TETRA TECH

NOR-00968

January 31, 2011

Mr. Stephen Scharf
New York Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Remedial Action A
625 Broadway, 11th Floor
Albany, New York 12233-7015

Reference: CLEAN Contract No. N62472-03-0057
Contract Task Order 66

Subject: BPOW 2-1 and BPOW 2-2 Outpost Monitoring Wells Repair and Sampling Summary
NWIRP Bethpage, New York

Dear Mr. Scharf:

On behalf of the Navy, please find enclosed a copy of the subject document. This document provides a summary of activities to repair and sample outpost monitoring wells BPOW 2-1 and 2-2 at Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York.

If you have any questions please contact Ms. Lora Fly, NAVFAC Mid-LANT, at (757) 341-2012.

Sincerely,

David D. Brayack, P.E.
Project Manager

Enclosure: (1) BPOW 2-1 and BPOW 2-2 Outpost Monitoring Wells Repair and Sampling Summary
NWIRP Bethpage, New York

Distribution:
Mid-Lant, Lora Fly
NYSDEC (Albany), Henry Wilkie (email)
NYSDOH (Troy), Steve Karpinski (email)
NAVAIR, Richard Smith
USEPA, Carol Stein (email)
NGC, Kent Smith (email)
South Farmingdale Water District
Tetra Tech NUS, Dave Brayack
ECOR Solutions, Al Taormina
Administrative Record
Project File

Tetra Tech NUS, Inc.
5700 Lake Wright Drive, Suite 309, Norfolk, VA 23502
Tel 757.461.3768 Fax 757.461.4148 www.ttnus.com

BPOW 2-1 AND BPOW 2-2 OUTPOST MONTORING WELLS
REPAIR AND SAMPLING SUMMARY
NWIRP BETHPAGE, NEW YORK

INTRODUCTION

This document summarizes activities conducted to repair and sample Outpost Monitoring Wells BPOW 2-1 and BPOW 2-2 at Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage (Figure 1). These activities include:

- Monitoring well repair (BPOW 2-1)
- Development of monitoring wells (BPOW 2-1, and BPOW2-2)
- Analytical results from October 2010 and December 2010 sampling events (BPOW 2-1, and BPOW 2-2)

BACKGROUND

In April 2003, the Navy issued the OU 2 Record of Decision (ROD) that in part identified the installation of Outpost Monitoring Wells BPOW 2-1 and 2-2. These monitoring wells were installed to provide a 4-year time period between site-related volatile organic compounds (VOCs) being detected in the outpost monitoring wells and a potential impact at South Farmingdale Water District Plant No. 3. A potential impact would consist of the detection of any site-related VOCs being at 0.5 micrograms per liter (µg/L) or greater. The wells were placed (horizontally and vertically) based on modeling efforts that identified flow pathways between the estimated location of site-related contamination at that time and the first detection of the contamination into the well field. The modeling used a target value of 0.5 µg/L for individual VOCs in the public water supply, which is a factor of 10 less than the maximum contaminant level (MCL) of 5 µg/L for most of the site-related VOCs.

In August and September 2003, the Navy installed and developed Outpost Monitoring Wells 2-1 and 2-2. In April 2004, the Navy installed dedicated pumps and packers in the wells. In May and June 2004, Northrop Grumman Corporation (NGC) collected the first groundwater samples from this area. The initial round of sampling for BPOW 2-1 was conducted in June 2004 and detected total volatile organic compound (TVOCs) at a concentration of 3.78 µg/L, including trichloroethene (TCE) detected at 1.1 µg/L. Two additional samples were collected from BPOW 2-1 in August 2004, and TVOCs totaled 6.8 and 5.4 µg/L, including TCE detected at a concentration of 1.8 µg/L in both samples. Benzene was also detected at a maximum concentration of 42 µg/L in these samples.

The initial round of sampling for BPOW 2-2 was conducted in May 2004, TCE was detected at a concentration of 0.84 ug/L. No other VOCs were detected in this sample, or in the two subsequent samples collected in May and June 2004.

Between 2004 and mid-2007, NGC continued to sample these wells on a quarterly basis. TVOCs were consistently detected in BPOW 2-1 at concentrations ranging from 3.6 ug/L to 10.24 ug/L. TVOCs were not detected in samples collected from BPOW 2-2 in the 2004 quarterly samples subsequent to the May 2004 event, but were consistently detected in groundwater samples collected from 2005 to 2007, with TVOC detections in BPOW 2-2 ranging from 0.55 to 2.4 ug/L. The maximum individual VOC detected in BPOW 2-2 was TCE at 1.4 ug/L in July 2006.

In 2007, in response to benzene detected in BP0W 2-1, NYSDEC conducted an investigation of groundwater in the area. This investigation included the removal of dedicated sampling pump and packer assemblies in outpost monitoring wells BPOW 2-1 and BPOW 2-2. This evaluation continued through 2008 and concluded that the well casing for BPOW 2-1 was cracked and that the detections of VOCs in BPOW 2-1 were the result of shallow contaminated groundwater infiltrating the casing and flowing downward into the screen interval. Because this crack resulted in a conduit for migration of shallow groundwater contamination into a zone that may be intercepted by a water district well, in 2009 the Navy repaired the well by installing a 2-inch monitoring well within the 4-inch well and using a bentonite/cement grout sealed the annular space above the screen zone. Additional detail on the repair and subsequent actions are described below.

OUTPOST MONITORING WELL BPOW 2-1

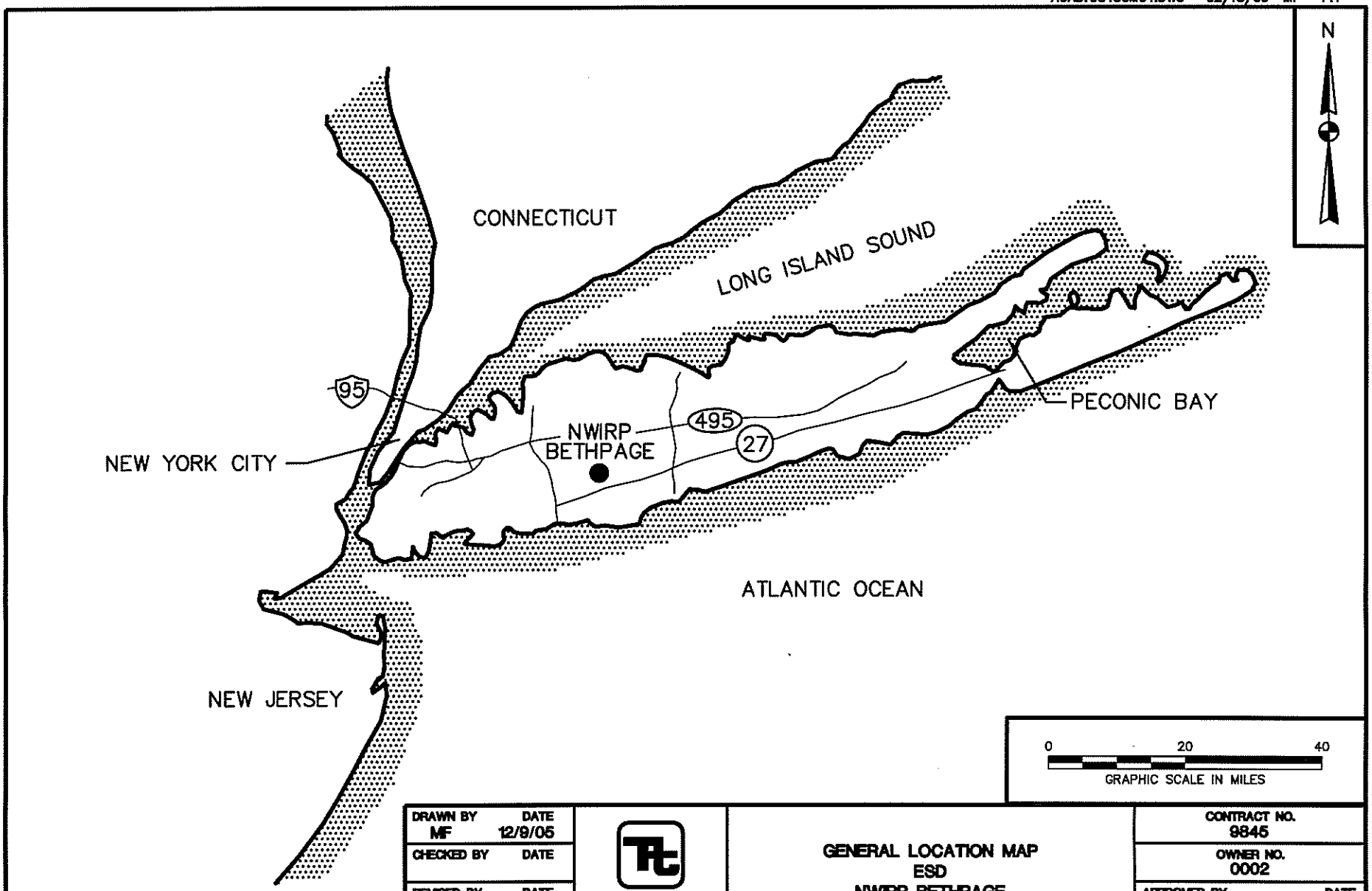
- BPOW 2-1 was repaired in May 2009. The monitoring well repair construction log is provided in Attachment 1.
- BPOW 2-1 was re-developed on October 5, 2010. The monitoring well development log is provided in Attachment 2.
- New dedicated submersible pump was installed on December 7, 2010.
- Groundwater samples were collected from BPOW 2-1 on October 6, 2010 and December 8, 2010. The sample collected in October 2010 was collected at the end of development to provide an initial evaluation of groundwater quality and are considered to be screening level quality. The sample collected in December 2010 is representative of stabilized groundwater conditions and is considered a high level quality sample.
- Samples were analyzed for Target Compound List (TCL) VOCs. Sample logs sheets documenting the collection of these samples are provided in Attachment 3. Sample Chain of Custody forms are provided in Attachment 4.

- Site-related VOCs were not detected in groundwater samples collected BPOW 2-1 during the October and December 2010 sampling events.
- Data validation reports are provided in Attachment 5.

OUTPOST MONITORING WELL BPOW 2-2

- No repairs were conducted on BPOW 2-2.
- BPOW 2-2 was re-developed on December 7, 2010. The monitoring well development log is provided in Attachment 2.
- A decontaminated submersible pump was installed on December 7, 2010 as documented in Attachment 1.
- Groundwater samples were collected from BPOW 2-2 on October 7, 2010 and December 8, 2010. The samples were analyzed for TCL VOCs. Sample logs sheets documenting the collection of these samples are provided in Attachment 3. Sample Chain of Custody forms are provided in Attachment 4.
- The sample collected from October 2010 had a single positive VOC detection, chloroethane at 12 µg/L. Chloroethane was also detected in the trip blank sample associated with this sampling event at a concentration of 13 µg/L. Because chloroethane was not detected in associated laboratory method blank, data validation did not reject the detection. However, it is suspected that the detection of chloroethane in the October 2010 BPOW 2-2 sample was attributed to laboratory contamination.
- Chloroethane was not detected in the December 2010 sample. However, 1,1-Dichloroethane was detected in this sample at 0.74 µg/L. This detection was qualified as an estimated value. Laboratory data validation qualified this detection as uncertainty near detection limit.
- Data validation reports are provided in Attachment 5.

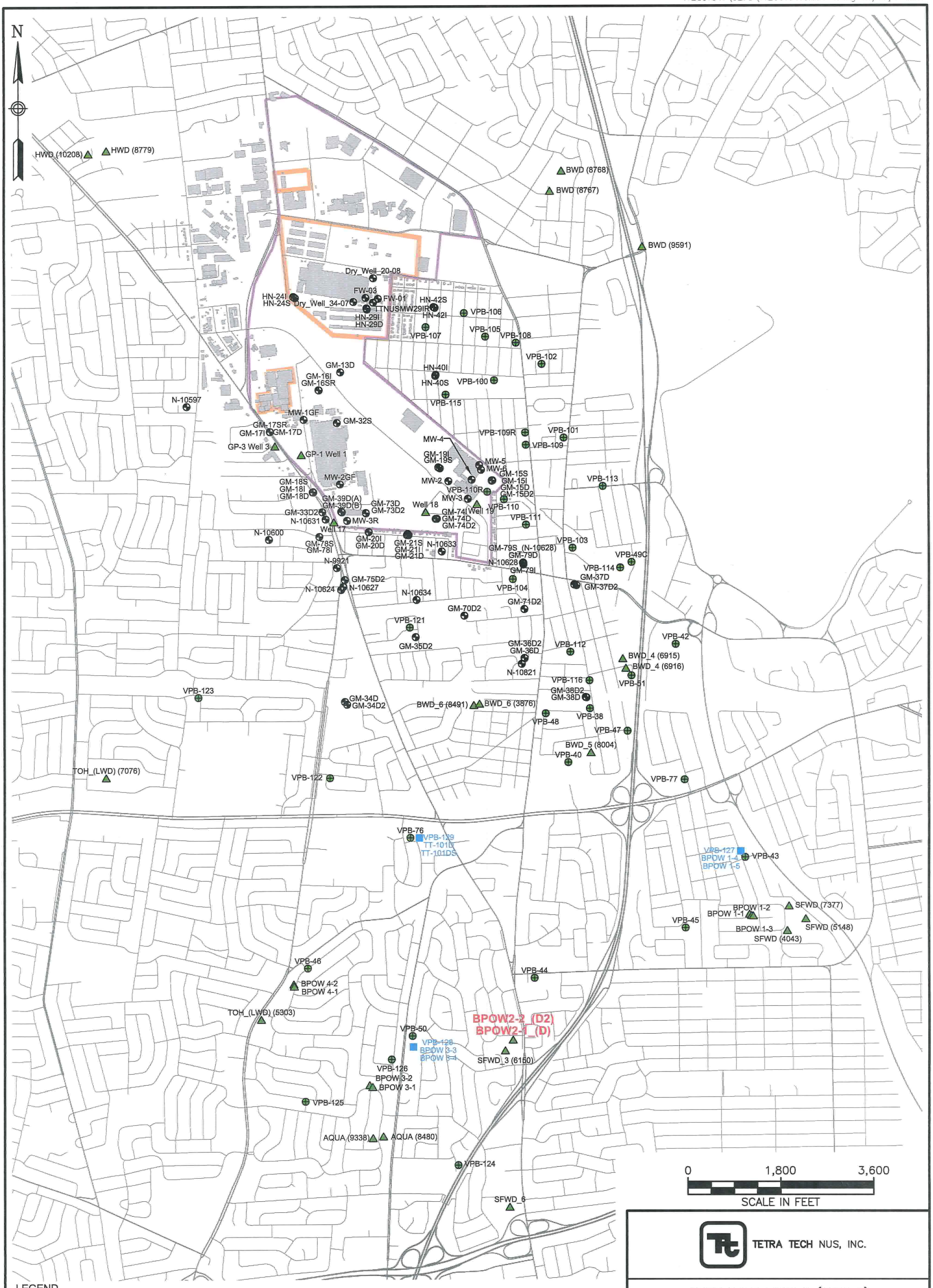
ACAD: 9845CM04.DWG 02/15/06 MF PIT



DRAWN BY MF DATE 12/9/05	Tetra Tech NUS, Inc.	GENERAL LOCATION MAP ESD NWIRP BETHPAGE BETHPAGE, NEW YORK	CONTRACT NO. 9845
CHECKED BY DATE			OWNER NO. 0002
REVISED BY DATE			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1 / REV. 0

FORM CADD NO. TTNUS-AH.DWG - REV 1 -9/10/98

112G01041\0275\112G01041GM04-1.dwg 01/27/11 MKB



LEGEND

- GROUNDWATER SAMPLING LOCATION
- VERTICAL PROFILE BORING
- WATER SUPPLY WELL
- PROPOSED VERTICAL PROFILE BORING AND OUTPOST MONITORING WELL LOCATION (2010/2011 INVESTIGATION)
- BUILDING
- HIGHWAY
- MAJOR LOCAL ROAD
- MINOR LOCAL ROAD
- 1997 NORTHROP-GRUMMAN BETHPAGE BOUNDARY
- 1997 NWIRP BETHPAGE BOUNDARY

TETRA TECH NUS, INC.

OPERABLE UNIT 2 (SITE 1) OUTPOST MONITORING WELLS BPOW 2-1 AND BPOW 2-2 LOCATION MAP NAVAL WEAPONS INDUSTRIAL RESERVE PLANT BETHPAGE, NEW YORK

FILE	SCALE
112G01041GM04-1	AS NOTED
FIGURE NUMBER: FIGURE 2	REV: 0 / DATE: 01/27/11

ATTACHMENT 1

MONITORING WELL REPAIR/CONSTRUCTION

CONSTRUCTION LOG

Attachment B
New Monitoring Well

WELL NO.: OW 2-1

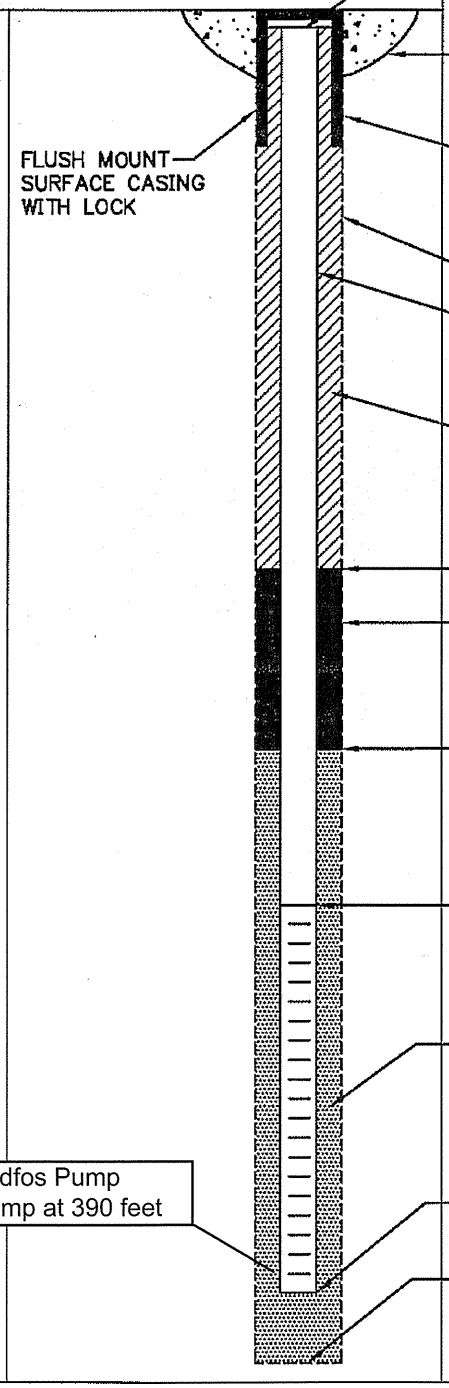
Tetra Tech NUS, Inc.

OVERBURDEN
MONITORING WELL SHEET
FLUSH - MOUNT

Repair by UTD

PROJECT NWIRP Bethpage	LOCATION Bethpage	DRILLER Unitech	
PROJECT NO. 112G00220	BORING NA 0	DRILLING METHOD NA	
DATE BEGUN 5/14/2009	DATE COMPLETED 5/14/2009		
FIELD GEOLOGIST STAN CONTI		DEVELOPMENT METHOD Hot Developed	
GROUND ELEVATION	DATUM		

ACAD:FORM_MWFN.dwg 07/20/99 INL



ELEVATION TOP OF RISER: _____

TYPE OF SURFACE SEAL: Concrete Pad

TYPE OF PROTECTIVE CASING: Steel - Flush Mount

I.D. OF PROTECTIVE CASING: 12" Diameter

DIAMETER OF HOLE: Original 8"

TYPE OF RISER PIPE: 2" Schedule 40 PVC riser

RISER PIPE I.D.: 2.067"

TYPE OF BACKFILL/SEAL: Cement / bentonite grout

ELEVATION/DEPTH TOP OF SEAL: 1330

TYPE OF SEAL: Bentonite Slurry

ELEVATION/DEPTH TOP OF SAND: #0 Sand 340-346 / #1 Sand 346-356

ELEVATION/DEPTH TOP OF SCREEN: 1356

TYPE OF SCREEN: Schedule 40 PVC

SLOT SIZE x LENGTH: 10 slot

TYPE OF SAND PACK: #1 filtersand

DIAMETER OF HOLE IN BEDROCK: NA

2-inch Grundfos Pump
bottom of pump at 390 feet

ELEVATION / DEPTH BOTTOM OF SCREEN: 1396

ELEVATION / DEPTH BOTTOM OF SAND: ~~1360~~

ELEVATION/DEPTH BOTTOM OF HOLE: 1400

BACKFILL MATERIAL BELOW SAND: NA

396' EJW 1/31/11

Pump installed on 12/8/2010.

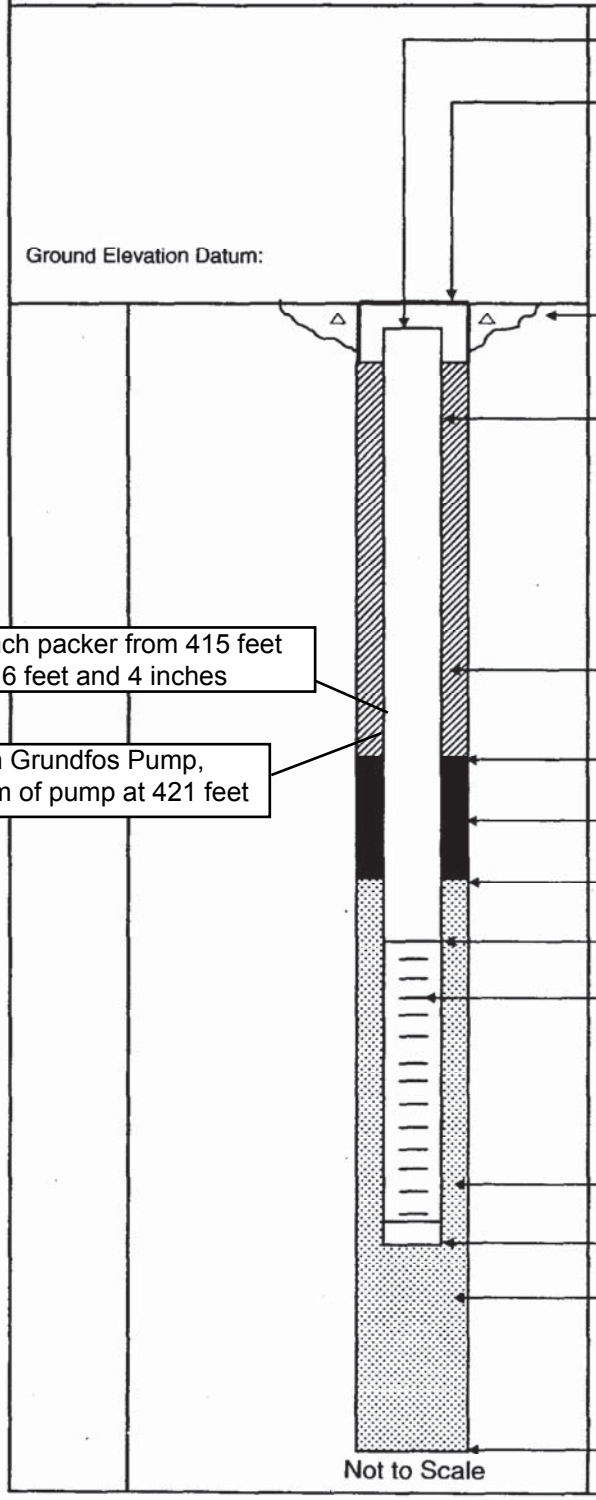
Tetra Tech NUS, Inc.

WELL No.: BPOW 2-2

MONITORING WELL SHEET

PERMIT No:

PROJECT:	NWIRP	DRILLING Co.:	UNITECH	BORING No.:	BPOW 2-2
PROJECT No.:	N4037	DRILLER:	EVANS	DATE COMPLETED:	8/20/03
SITE:	BPOW 2	DRILLING METHOD:	MUD ROT	NORTHING:	
GEOLOGIST:	CONTI	DEV. METHOD:		EASTING:	



Elevation / Depth of Top of Riser:	/
Elevation / Height of Top of Surface Casing:	/
I.D. of Surface Casing:	
Type of Surface Casing:	STEEL
Type of Surface Seal:	CONCRETE PAD
I.D. of Riser:	3 13/16"
Type of Riser:	PVC SCH 80
Borehole Diameter:	8"
Type of Backfill:	VOLCLAY GROUT
Elevation / Depth of ~~Seal~~ F SAND #0:	1425
Type of Seal:	NA
Elevation / Depth of Top of Filter Pack: (c)	1435
Elevation / Depth of Top of Screen:	1455
Type of Screen:	PVC SCH 80
Slot Size x Length:	10 SL x 40'
I.D. of Screen:	3 13/16
Type of Filter Pack: #1	SILICA SAND
Elevation / Depth of Bottom of Screen:	1495
Elevation / Depth of Bottom of Filter Pack:	1496
Type of Backfill Below Well:	SAND
Elevation / Total Depth of Borehole:	1510

Pump installed on 12/8/2010.

REV 2/12/04

ATTACHMENT 2

MONITORING WELL

DEVELOPMENT LOG

20.56 4" TPVC
2-2

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: BPOW-2-1 | Depth to Bottom (ft.): ~396' BGS | Responsible Personnel: Conti
Site: OU2 BETHPAGE | Static Water Level Before (ft.): 21.35 | Drilling Co.: Delta
Date Installed: 5/14/09 | Static Water Level After (ft.): | Project Name: Bethpage OU-2 Offsite GW
Date Developed: 10-5-10 | Screen Length (ft.): 40' | Project Number 112G00622
Dev. Method: AIR LIFT/PUMP | Specific Capacity:
Pump Type: GRUNDFOS 2"Φ | Casing ID (in.): 2"

REPAIRED ON 5/14/09 PLACED 2" INSIDE 4"Φ

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below ~~TOC~~ BGS)	Temperature (Degrees C)	pH	Specific Conductance (Units ms/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1130	NA	—	21.35					NO ODOR.
1200	"	300		15.16	4.50	0.175	185	~10 GPM CLOUDY
1300	"							~30 GPM CLEAR
1315	"	750		15.45	4.36	0.077	4.1	CLEAR
1330	"	1000	21.35	15.50	4.34	0.071	4.0	CLEAR AVE ~16.7 GPM
		XXXX						
0825	NA	—	21.29					AIR LIFT.
0945	NA	START						START AIR LIFT
1000	"	500±	NA	14.87	4.27	0.151	1.0	CLEAR
1015	"	1000	"	14.36	4.40	0.089	3.0	" ≈33GPM
		GO EMPTY						
1100	"	START	NA	—	—	—	—	
1115	"	500	NA	14.68	4.59	0.078	1.8	CLEAR.
1130	"	1000	NA	14.32	4.51	0.075	2.1	"
		3000	TOTAL AIR LIFT					SJ Conti

Min
30
10/5
10/6

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: BROW 2-2
Site: BETHPAGE OU-2
Date Installed: _____
Date Developed: 10-7-10
Dev. Method: AIR LIFT/ PUMP
Pump Type: GRUNDFOS

Depth to Bottom (ft.): ~510'
Static Water Level Before (ft.): 20.56
Static Water Level After (ft.): _____
Screen Length (ft.): _____
Specific Capacity: _____
Casing ID (in.): 4" SCH 80

Responsible Personnel: Conti
Drilling Co.: Delta
Project Name: Bethpage OU-2 Offsite GW
Project Number 112G00622

~ 80 GPM / AIR LIFT / HOSE @ 300'±

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1000	NA	—	20.56	—	—	—	—	—
1020	"	1600	NA	14.80	4.44	0.178	33.5	SL CLOUDY - NO ODOR
1040	"	3200	NA	15.31	4.61	0.107	7.1	CLEAR "
1100	"	4800	NA	16.02	4.61	0.103	0.0	"
1120		6400±	21.15	WL TPVC	4.61	0.101	1.0	"
		CANNOT	MEAS WL -	DUE TO	AIR	LIFT HOOKUP	AT	WELL.
		4" ϕ WELL	(NO REPAIR - JUST	RE-	DEVELOP	MENT.		

ATTACHMENT 3

GROUNDWATER SAMPLE LOG

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: BETHPAGE OU-2 OFFSITE GW
Project No.: 112G00622
PRE-DESIGN FIELD INVES

Sample ID No.: BP-OW-2-1
Sample Location: BPOW2-1
Sampled By: SJC

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

C.O.C. No.: 028424
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

Date: 10/6/10	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1410	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	NA
Method: Pump	CLEAR	4.62	.071	15.98	1.0	2.49	319	—

PURGE DATA:

	TIME							WATER LEV
Date: 10/6/10	1330	4.68	—	—	—	—	—	—
Method: Pump (2")	1340	4.60	.077	16.94	5.8	5.44	307	21.78
Monitor Reading (ppm): 0	1350	4.65	.072	16.02	0.3	2.77	315	21.90
Well Casing Diameter & Material	1400	4.62	.072	16.04	1.2	2.54	318	22.05
Type: 2" Φ PVC	1410	4.60	.071	15.98	1.0	2.49	319	22.14
Total Well Depth (TD): 396								
Static Water Level (WL): 20.85								
One Casing Volume (gal/L): 6l								
Start Purge (hrs): 1330								
End Purge (hrs): 1410								
Total Purge Time (min): 40								
Total Vol. Purged (gal/L): 280								

~7GPM

SAMPLE COLLECTION INFORMATION: Strike thru analysis not required

Analysis	Preservative	Container Requirements	Collected
VOCs	HCL/4 DEG C	2- 40ml Glass Vials	✓

OBSERVATIONS / NOTES:

2" MW = 0.163 gal/ft

Sample taken at discreet intervals using a hydropunch sampler unless otherwise noted.

Not enough volume for water quality parameters
Check box if not enough volume. ☐

Used pH paper instead of water quality meter
Check box if used pH paper. ☐

Pump e ~ 60' BGS
SAMPLING RATE
~ 1GPM

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	SJ Conti

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: BETHPAGE OU-2 OFFSITE GW
Project No.: 112G00622
PRE-DESIGN FIELD INVES

Sample ID No.: BP-OW-2-2
Sample Location: BPOW 2-2
Sampled By: SJC

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

C.O.C. No.: 028424
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

Date: 10/7/10	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1500	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	NA
Method: PUMP (2")	CLEAR							

PURGE DATA:

	TIME							WATER LEV	
Date: 10/7/10	1300	INITIAL		PUMP @		~7 GPM	—	—	≈7 GPM
Method: SUB PUMP	1310	4.55	.108	17.58	1.0	4.90	299	24.70	
Monitor Reading (ppm): 0	1320	4.50	.129	16.49	2.7	3.72	285	24.75	CLEAR
Well Casing Diameter & Material	1330	4.61	.120	15.56	5.0	2.95	282	24.78	"
Type: 4" SCH 80 PVC	1340	4.56	.111	15.29	1.9	1.98	290	24.80	"
Total Well Depth (TD): ~510	1350	4.53	.101	15.07	3.2	7.21	296	24.81	"
Static Water Level (WL): ~~20.56~~	24.10	@1300	—	—	—	—	—	—	
One Casing Volume (gal/L): 320	1400	4.50	.099	14.83	2.2	2.17	302	24.82	" (420 GAL)
Start Purge (hrs): 1300	1420	4.50	.102	14.74	1.0	2.19	303	25.13	" (7 GPM)
End Purge (hrs): 1500	1440	4.50	.101	15.15	0.0	219	298	25.15	
Total Purge Time (min): 120	1500	4.49	.106	14.93	1.0	2.15	316	25.18	
Total Vol. Purged (gal/L): 840									

SAMPLE COLLECTION INFORMATION: Strike thru analysis not required

Analysis	Preservative	Container Requirements	Collected
VOCs	HCL/4 DEG C	(2)-40ml Glass Vials	✓
		TO: COMPUCHEM	

OBSERVATIONS / NOTES:

2" MW = 0.163 gal/ft

Sample taken at discreet intervals using a hydropunch sampler unless otherwise noted.

SAY 490' H_2O (@ 20.56)

SAY 320 GAL/VOL

Not enough volume for water quality parameters
Check box if not enough volume. NA

WL AFTER DEV 24.10

Used pH paper instead of water quality meter
Check box if used pH paper. NA

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	SJ Conti

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 112G00622

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: BPOW2-1-20101208
Sample Location: BPOW2-1
Sampled By: VAS
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-8-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1000	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	ORP
Method: submersible pump	clear	4.25	0.059	11.18	0.0	4.86	0.0	263

PURGE DATA: (Gallons)

Date: 12-8-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other	Time
Method: submersible pump	1.0	4.87	0.121	10.67	31.8	5.39	0.0	260	0841
Monitor Reading (ppm): 0.0	50.0	4.37	0.062	10.49	3.5	4.83	0.0	240	0900
Well Casing Diameter & Material	100	4.32	0.058	10.45	0.0	4.87	0.0	251	0920
Type: 2 inch PVC	150	4.28	0.059	10.89	0.0	4.81	0.0	265	0940
Total Well Depth (TD): 400'	200	4.25	0.059	11.18	0.0	4.86	0.0	263	1000
Static Water Level (WL): 20.62'									
One Casing Volume (gal/L): 61.8									
Start Purge (hrs): 0840									
End Purge (hrs): 1000									
Total Purge Time (min): 100									
Total Vol. Purged (gal/L): 210									

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs	HCl	3 x 40 ml vials	9

OBSERVATIONS / NOTES:

- Pump flow rate ~ 2.5 gpm initially
- Pump set in well at ~ 390' BGS
- Sample split with ARCADIS
- No odors, stains, or elevated PID readings observed.

Water level
0845 → 20.85'
0900 → 20.90'
0920 → 20.91'
0940 → 20.90'

Circle if Applicable:

MS/MSD	Duplicate ID No.:
(Yes)	

Signature(s):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.:

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: BPOW2-2-20101208
Sample Location: BPOW2-2
Sampled By: VAS
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-8-10	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1230	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	ORP
Method: submersible pump	clear	4.15	0.106	11.20	0.0	4.59	0.0	268

PURGE DATA: (Gallons)

Date: 12-8-10	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other	Time
Method: submersible pump	2.0	4.31	0.146	12.05	8.2	5.80	0.0	254	1106
Monitor Reading (ppm): 0.0	60.0	4.20	0.109	11.38	6.0	6.21	0.0	270	1120
Well Casing Diameter & Material	125	4.19	0.107	11.31	0.0	5.73	0.0	271	1140
Type: 4" PVC	190	4.17	0.106	11.29	0.0	5.13	0.0	273	1200
Total Well Depth (TD): ~495'	260	4.16	0.106	11.22	0.0	4.88	0.0	271	1220
Static Water Level (WL): 28.66'	295	4.15	0.106	11.20	0.0	4.59	0.0	268	1230
One Casing Volume (gal/L): 309									
Start Purge (hrs): 1105									
End Purge (hrs): 1230									
Total Purge Time (min): 95									
Total Vol. Purged (gal/L): 300									

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs	HCl	3 x 40 ml vials	Yes

OBSERVATIONS / NOTES:

- Pump set in well at ~ 421' BGS
- Pump flow rate ~ 3.0 gpm
- Sample split with ARCADIS
- No stains, odors, or elevated PID readings observed.

water level
1120 → 27.15'
1140 → 27.13'
1200 → 27.14'
1220 → 27.13'
1230 → 27.14'

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

ATTACHMENT 4

SAMPLE CHAIN OF CUSTODY FORMS

47

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER No 928424 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G00622	BETHPAGE OU-2 GW	BRAYACK	757 461 3824	COMPUCHEM / DOVER
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
SJ Conti		CONTI	412 551 2629	
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FEDEX # 8735 5966 0829		CARY, NC.

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS VOCs (40ml)								COMMENTS
									G	4oC HCl									
10/6	0900	BP-OWTB-100610	TB	—	—	QC	G	2	2										1010052-01
10/6	1410	BP-OW-2-1	BPOW 2-1	—	—	GW	G	2	2										-02
10/7	1500	BP-OW-2-2	BPOW 2-1	—	—	GW	G	2	2										-03

rec'd @ 0.2°C
SN0015

1. RELINQUISHED BY SJ Conti	DATE 10/7/10	TIME 1530	1. RECEIVED BY FED EX.	DATE 10/7/10	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY Jennifer Dover	DATE 10/8/10	TIME 0922
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

B4488

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 27287 | PAGE 1 OF 1

PROJECT NO: 112G00622	FACILITY: NWIRP Bethpage	PROJECT MANAGER Dave Brayack	PHONE NUMBER (757) 461-3824	LABORATORY NAME AND CONTACT: Chemtech
SAMPLERS (SIGNATURE) Vince Shickora		FIELD OPERATIONS LEADER Vince Shickora	PHONE NUMBER (610) 491-9688	ADDRESS 284 Sheffield Street
		CARRIER/WAYBILL NUMBER FED EX # 8706 9629 3699		CITY, STATE Mountainside, NJ 07092

STANDARD TAT ☐
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☑ 7 day ☐ 14 day

	DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	TYPE OF ANALYSIS: PRESERVATIVE USED: VOCs	VOCs HCl							COMMENTS
										G		6							
1	12/8	0700	BP-TB01-20101208				QC	G	3	3									Trip Blank
2,3,4	12/8	1000	BPOW2-1-20101208				GW	G	9	9									Do MS/MSD
5	12/8	1230	BPOW2-2-20101208				GW	G	3	3									
6	12/8	1425	BPOW1-3-20101208				GW	G	3	3									
7	12/8	1800	BPOW-DUP01-20101208				GW	G	3	3									

1. RELINQUISHED BY	DATE 12-9-10	TIME 1600	1. RECEIVED BY	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY Fed Ex	DATE 12/10/10	TIME 9:30	3. RECEIVED BY	DATE 12/10/10	TIME 9:30

COMMENTS Temp. 4°C

16

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

ATTACHMENT 5

DATA VALIDATION

PACKAGES

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**D. BRAYACK**	**DATE:**	**NOVEMBER 30, 2010**
FROM:	**L. GANSER**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOC**
NWIRP BETHPAGE CTO 066
SAMPLE DELIVERY GROUP (SDG) 1010052

SAMPLES: 3/Aqueous/VOC

BP-OW-2-1 BP-OW-2-2 BP-OWTB-100610

Overview

The sample set for NWIRP Bethpage, CTO 066, SDG 1010052 consists of two (2) environmental aqueous samples and one (1) trip blank. The samples were analyzed for volatile organic compounds (VOCs). No field duplicates were included within this SDG.

The samples were collected on October 6 and 7, 2010 and analyzed by CompuChem, a division of Liberty Analytical Corporation. VOC analyses were conducted in accordance with EPA Method SW-846 8260B. The data contained in this SDG were validated with regard to the following parameters:

* • Data completeness
* • Holding times
* • GC/MS Tune
• Initial/continuing calibrations
• Laboratory Method Blank Results
* • Surrogate Recoveries
• Laboratory Control Sample/Laboratory Control Sample Duplicate Recoveries
* • Internal Standard Recoveries
* • Compound Quantitation
* • Compound Identification
* • Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Qualified analytical results are presented in Appendix A, results as reported by the laboratory are presented in Appendix B, Region II data validation forms are presented in Appendix C, and documentation supporting these findings is presented in Appendix D.

Volatile Organic Compounds

Initial and continuing calibration relative response factor (RRF) was <0.05 for acetone. Positive results for acetone were qualified as estimated, "J".

Continuing calibration percent difference was greater than >20% quality control limit (but <90%) for bromomethane and 4-methyl-2-pentanone on 10/12/10 at 16:16 on instrument 5972hp59. Nondetected results for the aforementioned compounds were qualified as estimated, "UJ".

Contaminants were detected in laboratory method blank VBLKIN at the following maximum concentrations.

Contaminant	Maximum Concentration (ug/L)	Action Level (ug/L)
1,2,4-Trichlorobenzene	1.3	6.5
Naphthalene	3.8	19
Toluene	0.62	3.1

An action level of 5X the maximum contaminant concentration was established to evaluate the samples for laboratory method blank contamination. Sample aliquot and dilution factors were taken into consideration during application of the blank action level. Positive results less than the action level were qualified as nondetected, "U", due to blank contamination. The trip blank was not qualified for laboratory blank contamination.

Percent recovery for one surrogate (1,2-dichloroethane-d4) was greater than quality control limits for sample BP-OW-2-1. Positive results in sample BP-OW-2-1 were qualified as estimated, "J".

Additional Comments

Nondetected results are reported at the limit of detection (LOD).

Positive results below the limit of quantitation (LOQ) and above the detection limit were qualified as estimated, "J", due to uncertainty near the detection limit.

Laboratory control sample duplicate percent recovery was greater than quality control limit for chloromethane. No action was taken as all results for chloromethane were nondetects.

No matrix spike/matrix spike duplicate samples were requested.

EXECUTIVE SUMMARY

Laboratory Performance Issues: 1,2,4-Trichlorobenzene, naphthalene, and toluene were detected in a laboratory method blank. Initial and continuing calibration RRF was <0.05 for acetone. The continuing calibration percent difference was greater than the quality control limit for several analytes. Surrogate recovery was greater than quality control limits affecting one sample.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA National Functional Guidelines for Organic Data Validation (10/99), USEPA Region II Standard Operating Procedures for Validating Volatile Organic Compounds by SW-846 Method 8260B HW-24 Revision 2 (August 2008) and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories" (January 2006).

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

Tetra Tech NUS
Leanne Ganser
Data Validator

TetraTech NUS
Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C – Region II Data Validation Forms
4. Appendix D - Support Documentation

Appendix A

Qualified Analytical Results

Data Validation Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS-GFAA MSA's r < 0.995 / ICP PDS Recovery Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 00622 SDG: 1010052 FRACTION: OV MEDIA: WATER	NSAMPLE	BP-OW-2-1			BP-OW-2-2			BP-OWTB-100610		
	LAB_ID	1010052-02			1010052-03			1010052-01		
	SAMP_DATE	10/6/2010			10/7/2010			10/6/2010		
	QC_TYPE	NM			NM			TB		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0		
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		0.5	U		0.5	U		0.5	U	
1,1,2,2-TETRACHLOROETHANE		2	U		2	U		2	U	
1,1,2-TRICHLOROETHANE		2	U		2	U		2	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		2	U		2	U		2	U	
1,1-DICHLOROETHANE		0.5	U		0.5	U		0.5	U	
1,1-DICHLOROETHENE		2	U		2	U		2	U	
1,1-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U	
1,2,4-TRICHLOROBENZENE		0.5	U		0.5	U		1.4	J	P
1,2-DIBROMO-3-CHLOROPROPANE		2	U		2	U		2	U	
1,2-DIBROMOETHANE		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROETHANE		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROPROPANE		2	U		2	U		2	U	
1,3-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U	
1,4-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U	
2-BUTANONE		5	U		5	U		6.8	J	P
2-HEXANONE		1.3	U		1.3	U		1.3	U	
4-METHYL-2-PENTANONE		1.3	UJ	C	1.3	UJ	C	1.3	UJ	C
ACETONE		7.1	J	CPR	9.3	J	CP	46	J	C
BENZENE		0.5	U		0.5	U		0.5	U	
BROMODICHLOROMETHANE		0.5	U		0.5	U		0.5	U	
BROMOFORM		2	U		2	U		2	U	
BROMOMETHANE		2	UJ	C	2	UJ	C	2	UJ	C
CARBON DISULFIDE		0.5	U		0.5	U		0.5	U	
CARBON TETRACHLORIDE		0.5	U		0.5	U		0.5	U	
CHLOROBENZENE		0.5	U		0.5	U		0.5	U	
CHLORODIBROMOMETHANE		0.5	U		0.5	U		0.5	U	
CHLOROETHANE		2	U		12			13		
CHLOROFORM		0.5	U		0.5	U		0.5	U	
CHLOROMETHANE		0.5	U		0.5	U		0.5	U	
CIS-1,2-DICHLOROETHENE		2	U		2	U		2	U	
CIS-1,3-DICHLOROPROPENE		2	U		2	U		2	U	
CYCLOHEXANE		0.5	U		0.5	U		0.5	U	
DICHLORODIFLUOROMETHANE		0.5	U		0.5	U		0.5	U	
ETHYLBENZENE		0.5	U		0.5	U		0.5	U	
ISOPROPYLBENZENE		0.5	U		0.5	U		0.5	U	

PROJ_NO: 00622	NSAMPLE	BP-OW-2-1			BP-OW-2-2			BP-OWTB-100610		
SDG: 1010052	LAB_ID	1010052-02			1010052-03			1010052-01		
FRACTION: OV	SAMP_DATE	10/6/2010			10/7/2010			10/6/2010		
MEDIA: WATER	QC_TYPE	NM			NM			TB		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0		
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
M+P-XYLENES		1	U		1	U		1	U	
METHYL ACETATE		2	U		2	U		2	U	
METHYL CYCLOHEXANE		0.5	U		0.5	U		0.5	U	
METHYL TERT-BUTYL ETHER		0.5	U		0.5	U		0.5	U	
METHYLENE CHLORIDE		0.5	U		0.5	U		0.5	U	
NAPHTHALENE		2	U		2	U		4.6	J	P
O-XYLENE		0.5	U		0.5	U		0.5	U	
STYRENE		0.5	U		0.5	U		0.5	U	
TETRACHLOROETHENE		0.5	U		0.5	U		0.5	U	
TOLUENE		0.79	U	A	0.73	U	A	1.2	J	P
TOTAL 1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U	
TOTAL XYLENES		0.5	U		0.5	U		0.5	U	
TRANS-1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U	
TRICHLOROETHENE		0.5	U		0.5	U		0.5	U	
TRICHLOROFLUOROMETHANE		0.5	U		0.5	U		0.5	U	
VINYL CHLORIDE		0.5	U		0.5	U		0.5	U	

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO: **D. BRAYACK** **DATE:** **JANUARY 14, 2011**

FROM: **MICHELLE L. ALLEN** **COPIES:** **DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOC, SVOC, PEST, and PCB**
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NWIRP), BETHPAGE
CTO 066
SAMPLE DELIVERY GROUP (SDG) B4488

SAMPLES: 5/Aqueous/VOC

BP-TB01-20101208 BPOW-DUP01-20101208 BPOW1-3-20101208
BPOW2-1-20101208 BPOW2-2-20101208

1/IDW/VOC/SVOC/PEST/PCB

BP-FRACIDW-20101209

Overview

The sample sets for NWIRP Bethpage, SDG B4488 consisted of four (4) aqueous environmental samples, one (1) aqueous waste sample, and one (1) aqueous trip blank. All six (6) aqueous samples were analyzed for volatile organic compounds (VOC). The one (1) aqueous waste sample was analyzed for semi-volatile organic compounds (SVOC), pesticides (PEST), and polychlorinated biphenyls (PCB). One field duplicate sample pair was associated with this sample data group (SDG); BPOW-DUP01-20101208/BPOW1-3-20101208.

The samples were collected by Tetra Tech on December 8 and 9, 2010 and analyzed by Chemtech. All analyses were conducted in accordance with EPA Methods SW-846 8260B, 8270C, 8081, 8082 and EPA Method 624 analytical and reporting protocols. The data contained in this SDG was validated with regard to the following parameters:

* • Data completeness
* • Hold times
* • GC/MS System Tuning and Performance
• Initial/continuing calibrations
* • Laboratory Method Blank Results
• Surrogate Spike Recoveries
• Internal Standard Recoveries
• Laboratory Control Sample/Laboratory Control Sample Duplicate Recoveries
• Matrix Spike/Matrix Spike Duplicate Results
* • Field Duplicate Precision Results
* • Compound Identification
* • Compound Quantitation
* • Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Qualified analytical results are presented in Appendix A, results as reported by the laboratory are presented in Appendix B, Region II data validation forms are presented in Appendix C, and documentation supporting these findings is presented in Appendix D.

Volatile (VOC)

The Percent Differences (%Ds) for 2-hexanone and bromoform exceeded the 20% quality control limit for the continuing calibration performed on instrument MSVOAD on 12/15/10 @ 11:33. Sample BPOW-DUP01-20101208 was affected. Only non-detected results were reported for these compounds in the affected sample and these non-detects were qualified as estimated, (UJ).

The continuing calibration %Ds for acetone and methyl acetate were greater than 20% quality control criteria on instrument MSVOAG on 12/13/10 @ 10:41 affecting samples TB01-20101208, BPOW1-3-20101208, BPOW2-1-20101208, and BPOW2-2-20101208. The non-detected results reported for these compounds were qualified as estimated, (UJ).

The Relative Percent Difference (RPD) for acetone, methyl acetate, 2-butanone, 1,1,2,2-tetrachloroethene, and 1,2-dibromo-3-chloropropane exceeded the 20% quality control limit in the Matrix Spike/Matrix Spike Duplicate (MS/MSD) analyses of sample BPOW2-1-20101208. No action was taken for the non-detected results reported for these compounds in the environmental sample since the Percent Recoveries (%Rs) were acceptable in the MS and MSD samples.

The Laboratory Control Sample (LCS), BSG1213W1, had %Rs for acetone and methyl acetate above the upper quality control limits. No action was taken in the affected samples since no positive results were reported for these compounds.

The LCS/Laboratory Control Sample Duplicate (LCSD) analyses, samples BSG1209W3/BSG1209W4, had RPDs for dichlorofluoromethane, chloromethane, vinyl chloride, bromomethane, chloroethane, trichlorofluoromethane, 1,1-dichloroethene, acetone, carbon disulfide, methyl acetate, and 2-butanone that exceeded 20%. In addition, the %R for acetone was greater that the upper quality control limit. No action was taken in the affected waste water sample since only non-detects were reported for the noncompliant compounds.

The positive result for 1,1-dichloroethane in sample BPOW2-2-20101208 reported below the Limit of Quantitation (LOQ) but above the Method Detection Limit (MDL) was qualified as estimated, (J). Non-detected results are reported to the Limit of Detection (LOD).

Semi-Volatile Organic Compounds (SVOC)

The internal standard, perylene-d12, was below the lower quality control limit in sample BP-FRACIDW-20101209. The sample was reanalyzed yielding similar results. The initial analysis of this sample was used in the data validation. The non-detected results reported the compounds associated with this internal standard were qualified as estimated, (UJ).

Pesticides (PEST)

No problems were noted.

Polychlorinated Biphenyls (PCB)

The surrogate spike compound, decachlorobiphenyl, had %Rs below the lower quality control limit in sample BP-FRACIDW-20101209 and its reanalysis. The initial analysis was used in the validation of the data. The non-detected results reported for the PCBs in this fraction were qualified as estimated, (UJ).

Additional Comments

The VOC analysis of the waste sample, BP-FRACIDW-20101209, was analyzed via EPA Method 624 and evaluated accordingly.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Some compounds were estimated due to continuing calibration %Ds greater than their respective quality control limit. The VOC LCS/LSD had %Rs and RPDs outside the quality control limits. Noncompliant surrogate %Rs resulted in the qualification the waste sample in the PCB fraction. One internal standard was below the lower quality control limit in the SVOC analysis of the waste sample. Affected compounds were estimated.

Other Factors Affecting Data Quality: The MS/MSD sample had noncompliant %Rs and RPDs. Non-detected results were not qualified. A positive result reported below the LOQ but above the MDL was qualified as estimated, (J). Non-detected results are reported to the LOD.

The data for these analyses were reviewed with reference to the following: SOP #HW-24 Revision #2, August 2008, USEPA Region II Hazardous Waste Support Branch Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry, SOP #HW-22 Revision #4, August 2008, USEPA Region II Hazardous Waste Support Branch Validating Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, SOP #HW-44 Revision #1, October 2006, USEPA Region II Hazardous Waste Support Branch Validating Pesticides by Gas Chromatography, SOP #HW-45 Revision #1, October 2006, USEPA Region II Hazardous Waste Support Branch Validating Polychlorinated Biphenyls by Gas Chromatography by SW-846 Methods 8260B, 8270C, 8081, and 8082, EPA Method 624, and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories" (January 2006).

TetraTech NUS
Michelle L. Allen
Chemist/Data Validator

TetraTech NUS
Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C – Region II Data Validation Forms
4. Appendix D - Support Documentation

Appendix A

Qualified Analytical Results

Data Validation Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's r < 0.995 / ICP PDS Recovery Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 00622	NSAMPLE	BP0W1-3-20101208			BP0W2-1-20101208			BP0W2-2-20101208			BP0W-DUP01-20101208		
SDG: B4488	LAB_ID	B4488-06			B4488-02			B4488-05			B4488-07		
FRACTION: OV	SAMP_DATE	12/8/2010			12/8/2010			12/8/2010			12/8/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF										BP0W1-3-20101208		
PARAMETER	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	
1,1,1-TRICHLOROETHANE	0.5	U		0.5	U		0.5	U		0.5	U		
1,1,2,2-TETRACHLOROETHANE	0.5	U		0.5	U		0.5	U		0.5	U		
1,1,2-TRICHLOROETHANE	0.5	U		0.5	U		0.5	U		0.5	U		
1,1,2-TRICHLOROTRIFLUOROETHANE	0.5	U		0.5	U		0.5	U		0.5	U		
1,1-DICHLOROETHANE	0.5	U		0.5	U		0.74	J	P	0.5	U		
1,1-DICHLOROETHENE	0.5	U		0.5	U		0.5	U		0.5	U		
1,2,4-TRICHLOROBENZENE	0.5	U		0.5	U		0.5	U		0.5	U		
1,2-DIBROMO-3-CHLOROPROPANE	0.5	U		0.5	U		0.5	U		0.5	U		
1,2-DIBROMOETHANE	0.5	U		0.5	U		0.5	U		0.5	U		
1,2-DICHLOROBENZENE	0.5	U		0.5	U		0.5	U		0.5	U		
1,2-DICHLOROETHANE	0.5	U		0.5	U		0.5	U		0.5	U		
1,2-DICHLOROPROPANE	0.5	U		0.5	U		0.5	U		0.5	U		
1,3-DICHLOROBENZENE	0.5	U		0.5	U		0.5	U		0.5	U		
1,4-DICHLOROBENZENE	0.5	U		0.5	U		0.5	U		0.5	U		
2-BUTANONE	2.5	U		2.5	U		2.5	U		2.5	U		
2-HEXANONE	2.5	U		2.5	U		2.5	U		2.5	UJ	C	
4-METHYL-2-PENTANONE	2.5	U		2.5	U		2.5	U		2.5	U		
ACETONE	2.5	UJ	C	2.5	UJ	C	2.5	UJ	C	2.5	U		
BENZENE	0.5	U		0.5	U		0.5	U		0.5	U		
BROMODICHLOROMETHANE	0.5	U		0.5	U		0.5	U		0.5	U		
BROMOFORM	0.5	U		0.5	U		0.5	U		0.5	UJ	C	
BROMOMETHANE	0.5	U		0.5	U		0.5	U		0.5	U		
CARBON DISULFIDE	0.5	U		0.5	U		0.5	U		0.5	U		
CARBON TETRACHLORIDE	0.5	U		0.5	U		0.5	U		0.5	U		
CHLOROBENZENE	0.5	U		0.5	U		0.5	U		0.5	U		
CHLORODIBROMOMETHANE	0.5	U		0.5	U		0.5	U		0.5	U		
CHLOROETHANE	0.5	U		0.5	U		0.5	U		0.5	U		
CHLOROFORM	0.5	U		0.5	U		0.5	U		0.5	U		
CHLOROMETHANE	0.5	U		0.5	U		0.5	U		0.5	U		
CIS-1,2-DICHLOROETHENE	0.5	U		0.5	U		0.5	U		0.5	U		
CIS-1,3-DICHLOROPROPENE	0.5	U		0.5	U		0.5	U		0.5	U		
CYCLOHEXANE	0.5	U		0.5	U		0.5	U		0.5	U		
DICHLORODIFLUOROMETHANE	0.5	U		0.5	U		0.5	U		0.5	U		
ETHYLBENZENE	0.5	U		0.5	U		0.5	U		0.5	U		
ISOPROPYLBENZENE	0.5	U		0.5	U		0.5	U		0.5	U		
M+P-XYLENES	1	U		1	U		1	U		1	U		

PROJ_NO: 00622	NSAMPLE	BP-TB01-20101208
SDG: B4488	LAB_ID	B4488-01
FRACTION: OV	SAMP_DATE	12/8/2010
MEDIA: WATER	QC_TYPE	NM
	UNITS	UG/L
	PCT_SOLIDS	0.0
	DUP_OF	

PARAMETER	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE	0.5	U	
1,1,2,2-TETRACHLOROETHANE	0.5	U	
1,1,2-TRICHLOROETHANE	0.5	U	
1,1,2-TRICHLOROTRIFLUOROETHANE	0.5	U	
1,1-DICHLOROETHANE	0.5	U	
1,1-DICHLOROETHENE	0.5	U	
1,2,4-TRICHLOROBENZENE	0.5	U	
1,2-DIBROMO-3-CHLOROPROPANE	0.5	U	
1,2-DIBROMOETHANE	0.5	U	
1,2-DICHLOROBENZENE	0.5	U	
1,2-DICHLOROETHANE	0.5	U	
1,2-DICHLOROPROPANE	0.5	U	
1,3-DICHLOROBENZENE	0.5	U	
1,4-DICHLOROBENZENE	0.5	U	
2-BUTANONE	2.5	U	
2-HEXANONE	2.5	U	
4-METHYL-2-PENTANONE	2.5	U	
ACETONE	2.5	UJ	C
BENZENE	0.5	U	
BROMODICHLOROMETHANE	0.5	U	
BROMOFORM	0.5	U	
BROMOMETHANE	0.5	U	
CARBON DISULFIDE	0.5	U	
CARBON TETRACHLORIDE	0.5	U	
CHLOROBENZENE	0.5	U	
CHLORODIBROMOMETHANE	0.5	U	
CHLOROETHANE	0.5	U	
CHLOROFORM	0.5	U	
CHLOROMETHANE	0.5	U	
CIS-1,2-DICHLOROETHENE	0.5	U	
CIS-1,3-DICHLOROPROPENE	0.5	U	
CYCLOHEXANE	0.5	U	
DICHLORODIFLUOROMETHANE	0.5	U	
ETHYLBENZENE	0.5	U	
ISOPROPYLBENZENE	0.5	U	
M+P-XYLENES	1	U	

PROJ_NO: 00622	NSAMPLE	BP0W1-3-20101208			BP0W2-1-20101208			BP0W2-2-20101208			BP0W-DUP01-20101208		
SDG: B4488	LAB_ID	B4488-06			B4488-02			B4488-05			B4488-07		
FRACTION: OV	SAMP_DATE	12/8/2010			12/8/2010			12/8/2010			12/8/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF										BP0W1-3-20101208		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
METHYL ACETATE		0.5	UJ	C	0.5	UJ	C	0.5	UJ	C	0.5	U	
METHYL CYCLOHEXANE		0.5	U		0.5	U		0.5	U		0.5	U	
METHYL TERT-BUTYL ETHER		0.5	U		0.5	U		0.5	U		0.5	U	
METHYLENE CHLORIDE		0.5	U		0.5	U		0.5	U		0.5	U	
O-XYLENE		0.5	U		0.5	U		0.5	U		0.5	U	
STYRENE		0.5	U		0.5	U		0.5	U		0.5	U	
TETRACHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TOLUENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRANS-1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRICHLOROFLUOROMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
VINYL CHLORIDE		0.5	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 00622	NSAMPLE	BP-TB01-20101208
SDG: B4488	LAB_ID	B4488-01
FRACTION: OV	SAMP_DATE	12/8/2010
MEDIA: WATER	QC_TYPE	NM
	UNITS	UG/L
	PCT_SOLIDS	0.0
	DUP_OF	

PARAMETER	RESULT	VQL	QLCD
METHYL ACETATE	0.5	UJ	C
METHYL CYCLOHEXANE	0.5	U	
METHYL TERT-BUTYL ETHER	0.5	U	
METHYLENE CHLORIDE	0.5	U	
O-XYLENE	0.5	U	
STYRENE	0.5	U	
TETRACHLOROETHENE	0.5	U	
TOLUENE	0.5	U	
TRANS-1,2-DICHLOROETHENE	0.5	U	
TRANS-1,3-DICHLOROPROPENE	0.5	U	
TRICHLOROETHENE	0.5	U	
TRICHLOROFLUOROMETHANE	0.5	U	
VINYL CHLORIDE	0.5	U	