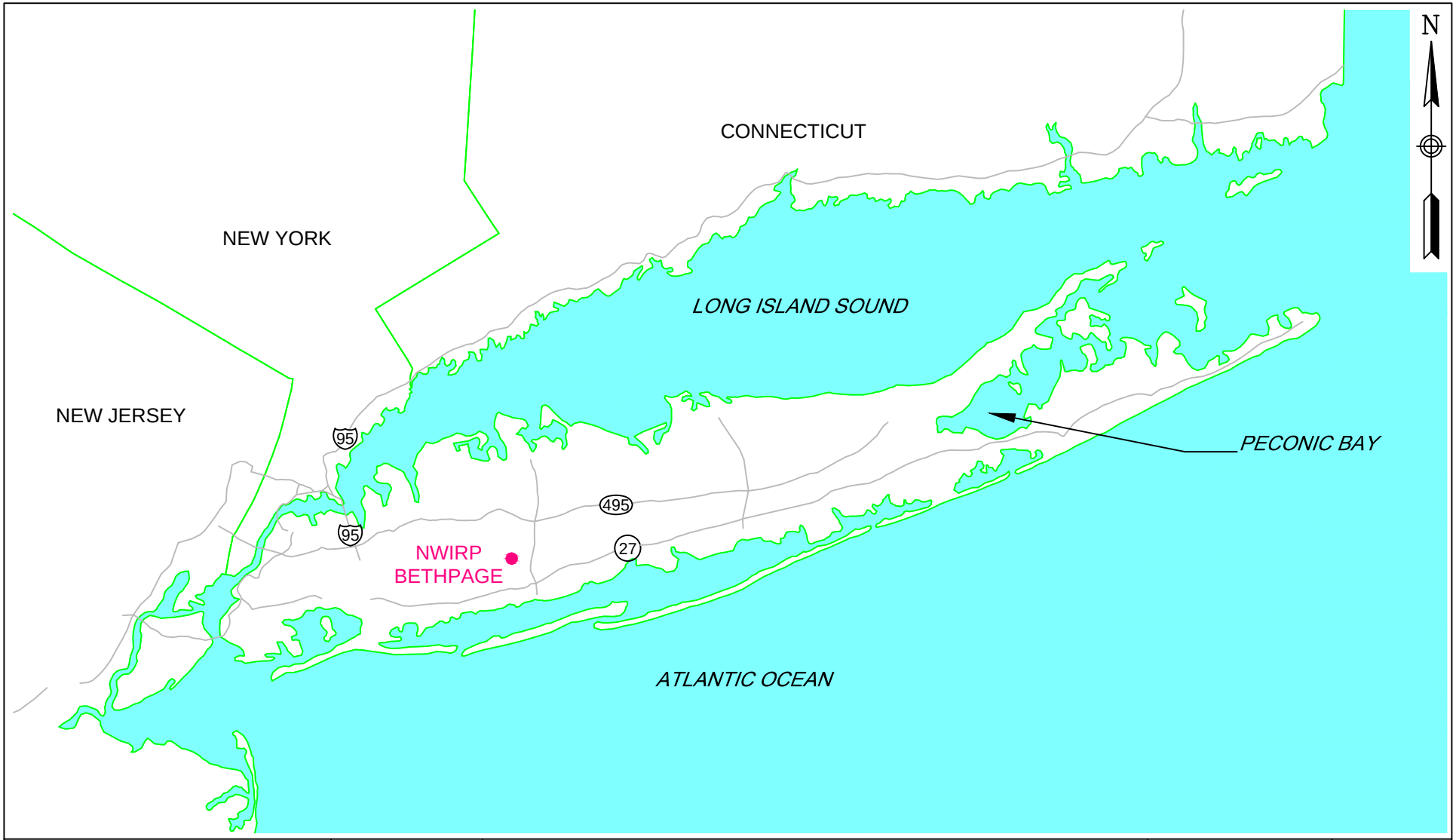
Table 4
Stabilized Field Parameters

Well	Date	Temperature (°C)	pH	Specific Conductance (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Depth to water (ft bgs)	Flow rate (ml/min)
BPOW6-1	3/26/2015	12.94	5.10	0.088	1.18	60.8	163	13.6	500
BPOW6-2	3/26/2015	12.98	5.33	0.032	1.18	-22.5	30	13.97	600
BPOW6-3	3/26/2015	12.88	4.94	0.027	0.88	218.4	4.47	10.78	550
BPOW6-4	3/26/2015	12.91	4.59	0.093	0.91	-34.1	3.99	10.11	750
BPOW6-5	6/25/2015	20.80	4.81	0.054	0.58	221.1	1.57	18.00	200
BPOW6-6	6/25/2015	16.46	4.10	0.028	0.61	330.7	31.6	18.51	700

* Initial water level not equilibrated due to pump installation; drawdown during sampling not determined.

Figures

112G00622\0510\112G00622CM01.DWG 08/02/10 MKB



0 15 30

SCALE IN MILES

NAVFAC

GENERAL LOCATION MAP
NWIRP BETHPAGE
BETHPAGE, NEW YORK

CONTRACT NUMBER	CTO NUMBER
N62470-11-D-8013	WE15
APPROVED BY --	DATE --
APPROVED BY --	DATE --
FIGURE NO. 1	REV 0

F:\Projects\Navy\Bethpage WXE0817.0 Deliverables\7.2 CADD\GIS_files\BethpageMAP DOCS\MXD\MISCLocation Maps\F2 BPOW6s 2015 08 17 R1.mxd

Former Northrop Grumman Site

Old Bethpage

Bethpage

Plainedge

Levittown

North Massapequa

North Wantagh

Seaford

Wantagh

Massapequa

Inset: BPOW6-1, BPOW6-2, BPOW6-3, BPOW6-4, BPOW6-5, and BPOW6-6 Location

Legend

- Monitoring Well
- Vertical Profile Boring
- Vertical Profile Boring - Proposed
- Water Supply Well
- Extraction Well

0 750 1,500 3,000 Feet

0 375 750 Feet

BPOW6-1, BPOW6-2, BPOW6-3, BPOW6-4, BPOW6-5, AND BPOW6-6 LOCATION MAP
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
BETHPAGE, NEW YORK

CONTRACT NUMBER	CTO NUMBER
N62470-11-D8013	WE15
APPROVED BY: PS	DATE: 9/9/2015
APPROVED BY: —	DATE: —
FIGURE NO.: 2	REV: 0

Appendix A

BPOW6-1, BPOW6-2, BPOW6-3, BPOW6-4, BPOW6-5, BPOW6-6

Section 1

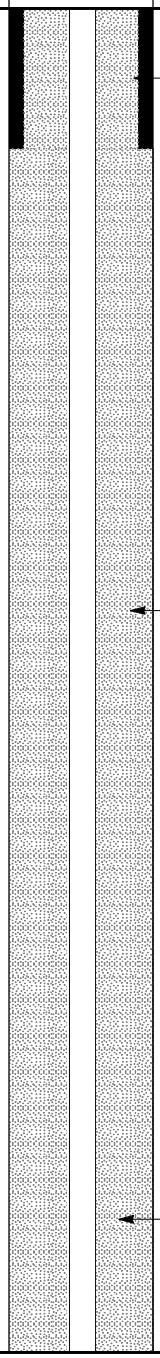
Boring Logs

Resolution Consultants

Boring Log

BORING #: BPOW6-1
Sheet 1 of 2

Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** V. Thayer
Location: Bayberry Ln and Sylvia Rd, Seaford, NY		**Drilling Company:** DELTA WELL AND PUMP COMPANY
Project #: 60266526	**Ground Elevation (msl):** 43.61	**Well Screen Interval (ft):** 550-575
Start Date: 8/21/2014	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):**
Finish Date: 9/15/2014	**Northing:** 193228.16 **Easting:** 1126796.92	**Total Depth (ft):** 595.0

DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	Well Completion	Well Construction
0					0-553 ft bgs: See VPB145 for Descriptions		10" Diameter Steel Casing Bentonite Grout 4" Diameter Schedule 80 PVC Riser
50							
100							
150							
200							
250							
300							
350							
400							
450							
500							

Resolution Consultants

Boring Log

BORING #: BPOW6-1
Sheet 2 of 2

Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** V. Thayer
Location: Bayberry Ln and Sylvia Rd, Seaford, NY		**Drilling Company:** DELTA WELL AND PUMP COMPANY
Project #: 60266526	**Ground Elevation (msl):** 43.61	**Well Screen Interval (ft):** 550-575
Start Date: 8/21/2014	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):**
Finish Date: 9/15/2014	**Northing:** 193228.16 **Easting:** 1126796.92	**Total Depth (ft):** 595.0

DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	Well Completion	Well Construction
506					0-553 ft bgs: See VPB145 for Descriptions *(continued)*		4" Diameter Schedule 80 PVC Riser *(continued)*
508							
510							
512							
514							
516							
518							
520							
522							#0 Filter Sand
524							
526							
528							
530							
532							
534							
536							
538							
540							
542							#1 Filter Sand
544							
546							
548							
550							
552							
554	0		SP-SM		Light gray (Gley 1 7/1) poorly graded SAND with Silt, angular medium sand, trace to few silt		
556							
558	0		SP-SM		Dark gray (Gley 1 4/1) poorly graded SAND with Silt, angular medium sand, bottom 2 in. sand interbedded with black laminated lignite		
560							
562							4" Diameter Schedule 80 PVC, 10 Slot Well Screen (550-575 ft bgs)
564	0		SP		Gray (Gley 1 5/1) poorly graded SAND, angular medium Sand, one 1/4" band of lignite		
566							
568	0		SP		Gray (Gley 1 5/1) poorly graded SAND, angular medium Sand, muscovite flakes, six 1/4" layers of lignite		
570							
572							
574	0		SP		Gray (Gley 1 6/1) poorly graded SAND, subangular medium to coarse Sand, two black layers of 1/4" lignite		
576							
578							Sump
580							
582							
584							
586							
588							#1 Sand to bottom
590							
592							
594							
					End of boring at 595.0 ft. bgs.		

Resolution Consultants

Boring Log

BORING #: BPOW6-2
Sheet 1 of 2

Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** V. Thayer
Location: Bayberry Ln and Sylvia Rd, Seaford, NY		**Drilling Company:** DELTA WELL AND PUMP COMPANY
Project #: 60266526	**Ground Elevation (msl):** 43.58	**Well Screen Interval (ft):** 755-780
Start Date: 7/25/2014	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):**
Finish Date: 8/18/2014	**Northing:** 193253.75 **Easting:** 1126785.34	**Total Depth (ft):** 798.0

DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	Well Completion	Well Construction
0					0-758 ft bgs: See VPB145 for Descriptions		10" Diameter Steel Casing
50							
100							
150							
200							
250							Bentonite Grout
300							
350							
400							
450							
500							
550							
600							4" Diameter Schedule 80 PVC Riser
650							
700							

Resolution Consultants

Boring Log

BORING #: BPOW6-2
Sheet 2 of 2

Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** V. Thayer
Location: Bayberry Ln and Sylvia Rd, Seaford, NY		**Drilling Company:** DELTA WELL AND PUMP COMPANY
Project #: 60266526	**Ground Elevation (msl):** 43.58	**Well Screen Interval (ft):** 755-780
Start Date: 7/25/2014	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):**
Finish Date: 8/18/2014	**Northing:** 193253.75 **Easting:** 1126785.34	**Total Depth (ft):** 798.0

DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	Well Completion	Well Construction
700					0-758 ft bgs: See VPB145 for Descriptions *(continued)*		4" Diameter Schedule 80 PVC Riser *(continued)*
702							
704							
706							
708							
710							
712							
714							#0 Filter Sand
716							
718							
720							
722							
724							
726							
728							
730							
732							
734							
736							
738							
740							
742							
744							
746							
748							
750							
752							#1 Filter Sand
754							
756							
758	0		SW-SC		Light gray (Gley 1) widely graded SAND with Clay, angular medium to coarse sand, little fine sand, trace subrounded fine gravel, few clay		
760							
762							
764	0		SW-SC		Light gray (Gley 1) widely graded SAND with Clay, medium to coarse sand, few subrounded fine gravel, few clay		
766							
768	0		SW-SC		Light gray (Gley 1) widely graded SAND with Clay, medium to coarse sand, trace subrounded fine gravel, few clay		4" Diameter Schedule 80 PVC, 10 Slot Well Screen (755-780 ft bgs)
770							
772							
774	0		GW-GC		Light gray (Gley 1) widely graded GRAVEL, subangular fine to coarse Gravel, few white clay		
776							
778	0		GW-GC		Light gray (Gley 1) widely graded GRAVEL with Clay, subrounded fine to coarse gravel, some fine to coarse sand, few clay		
780							Sump
782							
784							
786							
788							
790							
792							#1 Sand to bottom
794							
796							
798					End of boring at 798.0 ft. bgs.		

Resolution Consultants

Boring Log

BORING #: BPOW6-3
Sheet 1 of 2

Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** V. Thayer
Location: Jerome St & Wicks Ave, Seaford, NY		**Drilling Company:** DELTA WELL AND PUMP COMPANY
Project #: 60266526	**Ground Elevation (msl):** 40.34	**Well Screen Interval (ft):** 750-775
Start Date: 10/28/2014	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):**
Finish Date: 11/25/2014	**Northing:** 194106.07 **Easting:** 1127582.36	**Total Depth (ft):** 795.0

DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	Well Completion	Well Construction
0					0-753 ft bgs: See VPB146 for Descriptions		10" Diameter Steel Casing
50							
100							
150							
200							
250							Bentonite Grout
300							
350							
400							
450							
500							
550							
600							4" Diameter Schedule 80 PVC Riser
650							
700							

Resolution Consultants

Boring Log

BORING #: BPOW6-3
Sheet 2 of 2

Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** V. Thayer
Location: Jerome St & Wicks Ave, Seaford, NY		**Drilling Company:** DELTA WELL AND PUMP COMPANY
Project #: 60266526	**Ground Elevation (msl):** 40.34	**Well Screen Interval (ft):** 750-775
Start Date: 10/28/2014	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):**
Finish Date: 11/25/2014	**Northing:** 194106.07 **Easting:** 1127582.36	**Total Depth (ft):** 795.0

DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	Well Completion	Well Construction
716					0-753 ft bgs: See VPB146 for Descriptions *(continued)*		4" Diameter Schedule 80 PVC Riser *(continued)*
718							
720							
722							
724							#0 Filter Sand
726							
728							
730							
732							
734							
736							
738							
740							#1 Filter Sand
742							
744							
746							
748							
750							
752							
754	0.1		SM		Gray (7.5 YR 5/1) SILTY SAND, micaceous fine Sand, some silt, clay		
756							
758					No Recovery		
760							
762							
764	0.3		SP		Light gray (7.5 YR 5/1) SAND with one orange band, fine Sand		4" Diameter Schedule 80 PVC, 10 Slot Well Screen (750-775 ft bgs)
766			GC		Light gray (7.5 YR 7/1) CLAYEY GRAVEL, subrounded, fine to coarse Gravel, little fine to coarse sand, clay		
768	0.1		GC		Light gray (7.5 YR 7/1) CLAYEY GRAVEL, laminated clay (768-768.1) overlying gravel with minor orange staining, fine gravel, little fine to coarse sand, few clay		
770							
772							
774	0.1		GP-GC		Light gray (7.5 YR 7/1) GRAVEL with Clay; subrounded to subangular fine gravel, little fine to coarse sand, silt, clay		Sump
776							
778							
780							
782							
784							
786							
788							#1 Sand to bottom
790							
792							
794							
					End of boring at 795.0 ft. bgs.		

Resolution Consultants

Boring Log

BORING #: BPOW6-4
Sheet 1 of 2

Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** V. Thayer
Location: Jerome St & Wicks Ave, Seaford, NY		**Drilling Company:** DELTA WELL AND PUMP COMPANY
Project #: 60266526	**Ground Elevation (msl):** 40.40	**Well Screen Interval (ft):** 545-570
Start Date: 12/3/2014	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):**
Finish Date: 12/16/2014	**Northing:** 194127.00 **Easting:** 1127580.66	**Total Depth (ft):** 590.0

DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	Well Completion	Well Construction
0					0-548 ft bgs: See VPB146 for Descriptions		10" Diameter Steel Casing
50							
100							
150							
200							Bentonite Grout
250							
300							
350							
400							
450							4" Diameter Schedule 80 PVC Riser
500							

Resolution Consultants

Boring Log

BORING #: BPOW6-4
Sheet 2 of 2

Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** V. Thayer
Location: Jerome St & Wicks Ave, Seaford, NY		**Drilling Company:** DELTA WELL AND PUMP COMPANY
Project #: 60266526	**Ground Elevation (msl):** 40.40	**Well Screen Interval (ft):** 545-570
Start Date: 12/3/2014	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):**
Finish Date: 12/16/2014	**Northing:** 194127.00 **Easting:** 1127580.66	**Total Depth (ft):** 590.0

DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	Well Completion	Well Construction
500					0-548 ft bgs: See VPB146 for Descriptions *(continued)*		4" Diameter Schedule 80 PVC Riser *(continued)*
502							
504							
506							
508							
510							
512							
514							
516							
518							#0 Filter Sand
520							
522							
524							
526							
528							
530							
532							
534							
536							#1 Filter Sand
538							
540							
542							
544							
546							
548	0.1		SP-SM		Gray (5/1) poorly graded SAND with Silt, angular fine to medium sand, few silt		
550							
552							
554	0.1		SP-SM		Dark gray (4/1) poorly graded Sand with SILT, medium Sand, few coarse sand, few silt		
556							
558	0.3		SP-SM		Gray (5/1) poorly graded SAND with Silt, angular, medium sand, little fine sand, few silt		4" Diameter Schedule 80 PVC, 10 Slot Well Screen (545-570 ft bgs)
560							
562							
564	0.5		SP		Gray (5/1) poorly graded SAND, fine to medium Sand, muscovite flakes, trace silt, trace small gravel, one 0.25" band of lignite		
566							
568	0.1		SP		Gray (5/1) poorly graded SAND, medium Sand, trace silt, several 0.25" lignite seams		
570							Sump
572							
574							
576							
578							
580							
582							#1 Sand to bottom
584							
586							
588							
590					End of boring at 590.0 ft. bgs.		

Resolution Consultants

Boring Log

BORING #: BPOW6-5
Sheet 1 of 2

Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** V. Varricchio
Location: North Hickory, Massapequa, NY		**Drilling Company:** DELTA WELL AND PUMP COMPANY
Project #: 60266526	**Ground Elevation (msl):** 43.27	**Well Screen Interval (ft):** 525-550
Start Date: 5/1/2015	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):**
Finish Date: 5/8/2015	**Northing:** 194045.49 **Easting:** 1128178.28	**Total Depth (ft):** 567.0

DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	Well Completion	Well Construction
0					0-528 ft bgs: see VPB147 for Descriptions		10" Diameter Steel Casing
50							
100							
150							
200							
250							4" Diameter Schedule 80 PVC Riser
300							
350							
400							
450							

Resolution Consultants

Boring Log

BORING #: BPOW6-5
Sheet 2 of 2

Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** V. Varricchio
Location: North Hickory, Massapequa, NY		**Drilling Company:** DELTA WELL AND PUMP COMPANY
Project #: 60266526	**Ground Elevation (msl):** 43.27	**Well Screen Interval (ft):** 525-550
Start Date: 5/1/2015	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):**
Finish Date: 5/8/2015	**Northing:** 194045.49 **Easting:** 1128178.28	**Total Depth (ft):** 567.0

DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	Well Completion	Well Construction
490					0-528 ft bgs: see VPB147 for Descriptions *(continued)*		Bentonite Grout *(continued)*
492							
494							
496							
498							
500							
502							
504							
506							
508							
510							
512							#1 Filter Sand
514							
516							
518							
520							
522							
524							
526							
528	0		SP		Gray (10 YR 5/1) poorly graded medium SAND		
530							
532							
534	0		SP		Gray (10 YR 5/1) poorly graded medium SAND		
536							
538	0		SM		Gray (10 YR 5/1) silty fine poorly graded SAND, Lignite banding throughout		4" Diameter schedule 80 PVC, 10 Slot Well Screen (525-550 ft bgs)
540							
542							
544	0		SP		Gray (10 YR 6/1) poorly graded medium SAND		
546							
548	0		SP		Gray (10 YR 5/1) poorly graded fine to medium SAND		
550			CL		Gray (10 YR 5/1) SANDY lean CLAY		
552							Sump
554							
556							
558							
560							
562							#1 Sand to bottom of boring
564							
566							
					End of boring at 567.0 ft. bgs.		

Resolution Consultants

Boring Log

BORING #: BPOW6-6
Sheet 1 of 2

Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** S. Wright / P. Kareth
Location: North Hickory, Massapequa, NY		**Drilling Company:** DELTA WELL AND PUMP COMPANY
Project #: 60266526	**Ground Elevation (msl):** 43.17	**Well Screen Interval (ft):** 770-795
Start Date: 5/15/2015	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):**
Finish Date: 5/27/2015	**Northing:** 194044.59 **Easting:** 1128163.72	**Total Depth (ft):** 812.0

DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	Well Completion	Well Construction
0					0-773 ft bgs: See VPB147 for Descriptions		10" Diameter Steel Casing
50							
100							
150							
200							
250							
300							
350							
400							4" Diameter Schedule 80 PVC Riser
450							
500							
550							
600							
650							
700							

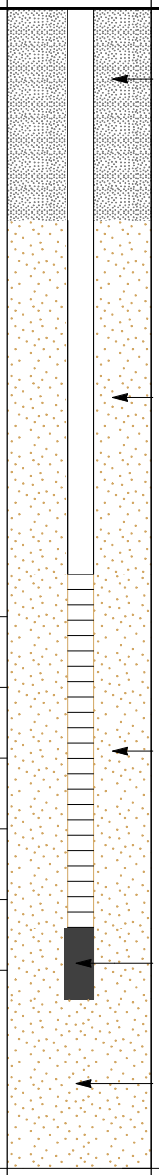
Resolution Consultants

Boring Log

BORING #: BPOW6-6
Sheet 2 of 2

Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** S. Wright / P. Kareth
Location: North Hickory, Massapequa, NY		**Drilling Company:** DELTA WELL AND PUMP COMPANY
Project #: 60266526	**Ground Elevation (msl):** 43.17	**Well Screen Interval (ft):** 770-795
Start Date: 5/15/2015	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):**
Finish Date: 5/27/2015	**Northing:** 194044.59 **Easting:** 1128163.72	**Total Depth (ft):** 812.0

DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION
730					0-773 ft bgs: See VPB147 for Descriptions *(continued)*
732					
734					
736					
738					
740					
742					
744					
746					
748					
750					
752					
754					
756					
758					
760					
762					
764					
766					
768					
770					
772					
774	0		SW		Light gray (10 YR 7/1) fine to coarse SAND, 20% fine to coarse Gravel, trace silt
776					
778	0		SW		Light gray (10 YR 7/1) fine to coarse SAND, 20% fine to coarse Gravel, 5% silt
780					
782					
784	0		SM		Light gray with grayish mottling (N7+10 YR 7/4) Silty fine SAND, spoontip is light gray (N7) Clayey fine Sand
786					
788	0		CL		Light Gray (5 YK 6/1) fine sandy CLAY. 7" layer of Silty fine Sand mid spoon, orange mottling in tip
790					
792					
794	0		SP-SM		Light gray (N7) medium to fine SAND, some Silt, few orange mottling, bottom 4" layer clayey fine Sand
796					
798					
800					
802					
804					
806					
808					
810					
812					End of boring at 812.0 ft. bgs.



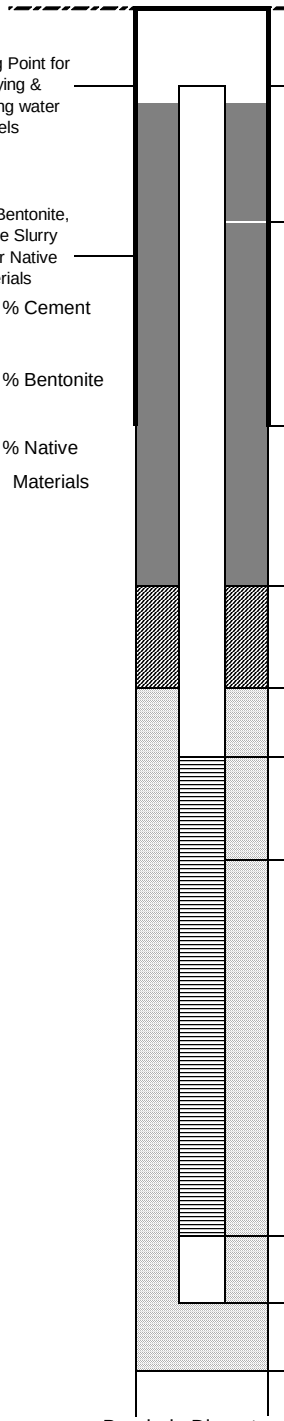
Section 2

Monitoring Well Construction Log

RESOLUTION CONSULTANTS

Client: NAVFAC	Project Number: 60266526	***WELL ID: BPOW6-1***	
Site Location: NWIRP BETHPAGE, NY			
Well Location: Bayberry Lane and Sylvia Road, Seaford, NY		Date Installed: 8/21/2014 - 9/15/14	
Method: MUD ROTARY		Inspector: V. THAYER	
Coords: Northing: 193228.16	Easting: 1126796.92	Contractor: DELTA WELL & PUMP	

MONITORING WELL CONSTRUCTION DETAIL



	Depth from G.S. (feet)	Elevation(feet) Datum
Top of 12 inch diameter Steel Curb Box and Ground Surface (G.S.)	0.00	43.61
Top of Riser Pipe fit with locking j-plug	0.68	42.93
Riser Pipe: Length 550 feet; Inside Diameter (ID) 4 inch; Type of Material PVC		
Bottom of Steel Surface Casing	52.5	-8.9
Bottom of Bentonite Grout	510.0	-466.4
Bottom of 0 Filter Sand/Top of #1 Filter Sand	535	-491.4
Top of Screen	550	-506.4
▲ Stabilized Water Level		
Screen: Length 25 feet; Inside Diameter (ID) 4 inch; Slot Size 10; Type of Material PVC		
Type/Size of Sand #1; Sand Pack Thickness 60 feet		
Bottom of Screen	575	-531.4
Bottom of Sump:	580	-536.4
Bottom of Borehole	595	-551.4

Borehole Diameter: 10 inch

Approved:

Describe Measuring Point:

Ground Surface

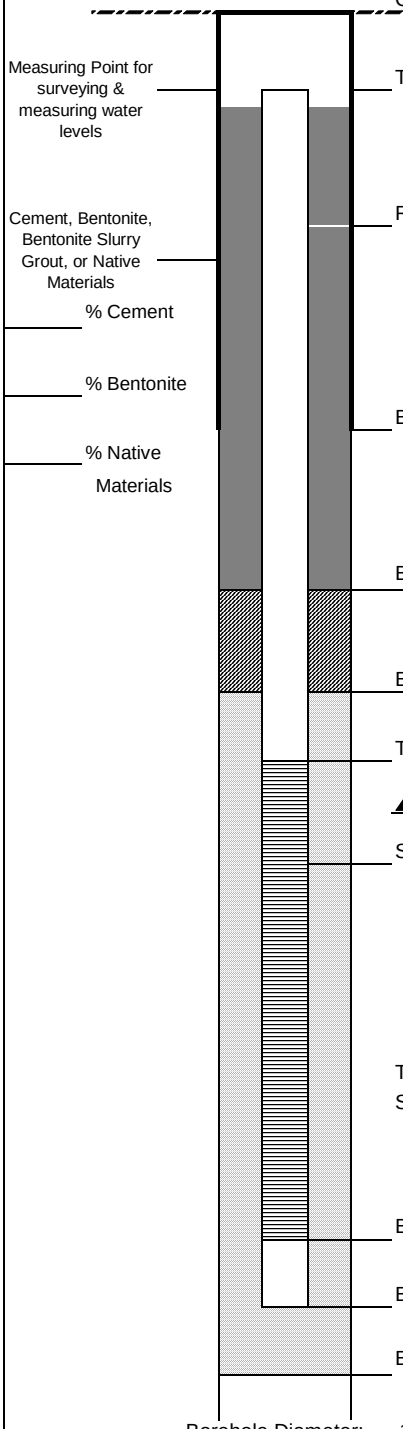
Signature

Date

RESOLUTION CONSULTANTS

Client: NAVFAC	Project Number: 60266526	***WELL ID: BPOW6-2***	
Site Location: NWIRP BETHPAGE, NY			
Well Location: Bayberry Lane and Sylvia Road, Seaford, NY		Date Installed: 7/25/2014 - 8/18/14	
Method: MUD ROTARY		Inspector: V. THAYER	
Coords: Northing: 193253.75	Easting: 1126785.34	Contractor: DELTA WELL & PUMP	

MONITORING WELL CONSTRUCTION DETAIL



	Depth from G.S. (feet)	Elevation(feet) Datum
Top of 12 inch diameter Steel Curb Box and Ground Surface (G.S.)	0.00	43.58
Top of Riser Pipe fit with locking j-plug	0.50	43.08
Riser Pipe:		
Length: 755 feet		
Inside Diameter (ID): 4 inch		
Type of Material: PVC		
Bottom of Steel Surface Casing	51.7	-8.1
Bottom of Bentonite Grout	710.0	-666.4
Bottom of 0 Filter Sand/Top of #1 Filter Sand	720	-676.4
Top of Screen	755	-711.4
▲ Stabilized Water Level		
Screen:		
Length: 25 feet		
Inside Diameter (ID): 4 inch		
Slot Size: 10		
Type of Material: PVC		
Type/Size of Sand: #1		
Sand Pack Thickness: 65 feet		
Bottom of Screen	780	-736.4
Bottom of Sump:	785	-741.4
Bottom of Borehole	798	-754.4

Borehole Diameter: 10 inch

Approved:

Describe Measuring Point:

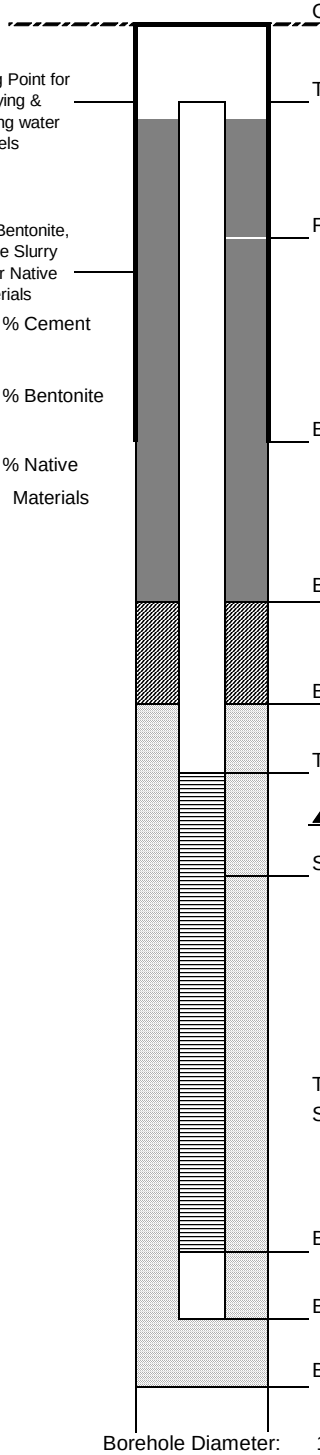
Ground Surface

Signature

Date

RESOLUTION CONSULTANTS	Client: NAVFAC	Project Number: 60266526	***WELL ID: BPOW6-3***
	Site Location: NWIRP BETHPAGE, NY		
	Well Location: Jerome St and Wicks Ave., Seaford, NY		Date Installed: 10/28/2014 - 11/25/14
	Method: MUD ROTARY		Inspector: V. THAYER
	Coords: Northing: 194106.07 Easting: 1127582.36		Contractor: DELTA WELL & PUMP

MONITORING WELL CONSTRUCTION DETAIL



	Depth from G.S. (feet)	Elevation(feet) Datum
Top of 12 inch diameter Steel Curb Box and Ground Surface (G.S.)	0.00	40.34
Top of Riser Pipe fit with locking j-plug	0.38	39.96
Riser Pipe:		
Length: 750 feet		
Inside Diameter (ID): 4 inch		
Type of Material: PVC		
Bottom of Steel Surface Casing	52.0	-11.7
Bottom of Bentonite Grout	717.0	-676.7
Bottom of 0 Filter Sand/Top of #1 Filter Sand	730	-689.7
Top of Screen	750	-709.7
▲ Stabilized Water Level		
Screen:		
Length: 25 feet		
Inside Diameter (ID): 4 inch		
Slot Size: 10		
Type of Material: PVC		
Type/Size of Sand: #1		
Sand Pack Thickness: 65 feet		
Bottom of Screen	775	-734.7
Bottom of Sump:	780	-739.7
Bottom of Borehole	795	-754.7

Borehole Diameter: 10 inch

Approved:

Describe Measuring Point:

Ground Surface

Signature

Date

RESOLUTION CONSULTANTS	Client: NAVFAC	Project Number: 60266526	***WELL ID: BPOW6-4***
	Site Location: NWIRP BETHPAGE, NY		
	Well Location: Jerome St and Wicks Ave, Seaford, NY		Date Installed: 12/3/2014 - 12/16/14
	Method: MUD ROTARY		Inspector: V. THAYER
	Coords: Northing: 194127.00 Easting: 1127580.66		Contractor: DELTA WELL & PUMP

MONITORING WELL CONSTRUCTION DETAIL

	Depth from G.S. (feet)	Elevation(feet) Datum
Top of 12 inch diameter Steel Curb Box and Ground Surface (G.S.)	0.00	40.4
Top of Riser Pipe fit with locking j-plug	0.38	40.02
Riser Pipe:		
Length: 545 feet		
Inside Diameter (ID): 4 inch		
Type of Material: PVC		
Bottom of Steel Surface Casing	52.5	-12.1
Bottom of Bentonite Grout	510.0	-469.6
Bottom of 0 Filter Sand/Top of #1 Filter Sand	525	-484.6
Top of Screen	545	-504.6
▲ Stabilized Water Level		
Screen:		
Length: 25 feet		
Inside Diameter (ID): 4 inch		
Slot Size: 10		
Type of Material: PVC		
Type/Size of Sand: #1		
Sand Pack Thickness: 65 feet		
Bottom of Screen	570	-529.6
Bottom of Sump:	575	-534.6
Bottom of Borehole	590	-549.6

Borehole Diameter: 10 inch

Approved:

Signature

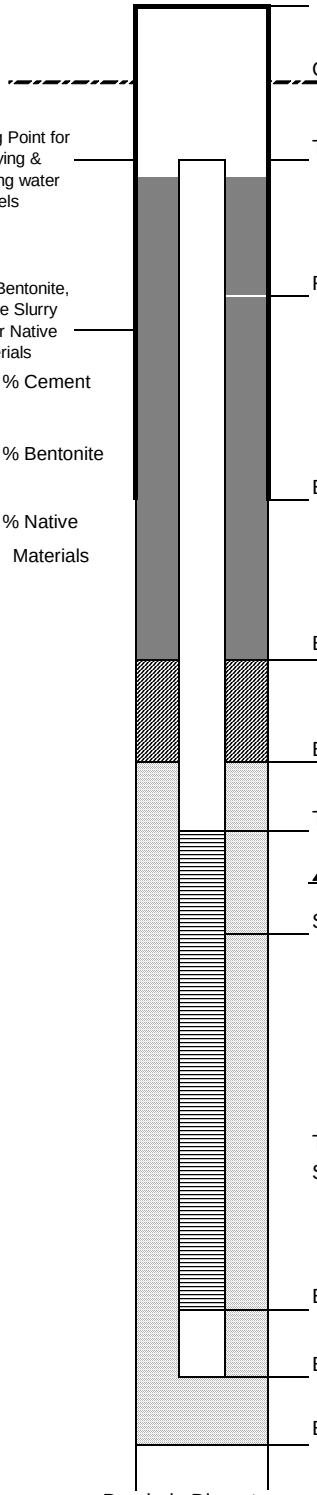
Date

Describe Measuring Point:

Ground Surface

RESOLUTION CONSULTANTS	Client: NAVFAC	Project Number: 60266526	***WELL ID: BPOW6-5***
	Site Location: NWIRP BETHPAGE, NY		
	Well Location: North Hickory, Massapequa, NY		Date Installed: 5/1/2015 - 5/8/2015
	Method: MUD ROTARY		Inspector: V. VARRICCHIO
	Coords: Northing: 194045.49 Easting: 1128178.28		Contractor: DELTA WELL & PUMP

MONITORING WELL CONSTRUCTION DETAIL



	Depth from G.S. (feet)	Elevation(feet) Datum
Top of 12 inch diameter Steel Curb Box	0.03	43.30
Ground Surface (G.S.)	0.00	43.27
Top of Riser Pipe fit with locking j-plug	0.69	42.58
Riser Pipe:		
Length: 525 feet		
Inside Diameter (ID): 4 inch		
Type of Material: PVC		
Bottom of Steel Surface Casing	54	-10.7
Bottom of Bentonite Grout	478.0	-434.7
Bottom of 0 Filter Sand/Top of #1 Filter Sand	500	-456.7
Top of Screen	525	-481.7
▲ Stabilized Water Level		
Screen:		
Length: 25 feet		
Inside Diameter (ID): 4 inch		
Slot Size: 10		
Type of Material: PVC		
Type/Size of Sand: #1		
Sand Pack Thickness: 67 feet		
Bottom of Screen	550	-506.7
Bottom of Sump:	555	-511.7
Bottom of Borehole	567	-523.7

Borehole Diameter: 10 inch

Approved:

Signature

Date

Describe Measuring Point:

Ground Surface

RESOLUTION CONSULTANTS	Client: NAVFAC	Project Number: 60266526	***WELL ID: BPOW6-6***
	Site Location: NWIRP BETHPAGE, NY		
	Well Location: North Hickory, Massapequa, NY		Date Installed: 5/15/2015 - 5/27/2015
	Method: MUD ROTARY		Inspector: S. WRIGHT/P. KARETH
	Coords: Northing: 194044.59 Easting: 1128163.72		Contractor: DELTA WELL & PUMP

MONITORING WELL CONSTRUCTION DETAIL

	Depth from G.S. (feet)	Elevation(feet) Datum
Ground Surface (G.S.)	0.00	43.17
Top of 12 inch diameter Steel Curb Box	0.01	43.16
Top of Riser Pipe fit with locking j-plug	0.83	42.34
Riser Pipe:		
Length: 770 feet		
Inside Diameter (ID): 4 inch		
Type of Material: PVC		
Bottom of Steel Surface Casing	54	-10.8
Bottom of Bentonite Grout	725.0	-681.8
Bottom of 0 Filter Sand/Top of #1 Filter Sand	745	-701.8
Top of Screen	770	-726.8
▲ Stabilized Water Level		
Screen:		
Length: 25 feet		
Inside Diameter (ID): 4 inch		
Slot Size: 10		
Type of Material: PVC		
Type/Size of Sand: #1		
Sand Pack Thickness: 67 feet		
Bottom of Screen	795	-751.8
Bottom of Sump:	800	-756.8
Bottom of Borehole	812	-768.8

Borehole Diameter: 10 inch

Approved:

Signature

Date

Describe Measuring Point:

Ground Surface

Section 3

BPOW6-5 and BPOW6-6 Abandonment

RESOLUTION CONSULTANTS

To: Navy CLEAN Bethpage Project File

From: Bill Spronz and Valerie Thayer, Resolution Consultants

Subject: Bethpage Well BPOW 6-5 and Boring BPOW 6-6 Decommissioning Procedure

Date: 10 April 2015

Introduction

On Friday, February 27, 2015, while drilling the borehole for planned observation well BPOW 6-6, pieces of Schedule 80 PVC well casing were observed mixed with the cuttings in the drilling mud. Investigation by the Delta Well and Pump Co. Inc. ("Delta") crew and the Resolution Consultants ("Resolution") geologist determined that borehole BPOW 6-6 had intersected the borehole and casing of nearby observation well BPOW 6-5 located about 13 feet away. Well BPOW 6-5 and borehole BPOW 6-6 were being installed at vertical profile boring location VPB 147 on Crocus Street in Seaford, New York. The purpose of this memorandum is to present the events that occurred and how the situation was resolved by the grouting and decommissioning of both boreholes.

Background:

Monitoring well BPOW 6-5 was completed to a depth of 795 feet below ground surface ("bgs") on February 11, 2015. The well was constructed of 4-inch diameter Schedule 80 PVC well screen installed from 770 to 795 feet bgs and 4-inch diameter Schedule 80 PVC casing installed from 770 feet bgs to the ground surface. The screen was packed with well sand, the casing tremie grouted to the ground surface, and a temporary PVC cap was installed at the top of the casing.

The BPOW 6-6 borehole was started on February 25, 2015. The planned depth for proposed well BPOW 6-6 was 550 feet bgs. Two days later, on February 27, 2015, Schedule 80 PVC casing was observed in the mud tub while drilling at about 460 to 480 feet bgs. When the crew opened up nearby well BPOW 6-5, water was flowing from the well casing suggesting that the well casing had been breached. The difference in hydrostatic head between the drilling mud in borehole BPOW 6-6 and the water in well BPOW 6-5 was causing water to flow from the well as the fluids equalized.

The crew measured the depth of borehole BPOW 6-6 at 450 feet bgs, and then reamed the borehole to 478 feet bgs to clean it out. Delta then set temporary plugs inside of the 10-inch surface casing and the mud return line welded to the top of the surface casing at boring BPOW 6-6 to prevent fluids from flowing from the borehole while investigating the condition of nearby well BPOW 6-5.

Resolution Consultants and the Navy assessed the situation and concluded that well BPOW 6-5 could not be salvaged. Therefore, the decision was made to decommission well BPOW 6-5 and borehole BPOW 6-6.

Planning:

On Monday, March 2, 2015, a conference call was held with Resolution and Delta personnel to discuss an approach to properly decommission well BPOW 6-6 and borehole BPOW 6-5. The goal for the well and borehole abandonment procedure was to tremie grout both the well and the boring from the total depth of each borehole to the ground surface to prevent potential contaminants of concern (COCs) from entering the borehole or the well and migrating vertically between subsurface zones. The following procedures were proposed:

- Set a temporary packer or plug in the surface casing of boring BPOW 6-5 to prevent fluids from being pushed up into this boring and from spilling into the street.
- Move the drilling rig off boring 6-5 and onto well BPOW 6-6.
- Confirm the depth of the breach and/or sediment blockage in the BPOW 6-6 well casing by dropping a weighted line into the well to determine whether debris or sediments blocked the casing.
- Install small diameter drill rods and drill bit into well BPOW 6-6 to drill or jet through potential obstructions in order to open the well to the total depth of 795 feet if possible.
- If the drill pipe or a tremie pipe could be advanced the total 795 foot depth of well BPOW 6-6, tremie grout the well from the bottom to the ground surface.
- If the drill pipe could not bypass the casing breach or debris fallen into the casing, tremie grout the well from the breach or blocked casing to the ground surface. At a minimum, the grout would be placed to form a seal from the breach in the casing to the ground surface.
- The 4-inch PVC well casing in BPOW 6-5 was already grouted in-place when the well was installed. Therefore, the formation outside of the casing is isolated from the inside of the well preventing vertical migration of potential COCs. Grouting the casing interior or at least from the casing breach to the ground surface in well BPOW 6-5 and fully grouting borehole BPOW 6-6 would complete the integrity of this seal.
- Once the level of grout was equal to the casing breach, the temporary plug in boring BPOW 6-5 would be removed and both borings would be tremie grouted the casing breach to the ground surface through the tremie pipe installed in well BPOW 6-5.
- Confirm that grout is present in both boreholes to the ground surface by monitoring returns at the mud pits and at the top of each borehole.
- Allow the grout to settle overnight and then top out both boreholes.
- Finish decommissioning each borehole by cutting off the casings below ground surface, filling the holes to grade, and restoring the grass in the tree lawn where the well and boring were located.

Implementation:

A drilling rig was set up over well BPOW 6-5 and on March 6, 2015, the depth of the breach in the casing was confirmed at 451 feet bgs using a weighted wire-line lowered into the casing. The drill crew was eventually able to by-pass this area and lowered the weighted wire-line to a depth of 470' within the PVC well casing where sediments and drilling fluid had fallen into well BPOW 6-5 preventing the weighted line from going any further.

A drill bit was attached to 1.25-inch drill pipe and lowered into well BPOW 6-5 to clean the debris out of the well casing to the extent possible so that the grout seal could be tremied from inside of the well casing below the breach to the ground surface. Delta was able to advance the drill bit past the casing breach at 451 feet bgs and felt that they were inside of the BPOW 6-5 PVC well casing based upon drilling conditions. The crew had difficulty maintaining circulation of the drilling mud once they passed the casing breach at 451 feet bgs and had to curtail cleaning the pipe at about 480 feet bgs because drill cuttings and mud were no longer returning to the surface and increased pressure in borehole BPOW 6-6 was causing the temporary plugs sealing the borehole to leak.

Delta was able to remove the drill pipe and install a tremie pipe to a depth of 470 feet bgs in well BPOW 6-5 on the morning of March 7, 2015. The temporary plugs in boring BPOW 6-6 were removed and Cetco high solids bentonite grout was pumped through the tremie pipe from 470 feet bgs to seal both boreholes. Grout returns were identified at ground surface in boring BPOW 6-6 at 12:50 PM and in well BPOW 6-5 at 1:15 PM on March 7, 2015.

On March 9, 2015, the grout seal was measured at 7 feet bgs in well BPOW 6-5 and at 55 feet bgs in boring BPOW 6-6. The Delta crew then tremied additional grout into the well and the boring to seal each to the ground surface. The temporary PVC well cap was removed from well BPOW 6-5 and the casings for well BPOW 6-5 and boring BPOW 6-6 were cut off below the ground surface. The grass strip where the two borings are located was restored to pre drilling condition on April 9, 2015.

Section 4

Groundwater Sample Log Sheets

RESOLUTION CONSULTANTS

Well ID: BPOW6-1

Low Flow Ground Water Sample Collection Record R2111 01

Client: Navy NWIRP Bethpage Date: 3/26/15 Time: Start 900 am/pm
Project No: 60266526 Finish 1130 am/pm
Site Location: Sylvia
Weather Conds: cloudy, 40° overnight rain Collector(s): Paul Kaneth

1. WATER LEVEL DATA: (measured from Top of Casing)

a. Total Well Length 580 c. Length of Water Column _____ (a-b)

Casing Diameter/Material: 4-inch PVC

b. Water Table Depth 13.52 d. Calculated System Volume (see back) 20ft screen, 13.1 gal

2. WELL PURGE DATA

a. Purge Method: Geotech bladder pump with drop tube assembly

b. Acceptance Criteria defined (see workplan)

- Temperature	± 3%	- D.O.	± 10% (values >0.5 mg/L)	Turbidity	± 10%
- pH	± 0.1 unit	- ORP	± 10mV		
- Sp. Cond.	± 3%	- Drawdown	< 0.3'	Remove a minimum 1 screen volume	

c. Field Testing Equipment used:

	Make	Model	Serial Number
	YSI	556	55474
	Hanna	98730	69117

Time (24hr)	Volume Removed (Liters)	Temp. (°C)	pH	Spec. Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Depth to water (ft)	Color/Odor
850	ON									
900		12.42	5.06	0.073	6.61	196.9	13.62	500	13.62	
910		12.41	4.79	0.075	4.16	220.2	19.5			
915		12.68	5.62	0.105	2.60	137.6				
920		12.72	5.71	0.113	1.82	103.4			13.58	
925		12.70	5.65	0.106	1.87	86.0				grey, cloudy visible silt
930	5gal	12.68	5.65	0.105	2.19	87.1	71000			

d. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☑	☐	☐
Has required turbidity been reached	☐	☒	☐
Have parameters stabilized	☑	☐	☐

(continued on back)

If no or N/A - Explain below
ended after 2hr purge (hit bottom turned grey/silt)

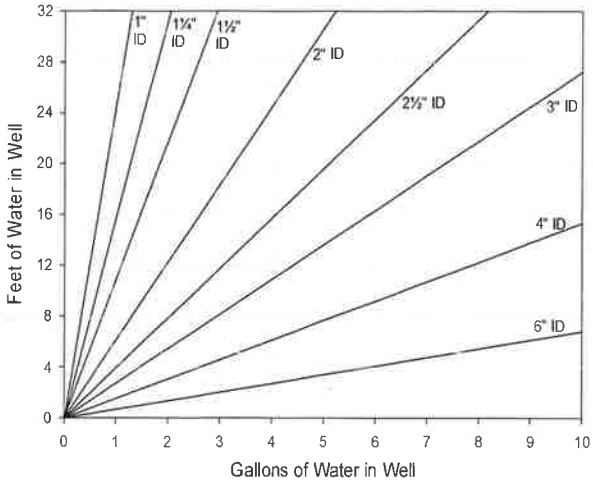
3. SAMPLE COLLECTION: Method: Geotech bladder pump with drop tube assembly

Sample ID	Container Type	No. of Containers	Preservation	Analysis Req.	Time
	40-mL vial	3	HCl	VOCs	1100
	1-L amber	2	none	1,4-Dioxane	

Comments hit bottom, tubing too long

Signature Paul Kaneth Date 3/26/15

Purge Volume Calculation



Volume / Linear Ft. of Pipe		
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

1 screen volume

15 ft = 56.8 L / 9.8 G
20 ft = 75.7 L / 13.1 G
25 ft = 94.6 L / 16.3 G

Well ID: SPOW6-1 @ 850 = 2hrs

(continued from front)

Time (24 hr)	Volume Removed (Liters)	Temp (°C)	pH	Spec. Cond. (mS/cm)	DO (mg/L) ±10%	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Depth to water (ft)	Color/Odor
935		12.61	5.60	0.102	2.41	69.6	>1000	500		
940		12.71	5.81	0.100	2.28	62.7	>1000			
945		12.75	5.53	0.098	2.00	58.1	>1000		13.60	
950		12.72	5.50	0.097	1.41	57.5	>1000			clear flowcell
955		12.68	5.45	0.094	1.58	54.8	>1000	500		
1000		12.62	5.38	0.092	1.50	53.0	905		13.58	clear flowcell
1005	1gal	12.72	5.36	0.090	1.20	57.0	850			
1010		12.74	5.31	0.091	1.16	54.8	786			
1015		12.69	5.27	0.089	1.29	55.0	576			
1020		12.74	5.24	0.089	1.31	53.5	511		13.61	
1025		12.76	5.24	0.088	1.34	53.6	443			
1030		12.81	5.19	0.089	1.08	58.8	327			
1035	15gal	12.90	5.16	0.088	1.16	59.7	265			
1040		12.88	5.14	0.088	1.15	60.0	243		13.60	
1045		12.97	5.12	0.088	1.14	60.6	162			
1050	17.5gal	12.94	5.10	0.088	1.18	60.8	163		13.60	
1100										Sample

RESOLUTION CONSULTANTS

Well ID: BPOW6-2

Low Flow Ground Water Sample Collection Record

Client: Navy NWIRP Bethpage
Project No: 60266526
Site Location: Sylvia
Weather Conds: 50s F, cloudy
Date: 3 / 26 / 15
Time: Start 825 am/pm
Finish 1100 am/pm
Collector(s): JC

1. WATER LEVEL DATA: (measured from Top of Casing)

a. Total Well Length 78.5'
c. Length of Water Column 13.96 (a-b)
Casing Diameter/Material: 4-inch PVC
b. Water Table Depth _____
d. Calculated System Volume (see back) 25 ft screen, 16.3 gal

2. WELL PURGE DATA

a. Purge Method: Geotech bladder pump with drop tube assembly

b. Acceptance Criteria defined (see workplan)

- Temperature	± 3%	- D.O.	± 10% (values >0.5 mg/L)	Turbidity	± 10%
- pH	± 0.1 unit	- ORP	± 10mV		
- Sp. Cond.	± 3%	- Drawdown	< 0.3'	Remove a minimum 1 screen volume	

c. Field Testing Equipment used:

	Make	Model	Serial Number
	YSI	556 MPS	71124
	Hanna	HI 98703	

Time (24hr)	Volume Removed (Liters)	Temp. (°C)	pH	Spec. Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Depth to water (ft)	Color/Odor
825		10.80	7.85	0.054	7.70	-42.3		500	13.99	cloudy
855		12.71	5.56	0.044	2.30	-22.3	26.4	600	13.99	cloudy
900		12.84	5.51	0.041	2.07	-26.2		600	13.99	cloudy
905	5 gal	12.87	5.69	0.045	1.75	-27.5	1000	600	13.99	cloudy
910		12.82	5.66	0.042	1.62	-33.0		600	13.99	cloudy
915		12.71	5.54	0.037	1.51	-38.4	370	600	13.99	cloudy
920		12.87	5.50	0.036	1.45	-38.6		600	13.98	cloudy

(continued on back)

d. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☒	☐	☐
Has required turbidity been reached	☒	☐	☐
Have parameters stabilized	☒	☐	☐

If no or N/A - Explain below.

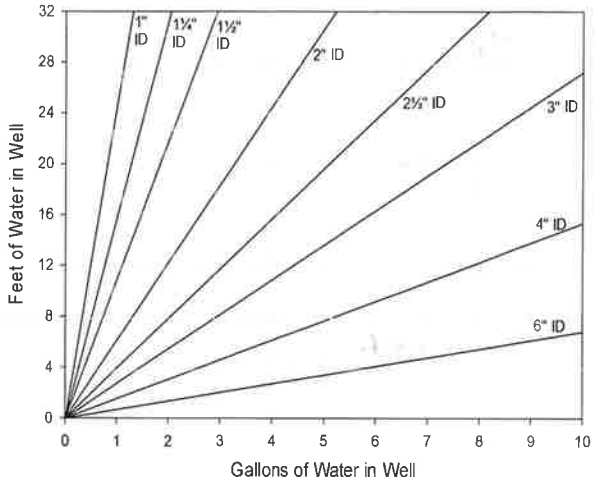
3. SAMPLE COLLECTION: Method: Geotech bladder pump with drop tube assembly

Sample ID	Container Type	No. of Containers	Preservation	Analysis Req.	Time
BPOW 6-2-GW-032615	40-mL vial	3	HCl	VOCs	1025
BPOW 6-2-GW-032615	1-L amber	2	none	1,4-Dioxane	1025

Comments: Hit bottom

Signature _____ Date 3/26/2015

Purge Volume Calculation



Volume / Linear Ft. of Pipe		
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

1 screen volume

15 ft = 56.8 L / 9.8 G
20 ft = 75.7 L / 13.1 G
25 ft = 94.6 L / 16.3 G

Well ID:

(continued from front)

Time (24 hr)	Volume Removed (Liters)	Temp (°C)	pH	Spec. Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Depth to water (ft)	Color/Odor
925		12.86	5.44	0.036	1.41	-39.1	265	600	13.99	Cloudy
930		12.52	5.44	0.035	1.69	-32.6	244	600	13.99	Cloudy
935		12.92	5.44	0.034	1.37	-35.0		600	13.99	Cloudy
940	10 gal	12.90	5.41	0.034	1.34	-35.1	134	600	13.97	Cloudy
945		12.91	5.39	0.033	1.32	-33.8	82.1	600	13.97	cloudy clearing
950		12.89	5.38	0.033	1.30	-32.5	69.0	600	13.97	"
955		12.88	5.37	0.033	1.27	-30.7	56.4	600	13.97	"
1000		12.85	5.36	0.032	1.24	-28.5	52.8	600	13.97	"
1005		12.88	5.36	0.032	1.23	-27.5	38.7	600	13.97	"
1010	15 gal	12.89	5.35	0.032	1.23	-26.2	33.1	600	13.97	"
1015		12.93	5.34	0.032	1.20	-24.3	29.9	600	13.97	"
1020		12.98	5.33	0.032	1.18	-22.5	30.4	600	13.97	"

Well ID: BPOW6-3

RESOLUTION CONSULTANTS

Low Flow Ground Water Sample Collection Record

Client: Navy NWIRP Bethpage　　Date: 3 / 26 / 15　　Time: Start 1230 am/pm (pm circled)
Project No: 60266526　　Finish 1445 am/pm
Site Location: Wicks and Jerome
Weather Conds: 40°, drizzle　　Collector(s): Paul Kanetti

1. WATER LEVEL DATA: (measured from Top of Casing)

a. Total Well Length 780　　c. Length of Water Column ________ (a-b)　　Casing Diameter/Material: 4-inch PVC

b. Water Table Depth 16.28　　d. Calculated System Volume (see back) 25ft screen 16.1 gal

2. WELL PURGE DATA

a. Purge Method: Geotech bladder pump with drop tube assembly

b. Acceptance Criteria defined (see workplan)

- Temperature	± 3%	- D.O.	± 10% (values >0.5 mg/L)	Turbidity	± 10%
- pH	± 0.1 unit	- ORP	± 10mV		
- Sp. Cond.	± 3%	- Drawdown	< 0.3'	Remove a minimum 1 screen volume	

c. Field Testing Equipment used:

Make	Model	Serial Number
YSI	556	71477
Hanna	98730	69177

Time (24hr)	Volume Removed (Liters)	Temp. (°C)	pH	Spec. Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Depth to water (ft)	Color/Odor
1300	ON									
1325		12.58	5.24	0.032	2.01	177.8		550	16.65	cloudy
1330		12.43	5.02	0.028	1.78	192.0				
1335	5gal	12.13	5.00	0.0028	1.61	195.2	223			
1340		12.13	4.96	0.027	1.42	199.6	18.1		16.62	
1345		12.35	4.96	0.027	1.20	202.9	46.5			
1350		12.25	4.95	0.027	1.15	204.5	17.5			

d. Acceptance criteria pass/fail　　(continued on back)

	Yes	No	N/A
Has required volume been removed	☑	☐	☐
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

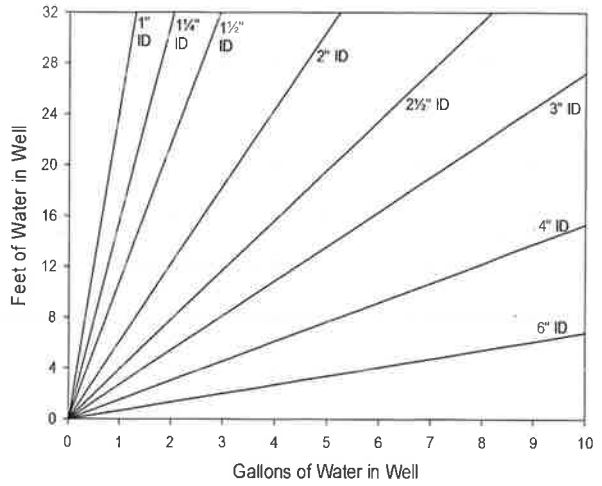
3. SAMPLE COLLECTION:　　Method: Geotech bladder pump with drop tube assembly

Sample ID	Container Type	No. of Containers	Preservation	Analysis Req.	Time
BPOW6-3-GW-032615	40-mL vial	3	HCl	VOCs	1450
	1-L amber	2	none	1,4-Dioxane	

Comments: hit bottom stirred up silt, pre cut tubing is to long

Signature: Paul Kanetti　　Date: 3/26/15

Purge Volume Calculation



Volume / Linear Ft. of Pipe		
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

1 screen volume

15 ft = ~~56.8~~ L / 9.8 G
20 ft = ~~75.71~~ L / 13.1 G
25 ft = ~~94.6~~ L / 16.3 G

Well ID:

(continued from front)

Time (24 hr)	Volume Removed (Liters)	Temp (°C)	pH	Spec. Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Depth to water (ft)	Color/Odor
1355		12.78	4.95	0.027	1.10	207.4	30.6	550	10.68	
1400		12.33	4.95	0.027	1.07	208.5	17.0			
1405	1 gal	12.50	4.94	0.027	1.07	210.2	14.0			
1410		12.47	4.94	0.027	1.04	211.3	11.1			
1415		12.44	4.94	0.027	1.01	212.4	6.58			
1420		12.31	4.94	0.027	0.98	213.5	5.86			
1425		12.32	4.94	0.027	0.98	214.4	5.85			
1430	1 gal	12.25	4.94	0.027	0.95	215.3	6.02	550	10.78	
1435		12.60	4.94	0.027	0.92	217.3	4.57			
1440		12.58	4.94	0.027	0.92	217.9	4.28			
1445	1 gal	12.86	4.94	0.027	0.88	218.4	4.47			
1450										

RESOLUTION CONSULTANTS

Well ID: BPOW6-4

Low Flow Ground Water Sample Collection Record

Client: Navy NWIRP Bethpage Date: 3 / 26 / 15 Time: Start 1320 am/pm
Project No: 60266526 Finish _____ am/pm
Site Location: Wicks Tgerome
Weather Conds: 40° drizzle Collector(s): JC

1. WATER LEVEL DATA: (measured from Top of Casing) 565.08

a. Total Well Length 575 c. Length of Water Column ~~4.58~~ (a-b)

Casing Diameter/Material: 4-inch PVC

b. Water Table Depth 9.92 d. Calculated System Volume (see back) 25ft screen 16.1 gal

2. WELL PURGE DATA

a. Purge Method: Geotech bladder pump with drop tube assembly

b. Acceptance Criteria defined (see workplan)

- Temperature	± 3%	- D.O.	± 10% (values >0.5 mg/L)	Turbidity	± 10%
- pH	± 0.1 unit	- ORP	± 10mV		
- Sp. Cond.	± 3%	- Drawdown	< 0.3'	Remove a minimum 1 screen volume	

c. Field Testing Equipment used:

	Make	Model	Serial Number
	YSI	556MPS	71124
	Horiba	U-22	69177

Time (24hr)	Volume Removed (Liters)	Temp. (°C)	pH	Spec. Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Depth to water (ft)	Color/Odor
1330		12.88	4.12	0.105	4.31	15.9		750	9.98	clear
1335		12.81	4.14	0.102	4.14	20.5		750	10.03	clear
1340		12.70	4.19	0.101	2.01	20.0		750	10.03	clear
1345		12.71	4.57	0.093	1.36	<5.1	76.2	750	10.09	clear
1350		12.64	4.57	0.093	1.27	-9.9		750	10.09	clear
1355		12.59	4.57	0.093	1.14	-15.8	6.31	750	10.09	clear
1400		12.62	4.57	0.092	1.10	-18.2		750	10.09	clear

d. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☑	☐	☐
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

(continued on back)

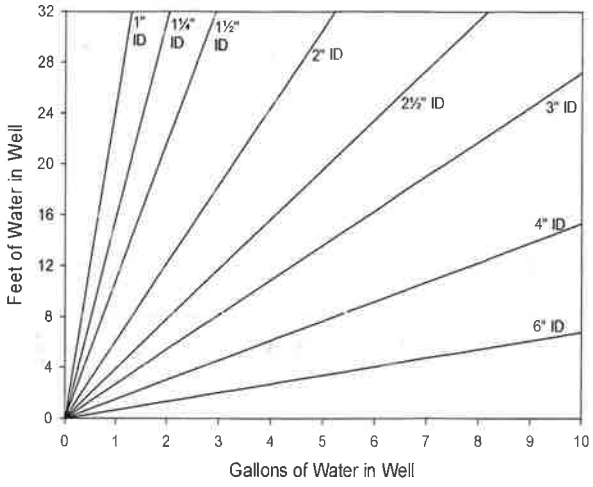
3. SAMPLE COLLECTION: Method: Geotech bladder pump with drop tube assembly

Sample ID	Container Type	No. of Containers	Preservation	Analysis Req.	Time
BPOW6-4-GW-032615	40-mL vial	3	HCl	VOCs	1500
BPOW6-4-GW-032615	1-L amber	2	none	1,4-Dioxane	1500

Comments

Signature _____ Date 3/26/2015

Purge Volume Calculation



Volume / Linear Ft. of Pipe		
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

1 screen volume

15 ft = ~~56.8 L~~ / 9.8 G
20 ft = ~~75.7 L~~ / 13.1 G
25 ft = ~~94.6 L~~ / 16.3 G

Well ID:

(continued from front)

Time (24 hr)	Volume Removed (Liters)	Temp (°C)	pH	Spec. Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Depth to water (ft)	Color/Odor
1405		12.80	4.57	0.093	1.03	-21.0	3.15	750	10.11	clear
1410		12.77	4.57	0.091	1.04	-24.1		750	10.11	clear
1415		12.83	4.57	0.092	1.01	-25.8	2.54	750	10.11	clear
1420		12.77	4.57	0.092	1.01	-26.9		750	10.11	clear
1425		12.71	4.57	0.091	1.00	-28.3	3.24	750	10.11	clear
1430		12.61	4.57	0.092	1.00	-29.8		750	10.11	clear
1435		12.64	4.58	0.092	0.98	-30.7	2.68	750	10.11	clear
1440		12.48	4.59	0.092	0.95	-32.1		750	10.11	clear
1445		12.90	4.59	0.093	0.91	-32.9	3.99	750	10.11	clear
1450		12.91	4.57	0.093	0.91	-34.1		750	10.11	clear

Well ID: BPOW6-S

RESOLUTION CONSULTANTS

Low Flow Ground Water Sample Collection Record

Client: Navy NWIRP Bethpage
Project No: 60266526
Site Location:
Weather Conds:

Date: 6 / 25 /15

Time: Start 0830 am/pm
Finish 1035 am/pm

Collector(s):

1. WATER LEVEL DATA: (measured from Top of Casing)

a. Total Well Length: 555 ft

b. Water Table Depth: 18.00 ft

c. Length of Water Column: 537.00 ft

d. Calculated System Volume (see back)

Casing Diameter/Material: 4-inch PVC

2. WELL PURGE DATA

a. Purge Method: Geotech bladder pump with drop tube assembly

b. Acceptance Criteria defined (see workplan)
- Temperature ± 3%
- pH ± 0.1 unit
- Sp. Cond. ± 3%
- D.O. ± 10% (values >0.5 mg/L)
- ORP ± 10mV
- Drawdown <0.3'
- Turbidity ± 10%
- Remove a minimum 1 screen volume

c. Field Testing Equipment used:

Make	Model	Serial Number
YSI	556 MPS	22091
HANNA	HI 98703	115400 34X

Time (24hr)	Volume Removed (liters)	Temp (°C)	pH	Sp. Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Depth to water (ft)	Color / Odor
1835	1	16.29	10.99	0.673	8.48	134.6	14.6	700	18.04	Clear/none
1845		15.83	6.31	0.085	3.84	150.6	11.0	800	18.05	"
1855	19	15.76	4.25	0.052	2.18	275.2	19.6	700	18.02	"
0905		15.90	4.26	0.053	1.73	279.6	11.5	700	18.06	"
0915		15.95	4.23	0.053	1.55	279.7	10.2	700	18.06	"
0925	38	16.15	4.43	0.053	1.08	275.3	3.49	700	18.02	"
0935		16.09	4.23	0.053	1.49	265.7	2.69	700	18.00	"

(continued on back)

d. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☒	☐	☐
Has required turbidity been reached	☒	☐	☐
Have parameters stabilized	☒	☐	☐

If no or N/A - Explain below.

3. SAMPLE COLLECTION:

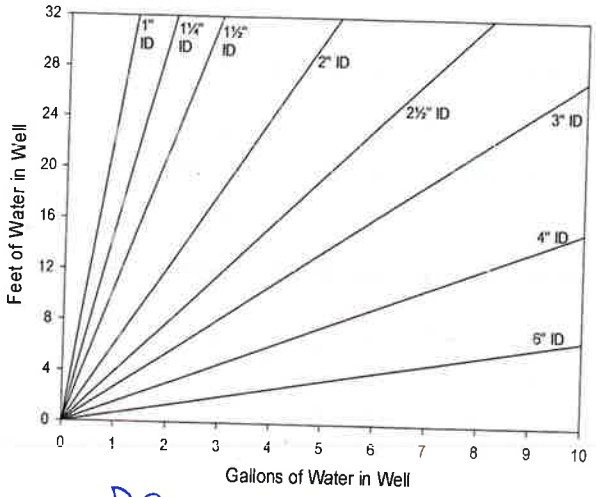
Method: Geotech bladder pump with drop tube assembly

Sample ID	Container type	No. of containers	Preservation	Analysis Req.	Time
BPOW6-S-GW-06252015	40-mL vials	3	HCl	VOCs	1020
"	1-L amber	2	none	1,4-Dioxane	1026

Comments

Signature

Purge Volume Calculation



Volume / Linear Ft. of Pipe		
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

1 screen volume

15 ft = 37.1 L / 9.8 G
20 ft = 49.6 L / 13.1 G
25 ft = 61.7 L / 16.3 G

Well ID: BPOW 6-5

(continued from front)

Time (24 hr)	Volume Removed (Liters)	Temp (°C)	pH	Spec. Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Depth to water (ft)	Color/Odor
0945		16.00	4.49	0.057	0.50	251.9	2.30	750	18.00	"
0955	62	16.03	4.46	0.053	0.75	240.3	2.14	700	18.00	"
1005		16.25	4.40	0.053	0.69	233.1	2.24	750	18.00	"
1010		16.98	4.34	0.053	0.65	239.6	1.65	200	18.00	"
1015		20.19	4.78	0.054	0.57	226.7	1.80	200	18.00	"
1020		20.80	4.81	0.054	0.58	224.1	1.57	200	18.00	Clear/none Sampled

RESOLUTION CONSULTANTS

Well ID: BPOW 6-6

Low Flow Ground Water Sample Collection Record

Client: Navy NWIRP Bethpage
Project No: 60266526
Site Location: N. Hickory
Weather Conds: 80's F clear

Date: 6 / 25 /15

Time: Start 810 ~~am~~/pm
Finish 1025 am/pm

Collector(s): SC

1. WATER LEVEL DATA: (measured from Top of Casing)

a. Total Well Length: 800 ft

b. Water Table Depth: 18.53 ft

c. Length of Water Column: 781.47 ft

d. Calculated System Volume (see back) 16.3 gal

Casing Diameter/Material: 4-inch PVC

2. WELL PURGE DATA

a. Purge Method: Geotech bladder pump with drop tube assembly

b. Acceptance Criteria defined (see workplan)
- Temperature ± 3%
- pH ± 0.1 unit
- Sp. Cond. ± 3%
- D.O. ± 10% (values >0.5 mg/L)
- ORP ± 10mV
- Drawdown <0.3'
- Turbidity ± 10%
- Remove a minimum 1 screen volume

c. Field Testing Equipment used: Make / Model / Serial Number

Time (24hr)	Volume Removed (liters)	Temp (°C)	pH	Sp. Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Depth to water (ft)	Color / Odor
825		16.04	5.05	0.048	1.59	265.6	627	700	18.55	slightly cloudy / none
835	Sample	15.98	4.63	0.035	1.45	283.6	—	700	18.56	" "
845		15.99	4.14	0.029	1.10	315.3	104	700	18.56	cleaning
855		16.08	4.27	0.028	0.89	311.9	75.7	700	18.56	slightly cloudy/none
905	10 gallons	16.04	4.34	0.028	0.85	311.4	69.0	700	18.56	clear/none
915		16.13	4.18	0.028	0.76	320.2	60.7	700	18.56	"
925		16.29	4.21	0.028		312.1	46.3	700	18.56	"

(continued on back)

d. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☒	☐	☐
Has required turbidity been reached	☒	☐	☐
Have parameters stabilized	☒	☐	☐

If no or N/A - Explain below.

3. SAMPLE COLLECTION:

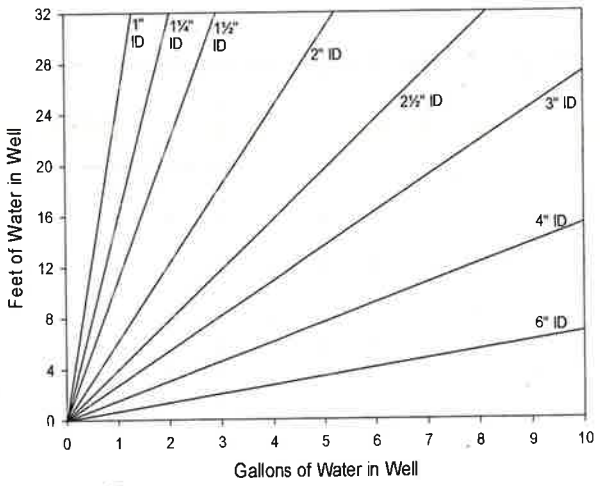
Method: Geotech bladder pump with drop tube assembly

Sample ID	Container type	No. of containers	Preservation	Analysis Req.	Time
BPOW 6-6-GW-06252015	40-mL vials	3	HCl	VOCs	1015
BPOW 6-6-GW-06252015	1-L amber	2	none	1,4-Dioxane	1015

Comments

Signature

Purge Volume Calculation



Volume / Linear Ft. of Pipe		
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

1 screen volume

15 ft = 37.1 L / 9.8 G
20 ft = 49.6 L / 13.1 G
25 ft = 61.7 L / 16.3 G

Well ID: BPOW 6-6

(continued from front)

Time (24 hr)	Volume Removed (Liters)	Temp (°C)	pH	Spec. Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Depth to water (ft)	Color/Odor
935	15 gallons	16.13	4.21	0.021	0.66	324.6	36.0	700	18.56	"
940	16.59	16.28	4.45	0.028	0.56	313.9	39.1	700	18.56	"
945		16.43	4.37	0.028	0.58	313.1	32.9	700	18.56	"
950		16.39	4.32	0.028	0.58	316.0	31.5	700	18.56	"
955		16.40	4.26	0.028	0.59	330.5	31.5	700	18.52	"
1000		16.46	4.10	0.029	0.61	330.7	31.6	700	18.51	"
1015										sample

Section 5

Analytical Data Validation – Resolution Consultants

Documentation of well name change

Well BPOW6-1 was originally named RE111D1

TOC data reported in data validation report package SH7523 contains sample RE111D1-SOIL-090514-573-575 and thus pertains to well BPOW6-1.

Well BPOW6-2 was originally named RE111D2

TOC data reported in data validation report package SH6618 contains sample RE111D2081114-768-770 and thus pertains to well BPOW6-2.

RESOLUTION CONSULTANTS

Resolution Consultants
250 Apollo Drive
Chelmsford, MA 01824

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Data Validation Report

Project:	Regional Groundwater Investigation - NWIRP Bethpage	
Laboratory:	Katahdin Analytical	
Service Request:	SH6618	
Analyses/Method:	EPA SW-846 Method 9060A for TOC	
Validation Level:	3	
AECOM Project Number:	60266526.SA.DV	
Prepared by:	Dawn Brule/RESCON	Completed on: 01/06/2015
Reviewed by:	Lori Herberich/RESCON	File Name: SH6618_9060A

SUMMARY

The samples listed below were collected by Resolution Consultants from the Regional Groundwater Investigation - NWIRP Bethpage site on August 11, 2014.

Sample ID	Matrix/Sample Type
RE111D2081114-768-770	Soil

Data validation activities were conducted with reference to these methods, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846,* Method 9060A, *Total Organic Carbon* (USEPA, 1996), *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (January 2010), and Quality Systems Manual (QSM) for Environmental Laboratories, Version 4.2 (DoD, October 2010) where applicable. In the absence of method-specific information, laboratory quality control (QC) limits, project-specific requirements and/or professional judgment were used as appropriate.

REVIEW ELEMENTS

The data were evaluated based on the following parameters (where applicable to the method):

✓	Data completeness (chain-of-custody [COC])/sample integrity
✓	Holding times and sample preservation
✓	Initial calibration/continuing calibration verification
✓	Laboratory blanks/equipment blanks
NA	Matrix spike (MS)/Matrix duplicate (MD) and/or matrix spike duplicate (MSD) results
✓	Laboratory control sample (LCS) results
NA	Field duplicates
✓	Sample results/reporting issues

The symbol (✓) indicates that no validation qualifiers were applied based on this parameter. NA indicates that the parameter was not included as part of this data set or was not applicable to this validation and therefore not reviewed. The symbol (✗) indicates that a QC nonconformance resulted in the qualification of data. Any QC nonconformance that resulted in the qualification of

data is discussed below. In addition, nonconformances or other issues that were noted during validation, but did not result in qualification of data, may be discussed for informational purposes only.

The data appear valid as reported and may be used for decision making purposes. There were no data points qualified or rejected on the basis of this data review.

RESULTS

Data Completeness (COC)/Sample Integrity

The data package was reviewed and found to meet acceptance criteria for completeness:

- The COCs were reviewed for completeness of information relevant to the samples and requested analyses, and for signatures indicating transfer of sample custody.
- The laboratory sample login sheet(s) were reviewed for issues potentially affecting sample integrity, including the condition of sample containers upon receipt at the laboratory.
- Completeness of analyses was verified by comparing the reported results to the COC requests.

Due to limitations in the reporting system, the laboratory omitted the "RE-" prefix from the sample ID in the report. The submitted EDD file reflects the full sample ID.

Holding Times/Sample Preservation

Sample preservation and preparation/analysis holding times were reviewed for conformance with the QC acceptance criteria. The QC acceptance criteria were met.

Initial Calibration/Continuing Calibration Verification

Calibration data were reviewed for conformance with the QC acceptance criteria to ensure that:

- all criteria were met for the calibration curves
- the initial calibration verification (ICV) percent recovery (%R) criteria were met; and
- the continuing calibration verification standard (CCV) method %Rs were met

The QC acceptance criteria were met.

Laboratory Blanks/Equipment Blanks

Laboratory method blanks and equipment rinsate blanks were evaluated as to whether there were contaminants detected above the detection limit (DL). An equipment blank was not submitted with the samples in this data set.

Data validation qualifications for individual samples are based on the maximum contaminant concentration detected in all associated blanks.

Method blank results were reviewed for conformance with the QC acceptance criteria. Detected results in blanks are not discussed in this data validation report if the associated results were nondetect or if qualification of sample results was not required.

The QC acceptance criteria were met and/or qualification of the sample results was not required.

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MS/MD and/or MSD Results

MS/MD/MSD analyses were not performed on samples reported in this SDG. There were no validation actions taken on this basis.

LCS Results

The LCS %Rs were reviewed for conformance with the QC acceptance criteria. All QC acceptance criteria were met.

Field Duplicate Results

There were no field duplicate samples submitted with this data set. No validation actions were taken on this basis.

Sample Results/Reporting Issues

Compounds that were not detected in the sample are reported as not detected (U) at the Limit of Detection (LOD).

Compounds detected at concentrations less than the LOQ but greater than the detection limit (DL) were qualified by the laboratory as estimated (J). This "J" qualifier was retained during data validation.

Any sample that was analyzed at a dilution due to high concentrations of target or non-target compounds or matrix interferences was checked to ensure that the results and/or sample specific LODs and LOQs were adjusted accordingly by the laboratory.

QUALIFICATION ACTIONS

No sample results were qualified as a result of this data review.

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600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

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Page 1 of 1

Client: Resolution Consultants	Contact: Eleanor Vivaudou	Phone #: ( )	Fax #: ( )
Address: 100 Red Schoolhouse Rd	City: Chestnut Ridge	State: NY new york	Zip Code: 10977
Purchase Order #	Proj. Name / No.: Bethpage 60266526		Katahdin Quote #
Bill (if different than above)	Address		
Sampler (Print / Sign): Valerie Thayer / Valerie Thayer			Copies To: Valerie Thayer

LAB USE ONLY WORK ORDER #: SH6618

KATAHDIN PROJECT NUMBER

REMARKS:

SHIPPING INFO: ☐ FED EX ☐ UPS ☐ CLIENT

AIRBILL NO:

TEMP°C ☐ TEMP BLANK ☐ INTACT ☐ NOT INTACT

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	ANALYSIS AND CONTAINER TYPE / PRESERVATIVES									
					Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N
					RBS	SVOCs TCL	TPH	reactive cyanide & reactive sulfide	TCLP Metals	Ignitability, pH, Corrosivity	VOCs TCL	Total Solids	Paint Filter	TOC
1)	IDWS-081814-9861	8/18/14 / 4:00	soil	12	X	X	X	X	X	X	X	X	X	
	Temp blank	/												
2)	RE111D2-081114-768-770	8/11/14 / 11:00	soil	1										X
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COMMENTS 1) Sampled roll-off 9861.
2) RE111D2 sample is from split-spoon sampling

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
Valerie Thayer	Aug 18 / 1:00	8/19 1145			
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)

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0000022

ORIGINAL

KAS-COC1

Katahdin
ANALYTICAL SERVICES

nelac
Cert No E87604

Report of Analytical Results

Client: Rick Purdy
AECOM
701 Edgewater Drive
Wakefield,MA 01880

Lab Sample ID: SH6618-2
Report Date: 04-SEP-14
Client PO: 16518
Project: Navy Clean WE15-03-0
SDG: SH6618

Sample Description	Matrix	Date Sampled	Date Received
111D2081114-768-770	SL	11-AUG-14	19-AUG-14

Parameter	Result	Adj LOQ	Adj MDL	Adj LOD	Anal. Method	QC.Batch	Anal. Date	Prep. Method	Prep. Date	Footnotes
TOC In Soil	920 ug/gdrywt	440	94.	330	SW846 9060A Mod.	WG148851	22-AUG-14 10:39:30	N/A	N/A	
Total Solids	90. %	1		N/A	SM2540G	WG148631	21-AUG-14 10:56:13	SM2540G	20-AUG-14	

Katahdin Analytical Services 0000893

RESOLUTION CONSULTANTS

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Data Validation Report

Project:	Regional Groundwater Investigation - NWIRP Bethpage	
Laboratory:	Katahdin Analytical	
Service Request:	SH7523	
Analyses/Method:	EPA SW-846 Method 9060A for TOC	
Validation Level:	3	
AECOM Project Number:	60266526.SA.DV	
Prepared by:	Dawn Brule/RESCON	Completed on: 01/06/2015
Reviewed by:	Lori Herberich/RESCON	File Name: SH7523_9060A

SUMMARY

The samples listed below were collected by Resolution Consultants from the Regional Groundwater Investigation - NWIRP Bethpage site on September 5, 2014.

Sample ID	Matrix/Sample Type
RE111D1-SOIL-090514-573-575	Soil

Data validation activities were conducted with reference to these methods, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846,* Method 9060A, *Total Organic Carbon* (USEPA, 1996), *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (January 2010), and Quality Systems Manual (QSM) for Environmental Laboratories, Version 4.2 (DoD, October 2010) where applicable. In the absence of method-specific information, laboratory quality control (QC) limits, project-specific requirements and/or professional judgment were used as appropriate.

REVIEW ELEMENTS

The data were evaluated based on the following review elements (where applicable to the method):

✓	Data completeness (chain-of-custody [COC])/sample integrity
✓	Holding times and sample preservation
✓	Initial calibration/continuing calibration verification
✓	Laboratory blanks/equipment blanks
NA	Matrix spike (MS)/Matrix duplicate (MD) and/or matrix spike duplicate (MSD) results
✓	Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
NA	Field duplicates
✓	Sample results/reporting issues

The symbol (✓) indicates that no validation qualifiers were applied based on this parameter. NA indicates that the parameter was not included as part of this data set or was not applicable to this validation and therefore not reviewed. The symbol (✗) indicates that a QC nonconformance resulted in the qualification of data. Any QC nonconformance that resulted in the qualification of

data is discussed below. In addition, nonconformances or other issues that were noted during validation, but did not result in qualification of data, may be discussed for informational purposes only.

The data appear valid as reported and may be used for decision making purposes. There were no data points qualified or rejected on the basis of this data review.

RESULTS

Data Completeness (COC)/Sample Integrity

The data package was reviewed and found to meet acceptance criteria for completeness:

- The COCs were reviewed for completeness of information relevant to the samples and requested analyses, and for signatures indicating transfer of sample custody.
- The laboratory sample login sheet(s) were reviewed for issues potentially affecting sample integrity, including the condition of sample containers upon receipt at the laboratory.
- Completeness of analyses was verified by comparing the reported results to the COC requests.

Due to limitations in the reporting system, the laboratory omitted the "RE111D1-" prefix from the sample ID in the report. The submitted EDD file reflects the full sample ID.

Holding Times/Sample Preservation

Sample preservation and preparation/analysis holding times were reviewed for conformance with the QC acceptance criteria. The QC acceptance criteria were met.

Initial Calibration/Continuing Calibration Verification

Calibration data were reviewed for conformance with the QC acceptance criteria to ensure that:

- all criteria were met for the calibration curves
- the initial calibration verification (ICV) percent recovery (%R) criteria were met; and
- the continuing calibration verification standard (CCV) method %Rs were met

The QC acceptance criteria were met.

Laboratory Blanks/Equipment Blanks

Laboratory method blanks and equipment rinsate blanks were evaluated as to whether there were contaminants detected above the detection limit (DL). An equipment blank was not submitted with the samples in this data set.

Data validation qualifications for individual samples are based on the maximum contaminant concentration detected in all associated blanks.

Method blank results were reviewed for conformance with the QC acceptance criteria. Detected results in blanks are not discussed in this data validation report if the associated results were nondetect or if qualification of sample results was not required.

The QC acceptance criteria were met and/or qualification of the sample results was not required.

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MS/MD and/or MSD Results

MS/MD/MSD analyses were not performed on samples reported in this SDG. There were no validation actions taken on this basis.

LCS/LCSD Results

The LCS/LCSD %Rs and/or relative percent recoveries (RPDs) were reviewed for conformance with the QC acceptance criteria. All QC acceptance criteria were met.

Field Duplicate Results

There were no field duplicate samples submitted with this data set. No validation actions were taken on this basis.

Sample Results/Reporting Issues

Compounds that were not detected in the sample are reported as not detected (U) at the Limit of Detection (LOD).

Compounds detected at concentrations less than the LOQ but greater than the detection limit (DL) were qualified by the laboratory as estimated (J). This "J" qualifier was retained during data validation.

Any sample that was analyzed at a dilution due to high concentrations of target or non-target compounds or matrix interferences was checked to ensure that the results and/or sample specific LODs and LOQs were adjusted accordingly by the laboratory.

QUALIFICATION ACTIONS

No sample results were qualified as a result of this data review.

ATTACHMENTS

Attachment A: Qualifier Codes and Explanations

Attachment A

Qualifier Codes and Explanations

Qualifier	Explanation
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

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CHAIN of CUSTODY

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Page ____ of ____

Client: Resolution Consultants	Contact: Eleanor Vivodow	Phone #: ( )	Fax #: ( )
Address: 100 Red Schoolhouse Rd	City: Chestnut Ridge	State: NY	Zip Code: 10977
Purchase Order #:	Proj. Name / No.: Bethpage 60266.52b		Katahdin Quote #:
Bill (if different than above)	Address:		
Sampler (Print / Sign): Valerie Thayer Valerie Thayer		Copies To: V Thayer	

LAB USE ONLY WORK ORDER #: 514523

KATAHDIN PROJECT NUMBER: ____

REMARKS: ____

SHIPPING INFO: ☐ FED EX ☐ UPS ☐ CLIENT

AIRBILL NO: ____

TEMP°C ____ ☐ TEMP BLANK ☐ INTACT ☐ NOT INTACT

10C

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	ANALYSIS AND CONTAINER TYPE / PRESERVATIVES: Filt. ☐Y ☐N
	RE111DI-Soil-090514-573-575	09/05/14 / 12:30	Soil	1	
	Temp blank	/	W	1	
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COMMENTS: Soil Sample collected from split-spoon - 573'-575' (RE111DI)

9-11-14/0930

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
Valerie Thayer	9/5/14 1230				
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)

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ORIGINAL

KAS-COC1

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Rick Purdy
AECOM
701 Edgewater Drive
Wakefield,MA 01880

Lab Sample ID: SH7523-1
Report Date: 25-SEP-14
Client PO: 16518
Project: Navy Clean WE15-03-0
SDG: SH7523

Sample Description	Matrix	Date Sampled	Date Received
SOIL-090514-573-575	SL	05-SEP-14 12:30:00	11-SEP-14

Parameter	Result	Adj LOQ	Adj MDL	Adj LOD	Anal. Method	QC.Batch	Anal. Date	Prep. Method	Prep. Date	Footnotes
TOC In Soil	2200 ug/gdrywt	470	100	N/A	SW846 9060A Mod.	WG150664	22-SEP-14 13:08:25	N/A	N/A	
Total Solids	84. %	1		N/A	SM2540G	WG150535	22-SEP-14 09:16:37	SM2540G	19-SEP-14	

DATA VALIDATION REPORT

Project:	Regional Groundwater Investigation — NWIRP Bethpage	
Laboratory:	Katahdin Analytical	
Sample Delivery Groups:	SI0596	
Analyses/Method:	Total Organic Carbon (TOC) by U.S. EPA SW-846 Method 9060A and Standard Method 5310B for Total Organic Carbon by High-Temperature Combustion	
Validation Level:	3	
Project Number:	0888812477.SA.DV	
Prepared by:	Dana Miller/Resolution Consultants	Completed on: 02/27/2015 Revised on: 10/27/2015
Reviewed by:	Tina Cantwell/Resolution Consultants	File Name: SI0596_9060A_5310B

SUMMARY

This report summarizes data review findings for samples listed below, collected by Resolution Consultants from the Regional Groundwater Investigation — NWIRP Bethpage site on 22 January 2015 in accordance with the following Sampling and Analysis Plans:

- *Sampling and Analysis Plan, Bethpage, New York.* (Resolution Consultants April 2013).
- *UFP SAP Addendum, Installation of Vertical Profile Borings and Monitoring Wells, Operable Unit 2, NWIRP Bethpage, New York.* (Resolution Consultants November 2013).
- *UFP SAP Addendum, Inclusion of Additional Target Analytes for Volatile Organics Analyses, NWIRP Bethpage OU2, Bethpage, New York*. (Resolution Consultants August 2014).

Sample ID	Lab ID	Matrix/Sample Type	Analysis
BPOW6-5-SOIL-012215-778-780		Soil	9060A
BPOW6-5-SOIL-D-012215		Field Duplicate	9060A
BPOW6-5-Equipment Blank-012215		Equipment Blank	5310B

Data validation activities were conducted using the following guidance documents: *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846, specifically Method 9060A, Total Organic Carbon* (U.S. EPA, 1996), *Method SM5310B, Total Organic Carbon by High-Temperature Combustion, U.S. Environmental Protection Agency (U.S. EPA) Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (NFG, January 2010, and Department of Defense

(DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 4.2 (October 2010). In the absence of method-specific information, laboratory quality control (QC) limits, project-specific requirements and/or professional judgment were used as appropriate.

REVIEW ELEMENTS

The data were evaluated based on the following parameters (where applicable to the method):

✓	Data completeness (chain-of-custody)/sample integrity
✓	Holding times and sample preservation
NA	Gas chromatography/Mass spectrometer performance checks
✓	Initial calibration/continuing calibration verification
✓	Laboratory blanks/equipment blanks/field blanks/trip blanks
NA	Surrogate spike recoveries
✓	Matrix spike and/or matrix spike duplicate results
✓	Laboratory control sample laboratory control sample duplicate results
✓	Field duplicates
NA	Internal standards
✓	Sample results/reporting issues

The symbol (✓) indicates that no validation qualifiers were applied based on this parameter. NA indicates that the parameter was not included as part of this data set or was not applicable to this validation and therefore not reviewed. Acceptable data parameters for which all criteria were met and no qualification was performed and non-conformance or other issues that were noted during validation, but did not result in qualification of data are not discussed further.

Qualifications Actions

The data was reviewed independently from the laboratory to assess data quality. All compounds detected at concentrations less than the limit of quantitation but greater than the method detection limit were qualified by the laboratory as estimated (J). This "J" qualifier was retained during data validation. Any sample that was analyzed at a dilution because of high concentrations of target or non-target analytes was checked to confirm that the results and/or sample-specific limit of quantitation and limit of detections were adjusted accordingly by the laboratory.

No results were qualified during this review. Analytical completeness was calculated to be 100% and the data are usable for their intended purpose, according to U.S. Environmental Protection Agency and Department of Defense guidelines. Katahdin Analytical discovered a QC error in Total Organic

Carbon calculations, informed us, and has implemented corrective action provided in Attachment A. Attachment B provides final results after data review.

ATTACHMENTS

Attachment A: Katahdin Analytical Corrective Action Report

Attachment B: Final Results after Data Review

Attachment A
Katahdin Analytical Corrective Action Report

KATAHDIN ANALYTICAL SERVICES, INC. – CORRECTIVE ACTION REPORT

Problem Identification (Person initiating CAR) Name: Leslie Dimond Date: 08/28/2015

Discovered by Laboratory X Discovered by Client (Complaint) Other

Details of Problem:

On August 28, 2015, a client called regarding several TOC results. They thought the results for their samples seemed to be off by a factor of ten. George Brewer looked into the matter and found that their sample results were calculated incorrectly. Calculations are set up to be performed automatically in KIMS. Each product code for a test contains information such as the method name, LOQ, LOD, MDL, limits and a specific process chain for reporting to the either the LOQ, LOD or MDL (i.e. three process chains). This process chain contains all of the calculations associated with a test including separate calculations for sample results, adjusted LOQs, LODs and MDLs, and results for QC samples. In October of 2014, a client asked why the lab was not adjusting LOQs, LODs and/or MDLs for the sample amount used, but only for an instrument dilution and total solids. The lab had felt that there wasn't really a standard weight amount, so this was not incorporated. After numerous discussions, the lab decided to change this and use 500 mg as the standard and to incorporate any different amount into the LOQ/LOD/MDL adjustment. MIS was asked to revise this TOC calculation in our Laboratory Information System (KIMS). The incorrect information was given to MIS, so the adjusted LOQ/LOD/MDL calculation was wrong.

The formula was: ADJ. LOQ/LOD/MDL = LOQ/LOD/MDL * DF * (Sample amount / 1000) * (100/TS).

During data review, sample results that are calculated automatically by KIMS, are checked at a frequency of 10% of all calculations. Sample results are checked in this manner, but adjusted limits are not necessarily checked. In December of 2014, a data reviewer noticed that some adjusted limits were not correct. This issue was reviewed with MIS, and it was discovered that the calculation was incorrect. It was corrected at this time and changed to:

ADJ. LOQ/LOD/MDL = LOQ/LOD/MDL * DF * (500 / Sample Amount) * (100/TS) (where 500 is the standard sample amount).

At the time this change was made, MIS was under the impression that the sample calculation was also incorrect and also needed to be corrected.

The formula for the sample result was: Results (ug/g) = $\frac{\text{Total carbon}}{\text{(sample amount / 1000)}}$ * (100/TS) (where 1000 is a conversion factor)

This was incorrectly changed to: Results (ug/g) = $\frac{\text{Total carbon}}{\text{(500 / Sample Amount)}}$ * TS

From December 29, 2014 to April 13, 2015, this error was often discovered during data review and manually corrected. The problem was not addressed with the MIS department. However, there were several cases where this error was not caught during data review and results were reported incorrectly. On April 13, 2015, this issue was brought to the attention of MIS and the sample calculation was corrected back to:

Results (ug/g) = $\frac{\text{Total carbon}}{\text{(sample amount / 1000)}}$ * (100/TS) (where 1000 is a conversion factor)

Blanks and LCSs were not affected by these changes because they are calculated using different calculations since total solids is not used in these situations. Duplicates and MS/MSD samples are also not affected because they use different calculations since these calculation strings involve recoveries, RPDs, etc.

Associated Non-Conformances: List logbook and page numbers

There are no non-conformances associated with this corrective action.

Root Cause Investigation & Determination (To be completed by Department Manager, Operations Manager and/or QA Officer)

Review the 6 "M's" below and investigate to determine whether one of them, or more than one, could be the cause of the problem.

Possible Causes	Details

KATAHDIN ANALYTICAL SERVICES, INC. – CORRECTIVE ACTION REPORT

Machine (Instrument)	KIMS – incorrect formulas were entered into the process chains for TOC in soil.
Method (or Process)	Katahdin's policy for data review: From the QAM: "For data that are reduced via computer, calculations are checked by the analyst (or designee) assigned to this task at a frequency designed to assure that the final data generation is valid." From SOP SD-904, Data Reduction, Review and Reporting: "All manual integrations, calculations and transcriptions are checked and 10% of all spreadsheet calculations are checked. The remainder of spreadsheet calculations is spot checked for potential anomalies." Katahdin does not have a formal process for handling calculation changes to process changes in KIMS. A verbal request is made to MIS and the change is made. Although the KIMS system does have an audit trail to track dates of changes and calculation changes, the request for these is not documented.
Materials	Not Applicable
Maintenance (Is something not working correctly?)	Not Applicable
Man (training, human error)	All personnel involved with data review are aware of the requirement to hand check 10% of the sample results. In some cases this appears to have been done and when the results did not calculate correctly, they were corrected in KIMS. There was no communication that the error may affect other batches of samples. In other sample batches, the 10% hand check must not have occurred.
Mother Nature (accidents, power issues, beyond our control)	Not Applicable

Corrective Action Plan: Name: Leslie Dimond Date: 08/28/2015

Details of Corrective Action Plan –

Querries were run through KIMS to generate lists for TOC in soil data entered into KIMS between two timeframes:

10/23/14 to 12/29/14 (incorrect LOQ/LOD/MDL adjustment) – 14 Work Orders were found in this timeframe

12/29/14 and 4/13/15 (incorrect sample calculation) - 16 Work Orders were found in this timeframe

The lab has reviewed all TOC in soil data from these time periods for accuracy. Some inaccurate data was found (as expected from the incorrect formulas). Some data was found to be correct. In these cases, MIS was able to determine, through the KIMS audit trail, that the data had been manually corrected.

A new form has been created for personnel to fill out when requesting calculation changes in KIMS. This form will ensure that MIS is clear on exactly what needs to be changed in KIMS. Through KIMS we are currently able to track formula changes (ie. the formula before and after the change) and when the change occurred. This new form will allow Katahdin to track the changes made by person requesting the change and why the change was necessary. Supervisor and QA/Management approval are required on these forms.

There also will be a mandatory retraining for all employees on Katahdin's policy for data review, stressing that 10% of all results generated from KIMS and spreadsheets need to be confirmed. Also, this retraining will stress the need for communication. If a problem is discovered with one batch of samples, then it might also be affecting other batches.

Additionally, when calculation changes are made, Katahdin must establish a time frame of 30 days or 10 workorders where

senior management or the Quality Assurance Officer must also check the new calculations.

Review & Approval of Corrective Action Plan

Supervisor Approval:	Date: 09.11.15
Operations Manager Approval: Deborah J. Nadeau	Date: 9.11.15
Quality Assurance Officer: Susie Dimond	Date: 09.11.15

Monitoring of Corrective Action (To be completed by QA Officer and/or Operations Manager): List details of follow-up

Corrective Action Effective	Return to Control – Yes No	Further Monitoring Needed/Additional Corrective Action

QA Approval: Date:

Additional Information:

Attachment B
Final Results after Data Review

				Sample Delivery Group		SI0596		SI0596	
				Lab ID		SI0596-1		SI0596-2	
				Sample ID		BP0W6-5-EQUIPMENT RINSATE BLANK-012215		BPOW6-5-SOIL-012215-778-780	
				Sample Date		1/22/2015		1/22/2015	
				Sample Type		Equipment Blank		Soil	
Method	Analyte	CAS No	Units	Result	Qual	Result	Qual	Result	Qual
5310B	TOTAL ORGANIC CARBON	-28	MG_L	0.36	J	NA		NA	
9060A	TOTAL ORGANIC CARBON	-28	UG_G	NA		390	J	290	J

				Sample Delivery Group	SI0596
				Lab ID	SI0596-3
				Sample ID	BPOW6-5-SOIL-D-012215
				Sample Date	1/22/2015
				Sample Type	Field Duplicate
Method	Analyte	CAS No	Units	Result	Qual
5310B	TOTAL ORGANIC CARBON	-28	MG_L	NA	
9060A	TOTAL ORGANIC CARBON	-28	UG_G	290	J

Notes:

MG_L = Milligrams per liter
UG_G = Micrograms per gram
NA = Not analyzed
Qual = Final qualifier

Final Qualifier:

J = The analyte was positively identified. The numerical value is the estimated concentration of the analyte in the sample.

DATA VALIDATION REPORT

Project:	Regional Groundwater Investigation — NWIRP Bethpage	
Laboratory:	Katahdin Analytical	
Sample Delivery Group:	SI1908	
Analyses/Method:	Volatile Organic Compounds by U.S. EPA SW-846 Method 8260C 1,4-Dioxane by U.S. EPA SW-846 Method 8270D via Selective Ion Monitoring (SIM)	
Validation Level:	3	
Project Number:	0888812477.SA.DV	
Prepared by:	Dana Miller/Resolution Consultants	Completed on: 06/08/2015
Reviewed by:	Tina Cantwell/Resolution Consultants	File Name: SI1908_8260C_8270D

SUMMARY

This report summarizes data review findings for samples listed below, collected by Resolution Consultants from the Regional Groundwater Investigation — NWIRP Bethpage Site on 26 March 2015 in accordance with the following Sampling and Analysis Plans:

- *Sampling and Analysis Plan, Bethpage, New York.* (Resolution Consultants April 2013).
- *UFP SAP Addendum, Installation of Vertical Profile Borings and Monitoring Wells, Operable Unit 2, NWIRP Bethpage, New York.* (Resolution Consultants November 2013).
- *UFP SAP Addendum, Inclusion of Additional Target Analytes for Volatile Organics Analyses, NWIRP Bethpage OU2, Bethpage, New York*. (Resolution Consultants August 2014).

Sample ID	Matrix/Sample Type	Analysis
BPOW6-1-GW-032615	Groundwater	8260C / 8270D_SIM
BPOW6-2-GW-032615	Groundwater	8260C / 8270D_SIM
BPOW6-3-GW-032615	Groundwater	8260C / 8270D_SIM
BPOW6-4-GW-032615	Field Duplicate	8260C / 8270D_SIM
TRIPBLANK032615	Groundwater	8260C

Data validation activities were conducted using the following guidance documents: *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846, specifically Method 8260C, Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry* (U.S. EPA, 2006), *SW-846 Method 8270D, Semivolatile Organic Compounds by Gas Chromatograph/Mass Spectrometry*

(U.S. EPA, 2007), *U.S. Environmental Protection Agency* (U.S. EPA) *Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (June 2008), and Department of Defense Quality Systems Manual for Environmental Laboratories, Version 4.2 (October 2010). In the absence of method-specific information, laboratory quality control (QC) limits, project-specific requirements and/or professional judgment were used as appropriate.

REVIEW ELEMENTS

The data were evaluated based on the following parameters (where applicable to the method):

✓	Data completeness (chain-of-custody/sample integrity
✓	Holding times and sample preservation
✓	Gas chromatography/Mass spectrometer performance checks
✗	Initial calibration/continuing calibration verification
✓	Laboratory blanks/trip blanks
✓	Surrogate spike recoveries
NA	Matrix spike and/or matrix spike duplicate results
✓	Laboratory control sample /laboratory control sample duplicate results
NA	Field duplicates
✓	Internal standards
✓	Sample results/reporting issues

The symbol (✓) indicates that no validation qualifiers were applied based on this parameter. NA indicates that the parameter was not included as part of this data set or was not applicable to this validation and therefore not reviewed. Acceptable data parameters for which all criteria were met and no qualification was performed and non-conformance or other issues that were noted during validation, but did not result in qualification of data are not discussed further. The symbol (✗) indicates that a QC non-conformance resulted in the qualification of data. Any QC non-conformance that resulted in the qualification of data is discussed below.

RESULTS

Initial Calibration/Continuing Calibration Verification

Calibration data were reviewed for conformance with the QC acceptance criteria to ensure that:

- the initial calibration percent relative standard deviation, correlation coefficient/coefficient of determination, and/or response factor method acceptance criteria were met;

- the initial calibration verification (ICV) standard percent recovery acceptance criteria were met;

- the continuing calibration verification standard (CCV) method percent difference or percent drift (%Ds) and response factor acceptance criteria were met; and

- the retention time method acceptance criteria were met.

Data qualification to the analytes associated with the specific calibration verification was as follows:

ICV Recovery Non-conformance:

Criteria	Actions	
	Detected Results	Non-detected Results
Recovery >120%	J	UJ
Recovery < 80%	J	UJ

Notes:
J = Estimated
UJ = Undetected and estimated

CCV Linearity Non-conformance:

Criteria	Actions	
	Detected Results	Non-detected Results
%Difference or %Drift > 20%	J	UJ

Notes:
J = Estimated
UJ = Undetected and estimated

ICV and CCV non-conformances are summarized in Attachment A in Tables A-1 and A-2.

Qualification Actions

The data was reviewed independently from the laboratory to assess data quality. Any sample that was analyzed at a dilution because of high concentrations of target or non-target analytes was checked to confirm that the results and/or sample-specific limit of quantitation and limit of detections were adjusted accordingly by the laboratory.

No results were rejected; therefore, analytical completeness was calculated to be 100 percent. Data not qualified during data review are considered usable by the project. The remaining results qualified as estimated may be high or low, but the data are usable for their intended purpose, according to U.S. Environmental Protection Agency and Department of Defense guidelines. Final

data review qualifiers used to describe results and how they should be interpreted by the end data user are provided in Attachment B and Attachment C. Attachment D provides final results after data review.

ATTACHMENTS

Attachment A: Non-Conformance Summary Tables
Attachment B: Qualifier Codes and Explanations
Attachment C: Reason Codes and Explanations
Attachment D: Final Results after Data Review

Attachment A
Non-Conformance Summary Table

Table A-1
Initial Calibration Verification Non-Conformance

Method	Analyte	ICV ID	%R	Limit	Associated Samples	Qualifier
8260C	Dichlorodifluoromethane	WG160458-7	132.53	80-120	BPOW6-1-GW-032615	UJ
8260C	Dichlorodifluoromethane	WG160458-7	132.53	80-120	BPOW6-2-GW-032615	UJ
8260C	Dichlorodifluoromethane	WG160458-7	132.53	80-120	BPOW6-3-GW-032615	UJ
8260C	Dichlorodifluoromethane	WG160458-7	132.53	80-120	BPOW6-4-GW-032615	UJ
8260C	Dichlorodifluoromethane	WG160458-7	132.53	80-120	TRIPBLANK032615	UJ
8260C	Chloromethane	WG160458-7	121.77	80-120	BPOW6-1-GW-032615	UJ
8260C	Chloromethane	WG160458-7	121.77	80-120	BPOW6-2-GW-032615	UJ
8260C	Chloromethane	WG160458-7	121.77	80-120	BPOW6-3-GW-032615	UJ
8260C	Chloromethane	WG160458-7	121.77	80-120	BPOW6-4-GW-032615	UJ
8260C	Chloromethane	WG160458-7	121.77	80-120	TRIPBLANK032615	UJ
8260C	Bromomethane	WG160458-7	130.01	80-120	BPOW6-1-GW-032615	UJ
8260C	Bromomethane	WG160458-7	130.01	80-120	BPOW6-2-GW-032615	UJ
8260C	Bromomethane	WG160458-7	130.01	80-120	BPOW6-3-GW-032615	UJ
8260C	Bromomethane	WG160458-7	130.01	80-120	BPOW6-4-GW-032615	UJ
8260C	Bromomethane	WG160458-7	130.01	80-120	TRIPBLANK032615	UJ
8260C	Carbon Disulfide	WG160458-7	544.89	80-120	BPOW6-1-GW-032615	UJ
8260C	Carbon Disulfide	WG160458-7	544.89	80-120	BPOW6-2-GW-032615	UJ
8260C	Carbon Disulfide	WG160458-7	544.89	80-120	BPOW6-3-GW-032615	UJ
8260C	Carbon Disulfide	WG160458-7	544.89	80-120	BPOW6-4-GW-032615	UJ
8260C	Carbon Disulfide	WG160458-7	544.89	80-120	TRIPBLANK032615	UJ
8260C	Acetone	WG160458-7	137.34	80-120	BPOW6-1-GW-032615	UJ
8260C	Acetone	WG160458-7	137.34	80-120	BPOW6-2-GW-032615	UJ
8260C	Acetone	WG160458-7	137.34	80-120	BPOW6-3-GW-032615	UJ
8260C	Acetone	WG160458-7	137.34	80-120	BPOW6-4-GW-032615	UJ
8260C	Acetone	WG160458-7	137.34	80-120	TRIPBLANK032615	UJ
8260C	2-Butanone	WG160458-7	134.65	80-120	BPOW6-1-GW-032615	UJ
8260C	2-Butanone	WG160458-7	134.65	80-120	BPOW6-2-GW-032615	UJ
8260C	2-Butanone	WG160458-7	134.65	80-120	BPOW6-3-GW-032615	UJ
8260C	2-Butanone	WG160458-7	134.65	80-120	BPOW6-4-GW-032615	UJ
8260C	2-Butanone	WG160458-7	134.65	80-120	TRIPBLANK032615	UJ
8260C	Cyclohexane	WG160458-7	193.37	80-120	BPOW6-1-GW-032615	UJ
8260C	Cyclohexane	WG160458-7	193.37	80-120	BPOW6-2-GW-032615	UJ
8260C	Cyclohexane	WG160458-7	193.37	80-120	BPOW6-3-GW-032615	UJ
8260C	Cyclohexane	WG160458-7	193.37	80-120	BPOW6-4-GW-032615	UJ
8260C	Cyclohexane	WG160458-7	193.37	80-120	TRIPBLANK032615	UJ
8260C	Tetrachloroethene	WG160458-7	124.99	80-120	BPOW6-1-GW-032615	UJ
8260C	Tetrachloroethene	WG160458-7	124.99	80-120	BPOW6-2-GW-032615	UJ
8260C	Tetrachloroethene	WG160458-7	124.99	80-120	BPOW6-3-GW-032615	UJ
8260C	Tetrachloroethene	WG160458-7	124.99	80-120	BPOW6-4-GW-032615	UJ
8260C	Tetrachloroethene	WG160458-7	124.99	80-120	TRIPBLANK032615	UJ
8260C	2-Hexanone	WG160458-7	130.94	80-120	BPOW6-1-GW-032615	UJ
8260C	2-Hexanone	WG160458-7	130.94	80-120	BPOW6-2-GW-032615	UJ
8260C	2-Hexanone	WG160458-7	130.94	80-120	BPOW6-3-GW-032615	UJ
8260C	2-Hexanone	WG160458-7	130.94	80-120	BPOW6-4-GW-032615	UJ
8260C	2-Hexanone	WG160458-7	130.94	80-120	TRIPBLANK032615	UJ

Notes:
ICV = Initial calibration verification
%R = Percent recovery
UJ = Non-detected analyte in associated sample qualified estimated “UJ” due to potential bias.

Table A-2
Continuing Calibration Verification Non-Conformance

Method	Analyte	CCV ID	%D	Limit	Associated Samples	Qualifier
8260C	Chloroethane	C2041.D	21.59	20	BPOW6-1-GW-032615	UJ
8260C	Chloroethane	C2041.D	21.59	20	BPOW6-2-GW-032615	UJ
8260C	Chloroethane	C2041.D	21.59	20	BPOW6-3-GW-032615	UJ
8260C	Chloroethane	C0241.D	21.59	20	BPOW6-4-GW-032615	UJ
8260C	Chloroethane	C0241.D	21.59	20	TRIPBLANK032615	UJ

Notes:
CCV = Continuing calibration verification
%D = Percent difference
UJ = Non-detected analyte in associated sample qualified estimated “UJ” due to potential bias.

Attachment B
Qualifier Codes and Explanations

Qualifier	Explanation
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual quantitation limit necessary to accurately and precisely measure the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Attachment C
Reason Codes and Explanations

Reason Code	Explanation
be	Equipment blank contamination
bf	Field blank contamination
bl	Laboratory blank contamination
bt	Trip blank contamination
c	Calibration issue
d	Reporting limit raised due to chromatographic interference
fd	Field duplicate relative percent difference
h	Holding times
i	Internal standard areas
k	Estimated Maximum Possible Concentration
l	Laboratory control sample
lc	Labeled compound recovery
ld	Laboratory duplicate relative percent difference
lp	Laboratory control sample/laboratory control sample duplicate relative percent difference
m	Matrix spike recovery
mc	Method compliance non-conformance
md	Matrix spike/matrix spike duplicate relative percent difference
nb	Negative laboratory blank contamination
p	Chemical preservation issue
r	Dual column relative percent difference
q	Quantitation issue
s	Surrogate recovery
su	Ion suppression
t	Temperature preservation issue
x	Percent solids
y	Serial dilution results
z	Interference check sample results (metals)

Attachment D
Final Results after Data Review

		Sample Delivery Group Lab ID Sample ID Sample Date Sample Type		SI1908 SI1908-1 BPOW6-1-GW-032615 3/26/2015 Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	UJ	c
8260C	2-HEXANONE	591-78-6	UG_L	2.5	UJ	c
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.5	UJ	c
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	UJ	c
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	UJ	c
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	UJ	c
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	UJ	c
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	UJ	c
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	UJ	c
8260C	TOLUENE	108-88-3	UG_L	0.5	U	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.5	U	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	0.17	U	

		Sample Delivery Group		SI1908		
		Lab ID		SI1908-2		
		Sample ID		BPOW6-2-GW-032615		
		Sample Date		3/26/2015		
		Sample Type		Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	UJ	c
8260C	2-HEXANONE	591-78-6	UG_L	2.5	UJ	c
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.5	UJ	c
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	UJ	c
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	UJ	c
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	UJ	c
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	UJ	c
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	UJ	c
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	UJ	c
8260C	TOLUENE	108-88-3	UG_L	0.5	U	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.5	U	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	0.19	U	

		Sample Delivery Group Lab ID Sample ID Sample Date Sample Type		SI1908 SI1908-3 BPOW6-3-GW-032615 3/26/2015 Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	UJ	c
8260C	2-HEXANONE	591-78-6	UG_L	2.5	UJ	c
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.5	UJ	c
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	UJ	c
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	UJ	c
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	UJ	c
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	UJ	c
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	UJ	c
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	UJ	c
8260C	TOLUENE	108-88-3	UG_L	0.5	U	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.5	U	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	0.17	U	

		Sample Delivery Group		SI1908		
		Lab ID		SI1908-4		
		Sample ID		BPOW6-4-GW-032615		
		Sample Date		3/26/2015		
		Sample Type		Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	UJ	c
8260C	2-HEXANONE	591-78-6	UG_L	2.5	UJ	c
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.5	UJ	c
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	UJ	c
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	UJ	c
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	UJ	c
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	UJ	c
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	UJ	c
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	UJ	c
8260C	TOLUENE	108-88-3	UG_L	0.5	U	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.5	U	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	0.17	U	

		Sample Delivery Group		SI1908		
		Lab ID		SI1908-5		
		Sample ID		TRIPBLANK032615		
		Sample Date		3/26/2015		
		Sample Type		Trip Blank		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	UJ	c
8260C	2-HEXANONE	591-78-6	UG_L	2.5	UJ	c
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.5	UJ	c
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	UJ	c
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	UJ	c
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	UJ	c
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	UJ	c
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	UJ	c
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	UJ	c
8260C	TOLUENE	108-88-3	UG_L	0.5	U	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.5	U	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	NA		

Notes:
UG_L = Micrograms per liter
Qual = Final qualifier (Refer to Attachment B)
RC = Reason code (Refer to Attachment C)

DATA VALIDATION REPORT

Project:	Regional Groundwater Investigation — NWIRP Bethpage
Laboratory:	Katahdin Analytical
Sample Delivery Group:	SI2993
Analyses/Method:	Total Organic Carbon by U.S. EPA SW-846 Method 9060A
Validation Level:	3
Project Number:	0888812477.SA.DV
Prepared by:	Dana Miller/Resolution Consultants Completed on: 05/9/2015
Reviewed by:	Tina Cantwell/Resolution Consultants File Name: SI2993_9060A

SUMMARY

This report summarizes data review findings for samples listed below, collected by Resolution Consultants from the Regional Groundwater Investigation — NWIRP Bethpage Site on 5 to 6 May 2015 in accordance with the following Sampling and Analysis Plans:

- *Sampling and Analysis Plan, Bethpage, New York.* (Resolution Consultants, April 2013).
- *UFP SAP Addendum, Installation of Vertical Profile Borings and Monitoring Wells, Operable Unit 2, NWIRP Bethpage, New York.* (Resolution Consultants, November 2013).
- *UFP SAP Addendum, Inclusion of Additional Target Analytes for Volatile Organics Analyses, NWIRP Bethpage OU2, Bethpage, New York*. (Resolution Consultants, August 2014).

Sample ID	Matrix/Sample Type	Analysis
BPOW6-5-SOIL-050515-528-530	Soil	9060A
BPOW6-5-EB-050615	Equipment Blank	5310B

Data validation activities were conducted using the following guidance documents: *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846, specifically Method 9060A, Total Organic Carbon* (U.S. EPA, 1996), *U.S. Environmental Protection Agency (U.S. EPA) Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (NFG, January 2010) and *Department of Defense Quality Systems Manual for Environmental Laboratories*, Version 4.2 (October 2010). In the absence of method-specific information, laboratory quality control (QC) limits, project-specific requirements, and/or professional judgment were used as appropriate.

REVIEW ELEMENTS

The data were evaluated based on the following parameters (where applicable to the method):

✓	Data completeness (chain-of-custody)/sample integrity
✓	Holding times and sample preservation
NA	Gas chromatography/Mass spectrometer performance checks
✓	Initial calibration verification /continuing calibration verification
✓	Laboratory blanks/trip blanks
NA	Surrogate spike recoveries
✓	Matrix spike and/or matrix spike duplicate results
✓	Laboratory control sample/laboratory control sample duplicate results
NA	Field duplicates
NA	Internal standards
✓	Sample results/reporting issues

The symbol (✓) indicates that no validation qualifiers were applied based on this parameter. NA indicates that the parameter was not included as part of this data set or was not applicable to this validation and therefore not reviewed. Acceptable data parameters for which all criteria were met and no qualification was performed and non-conformance or other issues that were noted during validation, but did not result in qualification of data are not discussed further.

Qualifications Actions

The data was reviewed independently from the laboratory to assess data quality. All compounds detected at concentrations less than the limit of quantitation but greater than the method detection limit were qualified by the laboratory as estimated (J). This "J" qualifier was retained during data validation. Any sample that was analyzed at a dilution because of high concentrations of target or non-target analytes was checked to confirm that the results and/or sample-specific limit of quantitation and limit of detections were adjusted accordingly by the laboratory.

No results were qualified during this data review. Attachment A provides final results after data review.

ATTACHMENTS

Attachment A: Final Results after Data Review

Attachment A
Final Results after Data Review

			Sample Delivery Group	SI2993		SI2993	
			Lab ID	SI2993-1		SI2993-2	
			Sample ID	BP0W6-5-SOIL-050515-528-530		BP0W6-5-EB-050615	
			Sample Date	5/5/2015		5/6/2015	
			Sample Type	Soil		Equipment Blank	
Method	Analyte	CAS No.	Units	Result	Qual	Result	Qual
5310B	TOTAL ORGANIC CARBON	-28	MG_L	NA		0.2	J
9060A	TOTAL ORGANIC CARBON	-28	UG_G	590		NA	

Notes:

ID = Identification
MG_L = Milligrams per liter
UG_G = Micrograms per gram
NA = Not analyzed
Qual = Final qualifier
J = Estimated value below the quantitation limit

DATA VALIDATION REPORT

Project:	Regional Groundwater Investigation — NWIRP Bethpage
Laboratory:	Katahdin Analytical
Sample Delivery Group:	SI3513
Analyses/Method:	Total Organic Carbon by U.S. EPA SW-846 Method 9060A
Validation Level:	3
Project Number:	0888812477.SA.DV
Prepared by:	Dana Miller/Resolution Consultants Completed on: 05/30/2015
Reviewed by:	Tina Cantwell/Resolution Consultants File Name: SI3513_9060A

SUMMARY

This report summarizes data review findings for samples listed below, collected by Resolution Consultants from the Regional Groundwater Investigation — NWIRP Bethpage Site on 21 May 2015 in accordance with the following Sampling and Analysis Plans:

- *Sampling and Analysis Plan, Bethpage, New York.* (Resolution Consultants, April 2013).
- *UFP SAP Addendum, Installation of Vertical Profile Borings and Monitoring Wells, Operable Unit 2, NWIRP Bethpage, New York.* (Resolution Consultants, November 2013).
- *UFP SAP Addendum, Inclusion of Additional Target Analytes for Volatile Organics Analyses, NWIRP Bethpage OU2, Bethpage, New York*. (Resolution Consultants, August 2014).

Sample ID	Matrix/Sample Type	Analysis
BPOW6-6-052115-773-775	Soil	9060A
BPOW6-6-FD-052115	Field Duplicate	9060A
BPOW6-6-052115-EB	Equipment Blank	5310B

Data validation activities were conducted using the following guidance documents: *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846, specifically Method 9060A, Total Organic Carbon* (U.S. EPA, 1996), *U.S. Environmental Protection Agency (U.S. EPA) Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (NFG, January 2010) and *Department of Defense Quality Systems Manual for Environmental Laboratories*, Version 4.2 (October 2010). In the absence of method-specific information, laboratory quality control (QC) limits, project-specific requirements, and/or professional judgment were used as appropriate.

REVIEW ELEMENTS

The data were evaluated based on the following parameters (where applicable to the method):

✓	Data completeness (chain-of-custody)/sample integrity
✓	Holding times and sample preservation
NA	Gas chromatography/Mass spectrometer performance checks
✓	Initial calibration verification /continuing calibration verification
✓	Laboratory blanks/trip blanks
NA	Surrogate spike recoveries
✓	Matrix spike and/or matrix spike duplicate results
✓	Laboratory control sample/laboratory control sample duplicate results
✓	Field duplicates
NA	Internal standards
✓	Sample results/reporting issues

The symbol (✓) indicates that no validation qualifiers were applied based on this parameter. NA indicates that the parameter was not included as part of this data set or was not applicable to this validation and therefore not reviewed. Acceptable data parameters for which all criteria were met and no qualification was performed and non-conformance or other issues that were noted during validation, but did not result in qualification of data are not discussed further.

Qualifications Actions

The data was reviewed independently from the laboratory to assess data quality. All compounds detected at concentrations less than the limit of quantitation but greater than the method detection limit were qualified by the laboratory as estimated (J). This "J" qualifier was retained during data validation. Any sample that was analyzed at a dilution because of high concentrations of target or non-target analytes was checked to confirm that the results and/or sample-specific limit of quantitation and limit of detections were adjusted accordingly by the laboratory.

No results were qualified during this data review. Attachment A provides final results after data review.

ATTACHMENTS

Attachment A: Final Results after Data Review

Attachment A
Final Results after Data Review

				Sample Delivery Group		SI3513		SI3513	
				Lab ID		SI3513-1		SI3513-2	
				Sample ID		BPOW6-6-052115-773-775		BPOW6-6-FD-052115	
				Sample Date		5/21/2015		5/21/2015	
				Sample Type		Soil		Field Duplicate	
Method	Analyte	CAS No	Units	Result	Qual	Result	Qual	Result	Qual
5310B	TOTAL ORGANIC CARBON	-28	MG_L	NA		NA		0.36	J
9060A	TOTAL ORGANIC CARBON	-28	UG_G	260	J	250	J	NA	

				SI3513		SI3513		SI3513	
				SI3513-3					
				BPOW6-6-052115-EB					
				5/21/2015					
				Equipment Blank					
Method	Analyte	CAS No	Units	Result	Qual				
5310B	TOTAL ORGANIC CARBON	-28	MG_L	0.36	J				
9060A	TOTAL ORGANIC CARBON	-28	UG_G	NA					

Notes:

ID = Identification
MG_L = Milligrams per liter
UG_G = Micrograms per gram
NA = Not analyzed
Qual = Final qualifier
J = Estimated value below the quantitation limit

DATA VALIDATION REPORT

Project:	Regional Groundwater Investigation — NWIRP Bethpage	
Laboratory:	Katahdin Analytical	
Sample Delivery Group:	SI4556	
Analyses/Method:	Volatile Organic Compounds by U.S. EPA SW-846 Method 8260C 1,4-Dioxane by U.S. EPA SW-846 Method 8270D via Selective Ion Monitoring (SIM)	
Validation Level:	3	
Project Number:	0888812477.SA.DV	
Prepared by:	Dana Miller/Resolution Consultants	Completed on: 07/30/2015
Reviewed by:	Tina Cantwell/Resolution Consultants	File Name: SI4556_8260C_8270D

SUMMARY

This report summarizes data review findings for samples listed below, collected by Resolution Consultants from the Regional Groundwater Investigation — NWIRP Bethpage Site on 24 and 25 June 2015 in accordance with the following Sampling and Analysis Plans:

- *Sampling and Analysis Plan, Bethpage, New York.* (Resolution Consultants, April 2013).
- *UFP SAP Addendum, Installation of Vertical Profile Borings and Monitoring Wells, Operable Unit 2, NWIRP Bethpage, New York.* (Resolution Consultants, November 2013).
- *UFP SAP Addendum, Inclusion of Additional Target Analytes for Volatile Organics Analyses, NWIRP Bethpage OU2, Bethpage, New York*. (Resolution Consultants, August 2014).

Sample ID	Matrix/Sample Type	Analysis
BPOW5-6-GW-062415	Groundwater	8260C/8270D_SIM
BPOW5-5-GW-062415	Groundwater	8260C/8270D_SIM
RE118D1-GW-062415	Groundwater	8260C/8270D_SIM
RE108D1-GW-062415	Groundwater	8260C/8270D_SIM
RE108D2-GW-062415	Groundwater	8260C/8270D_SIM
BPOW6-5-GW-062515	Groundwater	8260C/8270D_SIM
BPOW6-6-GW-062515	Field Duplicate	8260C/8270D_SIM
RE117D1-GW-062515	Groundwater	8260C/8270D_SIM
TRIPBLANK-062515	Trip Blank	8260C

Data validation activities were conducted using the following guidance documents: *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846, specifically Method 8260C, Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry* (United States Environmental Protection Agency [U.S. EPA] 2006), *SW-846 Method 8270D, Semivolatile Organic Compounds by Gas Chromatograph/Mass Spectrometry* (U.S. EPA 2007), *U.S. Environmental Protection Agency Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (U.S. EPA, June 2008), and *Department of Defense Quality Systems Manual for Environmental Laboratories*, Version 4.2 (October 2010). In the absence of method-specific information, laboratory quality control (QC) limits, project-specific requirements, and/or professional judgment were used as appropriate.

REVIEW ELEMENTS

The data were evaluated based on the following parameters (where applicable to the method):

✓	Data completeness (chain-of-custody)/sample integrity
✓	Holding times and sample preservation
✓	Gas chromatography/Mass spectrometer performance checks
✗	Initial calibration verification (ICV)/continuing calibration verification (CCV)
✓	Laboratory blanks/trip blanks
✓	Surrogate spike recoveries
NA	Matrix spike and/or matrix spike duplicate results
✓	Laboratory control sample/laboratory control sample duplicate results
NA	Field duplicates
✓	Internal standards
✓	Sample results/reporting issues

The symbol (✓) indicates that no validation qualifiers were applied based on this parameter. NA indicates that the parameter was not included as part of this data set or was not applicable to this validation and therefore not reviewed. Acceptable data parameters for which all criteria were met and no qualification was performed and non-conformance or other issues that were noted during validation, but did not result in qualification of data are not discussed further. The symbol (✗) indicates that a QC non-conformance resulted in the qualification of data. Any QC non-conformance that resulted in the qualification of data is discussed below.

RESULTS

Initial Calibration/Continuing Calibration Verification

Calibration data were reviewed for conformance with the QC acceptance criteria to ensure that:

- The initial calibration percent relative standard deviation, correlation coefficient/coefficient of determination, and/or response factor method acceptance criteria were met
- The ICV standard percent recovery acceptance criteria were met
- The CCV method percent difference or percent drift and response factor acceptance criteria were met
- The retention time method acceptance criteria were met

Data qualification to the analytes associated with the specific calibration verification was as follows:

ICV Recovery Non-conformance:

Criteria	Actions	
	Detected Results	Non-detected Results
Recovery >120%	J	UJ
Recovery < 80%	J	UJ

Notes:
J = Estimated
UJ = Undetected and estimated

ICV non-conformances are summarized in Attachment A in Table A-1.

Qualifications Actions

The data was reviewed independently from the laboratory to assess data quality. All compounds detected at concentrations less than the limit of quantitation but greater than the method detection limit were qualified by the laboratory as estimated (J). This "J" qualifier was retained during data validation. Any sample that was analyzed at a dilution because of high concentrations of target or non-target analytes was checked to confirm that the results and/or sample-specific limit of quantitation and limit of detections were adjusted accordingly by the laboratory.

No results were rejected; therefore, analytical completeness was calculated to be 100 percent. Data not qualified during data review are considered usable by the project. The remaining results qualified as estimated may be high or low, but the data are usable for their intended purpose, according to U.S. EPA and Department of Defense guidelines. Final data review qualifiers used to describe results and how they should be interpreted by the end data user are provided in Attachment B and Attachment C. Attachment D provides final results after data review.

ATTACHMENTS

Attachment A: Non-Conformance Summary Tables
Attachment B: Qualifier Codes and Explanations
Attachment C: Reason Codes and Explanations
Attachment D: Final Results after Data Review

Attachment A
Non-Conformance Summary Table

Table A-1
Initial Calibration Verification Non-Conformance

Method	Analyte	ICV ID	%R	Limit	Associated Samples	Qualifier
8260C	Chloroethane	P1539A	127.5	80-120	BPOW5-6-GW-062415	UJ
8260C	Chloroethane	P1539A	127.5	80-120	BPOW5-5-GW-062415	UJ
8260C	Chloroethane	P1539A	127.5	80-120	RE118D1-GW-062415	UJ
8260C	Chloroethane	P1539A	127.5	80-120	RE108D1-GW-062415	UJ
8260C	Chloroethane	P1539A	127.5	80-120	RE108D2-GW-062415	UJ
8260C	Chloroethane	P1539A	127.5	80-120	BPOW6-5-GW-062515	UJ
8260C	Chloroethane	P1539A	127.5	80-120	BPOW6-6-GW-062515	UJ
8260C	Chloroethane	P1539A	127.5	80-120	RE117D1-GW-062515	UJ
8260C	Chloroethane	P1539A	127.5	80-120	TRIPBLANK-062515	UJ

Notes:
ICV ID = Initial calibration verification identification
%R = Percent recovery
UJ = Non-detected analyte in associated sample qualified estimated “UJ” due to potential bias

Attachment B
Qualifier Codes and Explanations

Qualifier	Explanation
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual quantitation limit necessary to accurately and precisely measure the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Attachment C
Reason Codes and Explanations

Reason Code	Explanation
be	Equipment blank contamination
bf	Field blank contamination
bl	Laboratory blank contamination
bt	Trip blank contamination
c	Calibration issue
d	Reporting limit raised due to chromatographic interference
fd	Field duplicate relative percent difference
h	Holding times
i	Internal standard areas
k	Estimated Maximum Possible Concentration
l	Laboratory control sample
lc	Labeled compound recovery
ld	Laboratory duplicate relative percent difference
lp	Laboratory control sample/laboratory control sample duplicate relative percent difference
m	Matrix spike recovery
mc	Method compliance non-conformance
md	Matrix spike/matrix spike duplicate relative percent difference
nb	Negative laboratory blank contamination
p	Chemical preservation issue
r	Dual column relative percent difference
q	Quantitation issue
s	Surrogate recovery
su	Ion suppression
t	Temperature preservation issue
x	Percent solids
y	Serial dilution results
z	Interference check sample results (metals)

Attachment D
Final Results after Data Review

		Sample Delivery Group Lab ID Sample ID Sample Date Sample Type		SI4556 SI4556-1 BPOW5-6-GW-062415 6/24/2015 Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	12		
8260C	2-HEXANONE	591-78-6	UG_L	2.5	U	
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.5	U	
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	U	
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	U	
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	U	
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	U	
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	U	
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	U	
8260C	TOLUENE	108-88-3	UG_L	0.74	J	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.45	J	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	0.17	U	

		Sample Delivery Group		SI4556		
		Lab ID		SI4556-2		
		Sample ID		BPOW5-5-GW-062415		
		Sample Date		6/24/2015		
		Sample Type		Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	U	
8260C	2-HEXANONE	591-78-6	UG_L	2.5	U	
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	8		
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	U	
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	U	
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	U	
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	U	
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	U	
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	U	
8260C	TOLUENE	108-88-3	UG_L	0.5	U	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.5	U	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	0.18	U	

		Sample Delivery Group Lab ID Sample ID Sample Date Sample Type		SI4556 SI4556-3 RE118D1-GW-062415 6/24/2015 Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	U	
8260C	2-HEXANONE	591-78-6	UG_L	2.5	U	
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.7	J	
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	U	
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	U	
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	U	
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	U	
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	U	
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	U	
8260C	TOLUENE	108-88-3	UG_L	0.38	J	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.5	U	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	0.18	U	

		Sample Delivery Group Lab ID Sample ID Sample Date Sample Type		SI4556 SI4556-4 RE108D1-GW-062415 6/24/2015 Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	1		
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	0.34	J	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	U	
8260C	2-HEXANONE	591-78-6	UG_L	2.5	U	
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.5	U	
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	U	
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	U	
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	U	
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.34	J	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	U	
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	U	
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	1.4		
8260C	TOLUENE	108-88-3	UG_L	0.5	U	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	110		
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	5.2		

		Sample Delivery Group Lab ID Sample ID Sample Date Sample Type		SI4556 SI4556-5 RE108D2-GW-062415 6/24/2015 Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.98	J	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	6.8		
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	1.8		
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	4.6		
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	6.6		
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	8.1		
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	U	
8260C	2-HEXANONE	591-78-6	UG_L	2.5	U	
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.5	U	
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	U	
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	U	
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	1.5		
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	3.5		
8260C	CHLOROMETHANE	74-87-3	UG_L	1	U	
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	8.1		
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	U	
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	U	
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	2.2		
8260C	TOLUENE	108-88-3	UG_L	0.5	U	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	3900		
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	6.1		

		Sample Delivery Group Lab ID Sample ID Sample Date Sample Type		SI4556 SI4556-6RA BPOW6-5-GW-062515 6/25/2015 Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	U	
8260C	2-HEXANONE	591-78-6	UG_L	2.5	U	
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.5	U	
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	U	
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	U	
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	U	
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	U	
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	U	
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	U	
8260C	TOLUENE	108-88-3	UG_L	0.76	J	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.5	U	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	0.17	U	

		Sample Delivery Group		SI4556		
		Lab ID		SI4556-7RA		
		Sample ID		BPOW6-6-GW-062515		
		Sample Date		6/25/2015		
		Sample Type		Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	U	
8260C	2-HEXANONE	591-78-6	UG_L	2.5	U	
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.5	U	
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	U	
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	U	
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	U	
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	U	
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	U	
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	U	
8260C	TOLUENE	108-88-3	UG_L	1		
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.5	U	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	0.17	U	

		Sample Delivery Group		SI4556		
		Lab ID		SI4556-8		
		Sample ID		RE117D1-GW-062515		
		Sample Date		6/25/2015		
		Sample Type		Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.1	J	
8260C	2-HEXANONE	591-78-6	UG_L	2.5	U	
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.5	U	
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	U	
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	U	
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	U	
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	U	
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	U	
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	U	
8260C	TOLUENE	108-88-3	UG_L	0.5	U	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	7.8		
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	0.17	U	

		Sample Delivery Group Lab ID Sample ID Sample Date Sample Type		SI4556 SI4556-9 TRIPBLANK-062515 6/24/2015 Trip Blank		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	U	
8260C	2-HEXANONE	591-78-6	UG_L	2.5	U	
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.5	U	
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	U	
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	U	
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	UJ	c
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	U	
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	U	
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	U	
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	U	
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	U	
8260C	TOLUENE	108-88-3	UG_L	0.5	U	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.5	U	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	
8270D_SIM	1,4-DIOXANE	123-91-1	UG_L	NA		

Notes:
UG_L = Micrograms per liter
NA = Not analyzed
Qual = Final qualifier (Refer to Attachment B)
RC = Reason code (Refer to Attachment C)

RESOLUTION CONSULTANTS

Resolution Consultants
250 Apollo Drive
Chelmsford, MA 01824

978.905.2100 tel
978.905.2101 fax

Data Validation Report

Project:	Regional Groundwater Investigation - NWIRP Bethpage	
Laboratory:	Katahdin Analytical	
Service Request:	TH0114	
Analyses/Method:	EPA SW-846 Method 9060A for TOC and Standard Method 5310 for Total Organic Carbon by High-Temperature Combustion	
Validation Level:	3	
AECOM Project Number:	60266526.SA.DV	
Prepared by:	Dawn Brule/RESCON	Completed on: 01/06/2015
Reviewed by:	Lori Herberich/RESCON	File Name: TH0114_5310B and 9060A

SUMMARY

The samples listed below were collected by Resolution Consultants from the Regional Groundwater Investigation - NWIRP Bethpage site on November 18, 2014.

Sample ID	Matrix/Sample Type
BPOW 6-3-EQUIPMENT BLANK-111814	Equipment blank
BPOW 6-3-SOIL-D-111814-753-755	Field Duplicate of BPOW 6-3-SOIL-111814-753-755
BPOW 6-3-SOIL-111814-753-755	Soil

The samples were analyzed in accordance with:

- *Standard Methods for the Examination of Water and Wastewater, Method SM5310B, Total Organic Carbon by High-Temperature Combustion*
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846,* Method 9060A, *Total Organic Carbon* (USEPA, 1996).

Data validation activities were conducted with reference to these methods, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (January 2010), and Quality Systems Manual (QSM) for Environmental Laboratories, Version 4.2 (DoD, October 2010) where applicable. In the absence of method-specific information, laboratory quality control (QC) limits, project-specific requirements and/or professional judgment were used as appropriate.

REVIEW ELEMENTS

The data were evaluated based on the following review elements (where applicable to the method):

✓ Data completeness (chain-of-custody [COC])/sample integrity
✓ Holding times and sample preservation
✓ Initial calibration/continuing calibration verification

✓	Laboratory blanks/equipment blanks
✓	Matrix spike (MS)/matrix duplicate (MD) and/or matrix spike duplicate (MSD) results
✓	Laboratory control sample (LCS) results
✓	Field duplicates
✓	Sample results/reporting issues

The symbol (✓) indicates that no validation qualifiers were applied based on this parameter. NA indicates that the parameter was not included as part of this data set or was not applicable to this validation and therefore not reviewed. The symbol (✗) indicates that a QC nonconformance resulted in the qualification of data. Any QC nonconformance that resulted in the qualification of data is discussed below. In addition, nonconformances or other issues that were noted during validation, but did not result in qualification of data, may be discussed for informational purposes only.

The data appear valid as reported and may be used for decision making purposes. There were no data points qualified or rejected on the basis of this data review.

RESULTS

Data Completeness (COC)/Sample Integrity

The data package was reviewed and found to meet acceptance criteria for completeness:

- The COCs were reviewed for completeness of information relevant to the samples and requested analyses, and for signatures indicating transfer of sample custody.
- The laboratory sample login sheet(s) were reviewed for issues potentially affecting sample integrity, including the condition of sample containers upon receipt at the laboratory.
- Completeness of analyses was verified by comparing the reported results to the COC requests.

Due to limitations in the reporting system, the laboratory truncated the IDs for all the samples in the report. The submitted EDD file reflects the full sample ID.

Holding Times/Sample Preservation

Sample preservation and preparation/analysis holding times were reviewed for conformance with the QC acceptance criteria. The QC acceptance criteria were met.

Initial Calibration/Continuing Calibration Verification

Calibration data were reviewed for conformance with the QC acceptance criteria to ensure that:

- all criteria were met for the calibration curves
- the initial calibration verification (ICV) percent recovery (%R) criteria were met; and
- the continuing calibration verification standard (CCV) method %Rs were met

The QC acceptance criteria were met.

Laboratory Blanks/Equipment Blanks

Laboratory method blanks and equipment rinsate blanks were evaluated as to whether there were contaminants detected above the detection limit (DL).

Data validation qualifications for individual samples are based on the maximum contaminant concentration detected in all associated blanks.

Method and equipment rinsate results were reviewed for conformance with the QC acceptance criteria. Detected results in blanks are not discussed in this data validation report if the associated results were nondetect or if qualification of sample results was not required.

The QC acceptance criteria were met and/or qualification of the sample results was not required.

MS/MSD Results

All MS/MD/MSD criteria were met and/or qualification of the data was not required.

LCS Results

The LCS %Rs were reviewed for conformance with the QC acceptance criteria. All QC acceptance criteria were met.

Field Duplicate Results

Field duplicate RPDs were reviewed for conformance with the QC criterion of $\leq$60% for soil matrices. This criteria applies if both results were greater than five times the Limit of Quantitation (LOQ). All QC acceptance criteria were met.

Sample Results/Reporting Issues

Compounds that were not detected in the sample are reported as not detected (U) at the Limit of Detection (LOD).

Compounds detected at concentrations less than the LOQ but greater than the detection limit (DL) were qualified by the laboratory as estimated (J). This "J" qualifier was retained during data validation.

Any sample that was analyzed at a dilution due to high concentrations of target or non-target compounds or matrix interferences was checked to ensure that the results and/or sample specific LODs and LOQs were adjusted accordingly by the laboratory.

QUALIFICATION ACTIONS

No sample results were qualified as a result of this data review.

Katahdin ANALYTICAL SERVICES
600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

PLEASE BEAR DOWN AND PRINT LEGIBLY IN PEN

Page ____ of ____

Client: Resolution Consultants	Contact: Eleanor Vivaudou	Phone #: (914) 227-3942	Fax #: ( )
Address: 100 Red Schoolhouse Rd Suite B-1	City: Chestnut Ridge	State: NY	Zip Code: 10977
Purchase Order #	Proj. Name / No.: Bethpage 60266526		Katahdin Quote #
Bill (if different than above)	Address		
Sampler (Print / Sign): Valerie Thayer			Copies To: Valerie Thayer

LAB USE ONLY

WORK ORDER #: TH0114

KATAHDIN PROJECT NUMBER

REMARKS:

SHIPPING INFO: ☐ FED EX ☐ UPS ☐ CLIENT

AIRBILL NO:

TEMP°C ____ ☐ TEMP BLANK ☐ INTACT ☐ NOT INTACT

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	ANALYSIS AND CONTAINER TYPE PRESERVATIVES: Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N
	BPOW 6-3 - Equipment Rinsate Blank - 111814	Nov 18 2014 9:45	W	3	X									
	BPOW 6-3-soil- 111814-753-755	NOV 18 2014 9:35	soil	1	X									
VT	BPOW 6-3-soil-~~Field~~ D 111814	NOV 18 2014 9:35	soil	1	X									
	Temperature Blank		W	1										

COMMENTS: BPOW 6-3-soil-D-111814 is a Duplicate

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
Valerie Thayer	11/24/14 7-				
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
	11/26/14 0930				

0000008

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Rick Purdy
AECOM
701 Edgewater Drive
Wakefield,MA 01880

Lab Sample ID: TH0114-1
Report Date: 15-DEC-14
Client PO: 16518
Project: Navy Clean WE15-03-0
SDG: TH0114

Sample Description	Matrix	Date Sampled	Date Received
BPOW6-3-EB-111814	AQ	18-NOV-14 09:45:00	26-NOV-14

Parameter	Result	Adj LOQ	Adj MDL	Adj LOD	Anal. Method	QC.Batch	Anal. Date	Prep. Method	Prep. Date	Footnotes
Total Organic Carbon	J0.35 mg/L	1.0	0.10	.5	SM5310B	WG155518	10-DEC-14 18:42:12	N/A	N/A	

Katahdin
ANALYTICAL SERVICES

Accredited in accordance with nelac
Cert No E87604

Report of Analytical Results

Client: Rick Purdy
AECOM
701 Edgewater Drive
Wakefield,MA 01880

Lab Sample ID: TH0114-2
Report Date: 15-DEC-14
Client PO: 16518
Project: Navy Clean WE15-03-0
SDG: TH0114

Sample Description	Matrix	Date Sampled	Date Received
OW6-3-1118-753-755	SL	18-NOV-14 09:35:00	26-NOV-14

Parameter	Result	Adj LOQ	Adj MDL	Adj LOD	Anal. Method	QC.Batch	Anal. Date	Prep. Method	Prep. Date	Footnotes
TOC In Soil	1200 ug/gdrywt	730	150	550	SW846 9060A Mod.	WG155500	09-DEC-14 14:23:47	N/A	N/A	
Total Solids	67. %	1		N/A	SM2540G	WG155033	04-DEC-14 11:13:15	SM2540G	03-DEC-14	

Katahdin Analytical Services 0000020

Katahdin
ANALYTICAL SERVICES

Accredited in accordance with nelac
Cert No E87604

Report of Analytical Results

Client: Rick Purdy
AECOM
701 Edgewater Drive
Wakefield,MA 01880

Lab Sample ID: TH0114-3
Report Date: 15-DEC-14
Client PO: 16518
Project: Navy Clean WE15-03-0
SDG: TH0114

Sample Description	Matrix	Date Sampled	Date Received
OW6-3-1118-753-755D	SL	18-NOV-14 09:35:00	26-NOV-14

Parameter	Result	Adj LOQ	Adj MDL	Adj LOD	Anal. Method	QC.Batch	Anal. Date	Prep. Method	Prep. Date	Footnotes
TOC In Soil	1300 ug/gdrywt	1200	250	880	SW846 9060A Mod.	WG155500	09-DEC-14 15:06:16	N/A	N/A	
Total Solids	78. %	1		N/A	SM2540G	WG155033	04-DEC-14 11:13:30	SM2540G	03-DEC-14	

DATA VALIDATION REPORT

Project:	Regional Groundwater Investigation — NWIRP Bethpage	
Laboratory:	Katahdin Analytical	
Sample Delivery Group:	TH0531	
Analyses/Method:	Total Organic Carbon by U.S. EPA SW-846 Method 9060A	
Validation Level:	3	
Project Number:	0888812477.SA.DV	
Prepared by:	Dana Miller/Resolution Consultants	Completed on: 02/06/2015 Revised on: 10/27/2015
Reviewed by:	Tina Cantwell/Resolution Consultants	File Name: TH0531_9060A

SUMMARY

This report summarizes data review findings for samples listed below, collected by Resolution Consultants from the Regional Groundwater Investigation — NWIRP Bethpage Site on 8 December 2014 in accordance with the following Sampling and Analysis Plans:

- *Sampling and Analysis Plan, Bethpage, New York.* (Resolution Consultants, April 2013).
- *UFP SAP Addendum, Installation of Vertical Profile Borings and Monitoring Wells, Operable Unit 2, NWIRP Bethpage, New York.* (Resolution Consultants, November 2013).
- *UFP SAP Addendum, Inclusion of Additional Target Analytes for Volatile Organics Analyses, NWIRP Bethpage OU2, Bethpage, New York*. (Resolution Consultants, August 2014).

Sample ID	Matrix/Sample Type	Analysis
BPOW6-4-SOIL-120514-563-565	Soil	9060A
BPOW6-4-SOIL-D-120814	Soil	9060A
BPOW6-4-EB-120814	Equipment Blank	5310B

Data validation activities were conducted using the following guidance documents: *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846, specifically Method 9060A, Total Organic Carbon* (U.S. EPA, 1996), *U.S. Environmental Protection Agency (U.S. EPA) Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (NFG, January 2010) and *Department of Defense Quality Systems Manual for Environmental Laboratories*, Version 4.2

(October 2010). In the absence of method-specific information, laboratory quality control (QC) limits, project-specific requirements, and/or professional judgment were used as appropriate.

REVIEW ELEMENTS

The data were evaluated based on the following parameters (where applicable to the method):

✓	Data completeness (chain-of-custody)/sample integrity
✓	Holding times and sample preservation
NA	Gas chromatography/Mass spectrometer performance checks
✓	Initial calibration verification /continuing calibration verification
✓	Laboratory blanks/trip blanks
NA	Surrogate spike recoveries
NA	Matrix spike and/or matrix spike duplicate results
✓	Laboratory control sample/laboratory control sample duplicate results
✗	Field duplicates
NA	Internal standards
✓	Sample results/reporting issues

The symbol (✓) indicates that no validation qualifiers were applied based on this parameter. NA indicates that the parameter was not included as part of this data set or was not applicable to this validation and therefore not reviewed. Acceptable data parameters for which all criteria were met and no qualification was performed and non-conformance or other issues that were noted during validation, but did not result in qualification of data are not discussed further. The symbol (✗) indicates that a QC non-conformance resulted in the qualification of data. Any QC non-conformance that resulted in the qualification of data is discussed below.

RESULTS

Field Duplicate

Field duplicate RPDs were reviewed for conformance with the Resolution Consultants QC criteria of $\leq$50% for solid matrices and $\leq$30% for aqueous matrices. These criteria apply if both results were greater than two times the limit of quantitation (LOQ). Non-conformance is summarized in Attachment A in Table A-1. Data qualification to the analytes associated with the specific field duplicate RPDs was as follows:

Field Duplicate Non-conformances Chart:

Criteria	RPD	Action	
		Detected	Non-detected
Sample and duplicate are nondetect	Not calculable (NC)	No qualification	No qualification
Sample and duplicate results ≥2x LOQ	>30 (aqueous)	J	Not Applicable
	>50 (solids)		
If sample or duplicate result is >2x LOQ and the other is not detected	NC	J	UJ
If sample or duplicate result is <2x LOQ and the other is not detected	NC	No qualification	No qualification

Notes:

LOQ	=	Limit of quantitation
J	=	Estimated
UJ	=	Undetected and estimated

Qualifications Actions

The data was reviewed independently from the laboratory to assess data quality. All compounds detected at concentrations less than the limit of quantitation but greater than the method detection limit were qualified by the laboratory as estimated (J). This "J" qualifier was retained during data validation. Any sample that was analyzed at a dilution because of high concentrations of target or non-target analytes was checked to confirm that the results and/or sample-specific limit of quantitation and limit of detections were adjusted accordingly by the laboratory.

No results were rejected; therefore, analytical completeness was calculated to be 100 percent. Data not qualified during data review are considered usable by the project. The remaining results qualified as estimated may be high or low, but the data are usable for their intended purpose, according to U.S. EPA and Department of Defense guidelines. Final data review qualifiers used to describe results and how they should be interpreted by the end data user are provided in Attachment B and Attachment C. Katahdin Analytical discovered a QC error in Total Organic Carbon calculations, informed us, and has implemented corrective action provided in Attachment D. Attachment E provides final results after data review.

ATTACHMENTS

Attachment A: Non-Conformance Summary Tables
Attachment B: Qualifier Codes and Explanations
Attachment C: Reason Codes and Explanations
Attachment D: Katahdin Analytical Corrective Action Report
Attachment E: Final Results after Data Review

Attachment A
Non-Conformance Summary Tables

Table A-1 Field Duplicate Non-Conformance							
Sample ID	Duplicate ID	Compound	Sample Result (UG_G)	Duplicate Result (UG_G)	RPD	RPD Limit	Qualifiers
BPOW6-4-SOIL-120514-563-565	BPOW6-4-SOIL-D-120814	TOC	1400	720	64.2	50	J-both

Notes:

ID = Identification
TOC = Total organic carbon
UG_G = Micrograms per gram
RPD = Relative percent difference
J = Estimated value

Attachment B
Qualifier Codes and Explanations

Qualifier	Explanation
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual quantitation limit necessary to accurately and precisely measure the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Attachment C
Reason Codes and Explanations

Reason Code	Explanation
be	Equipment blank contamination
bf	Field blank contamination
bl	Laboratory blank contamination
bt	Trip blank contamination
c	Calibration issue
d	Reporting limit raised due to chromatographic interference
fd	Field duplicate relative percent difference
h	Holding times
i	Internal standard areas
k	Estimated Maximum Possible Concentration
l	Laboratory control sample
lc	Labeled compound recovery
ld	Laboratory duplicate relative percent difference
lp	Laboratory control sample/laboratory control sample duplicate relative percent difference
m	Matrix spike recovery
mc	Method compliance non-conformance
md	Matrix spike/matrix spike duplicate relative percent difference
nb	Negative laboratory blank contamination
p	Chemical preservation issue
r	Dual column relative percent difference
q	Quantitation issue
s	Surrogate recovery
su	Ion suppression
t	Temperature preservation issue
x	Percent solids
y	Serial dilution results
z	Interference check sample results (metals)

Attachment D
Katahdin Analytical Corrective Action Report

KATAHDIN ANALYTICAL SERVICES, INC. – CORRECTIVE ACTION REPORT

Problem Identification (Person initiating CAR) Name: Leslie Dimond Date: 08/28/2015

Discovered by Laboratory X Discovered by Client (Complaint) Other

Details of Problem:

On August 28, 2015, a client called regarding several TOC results. They thought the results for their samples seemed to be off by a factor of ten. George Brewer looked into the matter and found that their sample results were calculated incorrectly. Calculations are set up to be performed automatically in KIMS. Each product code for a test contains information such as the method name, LOQ, LOD, MDL, limits and a specific process chain for reporting to the either the LOQ, LOD or MDL (i.e. three process chains). This process chain contains all of the calculations associated with a test including separate calculations for sample results, adjusted LOQs, LODs and MDLs, and results for QC samples. In October of 2014, a client asked why the lab was not adjusting LOQs, LODs and/or MDLs for the sample amount used, but only for an instrument dilution and total solids. The lab had felt that there wasn't really a standard weight amount, so this was not incorporated. After numerous discussions, the lab decided to change this and use 500 mg as the standard and to incorporate any different amount into the LOQ/LOD/MDL adjustment. MIS was asked to revise this TOC calculation in our Laboratory Information System (KIMS). The incorrect information was given to MIS, so the adjusted LOQ/LOD/MDL calculation was wrong.

The formula was: ADJ. LOQ/LOD/MDL = LOQ/LOD/MDL * DF * (Sample amount / 1000) * (100/TS).

During data review, sample results that are calculated automatically by KIMS, are checked at a frequency of 10% of all calculations. Sample results are checked in this manner, but adjusted limits are not necessarily checked. In December of 2014, a data reviewer noticed that some adjusted limits were not correct. This issue was reviewed with MIS, and it was discovered that the calculation was incorrect. It was corrected at this time and changed to:

ADJ. LOQ/LOD/MDL = LOQ/LOD/MDL * DF * (500 / Sample Amount) * (100/TS) (where 500 is the standard sample amount).

At the time this change was made, MIS was under the impression that the sample calculation was also incorrect and also needed to be corrected.

The formula for the sample result was: Results (ug/g) = $\frac{\text{Total carbon}}{\text{(sample amount / 1000)}}$ * (100/TS) (where 1000 is a conversion factor)

This was incorrectly changed to: Results (ug/g) = $\frac{\text{Total carbon}}{\text{(500 / Sample Amount)}}$ * TS

From December 29, 2014 to April 13, 2015, this error was often discovered during data review and manually corrected. The problem was not addressed with the MIS department. However, there were several cases where this error was not caught during data review and results were reported incorrectly. On April 13, 2015, this issue was brought to the attention of MIS and the sample calculation was corrected back to:

Results (ug/g) = $\frac{\text{Total carbon}}{\text{(sample amount / 1000)}}$ * (100/TS) (where 1000 is a conversion factor)

Blanks and LCSs were not affected by these changes because they are calculated using different calculations since total solids is not used in these situations. Duplicates and MS/MSD samples are also not affected because they use different calculations since these calculation strings involve recoveries, RPDs, etc.

Associated Non-Conformances: List logbook and page numbers

There are no non-conformances associated with this corrective action.

Root Cause Investigation & Determination (To be completed by Department Manager, Operations Manager and/or QA Officer)

Review the 6 "M's" below and investigate to determine whether one of them, or more than one, could be the cause of the problem.

Possible Causes	Details

KATAHDIN ANALYTICAL SERVICES, INC. – CORRECTIVE ACTION REPORT

Machine (Instrument)	KIMS – incorrect formulas were entered into the process chains for TOC in soil.
Method (or Process)	Katahdin's policy for data review: From the QAM: "For data that are reduced via computer, calculations are checked by the analyst (or designee) assigned to this task at a frequency designed to assure that the final data generation is valid." From SOP SD-904, Data Reduction, Review and Reporting: "All manual integrations, calculations and transcriptions are checked and 10% of all spreadsheet calculations are checked. The remainder of spreadsheet calculations is spot checked for potential anomalies." Katahdin does not have a formal process for handling calculation changes to process changes in KIMS. A verbal request is made to MIS and the change is made. Although the KIMS system does have an audit trail to track dates of changes and calculation changes, the request for these is not documented.
Materials	Not Applicable
Maintenance (Is something not working correctly?)	Not Applicable
Man (training, human error)	All personnel involved with data review are aware of the requirement to hand check 10% of the sample results. In some cases this appears to have been done and when the results did not calculate correctly, they were corrected in KIMS. There was no communication that the error may affect other batches of samples. In other sample batches, the 10% hand check must not have occurred.
Mother Nature (accidents, power issues, beyond our control)	Not Applicable

Corrective Action Plan: Name: Leslie Dimond Date: 08/28/2015

Details of Corrective Action Plan –

Querries were run through KIMS to generate lists for TOC in soil data entered into KIMS between two timeframes:

10/23/14 to 12/29/14 (incorrect LOQ/LOD/MDL adjustment) – 14 Work Orders were found in this timeframe

12/29/14 and 4/13/15 (incorrect sample calculation) - 16 Work Orders were found in this timeframe

The lab has reviewed all TOC in soil data from these time periods for accuracy. Some inaccurate data was found (as expected from the incorrect formulas). Some data was found to be correct. In these cases, MIS was able to determine, through the KIMS audit trail, that the data had been manually corrected.

A new form has been created for personnel to fill out when requesting calculation changes in KIMS. This form will ensure that MIS is clear on exactly what needs to be changed in KIMS. Through KIMS we are currently able to track formula changes (ie. the formula before and after the change) and when the change occurred. This new form will allow Katahdin to track the changes made by person requesting the change and why the change was necessary. Supervisor and QA/Management approval are required on these forms.

There also will be a mandatory retraining for all employees on Katahdin's policy for data review, stressing that 10% of all results generated from KIMS and spreadsheets need to be confirmed. Also, this retraining will stress the need for communication. If a problem is discovered with one batch of samples, then it might also be affecting other batches.

Additionally, when calculation changes are made, Katahdin must establish a time frame of 30 days or 10 workorders where

senior management or the Quality Assurance Officer must also check the new calculations.

Review & Approval of Corrective Action Plan

Supervisor Approval:	Date: 09.11.15
Operations Manager Approval: Deborah J. Nadeau	Date: 9.11.15
Quality Assurance Officer: Susie Dimond	Date: 09.11.15

Monitoring of Corrective Action (To be completed by QA Officer and/or Operations Manager): List details of follow-up

Corrective Action Effective	Return to Control – Yes No	Further Monitoring Needed/Additional Corrective Action

QA Approval: Date:

Additional Information:

Attachment E
Final Results after Data Review

				Sample Delivery Group	TH0531			TH0531			TH0531		
				Lab ID	TH0531-1			TH0531-2			TH0531-3		
				Sample ID	BP0W6-4-SOIL-120814-563-565			BPOW6-4-SOIL-D-120814			BPOW6-4-EB-120814		
				Sample Date	12/8/2014			12/8/2014			12/8/2014		
				Sample Type	Soil			Field Duplicate			Equipment Blank		
Method	Analyte	CAS No	Units		Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
5310B	TOTAL ORGANIC CARBON	-28	MG_L		NA			NA			0.34	J	
9060A	TOTAL ORGANIC CARBON	-28	UG_G		1400	J	fd	720	J	fd	NA		

Notes:

MG_L = Milligrams per liter
UG_G = Micrograms per gram
NA = Not analyzed
Qual = Final qualifier (Refer to Attachment B)
RC = Reason code (Refer to Attachment C)

Section 6

Analytical Data Validation - Arcadis

ARCADIS
Infrastructure · Water · Environment · Buildings

Imagine the result

Northrop Grumman Corporation-Operable Unit 2

Data Review

BETHPAGE, NEW YORK

Volatile Analysis

SDG #JB97683

Analyses Performed By:
Accutest Laboratories
Dayton, New Jersey

Report #23906R
July 17, 2015
Review Level: Tier II
Project #NY001496.1514.NAVI4

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #JB97683 for samples collected in association with the Northrop Grumman-Bethpage Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					VOC	SVOC	PCB	MET	MISC
BPOW 6-1	JB97683-1	Water	06/22/2015		X				
TB062215KV1	JB97683-2	Water	06/22/2015		X				
FB062215KV1	JB97683-3	Water	06/22/2015		X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

GENERAL INFORMATION

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Collection Technique (grab, composite, etc.)		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X	X		
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form completed		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

QA - Quality Assurance

VOLATILE ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA), Method 524.2. Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

  U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

VOLATILE ORGANIC COMPOUND (VOC) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
EPA 524.2	Water	14 days from collection to analysis	Cool to < 6°C; preserved to a pH of less than 2 s.u..

s.u. Standard units

All samples were analyzed within the specified holding time and temperature criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

All compounds associated with the QA blanks exhibited a concentration less than the MDL, with the exception of the compounds listed in the following table. Sample results associated with QA blank contamination that were greater than the BAL resulted in the removal of the laboratory qualifier (B) of data. Sample results less than the BAL associated with the following sample locations were qualified as listed in the following table.

Sample Locations	Analytes	Sample Result	Qualification
BPOW 6-1	Acetone	Detected sample results >RL and <BAL	"UB" at detected sample concentration
	TICs: Isopropyl alcohol (RT: 7.46) Propanal, 2-methyl (RT: 8.71)	Detected sample results less than 5 times blank result	R

RL Reporting limit

3. Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. VOC analysis requires that all surrogates associated with the analysis exhibit recoveries within the laboratory-established acceptance limits.

All surrogate recoveries were within control limits.

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

A MS analysis was not performed on a sample location associated with this SDG.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices.

A field duplicate was not collected on a sample location associated with this SDG.

7. Laboratory Duplicate Analysis

The laboratory duplicate relative percent difference (RPD) criterion is applied when parent and duplicate sample concentrations are greater than or equal to 5 times the RL. A control limit of 20% for water matrices is applied when the criteria above is true. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices.

A laboratory duplicate was not performed on a sample location associated with this SDG.

8. System Performance and Overall Assessment

Tentatively identified compounds (TICs) were identified in sample locations BPOW 6-1 and FB062215KV1. The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. TICs are qualified as estimated (JN).

Overall system performance was noted by the laboratory in the case narrative as acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR VOCs

VOCs: 524.2	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
Tier II Validation					
Holding times & Temperature		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X	X		
C. Trip blanks		X	X		
Surrogate (%R)		X		X	
Laboratory Control Sample (%R)		X		X	
Laboratory Control Sample Duplicate(LCSD)					X
LCS/LCSD Precision (RPD)					X
Matrix Spike (MS)					X
Matrix Spike Duplicate(MSD)					X
MS/MSD Precision (RPD)					X
Field/Lab Duplicate (RPD)					X
Dilution Factor		X		X	
Moisture Content					X

%R Percent Recovery RPD Relative Percent Difference

VALIDATION PERFORMED BY: Lisa Horton

SIGNATURE: 

DATE: July 17, 2015

PEER REVIEW BY: Todd Church

DATE: July 20, 2015

CHAIN OF CUSTODY/
CORRECTED SAMPLE ANALYSIS DATA SHEETS

ACCUTEST LABORATORIES

GW
WFB
WTB

CHAIN OF CUSTODY

Accutest New Jersey/SPL Environmental
2235 Route 130, Dayton, NJ 08810
TEL. 732-329-0200 FAX: 732-329-3499/3480
www.accutest.com

PAGE 1 OF 1

FED-EX Tracking # #5 | Bottle Order Control #
Accutest Quote # | Accutest Job # JB97683

Client / Reporting Information

Company Name: Arcadis
Street Address: 2 Huntington Quad, Suite 1S10
City: Melville State: NY Zip: 11747
Project Contact: Soma Das, soma.das@arcadis-us.com E-mail:
Phone #: 631-249-7600 Fax #: 631-249-7610
Sampler(s) Name(s): Kirk VARGAS Pat PRZYBYLSKI Phone #: 631-249-7600

Project Information

Project Name: AGMNYM62235 // OU2 Monitoring Wells Northrop Grumman OU2 Hydro
Street:
City: Bethpage State: NY
Project #: NY001496.314I.GWMI3
Client Purchase Order #: Work Authorization #: NY001496_2015
Project Manager: Carlo San Giovanni

Billing Information (if different from Report to)

Company Name: Arcadis, U.S., Inc. Attn: Accts Payable
Street Address: 630 Plaza Drive, Suite 600
City: Highlands Ranch, State: CO Zip: 80129
Attention: Soma Das

Requested Analysis (see TEST CODE sheet)

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	Number of preserved Bottles: HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	~~VC626G2NG36GW+40~~	Cd, Cr (Total) 6010C	Cd, Cr (Dissolved, Field Filtered) 6010C	VC 524.2 NG 36GW+40
-1	BPOW G-1		6/22/15	1305	KV	GW	3	3											✓
-2	FB062215KV1		6/22/15	0955	KV	FB	3	3											✓
-3	TB062215KV1		6/22/15	0930	—	TB	2	2											✓

Matrix Codes: DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SO - Soil; SL- Sludge; SED-Sediment; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid; WP - Wipe; FB-Field Blank; EB-Equipment Blank; RB- Rinse Blank; TB-Trip Blank

LAB USE ONLY: V373

INITIAL ASESSMENT MA
LABEL VERIFICATION JM

Turnaround Time (Business days)

- [ ] Std. 15 Business Days
- [x] Std. 10 Business Days (by Contract only)
- [ ] 10 Day *RUSH*
- [ ] 5 Day *RUSH*
- [ ] 3 Day *EMERGENCY*
- [ ] 2 Day *EMERGENCY*
- [ ] 1 Day *EMERGENCY*

Emergency & Rush T/A data available VIA Lablink

Approved By (Accutest PM): / Date:

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULLT1 (Level 3+4)
- [ ] NJ Reduced
- [ ] Commercial "C"
- [ ] NYASP Category A
- [ ] NYASP Category B
- [ ] State Forms
- [ ] EDD Format
- [x] Other COMMC+

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

RL reporting for metals

Method 524.2 but full list as per email dated 5/18/2015

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1		6/22/15 2130		6/23/15 10:05		
2					6/23/15 1142	
3						
4						
5						

Custody Seal # — [ ] Intact [x] Not Intact — Preserved where applicable [ ] — On ice [x] — Cooler Temp. 2.4°C IP

5.1 5

JB97683: Chain of Custody
Page 1 of 3

Report of Analysis

Client Sample ID: BPOW 6-1
Lab Sample ID: JB97683-1
Matrix: AQ - Water
Method: EPA 524.2 REV 4.1
Project: Northrop Grumman, OU2 Hydro, Bethpage, NY

Date Sampled: 06/22/15
Date Received: 06/23/15
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1B97958.D	1	06/29/15	MD	n/a	n/a	V1B4647
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	9.3	5.0	0.91	ug/l	UB
78-93-3	2-Butanone	ND	5.0	0.57	ug/l	
71-43-2	Benzene	ND	0.50	0.057	ug/l	
75-27-4	Bromodichloromethane	ND	0.50	0.082	ug/l	
75-25-2	Bromoform	ND	0.50	0.046	ug/l	
74-83-9	Bromomethane	ND	0.50	0.077	ug/l	
75-15-0	Carbon disulfide	ND	0.50	0.028	ug/l	
108-90-7	Chlorobenzene	ND	0.50	0.027	ug/l	
75-00-3	Chloroethane	ND	0.50	0.037	ug/l	
67-66-3	Chloroform	ND	0.50	0.031	ug/l	
74-87-3	Chloromethane	0.51	0.50	0.044	ug/l	
56-23-5	Carbon tetrachloride	ND	0.50	0.074	ug/l	
75-34-3	1,1-Dichloroethane	ND	0.50	0.039	ug/l	
75-35-4	1,1-Dichloroethylene	ND	0.50	0.054	ug/l	
107-06-2	1,2-Dichloroethane	ND	0.50	0.034	ug/l	
78-87-5	1,2-Dichloropropane	ND	0.50	0.082	ug/l	
124-48-1	Dibromochloromethane	ND	0.50	0.042	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	0.50	0.039	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	0.50	0.081	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	0.033	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	0.063	ug/l	
100-41-4	Ethylbenzene	ND	0.50	0.033	ug/l	
76-13-1	Freon 113	ND	1.0	0.10	ug/l	
591-78-6	2-Hexanone	ND	2.0	0.084	ug/l	
75-09-2	Methylene chloride	ND	0.50	0.047	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	2.0	0.27	ug/l	
100-42-5	Styrene	ND	0.50	0.028	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	0.50	0.050	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	0.035	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	0.50	0.052	ug/l	
127-18-4	Tetrachloroethylene	ND	0.50	0.091	ug/l	
108-88-3	Toluene	ND	0.50	0.044	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BPOW 6-1		
Lab Sample ID:	JB97683-1	**Date Sampled:**	06/22/15
Matrix:	AQ - Water	**Date Received:**	06/23/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethylene	ND	0.50	0.024	ug/l	
75-01-4	Vinyl chloride	ND	0.50	0.032	ug/l	
	m,p-Xylene	ND	0.50	0.13	ug/l	
95-47-6	o-Xylene	ND	0.50	0.029	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2199-69-1	1,2-Dichlorobenzene-d4	93%		78-114%
460-00-4	4-Bromofluorobenzene	86%		77-115%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q	
67-63-0	Isopropyl Alcohol	~~7.46~~	~~60~~	~~ug/l~~	~~JN~~	R
	Propanal, methyl-	~~8.71~~	~~.98~~	~~ug/l~~	~~J~~	R
	Propanol, methyl-	10.84	2.1	ug/l	J	N
	Furan, tetrahydro-tetramethyl-	12.87	2.2	ug/l	J	N
	Hexanol, ethyl-	17.36	.82	ug/l	J	N
	Total TIC, Volatile	5.12	~~66.1~~	ug/l	J	N

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: FB062215KV1
Lab Sample ID: JB97683-2
Matrix: AQ - Field Blank Water
Method: EPA 524.2 REV 4.1
Project: Northrop Grumman, OU2 Hydro, Bethpage, NY

Date Sampled: 06/22/15
Date Received: 06/23/15
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1B97959.D	1	06/29/15	MD	n/a	n/a	V1B4647
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	1.1	5.0	0.91	ug/l	J
78-93-3	2-Butanone	ND	5.0	0.57	ug/l	
71-43-2	Benzene	ND	0.50	0.057	ug/l	
75-27-4	Bromodichloromethane	ND	0.50	0.082	ug/l	
75-25-2	Bromoform	ND	0.50	0.046	ug/l	
74-83-9	Bromomethane	ND	0.50	0.077	ug/l	
75-15-0	Carbon disulfide	ND	0.50	0.028	ug/l	
108-90-7	Chlorobenzene	ND	0.50	0.027	ug/l	
75-00-3	Chloroethane	ND	0.50	0.037	ug/l	
67-66-3	Chloroform	0.15	0.50	0.031	ug/l	J
74-87-3	Chloromethane	ND	0.50	0.044	ug/l	
56-23-5	Carbon tetrachloride	ND	0.50	0.074	ug/l	
75-34-3	1,1-Dichloroethane	ND	0.50	0.039	ug/l	
75-35-4	1,1-Dichloroethylene	ND	0.50	0.054	ug/l	
107-06-2	1,2-Dichloroethane	ND	0.50	0.034	ug/l	
78-87-5	1,2-Dichloropropane	ND	0.50	0.082	ug/l	
124-48-1	Dibromochloromethane	ND	0.50	0.042	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	0.50	0.039	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	0.50	0.081	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	0.033	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	0.063	ug/l	
100-41-4	Ethylbenzene	ND	0.50	0.033	ug/l	
76-13-1	Freon 113	ND	1.0	0.10	ug/l	
591-78-6	2-Hexanone	ND	2.0	0.084	ug/l	
75-09-2	Methylene chloride	ND	0.50	0.047	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	2.0	0.27	ug/l	
100-42-5	Styrene	ND	0.50	0.028	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	0.50	0.050	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	0.035	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	0.50	0.052	ug/l	
127-18-4	Tetrachloroethylene	ND	0.50	0.091	ug/l	
108-88-3	Toluene	ND	0.50	0.044	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	FB062215KV1		
Lab Sample ID:	JB97683-2	**Date Sampled:**	06/22/15
Matrix:	AQ - Field Blank Water	**Date Received:**	06/23/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethylene	ND	0.50	0.024	ug/l	
75-01-4	Vinyl chloride	ND	0.50	0.032	ug/l	
	m,p-Xylene	ND	0.50	0.13	ug/l	
95-47-6	o-Xylene	ND	0.50	0.029	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2199-69-1	1,2-Dichlorobenzene-d4	91%		78-114%
460-00-4	4-Bromofluorobenzene	86%		77-115%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
67-63-0	Isopropyl Alcohol	7.47	4.6	ug/l	JN
	Propanal, methyl-	8.72	1.3	ug/l	J N
	Total TIC, Volatile		5.9	ug/l	J N

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TB062215KV1		
Lab Sample ID:	JB97683-3	**Date Sampled:**	06/22/15
Matrix:	AQ - Trip Blank Water	**Date Received:**	06/23/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1B97907.D	1	06/27/15	MD	n/a	n/a	V1B4644
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	5.0	0.91	ug/l	
78-93-3	2-Butanone	ND	5.0	0.57	ug/l	
71-43-2	Benzene	ND	0.50	0.057	ug/l	
75-27-4	Bromodichloromethane	ND	0.50	0.082	ug/l	
75-25-2	Bromoform	ND	0.50	0.046	ug/l	
74-83-9	Bromomethane	ND	0.50	0.077	ug/l	
75-15-0	Carbon disulfide	ND	0.50	0.028	ug/l	
108-90-7	Chlorobenzene	ND	0.50	0.027	ug/l	
75-00-3	Chloroethane	ND	0.50	0.037	ug/l	
67-66-3	Chloroform	0.17	0.50	0.031	ug/l	J
74-87-3	Chloromethane	ND	0.50	0.044	ug/l	
56-23-5	Carbon tetrachloride	ND	0.50	0.074	ug/l	
75-34-3	1,1-Dichloroethane	ND	0.50	0.039	ug/l	
75-35-4	1,1-Dichloroethylene	ND	0.50	0.054	ug/l	
107-06-2	1,2-Dichloroethane	ND	0.50	0.034	ug/l	
78-87-5	1,2-Dichloropropane	ND	0.50	0.082	ug/l	
124-48-1	Dibromochloromethane	ND	0.50	0.042	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	0.50	0.039	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	0.50	0.081	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	0.033	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	0.063	ug/l	
100-41-4	Ethylbenzene	ND	0.50	0.033	ug/l	
76-13-1	Freon 113	ND	1.0	0.10	ug/l	
591-78-6	2-Hexanone	ND	2.0	0.084	ug/l	
75-09-2	Methylene chloride	ND	0.50	0.047	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	2.0	0.27	ug/l	
100-42-5	Styrene	ND	0.50	0.028	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	0.50	0.050	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	0.035	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	0.50	0.052	ug/l	
127-18-4	Tetrachloroethylene	ND	0.50	0.091	ug/l	
108-88-3	Toluene	ND	0.50	0.044	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TB062215KV1		
Lab Sample ID:	JB97683-3	**Date Sampled:**	06/22/15
Matrix:	AQ - Trip Blank Water	**Date Received:**	06/23/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethylene	ND	0.50	0.024	ug/l	
75-01-4	Vinyl chloride	ND	0.50	0.032	ug/l	
	m,p-Xylene	ND	0.50	0.13	ug/l	
95-47-6	o-Xylene	ND	0.50	0.029	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2199-69-1	1,2-Dichlorobenzene-d4	88%		78-114%
460-00-4	4-Bromofluorobenzene	88%		77-115%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	Total TIC, Volatile		0	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Northrop Grumman Corporation-Operable Unit 2

Data Review

BETHPAGE, NEW YORK

Volatile Analysis

SDG #JB97745

Analyses Performed By:
Accutest Laboratories
Dayton, New Jersey

Report #23913R
July 10, 2015
Review Level: Tier II
Project #NY001496.1514.NAVI4

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #JB97745 for samples collected in association with the Northrop Grumman-Bethpage Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					VOC	SVOC	PCB	MET	MISC
BPOW 6-2	JB97745-1	Water	06/23/2015		X				
FB062315KV1	JB97745-2	Water	06/23/2015		X				
TB062315KV1	JB97745-3	Water	06/23/2015		X				
BPOW 6-R	JB97745-4	Water	06/23/2015	BPOW 6-2	X				

ANALYTICAL DATA PACKAGE DOCUMENTATION

GENERAL INFORMATION

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Collection Technique (grab, composite, etc.)		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X	X		
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form completed		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

QA - Quality Assurance

VOLATILE ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA), Method 524.2. Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

  U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

VOLATILE ORGANIC COMPOUND (VOC) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
EPA 524.2	Water	14 days from collection to analysis	Cool to < 6°C; preserved to a pH of less than 2 s.u..

s.u. Standard units

All samples were analyzed within the specified holding time and temperature criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

All compounds associated with the QA blanks exhibited a concentration less than the MDL, with the exception of the compounds listed in the following table. Sample results associated with QA blank contamination that were greater than the BAL resulted in the removal of the laboratory qualifier (B) of data. Sample results less than the BAL associated with the following sample locations were qualified as listed in the following table.

Sample Locations	Analytes	Sample Result	Qualification
BPOW 6-2 BPOW 6-R	Acetone	Detected sample results >RL and <BAL	"UB" at detected sample concentration
	TICs: Isopropyl alcohol (RT: 7.46/7.47)	Detected sample results less than 5 times blank result	R

RL Reporting limit

3. Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. VOC analysis requires that all surrogates associated with the analysis exhibit recoveries within the laboratory-established acceptance limits.

All surrogate recoveries were within control limits.

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

A MS analysis was not performed on a sample location associated with this SDG.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
BPOW 6-2/ BPOW 6-R	Acetone	2.0 J	2.9 J	AC

AC Acceptable

The calculated RPDs between the parent sample and field duplicate were acceptable.

7. Laboratory Duplicate Analysis

The laboratory duplicate relative percent difference (RPD) criterion is applied when parent and duplicate sample concentrations are greater than or equal to 5 times the RL. A control limit of 20% for water matrices is applied when the criteria above is true. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices.

A laboratory duplicate was not performed on a sample location associated with this SDG.

8. System Performance and Overall Assessment

Tentatively identified compounds (TICs) were identified in sample locations BPOW 6-2, FB062315KV1 and BPOW 6-R. The analysis indicates the presence of a compound for which there is presumptive evidence to

make a tentative identification. TICs are qualified as estimated (JN).

Overall system performance was noted by the laboratory in the case narrative as acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR VOCs

VOCs: 524.2	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
Tier II Validation					
Holding times & Temperature		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X	X		
C. Trip blanks		X	X		
Surrogate (%R)		X		X	
Laboratory Control Sample (%R)		X		X	
Laboratory Control Sample Duplicate(LCSD)					X
LCS/LCSD Precision (RPD)					X
Matrix Spike (MS)					X
Matrix Spike Duplicate(MSD)					X
MS/MSD Precision (RPD)					X
Field/Lab Duplicate (RPD)		X		X	
Dilution Factor		X		X	
Moisture Content					X

%R Percent Recovery RPD Relative Percent Difference

VALIDATION PERFORMED BY: Lisa Horton

SIGNATURE: 

DATE: July 10, 2015

PEER REVIEW BY: Todd Church

DATE: July 16, 2015

CHAIN OF CUSTODY/
CORRECTED SAMPLE ANALYSIS DATA SHEETS

GW
WTB
WFB

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

Accutest New Jersey/SPL Environmental
2235 Route 130, Dayton, NJ 08810
TEL. 732-329-0200 FAX: 732-329-3499/3480
www.accutest.com

PAGE 1 OF 1

FED-EX Tracking # #5 | Bottle Order Control #
Accutest Quote # | Accutest Job # JB97745

Client / Reporting Information

Company Name: Arcadis
Street Address: 2 Huntington Quad, Suite 1S10
City: Melville State: NY Zip: 11747
Project Contact: Soma Das, soma.das@arcadis-us.com E-mail:
Phone #: 631-249-7600 Fax #: 631-249-7610
Sampler(s) Name(s): Kirk Argas 516-243-3691 Phone #:

Project Information

Project Name: AGMNYM62235 // OU2 Monitoring Wells Northrop Grumman OU2 Hydro
Street:
City: Bethpage State: NY
Project #: 1514. NAVI3 NY001496.~~3441.GWM13~~
Client Purchase Order #: Work Authorization #: NY001496_2015
Project Manager: Carlo San Giovanni

Billing Information (if different from Report to)

Company Name: Arcadis, U.S., Inc. Attn: Accts Payable
Street Address: 630 Plaza Drive, Suite 600
City: Highlands Ranch, State: CO Zip: 80129
Attention: Soma Das

Requested Analysis (see TEST CODE sheet)

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	Number of preserved Bottles: HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	~~VC82682NG30GW+40~~	Cd, Cr (Total) 6010C	Cd, Cr (Dissolved, Field Filtered) 6010C	VC 524.2 NG 36 GW+40
1	BPOW G-2		6/23/15	1205	KV	GW	3	3											✓
2	FBOG2315 KV1		6/23/15	1110	KV	FB	3	3											✓
3	TBOG2315 KV1		6/23/15	1100	—	TB	2	2											✓
4	BPOW G-R		6/23/15	—	KV	GW	3	3											✓

Matrix Codes: DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SO - Soil; SL- Sludge; SED-Sediment; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid; WP - Wipe; FB-Field Blank; EB-Equipment Blank; RB- Rinse Blank; TB-Trip Blank

LAB USE ONLY: V387

Turnaround Time (Business days)

- [ ] Std. 15 Business Days
- [x] Std. 10 Business Days (by Contract only)
- [ ] 10 Day *RUSH*
- [ ] 5 Day *RUSH*
- [ ] 3 Day *EMERGENCY*
- [ ] 2 Day *EMERGENCY*
- [ ] 1 Day *EMERGENCY*

Emergency & Rush T/A data available VIA Lablink

Approved By (Accutest PM): / Date:
INITIAL ASESSMENT ZADM
LABEL VERIFICATION NV

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULLT1 (Level 3+4)
- [ ] NJ Reduced
- [ ] Commercial "C"
- [ ] NYASP Category A
- [ ] NYASP Category B
- [ ] State Forms
- [ ] EDD Format
- [x] Other COMMC+

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

RL reporting for metals
Method 524.2 but full list
as per email dated 5/18/2015

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler:	Date Time:	Received By:
1		6/23/15 1830	
2		6/24/15 10:10	
3			
4			
5			

Custody Seal # | [ ] Intact [x] Not Intact | Preserved where applicable [ ] | On Ice [x] | Cooler Temp. 3.1°C IP

Report of Analysis

Client Sample ID:	BPOW 6-2		
Lab Sample ID:	JB97745-1	**Date Sampled:**	06/23/15
Matrix:	AQ - Ground Water	**Date Received:**	06/24/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1B97914.D	1	06/27/15	MD	n/a	n/a	V1B4645
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone 5.0	~~2.0~~	5.0	0.91	ug/l	~~J~~ UB
78-93-3	2-Butanone	ND	5.0	0.57	ug/l	
71-43-2	Benzene	ND	0.50	0.057	ug/l	
75-27-4	Bromodichloromethane	ND	0.50	0.082	ug/l	
75-25-2	Bromoform	ND	0.50	0.046	ug/l	
74-83-9	Bromomethane	ND	0.50	0.077	ug/l	
75-15-0	Carbon disulfide	ND	0.50	0.028	ug/l	
108-90-7	Chlorobenzene	ND	0.50	0.027	ug/l	
75-00-3	Chloroethane	ND	0.50	0.037	ug/l	
67-66-3	Chloroform	ND	0.50	0.031	ug/l	
74-87-3	Chloromethane	ND	0.50	0.044	ug/l	
56-23-5	Carbon tetrachloride	ND	0.50	0.074	ug/l	
75-34-3	1,1-Dichloroethane	ND	0.50	0.039	ug/l	
75-35-4	1,1-Dichloroethylene	ND	0.50	0.054	ug/l	
107-06-2	1,2-Dichloroethane	ND	0.50	0.034	ug/l	
78-87-5	1,2-Dichloropropane	ND	0.50	0.082	ug/l	
124-48-1	Dibromochloromethane	ND	0.50	0.042	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	0.50	0.039	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	0.50	0.081	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	0.033	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	0.063	ug/l	
100-41-4	Ethylbenzene	ND	0.50	0.033	ug/l	
76-13-1	Freon 113	ND	1.0	0.10	ug/l	
591-78-6	2-Hexanone	ND	2.0	0.084	ug/l	
75-09-2	Methylene chloride	ND	0.50	0.047	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	2.0	0.27	ug/l	
100-42-5	Styrene	ND	0.50	0.028	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	0.50	0.050	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	0.035	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	0.50	0.052	ug/l	
127-18-4	Tetrachloroethylene	ND	0.50	0.091	ug/l	
108-88-3	Toluene	ND	0.50	0.044	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
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B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BPOW 6-2		
Lab Sample ID:	JB97745-1	**Date Sampled:**	06/23/15
Matrix:	AQ - Ground Water	**Date Received:**	06/24/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethylene	ND	0.50	0.024	ug/l	
75-01-4	Vinyl chloride	ND	0.50	0.032	ug/l	
	m,p-Xylene	ND	0.50	0.13	ug/l	
95-47-6	o-Xylene	ND	0.50	0.029	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2199-69-1	1,2-Dichlorobenzene-d4	90%		78-114%
460-00-4	4-Bromofluorobenzene	87%		77-115%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
67-63-0	Isopropyl Alcohol	~~7.46~~	~~1.9~~	~~ug/l~~	~~JN~~ R
78-84-2	Propanal, 2-methyl-	8.71	.79	ug/l	JN
	Total TIC, Volatile	0.79	~~2.69~~	ug/l	J N

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: FB062315KV1
Lab Sample ID: JB97745-2
Matrix: AQ - Field Blank Water
Method: EPA 524.2 REV 4.1
Project: Northrop Grumman, OU2 Hydro, Bethpage, NY

Date Sampled: 06/23/15
Date Received: 06/24/15
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1B97955.D	1	06/29/15	MD	n/a	n/a	V1B4647
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	1.1	5.0	0.91	ug/l	J
78-93-3	2-Butanone	ND	5.0	0.57	ug/l	
71-43-2	Benzene	ND	0.50	0.057	ug/l	
75-27-4	Bromodichloromethane	ND	0.50	0.082	ug/l	
75-25-2	Bromoform	ND	0.50	0.046	ug/l	
74-83-9	Bromomethane	ND	0.50	0.077	ug/l	
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75-00-3	Chloroethane	ND	0.50	0.037	ug/l	
67-66-3	Chloroform	0.13	0.50	0.031	ug/l	J
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78-87-5	1,2-Dichloropropane	ND	0.50	0.082	ug/l	
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156-60-5	trans-1,2-Dichloroethylene	ND	0.50	0.039	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	0.50	0.081	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	0.033	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	0.063	ug/l	
100-41-4	Ethylbenzene	ND	0.50	0.033	ug/l	
76-13-1	Freon 113	ND	1.0	0.10	ug/l	
591-78-6	2-Hexanone	ND	2.0	0.084	ug/l	
75-09-2	Methylene chloride	ND	0.50	0.047	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	2.0	0.27	ug/l	
100-42-5	Styrene	ND	0.50	0.028	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	0.50	0.050	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	0.035	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	0.50	0.052	ug/l	
127-18-4	Tetrachloroethylene	ND	0.50	0.091	ug/l	
108-88-3	Toluene	ND	0.50	0.044	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	FB062315KV1		
Lab Sample ID:	JB97745-2	**Date Sampled:**	06/23/15
Matrix:	AQ - Field Blank Water	**Date Received:**	06/24/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethylene	ND	0.50	0.024	ug/l	
75-01-4	Vinyl chloride	ND	0.50	0.032	ug/l	
	m,p-Xylene	ND	0.50	0.13	ug/l	
95-47-6	o-Xylene	ND	0.50	0.029	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2199-69-1	1,2-Dichlorobenzene-d4	98%		78-114%
460-00-4	4-Bromofluorobenzene	87%		77-115%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
67-63-0	Isopropyl Alcohol	7.47	1.7	ug/l	JN
	Total TIC, Volatile		1.7	ug/l	J N

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: TB062315KV1
Lab Sample ID: JB97745-3
Matrix: AQ - Trip Blank Water
Method: EPA 524.2 REV 4.1
Project: Northrop Grumman, OU2 Hydro, Bethpage, NY

Date Sampled: 06/23/15
Date Received: 06/24/15
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1B97956.D	1	06/29/15	MD	n/a	n/a	V1B4647
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	5.0	0.91	ug/l	
78-93-3	2-Butanone	ND	5.0	0.57	ug/l	
71-43-2	Benzene	ND	0.50	0.057	ug/l	
75-27-4	Bromodichloromethane	ND	0.50	0.082	ug/l	
75-25-2	Bromoform	ND	0.50	0.046	ug/l	
74-83-9	Bromomethane	ND	0.50	0.077	ug/l	
75-15-0	Carbon disulfide	ND	0.50	0.028	ug/l	
108-90-7	Chlorobenzene	ND	0.50	0.027	ug/l	
75-00-3	Chloroethane	ND	0.50	0.037	ug/l	
67-66-3	Chloroform	0.17	0.50	0.031	ug/l	J
74-87-3	Chloromethane	ND	0.50	0.044	ug/l	
56-23-5	Carbon tetrachloride	ND	0.50	0.074	ug/l	
75-34-3	1,1-Dichloroethane	ND	0.50	0.039	ug/l	
75-35-4	1,1-Dichloroethylene	ND	0.50	0.054	ug/l	
107-06-2	1,2-Dichloroethane	ND	0.50	0.034	ug/l	
78-87-5	1,2-Dichloropropane	ND	0.50	0.082	ug/l	
124-48-1	Dibromochloromethane	ND	0.50	0.042	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	0.50	0.039	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	0.50	0.081	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	0.033	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	0.063	ug/l	
100-41-4	Ethylbenzene	ND	0.50	0.033	ug/l	
76-13-1	Freon 113	ND	1.0	0.10	ug/l	
591-78-6	2-Hexanone	ND	2.0	0.084	ug/l	
75-09-2	Methylene chloride	ND	0.50	0.047	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	2.0	0.27	ug/l	
100-42-5	Styrene	ND	0.50	0.028	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	0.50	0.050	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	0.035	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	0.50	0.052	ug/l	
127-18-4	Tetrachloroethylene	ND	0.50	0.091	ug/l	
108-88-3	Toluene	ND	0.50	0.044	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TB062315KV1		
Lab Sample ID:	JB97745-3	**Date Sampled:**	06/23/15
Matrix:	AQ - Trip Blank Water	**Date Received:**	06/24/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethylene	ND	0.50	0.024	ug/l	
75-01-4	Vinyl chloride	ND	0.50	0.032	ug/l	
	m,p-Xylene	ND	0.50	0.13	ug/l	
95-47-6	o-Xylene	ND	0.50	0.029	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2199-69-1	1,2-Dichlorobenzene-d4	95%		78-114%
460-00-4	4-Bromofluorobenzene	91%		77-115%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	Total TIC, Volatile		0	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BPOW 6-R		
Lab Sample ID:	JB97745-4	**Date Sampled:**	06/23/15
Matrix:	AQ - Ground Water	**Date Received:**	06/24/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1B97957.D	1	06/29/15	MD	n/a	n/a	V1B4647
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone 5.0	2.9	5.0	0.91	ug/l	J UB
78-93-3	2-Butanone	ND	5.0	0.57	ug/l	
71-43-2	Benzene	ND	0.50	0.057	ug/l	
75-27-4	Bromodichloromethane	ND	0.50	0.082	ug/l	
75-25-2	Bromoform	ND	0.50	0.046	ug/l	
74-83-9	Bromomethane	ND	0.50	0.077	ug/l	
75-15-0	Carbon disulfide	ND	0.50	0.028	ug/l	
108-90-7	Chlorobenzene	ND	0.50	0.027	ug/l	
75-00-3	Chloroethane	ND	0.50	0.037	ug/l	
67-66-3	Chloroform	ND	0.50	0.031	ug/l	
74-87-3	Chloromethane	ND	0.50	0.044	ug/l	
56-23-5	Carbon tetrachloride	ND	0.50	0.074	ug/l	
75-34-3	1,1-Dichloroethane	ND	0.50	0.039	ug/l	
75-35-4	1,1-Dichloroethylene	ND	0.50	0.054	ug/l	
107-06-2	1,2-Dichloroethane	ND	0.50	0.034	ug/l	
78-87-5	1,2-Dichloropropane	ND	0.50	0.082	ug/l	
124-48-1	Dibromochloromethane	ND	0.50	0.042	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	0.50	0.039	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	0.50	0.081	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	0.033	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	0.063	ug/l	
100-41-4	Ethylbenzene	ND	0.50	0.033	ug/l	
76-13-1	Freon 113	ND	1.0	0.10	ug/l	
591-78-6	2-Hexanone	ND	2.0	0.084	ug/l	
75-09-2	Methylene chloride	ND	0.50	0.047	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	2.0	0.27	ug/l	
100-42-5	Styrene	ND	0.50	0.028	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	0.50	0.050	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	0.035	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	0.50	0.052	ug/l	
127-18-4	Tetrachloroethylene	ND	0.50	0.091	ug/l	
108-88-3	Toluene	ND	0.50	0.044	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BPOW 6-R		
Lab Sample ID:	JB97745-4	**Date Sampled:**	06/23/15
Matrix:	AQ - Ground Water	**Date Received:**	06/24/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethylene	ND	0.50	0.024	ug/l	
75-01-4	Vinyl chloride	ND	0.50	0.032	ug/l	
	m,p-Xylene	ND	0.50	0.13	ug/l	
95-47-6	o-Xylene	ND	0.50	0.029	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2199-69-1	1,2-Dichlorobenzene-d4	99%		78-114%
460-00-4	4-Bromofluorobenzene	91%		77-115%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q	
67-63-0	Isopropyl Alcohol	~~7.47~~	~~3.5~~	~~ug/l~~	~~JN~~	R
78-84-2	Propanal, 2-methyl-	8.72	2.7	ug/l	JN	
15045-43-9	Furan, tetrahydro-2,2,5,5-tetramethyl-	12.88	.69	ug/l	JN	
	Total TIC, Volatile	3.39	~~6.89~~	ug/l	J N	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Northrop Grumman Corporation-Operable Unit 2

Data Review

BETHPAGE, NEW YORK

Volatile Analysis

SDG #JB97890

Analyses Performed By:
Accutest Laboratories
Dayton, New Jersey

Report #23914R
July 10, 2015
Review Level: Tier II
Project #NY001496.1514.NAVI4

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #JB97890 for samples collected in association with the Northrop Grumman-Bethpage Site. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					VOC	SVOC	PCB	MET	MISC
BPOW 6-3	JB97890-1	Water	06/24/2015		X				
TB062415KV1	JB97890-2	Water	06/24/2015		X				
FB062415KV1	JB97890-3	Water	06/24/2015		X				
BPOW 6-4	JB97890-4	Water	06/24/2015		X				

Note:

1. The matrix spike/matrix spike duplicate (MS/MSD) analysis was performed on sample location BPOW 6-3.

ANALYTICAL DATA PACKAGE DOCUMENTATION

GENERAL INFORMATION

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Collection Technique (grab, composite, etc.)		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X	X		
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form completed		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

QA - Quality Assurance

VOLATILE ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA), Method 524.2. Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

  U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

VOLATILE ORGANIC COMPOUND (VOC) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
EPA 524.2	Water	14 days from collection to analysis	Cool to < 6°C; preserved to a pH of less than 2 s.u..

s.u. Standard units

All samples were analyzed within the specified holding time and temperature criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

All compounds associated with the QA blanks exhibited a concentration less than the MDL, with the exception of the compounds listed in the following table. Sample results associated with QA blank contamination that were greater than the BAL resulted in the removal of the laboratory qualifier (B) of data. Sample results less than the BAL associated with the following sample locations were qualified as listed in the following table.

Sample Locations	Analytes	Sample Result	Qualification
BPOW 6-3	Acetone	Detected sample results >RL and <BAL	"UB" at detected sample concentration
	TICs: Isopropyl alcohol (RT: 7.46)	Detected sample results less than 5 times blank result	R

RL Reporting limit

3. Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. VOC analysis requires that all surrogates associated with the analysis exhibit recoveries within the laboratory-established acceptance limits.

All surrogate recoveries were within control limits.

4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS/MSD exhibited acceptable recoveries and RPD between the MS/MSD recoveries.

5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices.

A field duplicate was not collected on a sample location associated with this SDG.

7. Laboratory Duplicate Analysis

The laboratory duplicate relative percent difference (RPD) criterion is applied when parent and duplicate sample concentrations are greater than or equal to 5 times the RL. A control limit of 20% for water matrices is applied when the criteria above is true. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices.

A laboratory duplicate was not performed on a sample location associated with this SDG.

8. System Performance and Overall Assessment

Tentatively identified compounds (TICs) were identified in sample locations BPOW 6-3, TB062415KV1 and FB062415KV1. The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. TICs are qualified as estimated (JN).

Overall system performance was noted by the laboratory in the case narrative as acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR VOCs

VOCs: 524.2	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
Tier II Validation					
Holding times & Temperature		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X	X		
C. Trip blanks		X	X		
Surrogate (%R)		X		X	
Laboratory Control Sample (%R)		X		X	
Laboratory Control Sample Duplicate(LCSD)					X
LCS/LCSD Precision (RPD)					X
Matrix Spike (MS)		X		X	
Matrix Spike Duplicate(MSD)		X		X	
MS/MSD Precision (RPD)		X		X	
Field/Lab Duplicate (RPD)					X
Dilution Factor		X		X	
Moisture Content					X

%R Percent Recovery RPD Relative Percent Difference

VALIDATION PERFORMED BY: Lisa Horton

SIGNATURE: 

DATE: July 10, 2015

PEER REVIEW BY: Todd Church

DATE: July 16, 2015

CHAIN OF CUSTODY/
CORRECTED SAMPLE ANALYSIS DATA SHEETS

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

Accutest New Jersey/SPL Environmental
2235 Route 130, Dayton, NJ 08810
TEL. 732-329-0200 FAX: 732-329-3499/3480
www.accutest.com

PAGE 1 OF 1

FED-EX Tracking # #5 | Bottle Order Control #
Accutest Quote # | Accutest Job # JB97890

Client / Reporting Information
Company Name: Arcadis
Street Address: 2 Huntington Quad, Suite 1S10
City: Melville State: NY Zip: 11747
Project Contact: Soma Das, E-mail: soma.das@arcadis-us.com
Phone #: 631-249-7600 Fax #: 631-249-7610
Sampler(s) Name(s): Aaron Mages / [illegible] Phone #: 516-257-6247

Project Information
Project Name: AGMNYM62235 // OU2 Monitoring Wells Northrop Grumman OU2 Hydro
City: Bethpage State: NY
Project #: NY001496.3141.GWMI3 (1514.NAVI3)
Client Purchase Order #: Work Authorization #: NY001496_2015
Project Manager: Carlo San Giovanni

Billing Information (if different from Report to)
Company Name: Arcadis, U.S., Inc. Attn: Accts Payable
Street Address: 630 Plaza Drive, Suite 600
City: Highlands Ranch, State: CO Zip: 80129
Attention: Soma Das

Requested Analysis (see TEST CODE sheet): ~~VC8260NG36GW+40~~ PP; Cd, Cr (Total) 6010C; Cd, Cr (Dissolved, Field Filtered) 6010C; VC 524.2 NG 36GW+40

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottles	HCl	VC 524.2NG36GW+40
-1	BPOW 6-3		6/24/15	1040	AM	GW	9*	9	✓
-2	TB062415AM2		6/24/15	0800	—	TB	2	2	✓
-3	FB062415AM2		6/24/15	0815	AM	FB	3	3	✓
-4	BPOW 6-4		6/24/15	1337	AM	GW	3	3	✓

Matrix Codes: DW - Drinking Water, GW - Ground Water, WW - Water, SW - Surface Water, SO - Soil, SL - Sludge, SED - Sediment, OI - Oil, LIQ - Other Liquid, AIR - Air, SOL - Other Solid, WP - Wipe, FB - Field Blank, EB - Equipment Blank, RB - Rinse Blank, TB - Trip Blank

LAB USE ONLY: V423

INITIAL ASSESSMENT JC 3A
LABEL VERIFICATION [initials]

Turnaround Time (Business days)
- [ ] Std. 15 Business Days
- [x] Std. 10 Business Days (by Contract only)
- [ ] 10 Day RUSH
- [ ] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [ ] 1 Day EMERGENCY

Approved By (Accutest PM): / Date:

Emergency & Rush T/A data available VIA Lablink

Data Deliverable Information
- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULLT1 (Level 3+4)
- [ ] NJ Reduced
- [ ] Commercial "C"
- [ ] NYASP Category A
- [ ] NYASP Category B
- [ ] State Forms
- [ ] EDD Format
- [x] Other COMMC+

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions
RL reporting for metals * Please use BPOW6-3 for QA/QC MS/MSD Sample
Method 524.2 list as per email dated 5/18/2015

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 [signature]	6/24/15 2100	1 [signature]	2 [signature]	6/25/15 20:45	2 [signature]
Relinquished by Sampler: 3	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
Relinquished by: 5	Date Time:	Received By: 5	Custody Seal # None		

Intact / Not intact; Preserved where applicable; On Ice ☑; Cooler Temp. 4.3°C IP

JB97890: Chain of Custody
Page 1 of 2

Report of Analysis

Client Sample ID:	BPOW 6-3		
Lab Sample ID:	JB97890-1	**Date Sampled:**	06/24/15
Matrix:	AQ - Water	**Date Received:**	06/25/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1B97954.D	1	06/29/15	MD	n/a	n/a	V1B4647
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Special VOA List

CAS No.	Compound		Result	RL	MDL	Units	Q	
67-64-1	Acetone	5.0	1.0	5.0	0.91	ug/l	J	UB
78-93-3	2-Butanone		ND	5.0	0.57	ug/l		
71-43-2	Benzene		ND	0.50	0.057	ug/l		
75-27-4	Bromodichloromethane		ND	0.50	0.082	ug/l		
75-25-2	Bromoform		ND	0.50	0.046	ug/l		
74-83-9	Bromomethane		ND	0.50	0.077	ug/l		
75-15-0	Carbon disulfide		ND	0.50	0.028	ug/l		
108-90-7	Chlorobenzene		ND	0.50	0.027	ug/l		
75-00-3	Chloroethane		ND	0.50	0.037	ug/l		
67-66-3	Chloroform		ND	0.50	0.031	ug/l		
74-87-3	Chloromethane		ND	0.50	0.044	ug/l		
56-23-5	Carbon tetrachloride		ND	0.50	0.074	ug/l		
75-34-3	1,1-Dichloroethane		ND	0.50	0.039	ug/l		
75-35-4	1,1-Dichloroethylene		ND	0.50	0.054	ug/l		
107-06-2	1,2-Dichloroethane		ND	0.50	0.034	ug/l		
78-87-5	1,2-Dichloropropane		ND	0.50	0.082	ug/l		
124-48-1	Dibromochloromethane		ND	0.50	0.042	ug/l		
156-60-5	trans-1,2-Dichloroethylene		ND	0.50	0.039	ug/l		
156-59-2	cis-1,2-Dichloroethylene		ND	0.50	0.081	ug/l		
10061-02-6	trans-1,3-Dichloropropene		ND	0.50	0.033	ug/l		
10061-01-5	cis-1,3-Dichloropropene		ND	0.50	0.063	ug/l		
100-41-4	Ethylbenzene		ND	0.50	0.033	ug/l		
76-13-1	Freon 113		ND	1.0	0.10	ug/l		
591-78-6	2-Hexanone		ND	2.0	0.084	ug/l		
75-09-2	Methylene chloride		ND	0.50	0.047	ug/l		
108-10-1	4-Methyl-2-pentanone		ND	2.0	0.27	ug/l		
100-42-5	Styrene		ND	0.50	0.028	ug/l		
71-55-6	1,1,1-Trichloroethane		ND	0.50	0.050	ug/l		
79-34-5	1,1,2,2-Tetrachloroethane		ND	0.50	0.035	ug/l		
79-00-5	1,1,2-Trichloroethane		ND	0.50	0.052	ug/l		
127-18-4	Tetrachloroethylene		ND	0.50	0.091	ug/l		
108-88-3	Toluene		ND	0.50	0.044	ug/l		

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BPOW 6-3		
Lab Sample ID:	JB97890-1	**Date Sampled:**	06/24/15
Matrix:	AQ - Water	**Date Received:**	06/25/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethylene	ND	0.50	0.024	ug/l	
75-01-4	Vinyl chloride	ND	0.50	0.032	ug/l	
	m,p-Xylene	ND	0.50	0.13	ug/l	
95-47-6	o-Xylene	ND	0.50	0.029	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2199-69-1	1,2-Dichlorobenzene-d4	96%		78-114%
460-00-4	4-Bromofluorobenzene	91%		77-115%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
67-63-0	Isopropyl Alcohol	~~7.46~~	~~3.5~~	ug/l	~~JN~~ R
	Total TIC, Volatile		~~3.5~~	ug/l	~~J~~

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TB062415AM1		
Lab Sample ID:	JB97890-2	**Date Sampled:**	06/24/15
Matrix:	AQ - Trip Blank Water	**Date Received:**	06/25/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1B97963.D	1	06/29/15	MD	n/a	n/a	V1B4647
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	1.5	5.0	0.91	ug/l	J
78-93-3	2-Butanone	ND	5.0	0.57	ug/l	
71-43-2	Benzene	ND	0.50	0.057	ug/l	
75-27-4	Bromodichloromethane	ND	0.50	0.082	ug/l	
75-25-2	Bromoform	ND	0.50	0.046	ug/l	
74-83-9	Bromomethane	ND	0.50	0.077	ug/l	
75-15-0	Carbon disulfide	ND	0.50	0.028	ug/l	
108-90-7	Chlorobenzene	ND	0.50	0.027	ug/l	
75-00-3	Chloroethane	ND	0.50	0.037	ug/l	
67-66-3	Chloroform	0.17	0.50	0.031	ug/l	J
74-87-3	Chloromethane	ND	0.50	0.044	ug/l	
56-23-5	Carbon tetrachloride	ND	0.50	0.074	ug/l	
75-34-3	1,1-Dichloroethane	ND	0.50	0.039	ug/l	
75-35-4	1,1-Dichloroethylene	ND	0.50	0.054	ug/l	
107-06-2	1,2-Dichloroethane	ND	0.50	0.034	ug/l	
78-87-5	1,2-Dichloropropane	ND	0.50	0.082	ug/l	
124-48-1	Dibromochloromethane	ND	0.50	0.042	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	0.50	0.039	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	0.50	0.081	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	0.033	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	0.063	ug/l	
100-41-4	Ethylbenzene	ND	0.50	0.033	ug/l	
76-13-1	Freon 113	ND	1.0	0.10	ug/l	
591-78-6	2-Hexanone	ND	2.0	0.084	ug/l	
75-09-2	Methylene chloride	ND	0.50	0.047	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	2.0	0.27	ug/l	
100-42-5	Styrene	ND	0.50	0.028	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	0.50	0.050	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	0.035	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	0.50	0.052	ug/l	
127-18-4	Tetrachloroethylene	ND	0.50	0.091	ug/l	
108-88-3	Toluene	ND	0.50	0.044	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TB062415AM1		
Lab Sample ID:	JB97890-2	**Date Sampled:**	06/24/15
Matrix:	AQ - Trip Blank Water	**Date Received:**	06/25/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethylene	ND	0.50	0.024	ug/l	
75-01-4	Vinyl chloride	ND	0.50	0.032	ug/l	
	m,p-Xylene	ND	0.50	0.13	ug/l	
95-47-6	o-Xylene	ND	0.50	0.029	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2199-69-1	1,2-Dichlorobenzene-d4	94%		78-114%
460-00-4	4-Bromofluorobenzene	86%		77-115%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
67-63-0	Isopropyl Alcohol	7.47	3.4	ug/l	JN
	unknown	9.67	.7	ug/l	J N
	Total TIC, Volatile		4.1	ug/l	J N

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: FB062415AM1
Lab Sample ID: JB97890-3
Matrix: AQ - Field Blank Water
Method: EPA 524.2 REV 4.1
Project: Northrop Grumman, OU2 Hydro, Bethpage, NY

Date Sampled: 06/24/15
Date Received: 06/25/15
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1B97961.D	1	06/29/15	MD	n/a	n/a	V1B4647
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	1.3	5.0	0.91	ug/l	J
78-93-3	2-Butanone	ND	5.0	0.57	ug/l	
71-43-2	Benzene	ND	0.50	0.057	ug/l	
75-27-4	Bromodichloromethane	ND	0.50	0.082	ug/l	
75-25-2	Bromoform	ND	0.50	0.046	ug/l	
74-83-9	Bromomethane	ND	0.50	0.077	ug/l	
75-15-0	Carbon disulfide	ND	0.50	0.028	ug/l	
108-90-7	Chlorobenzene	ND	0.50	0.027	ug/l	
75-00-3	Chloroethane	ND	0.50	0.037	ug/l	
67-66-3	Chloroform	0.099	0.50	0.031	ug/l	J
74-87-3	Chloromethane	ND	0.50	0.044	ug/l	
56-23-5	Carbon tetrachloride	ND	0.50	0.074	ug/l	
75-34-3	1,1-Dichloroethane	ND	0.50	0.039	ug/l	
75-35-4	1,1-Dichloroethylene	ND	0.50	0.054	ug/l	
107-06-2	1,2-Dichloroethane	ND	0.50	0.034	ug/l	
78-87-5	1,2-Dichloropropane	ND	0.50	0.082	ug/l	
124-48-1	Dibromochloromethane	ND	0.50	0.042	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	0.50	0.039	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	0.50	0.081	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	0.033	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	0.063	ug/l	
100-41-4	Ethylbenzene	ND	0.50	0.033	ug/l	
76-13-1	Freon 113	ND	1.0	0.10	ug/l	
591-78-6	2-Hexanone	ND	2.0	0.084	ug/l	
75-09-2	Methylene chloride	ND	0.50	0.047	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	2.0	0.27	ug/l	
100-42-5	Styrene	ND	0.50	0.028	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	0.50	0.050	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	0.035	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	0.50	0.052	ug/l	
127-18-4	Tetrachloroethylene	ND	0.50	0.091	ug/l	
108-88-3	Toluene	ND	0.50	0.044	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	FB062415AM1		
Lab Sample ID:	JB97890-3	**Date Sampled:**	06/24/15
Matrix:	AQ - Field Blank Water	**Date Received:**	06/25/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethylene	ND	0.50	0.024	ug/l	
75-01-4	Vinyl chloride	ND	0.50	0.032	ug/l	
	m,p-Xylene	ND	0.50	0.13	ug/l	
95-47-6	o-Xylene	ND	0.50	0.029	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2199-69-1	1,2-Dichlorobenzene-d4	99%		78-114%
460-00-4	4-Bromofluorobenzene	91%		77-115%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
67-63-0	Isopropyl Alcohol	7.48	1.5	ug/l	JN
	Total TIC, Volatile		1.5	ug/l	J N

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BPOW 6-4		
Lab Sample ID:	JB97890-4	**Date Sampled:**	06/24/15
Matrix:	AQ - Water	**Date Received:**	06/25/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1B97962.D	1	06/29/15	MD	n/a	n/a	V1B4647
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	5.0	0.91	ug/l	
78-93-3	2-Butanone	ND	5.0	0.57	ug/l	
71-43-2	Benzene	ND	0.50	0.057	ug/l	
75-27-4	Bromodichloromethane	ND	0.50	0.082	ug/l	
75-25-2	Bromoform	ND	0.50	0.046	ug/l	
74-83-9	Bromomethane	ND	0.50	0.077	ug/l	
75-15-0	Carbon disulfide	ND	0.50	0.028	ug/l	
108-90-7	Chlorobenzene	ND	0.50	0.027	ug/l	
75-00-3	Chloroethane	ND	0.50	0.037	ug/l	
67-66-3	Chloroform	ND	0.50	0.031	ug/l	
74-87-3	Chloromethane	ND	0.50	0.044	ug/l	
56-23-5	Carbon tetrachloride	ND	0.50	0.074	ug/l	
75-34-3	1,1-Dichloroethane	ND	0.50	0.039	ug/l	
75-35-4	1,1-Dichloroethylene	ND	0.50	0.054	ug/l	
107-06-2	1,2-Dichloroethane	ND	0.50	0.034	ug/l	
78-87-5	1,2-Dichloropropane	ND	0.50	0.082	ug/l	
124-48-1	Dibromochloromethane	ND	0.50	0.042	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	0.50	0.039	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	0.50	0.081	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	0.033	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	0.063	ug/l	
100-41-4	Ethylbenzene	ND	0.50	0.033	ug/l	
76-13-1	Freon 113	ND	1.0	0.10	ug/l	
591-78-6	2-Hexanone	ND	2.0	0.084	ug/l	
75-09-2	Methylene chloride	ND	0.50	0.047	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	2.0	0.27	ug/l	
100-42-5	Styrene	ND	0.50	0.028	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	0.50	0.050	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	0.035	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	0.50	0.052	ug/l	
127-18-4	Tetrachloroethylene	ND	0.50	0.091	ug/l	
108-88-3	Toluene	ND	0.50	0.044	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BPOW 6-4		
Lab Sample ID:	JB97890-4	**Date Sampled:**	06/24/15
Matrix:	AQ - Water	**Date Received:**	06/25/15
Method:	EPA 524.2 REV 4.1	**Percent Solids:**	n/a
Project:	Northrop Grumman, OU2 Hydro, Bethpage, NY		

Special VOA List

CAS No.	Compound	Result	RL	MDL	Units	Q
79-01-6	Trichloroethylene	ND	0.50	0.024	ug/l	
75-01-4	Vinyl chloride	ND	0.50	0.032	ug/l	
	m,p-Xylene	ND	0.50	0.13	ug/l	
95-47-6	o-Xylene	ND	0.50	0.029	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2199-69-1	1,2-Dichlorobenzene-d4	96%		78-114%
460-00-4	4-Bromofluorobenzene	91%		77-115%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	Total TIC, Volatile		0	ug/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

ARCADIS

Table 1. Concentrations of Volatile Organic Compounds in Monitoring Wells BPOW 6-1, BPOW 6-2, BPOW 6-3 and BPOW 6-4, Second Quarter 2015, Operable Unit 2 (Groundwater), Bethpage, New York.

CONSTITUENT (Units in µg/L)	Well: / Sample ID: / Date:	BPOW 6-1 / BPOW 6-1 / 6/22/2015	BPOW 6-2 / BPOW 6-2 / 6/23/2015	BPOW 6-2 / BPOW 6-R [1] / 6/23/2015	BPOW 6-3 / BPOW 6-3 / 6/24/2015	BPOW 6-4 / BPOW 6-4 / 6/24/2015
1,1,1-Trichloroethane		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-trichloro-1,2,2-trifluroethane		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Butanone (MEK)		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2-Hexanone		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
4-methyl-2-pentanone (MIK)		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Acetone		< 9.3 B	< 5.0 B	< 5.0 B	< 5.0 B	< 5.0
Benzene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromoform		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromomethane		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon Disulfide		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon tetrachloride		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroform		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane		**0.51**	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,2-dichloroethene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-dichloropropene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibromochloromethane		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Ethylbenzene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Methylene Chloride		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-dichloroethene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-dichloropropene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethylene		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl Chloride		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylene-o		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes - m,p		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total VOCs		**0.51**	0	0	0	0

Notes and Abbreviations:

[1] BPOW 6-R is a blind duplicate sample.

Results validated following protocols specified in OU2 Groundwater Monitoring Plan (ARCADIS 2014)

Samples analyzed for the TCL VOCs using USEPA Method 524.2.

Total VOCs are rounded to two significant figures.

Bold value indicates a detection

TCL Target Compound List

VOC Volatile Organic Compound

USEPA United States Environmental Protection Agency

µg/L Micrograms per liter

B Compound detected in associated blank sample

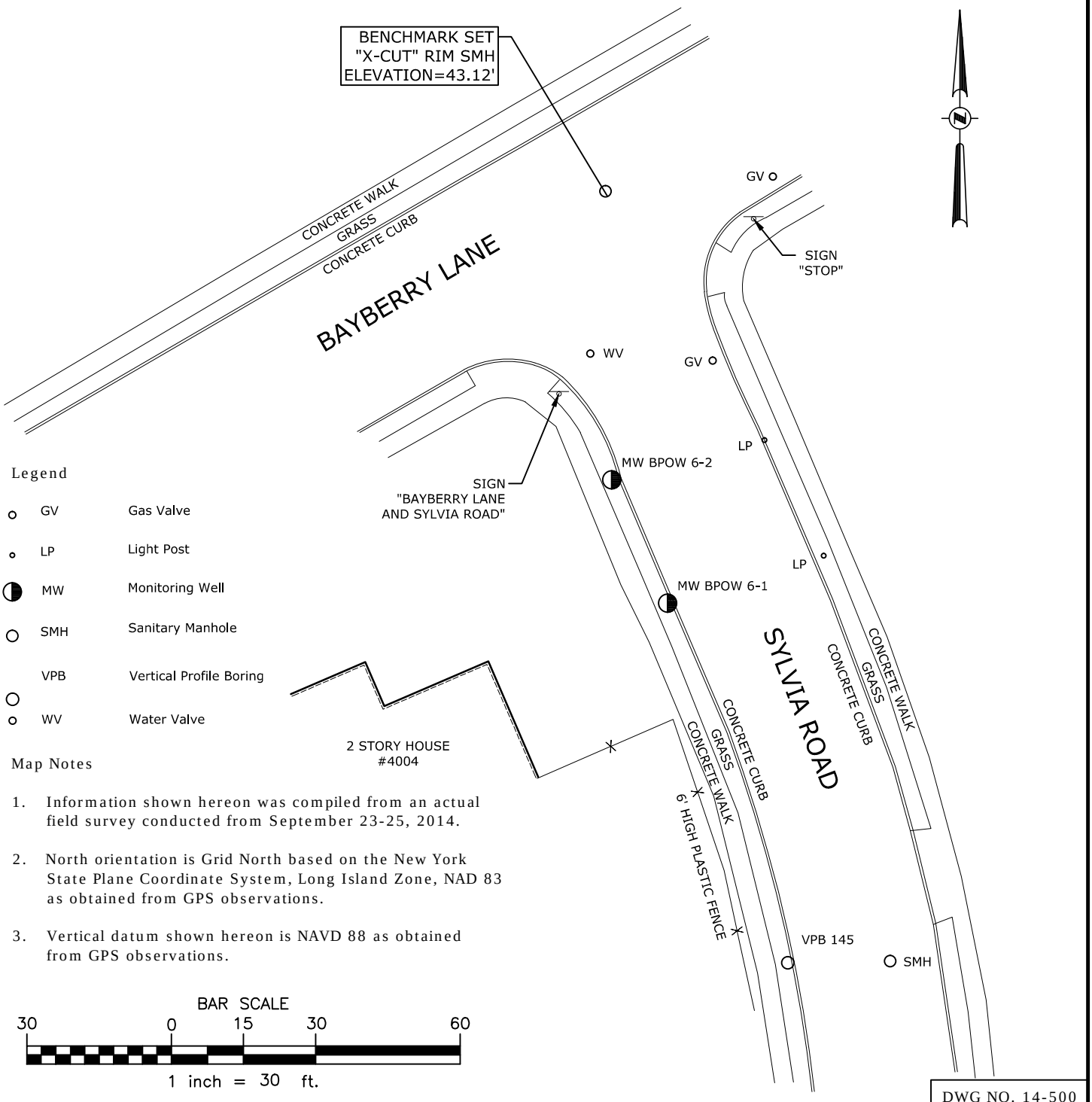
Section 7

Survey

NONE :XREFS

UNAUTHORIZED ALTERATION OR ADDITION TO THIS DOCUMENT IS A VIOLATION OF SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

Description	Northing	Easting	Latitude	Longitude	Ground	Rim	PVC
VPB 145	193153.53	1126821.88	N40-41-44.48	W73-29-09.07	44.20	NA	NA
MWBPOW6-1	193228.16	1126796.92	N40-41-45.22	W73-29-09.38	43.61	43.61	42.93
MWBPOW6-2	193253.75	1126785.34	N40-41-45.48	W73-29-09.53	43.58	43.58	43.08



Legend

GV	Gas Valve
LP	Light Post
MW	Monitoring Well
SMH	Sanitary Manhole
VPB	Vertical Profile Boring
WV	Water Valve

Map Notes

1. Information shown hereon was compiled from an actual field survey conducted from September 23-25, 2014.
2. North orientation is Grid North based on the New York State Plane Coordinate System, Long Island Zone, NAD 83 as obtained from GPS observations.
3. Vertical datum shown hereon is NAVD 88 as obtained from GPS observations.

BAR SCALE

30 0 15 30 60

1 inch = 30 ft.

DWG NO. 14-500

Date	RECORD OF WORK	Appr.
7-15-15	WELL DESIGNATIONS REVISED	JFC

VERTICAL PROFILE BORING 145 SURVEY LOCATION
4004 BAYBERRY LANE

TOWN OF SEAFORD | NASSAU COUNTY, NEW YORK

C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture & Landscape Architecture, D.P.C.
50 CENTURY HILL DRIVE, LATHAM, NY 12110
518.786.7400 * FAX 518.786.7299

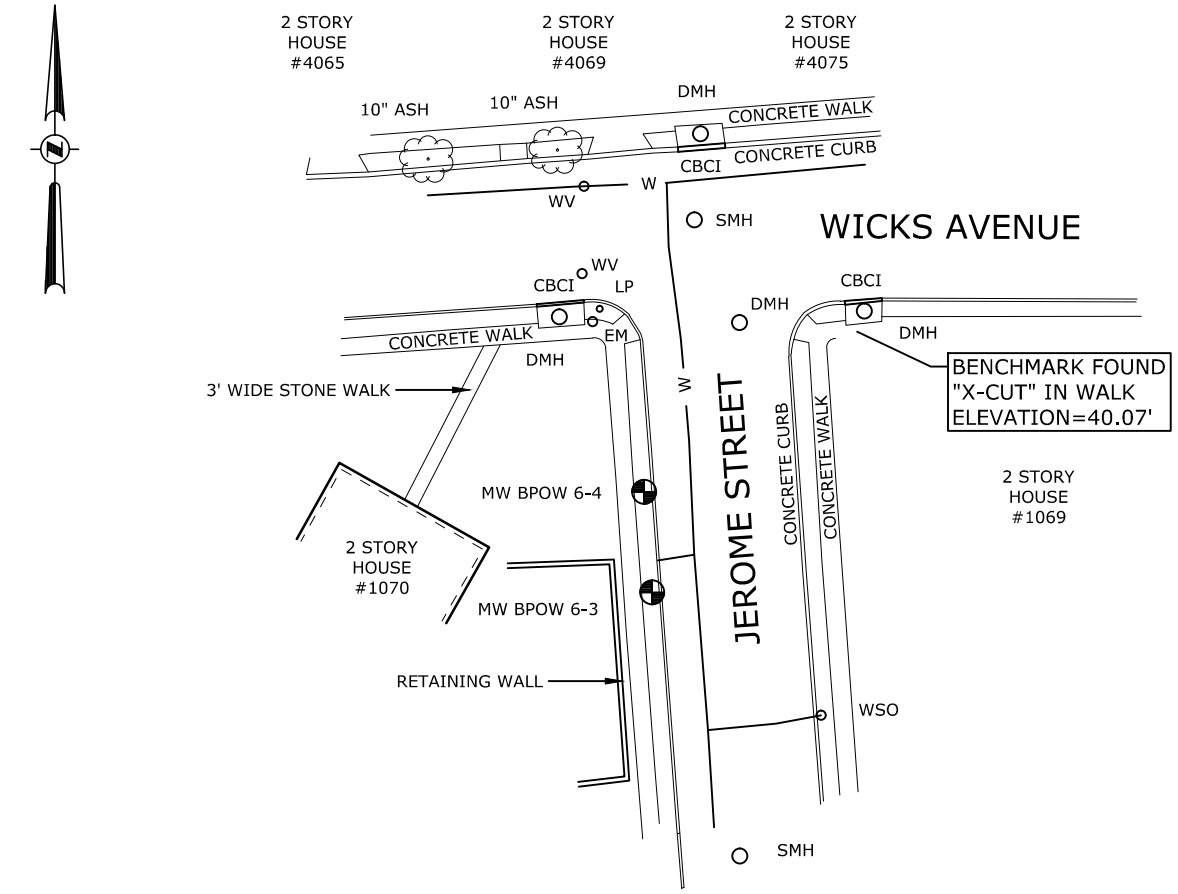
Drafter: LMK	Checker: JFC	SCALE: 1"=30'	DATE: SEPT. 24, 2014
Appr. by: JFC	Proj. No. 14.4121		

CAD DWG. FILE NAME: K:\Projects\14412\1\Survey\Drawings and Maps\VPB 145.dwg

NONE :XREFS

UNAUTHORIZED ALTERATION OR ADDITION TO THIS DOCUMENT IS A VIOLATION OF SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

Description	Northing	Easting	Latitude	Longitude	Ground	Rim	PVC
MW BPOW 6-4	194127.00	1127580.66	N40-41-54.06	W73-28-59.14	40.40	40.40	40.02
MW BPOW 6-3	194106.07	1127582.36	N40-41-53.85	W73-28-59.12	40.34	40.34	39.96



Legend

CBCI	Catch Basin Curb Inlet
	Deciduous Tree
EM	Electric Marker
LP	Light Pole
MW BPOW 6-3	Monitoring Well
SMH	Sanitary Manhole
WSO	Water Shut Off
WV	Water Valve
W	Water Line

Map Notes

1. Information shown hereon was compiled from an actual field survey conducted on March 26, 2015.
2. North orientation is Grid North based on the New York State Plane Coordinate System, Long Island Zone, NAD 83 as obtained from GPS observations.
3. Vertical datum shown hereon is NAVD 88 as obtained from GPS observations.

BAR SCALE
40 0 20 40 80
1 inch = 40 ft.

DWG NO. 15-219

Date	RECORD OF WORK	Appr.

VERTICAL PROFILE BORING 146 SURVEY LOCATION
MW BPOW 6-3 AND MW BPOW 6-4
4099 JEROME STREET

TOWN OF BETHPAGE | NASSAU COUNTY, NEW YORK

Drafter: LMK	Checker: JFC
Appr. by: JFC	Proj. No. 14.4121

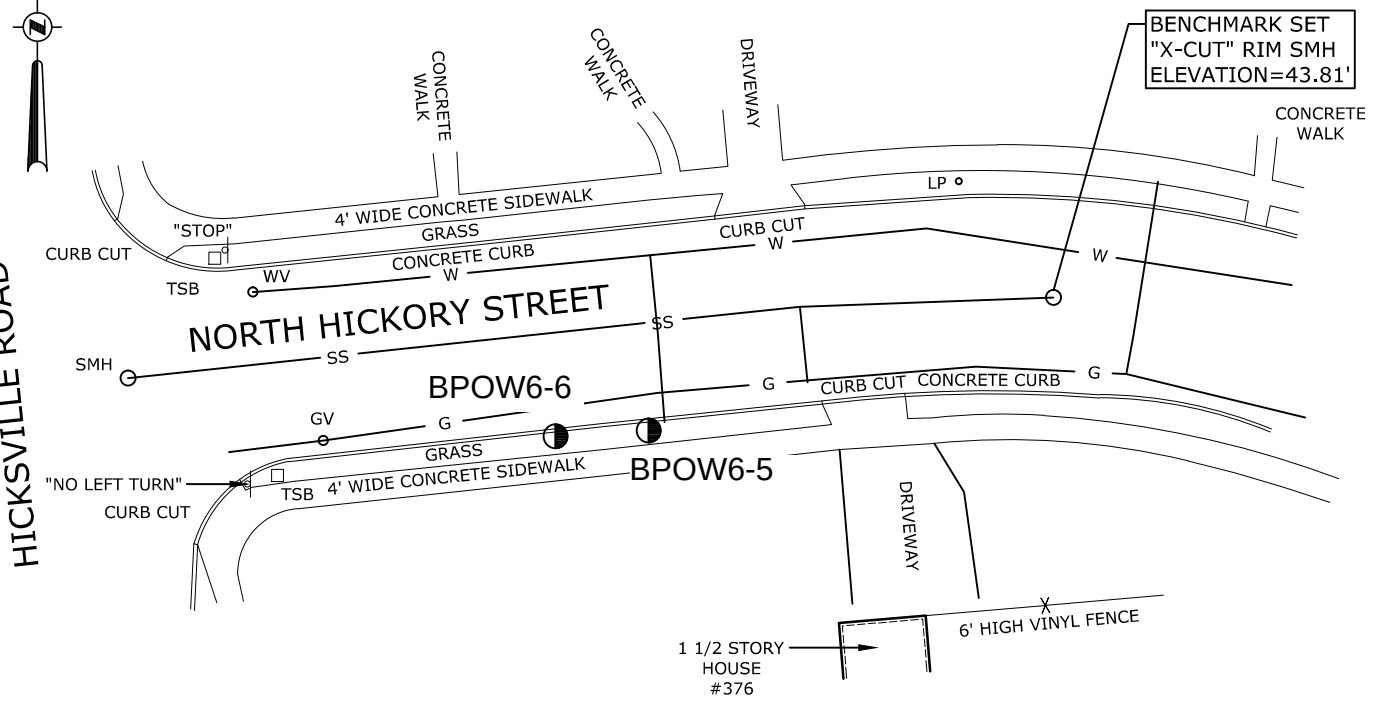
C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture & Landscape Architecture, D.P.C.
50 CENTURY HILL DRIVE, LATHAM, NY 12110
518.786.7400 * FAX 518.786.7299

SCALE: 1"=40' | DATE: MARCH 26, 2015

CAD DWG. FILE NAME: K:\Projects\14121\Survey\Drawings and Maps\MW BPOW6-3 AND MW BPOW6-4.dwg

NONE :XREFS

Description	Northing	Easting	Latitude	Longitude	Ground	Rim	PVC
BPOW6-5	194045.49	1128178.28	N40-41-53.22	W73-28-51.39	43.27	43.30	42.58
BPOW6-6	194044.59	1128163.72	N40-41-53.21	W73-28-51.58	43.17	43.16	42.34



Legend

○	DMH	Drainage Manhole
○	GV	Gas Valve
○	LP	Light Pole
◑	MW	Monitoring Well
○	SMH	Sanitary Manhole
—○—		Sign
□	TSB	Traffic Signal Box
○	WV	Water Valve
—— G ——		Underground Gas Line
—— SS ——		Underground Sanitary Line
—— W ——		Underground Water Line

Map Notes

1. Information shown hereon was compiled from an actual field survey conducted from July 7, 2015.
2. North orientation is Grid North based on the New York State Plane Coordinate System, Long Island Zone, NAD 83 as obtained from GPS observations.
3. Vertical datum shown hereon is NAVD 88 as obtained from GPS observations.

BAR SCALE

30 0 15 30 60

1 inch = 30 ft.

SHEET 2 OF 2

DWG NO. 14-501

Date	RECORD OF WORK	Appr.
7-7-15	ADDED SHEET 2	JFC

VERTICAL PROFILE BORING 147 SURVEY LOCATION
MONITORING WELL BPOW6-5 AND 6-6 SURVEY LOCATION
376 NORTH HICKORY STREET

TOWN OF MASSAPEQUA | NASSAU COUNTY, NEW YORK

Drafter: LMK | Checker: JFC

Appr. by: JFC | Proj. No. 14.4121

SCALE: 1"=30' | DATE:SEPT. 24, 2014

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CAD DWG. FILE NAME: K:\Projects\14412\1\Survey\Drawings and Maps\VPB 147.dwg