101.02.02.0002

FORMER DRY WELL INVESTIGATION SOUTH OF PLANT NO. 3 AREA OF CONCERN 20

Naval Weapons Industrial Reserve Plant (NWIRP)

Bethpage, New York

Northern Division
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298

Contract Task Order 0283

January 2000

TETRA TECH NUS, INC.

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AREA OF CONCERN 20

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1.0 INTRODUCTION

This report has been prepared as part of the Free Product Recovery Investigation for Contract Task Order (CTO) No. 283 by Tetra Tech NUS, Inc. (TtNUS) for the Northern Division (NORTHDIV) Naval Facilities Engineering Command (NAVFAC) under the Comprehensive Long-Term Environmental Action – Navy (CLEAN) Contract Number N62472-90-D-1298. The purpose of this report is to determine if metal concentrations present in subsurface soils at the location of a former dry well (Area of Concern (AOC) 20) south of Plant No. 3 are in excess of regulatory standards at the Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York. This letter report presents the results of supplemental subsurface soil testing at this location

AOC 20 consists of several dry wells investigated by Northrop Grumman as part of an overall environmental evaluation of Plant No. 3 in 1997 and 1998. One of the former dry wells is located south of Plant No. 3 near AOC 22 – Former Underground Storage Tanks and soils in the area were found to contain elevated concentrations of mercury, lead, and zinc. This dry well has not been active in recent operations (10 years) and is believed by plant personnel to have been out of operation much longer. The dry well structure is not present at the site and the only evidence of this location is historic utility drawings and the presence of gravel in some of the borings.

2.0 FIELD PROGRAM DESCRIPTION AND RATIONALE

The objective of this investigation is to confirm the presence of RCRA metals in soils at a former AOC 20 dry well south of Plant No. 3; and if present, to delineate the approximate extent of contamination. A subsurface soil investigation was conducted in June 1999.

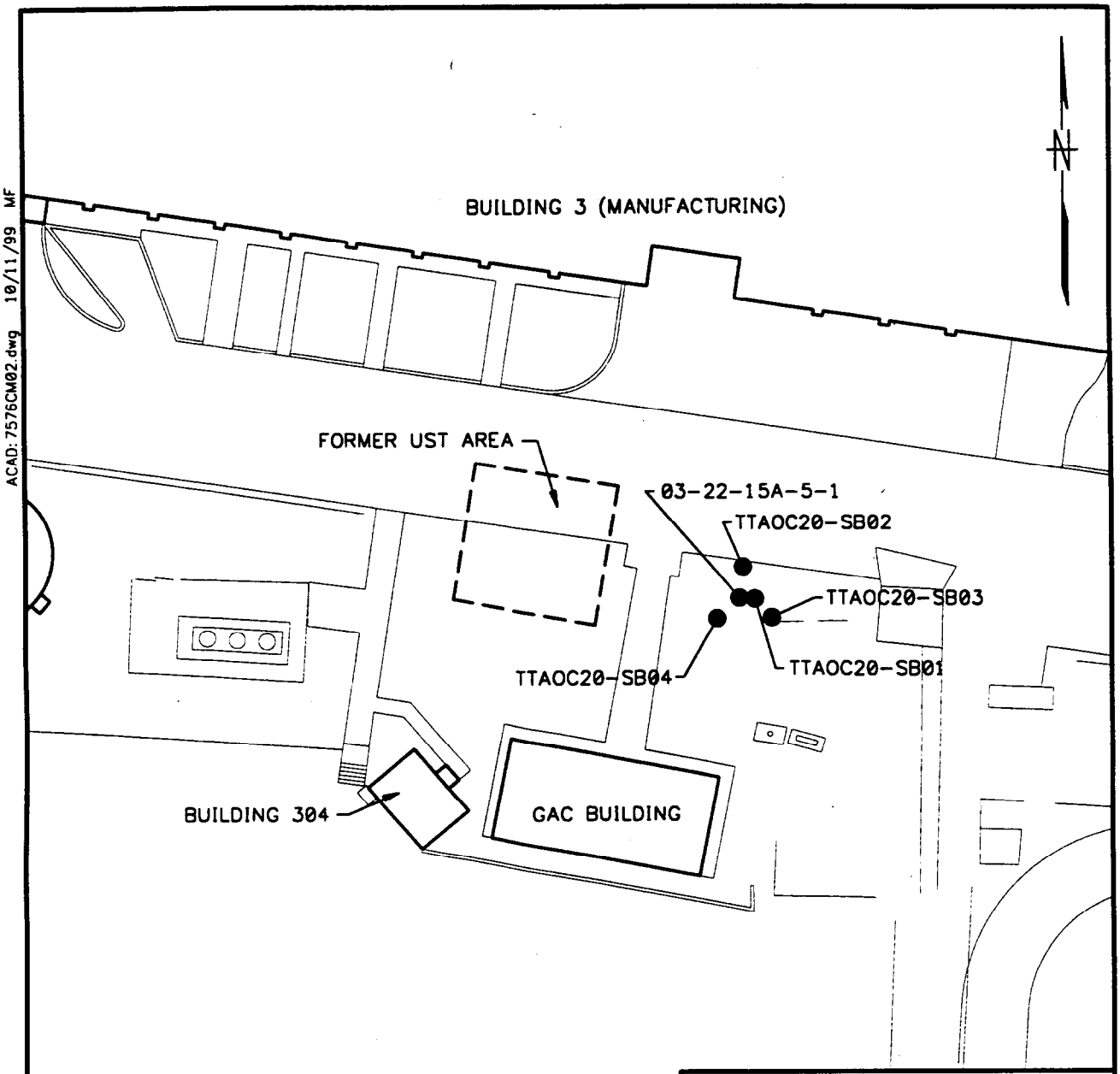
Field activities are presented by task in the following paragraphs. All field activities were conducted in accordance with procedures referenced in TtNUS Standard Operating Procedures (SOPs), and in accordance with the health and safety procedures established in the site HASP.

2.1 Soil Borings

The location of the former dry well was identified in the field based on historic plant utility drawings. Four soil borings were then installed using hollow-stem auguring drilling techniques. The soil borings were drilled using a truck-mounted drill rig with 3 ¼-inch I.D., 6-inch O.D., by 5-foot length hollow-stem auger casts. Soil boring TTAOC20-SB01 was placed at the approximate center of the former dry well location. The three perimeter soil boring locations, TTAOC20-SB02 through TTAOC20-SB04, were placed approximately 10 feet to the north, southeast and southwest of TTAOC20-SBO1 respectively. The perimeter locations were separated by approximately 120 degrees. Soil boring locations TTAOC20-SB01 through TTAOC20-SB04 are depicted in Figure 2-1. Soil boring log sheets are included in Appendix A.

2.2 Soil Sampling

For each of the soil borings, split spoon samples were collected by auguring to the top of the depth interval of interest and driving a 2-inch O.D. by 24-inch length split barrel sampler with repeated blows using a 140-pound weight falling a distance of 30 inches. Split spoon samples were collected at 3 feet to 5 feet, 8 feet to 10 feet, and 13 feet to 15 feet below ground surface in all of the soil borings. For two of the four soil borings, TTAOC20-SB02 and TTAOC20-SB03, poor sample returns over the 13 foot to 15 foot interval made it necessary to collect additional split spoon samples from 15 feet to 17 feet below ground surface in order to meet the laboratory-specified volume requirements.



DRAWN BY DATE HJP 9/21/99	Tetra Tech NUS, Inc.	CONTRACT NO. 7576	OWNER NO. -----
CHECKED BY DATE	AOC 20 SAMPLING LOCATIONS NWIRP BETHPAGE BETHPAGE, NY	APPROVED BY	DATE
COST/SCHED-AREA		APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO. FIGURE 2-1	REV. 0

FORM CADD NO. TtNUS_AV.DWG - REV 0 - 1/22/98

bp9910a0c20result, 01/14/00

To allow for the inclusion of the current AOC 20 data set into a larger data base for NWIRP Bethpage, sample and soil boring labels were modified slightly. For example, soil sample TTNUS-20-SB-01-0305 was collected from soil boring TTAOC20-SB01 (or TT20-SB01) at a depth of 3 to 5 feet below ground surface. TT and TTNUS both refer to TtNUS, SB is soil boring, and "20" references AOC 20. For the Northrop Grumman sample (03-22-15A-S-1), "03" refers to Plant No. 3. As discussed with Northrop Grumman contractors in June 1999, "22" should have been identified as "20". The balance of the label identifies the soil boring number and sample number.

Soil samples from all intervals were used to characterize the lithology and were analyzed for 8 RCRA Metals and zinc by SW-846 6010B/7000A series (USEPA 1997). All data collected was subject to data validation. This data validation was performed in accordance with USEPA Region 2 data validation requirements.

One Matrix Spike/Matrix Spike Duplicate and one Blind Field Duplicate sample were collected from soil boring TTAOC20-SB01. It was necessary to combine soil sample returns over a 4-foot interval (8 feet to 12 feet below ground surface) to meet the necessary laboratory-specified volume requirements for these QA/QC samples. In addition, one Field Blank sample of the potable water source used for decontamination activities located near the former drum marshalling area was collected and analyzed for 8 RCRA Metals and zinc by Methods SW-846 6010B/7000A series (USEPA 1997). Sample log sheets and chain-of-custody forms are included in Appendix A, respectively.

2.3 Soil Boring Survey

At the completion of the soil boring drilling program, relative coordinates for each of the soil boring locations were determined by conducting a grid survey using permanent physical features in the AOC 20 as sight lines. Coordinates were measured to the nearest 0.50-feet with a measuring tape and recorded in the field logbook on hand-illustrated maps depicting the relative positions of each of the soil boring locations. The locations of each of the soil borings were also documented photographically.

2.4 Decontamination Procedures

All auger casts were decontaminated between soil boring locations at the constructed decontamination pad using a pressurized steam cleaner and potable water.

All split spoons were decontaminated prior sample acquisition according to the following procedure.

- Potable water and detergent rinse (Alconox/Liquinox)
- Tap water rinse
- Distilled/deionized water rinse
- Methanol rinse
- Distilled/ deionized water rinse
- Air dry

2.5 Investigative-Derived-Waste (IDW)

All water generated during decontamination activities was containerized in 55-gallon Department-of-Transportation (DOT)-approved steel drums (DOT 17-H) and staged at the appropriated drum storage area (GAC Building south of Plant No. 3).

3.0 NATURE AND EXTENT OF CONTAMINATION IN SITE MEDIA

Subsurface soil [depths greater than 2 feet below ground surface (bgs)] samples were collected from Area of Concern 20 (AOC 20). Based upon the analytical results for these samples, the nature and extent of contamination at AOC 20 is discussed in the following section. Analytical results are presented in Table 3-1 and Figure 3-1.

All soil samples were analyzed for RCRA metals plus zinc (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and zinc). Considered in this data set were thirteen soil samples (including one field duplicate pair) and sample 03-22-15A-S-1, which was collected by Northrop Grumman in 1998. Results for these analytes were compared to Soil Clean-up Objectives as per New York State Department of Environmental Conservation (NYSDEC), "Division of Technical and Administrative Guidance Memorandum: Determination of Soil Clean-up Objectives and Clean-up Levels" (January 24, 1994) (TAGM 4046). An excerpt of Appendix A Table 4 from the NYSDEC TAGM follows:

Constituent	NYSDEC TAGMs (mg/kg)
Arsenic	7.5 or SB
Barium	300 or SB
Cadmium	1 or SB
Chromium	10 or SB
Lead	SB
Mercury	0.1
Selenium	2 or SB
Silver	SB
Zinc	20 or SB

Table 3-1 of this report display a summary of all analytical results compared to TAGMs and Site Background as detailed in the Halliburton NUS Environmental Corporation "Final Remedial Investigation Report for NWIRP Bethpage, New York, (May 1992). As displayed Table 3-1, silver was not detected in any of the samples collected and cadmium was only detected in one sample TTNUS-20-SB-01-0305 at a concentration of 0.03 mg/kg. Additionally mercury and selenium were detected in about half of the samples collected. The remaining metals were

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TABLE 3-1

ANALYTICAL RESULTS AND COMPARISON TO NYSDEC TAGMS
AOC 20 - DRY WELLS
NWIRP BETHPAGE, NY

Sample Number:	TTNUS-20-SB-01-0305	TTNUS-20-SB-01-0812	TTNUS-20-SB-01-0812-I	TTNUS-20-SB-01-1315	TTNUS-20-SB-02-0305	TTNUS-20-SB-02-0810	TTNUS-20-SB-02-1317	NYSDEC
Top Depth:	3	8	8	13	3	8	13	TAGMs/Basis
Bottom Depth:	5	12	12	15	5	10	17	
Sample Date:	29-Jun-99	29-Jun-99	29-Jun-99	29-Jun-99	29-Jun-99	29-Jun-99	29-Jun-99	
Inorganics (mg/kg)								
ARSENIC	2.7	2.3	4.1	1.1	0.87	0.88	1.2	7.5/TAGM
BARIUM	15.2	8.8	9.9	6.1	5.1	7.3	6.6	300/TAGM
CADMIUM	0.03	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	1/TAGM
CHROMIUM	16.1	7.6	9	3.6	4.6	2.7	5.2	12.7/SB
LEAD	4.3	2.7	2.7	2	1.4	1.6	1.4	7.8/SB
MERCURY	0.04	0.02 U	0.06	0.02 U	0.04	0.02 U	0.02 U	0.1/TAGM
SELENIUM	0.35	0.21	0.25	0.21 U	0.27	0.2 U	0.24	2/TAGM
SILVER	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	NA/SB
ZINC [2]	19.7 R	7.8 R	10.9 R	7.5 R	6.8 R	5.5 R	4.5 R	20/SB-TAGM

Sample Number:	TTNUS-20-SB-03-0305	TTNUS-20-SB-03-0810	TTNUS-20-SB-03-1517	TTNUS-20-SB-04-0305	TTNUS-20-SB-04-0810	TTNUS-20-SB-04-1315	03-22-15A-S-1 [2]	NYSDEC
Top Depth:	3	8	15	3	8	0	8	TAGMs/Basis
Bottom Depth:	5	10	17	5	10	15	10	
Sample Date:	29-Jun-99	29-Jun-99	29-Jun-99	29-Jun-99	29-Jun-99	29-Jun-99		
Inorganics (mg/kg)								
ARSENIC	1.4	1.5	0.67	6.3	0.83	2.4	ND	7.5/TAGM
BARIUM	8.1	6.2	4.8	46.1	8.3	3	ND	300/TAGM
CADMIUM	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	ND	1/TAGM
CHROMIUM	4.7	3.4	2.3	17	3.4	13.3	ND	12.7/SB
LEAD	2.4	2.3	1.2	9.7	1.2	1.2	4070 J	7.8/SB
MERCURY	0.03	0.03	0.04	0.03	0.02 U	0.02 U	0.47	0.1/TAGM
SELENIUM	0.21 U	0.21 U	0.21 U	0.47	0.21 U	0.22	ND	2/TAGM
SILVER	0.06 U	0.06 U	0.06 U	0.07 U	0.06 U	0.06 U	ND	NA/SB
ZINC [2]	10.6 R	7.4 R	6.2 R	25.9 R	4.7 R	7.3 R	119	20/SB-TAGM

ND - Not Detected.
NA - Not Available because the result for this analyte was not detected in site background.
TAGM - Technical and Administrative Guidance Memorandum. [4046, NYSDEC January 24, 1994 (Revised)]
SB - Site Background, Halliburton NUS Environmental Corporation May 1992. Final Remedial Investigation Report NWIRP Bethpage.
U - Value was nondetected at or above the concentration reported.
R - Positive result is deemed unusable due to its presence in a field blank.
(1) In accordance with USEPA Region 2 data validation guidance, all positive zinc results were rejected due to field blank contamination. However since these results are at worst biased high we have chosen to consider them in this screening exercise.
(2) Sample collected by Northrup Grumman.
Shaded results exceed the SB or TAGM 4046.

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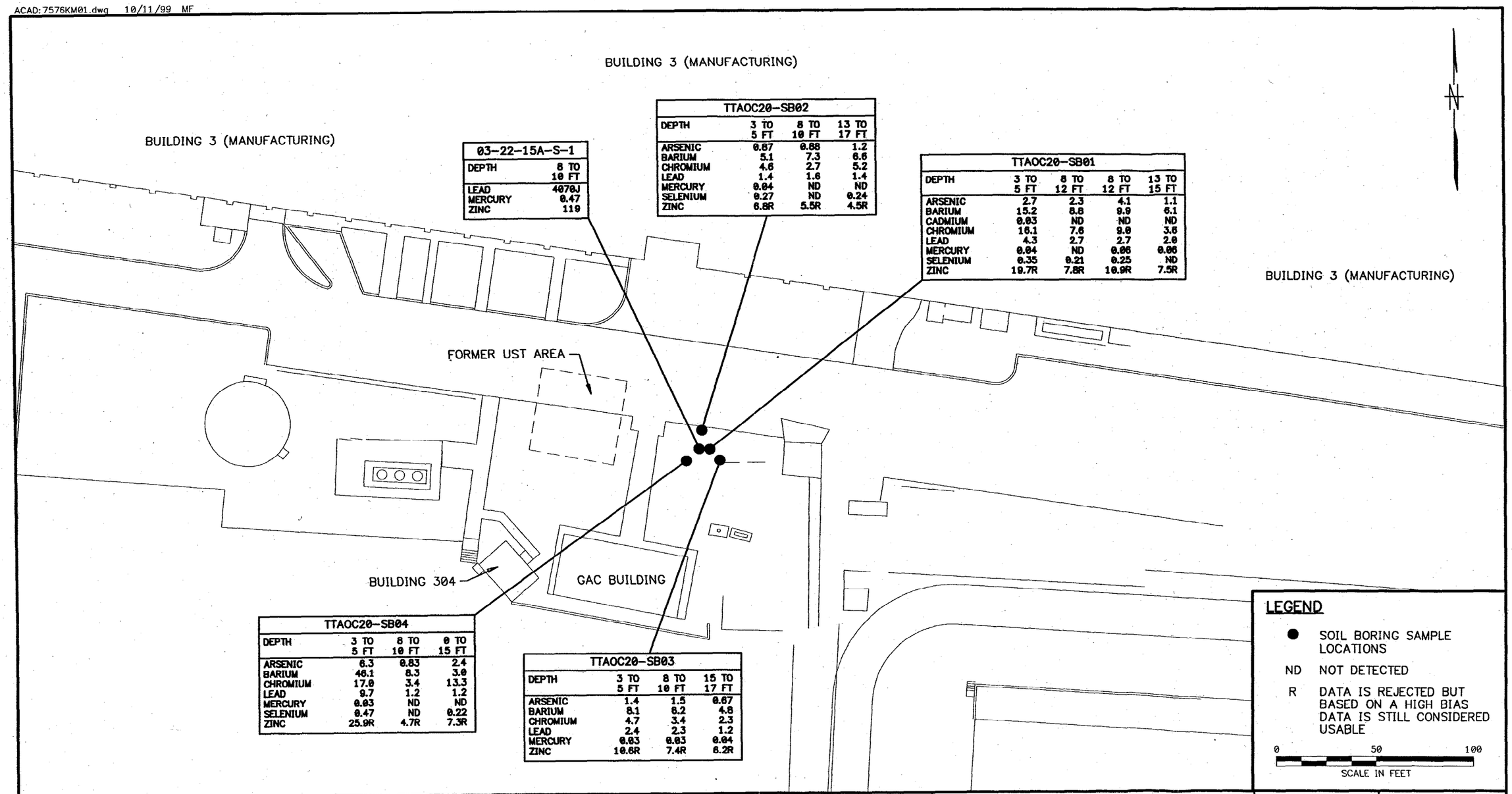

03-22-15A-S-1	
DEPTH	8 TO 10 FT
LEAD	4070J
MERCURY	0.47
ZINC	119

TTAOC20-SB02			
DEPTH	3 TO 5 FT	8 TO 10 FT	13 TO 17 FT
ARSENIC	0.87	0.88	1.2
BARIUM	5.1	7.3	6.6
CHROMIUM	4.6	2.7	5.2
LEAD	1.4	1.6	1.4
MERCURY	0.04	ND	ND
SELENIUM	0.27	ND	0.24
ZINC	6.8R	5.5R	4.5R

TTAOC20-SB01				
DEPTH	3 TO 5 FT	8 TO 12 FT	8 TO 12 FT	13 TO 15 FT
ARSENIC	2.7	2.3	4.1	1.1
BARIUM	15.2	8.8	9.9	6.1
CADMIUM	0.03	ND	ND	ND
CHROMIUM	16.1	7.6	9.0	3.6
LEAD	4.3	2.7	2.7	2.0
MERCURY	0.04	ND	0.06	0.06
SELENIUM	0.35	0.21	0.25	ND
ZINC	19.7R	7.8R	10.9R	7.5R

TTAOC20-SB04			
DEPTH	3 TO 5 FT	8 TO 10 FT	0 TO 15 FT
ARSENIC	6.3	0.83	2.4
BARIUM	48.1	8.3	3.0
CHROMIUM	17.0	3.4	13.3
LEAD	9.7	1.2	1.2
MERCURY	0.03	ND	ND
SELENIUM	0.47	ND	0.22
ZINC	25.9R	4.7R	7.3R

TTAOC20-SB03			
DEPTH	3 TO 5 FT	8 TO 10 FT	15 TO 17 FT
ARSENIC	1.4	1.5	0.67
BARIUM	8.1	8.2	4.8
CHROMIUM	4.7	3.4	2.3
LEAD	2.4	2.3	1.2
MERCURY	0.03	0.03	0.04
ZINC	10.6R	7.4R	6.2R

LEGEND

- ● SOIL BORING SAMPLE LOCATIONS
- ND NOT DETECTED
- R DATA IS REJECTED BUT BASED ON A HIGH BIAS DATA IS STILL CONSIDERED USABLE

0 50 100
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MF DATE 10/8/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

AOC 20
POSITIVE DETECTIONS IN SOIL
NWIRP BETHPAGE
BETHPAGE, NY

CONTRACT NO. 7576 | OWNER NO. 0283
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 3-1 | REV. 0

FORM CADD NO. TtNUS_BH.DGN - REV 0 - 1/20/98

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detected in nearly all the samples collected. Arsenic was detected at a maximum concentration of 6.3 mg/kg in sample TTNUS-20-SB-04-0305. Barium was detected at a maximum concentration of 46.1 mg/kg in sample TTNUS-20-SB-04-0305. Chromium was detected at a maximum concentration of 17 mg/kg in sample TTNUS-20-SB-04-0305. Lead was detected at a maximum concentration of 4070 mg/kg in sample 03-22-15A-S-1 (Northrup Grumman), but at a maximum concentration of 9.7 mg/kg in sample TTNUS-20-SB-04-0305 (TtNUS). Mercury was detected at maximum concentration of 0.47 mg/kg in sample 03-22-15A-S-1 (Northrop Grumman), but at a maximum concentration of 0.06 mg/kg in sample TTNUS-20-SB-01-0812-D (TtNUS). Selenium was detected at a maximum concentration of 0.47 mg/kg in sample TTNUS-20-SB-04-0305. Zinc was detected at maximum concentration of 119 mg/kg in sample 03-22-15A-S-1 (Northrop Grumman), but at a maximum concentration of 25.9 mg/kg in sample TTNUS-20-SB-04-0305 (TtNUS).

Chromium concentrations of 16.1 mg/kg in sample TTNUS-20-SB-01-0305, 13.3 mg/kg in sample TTNUS-20-SB-04-1315, and 17 mg/kg in sample TTNUS-20-SB-04-0305 were in excess of the TAGM of 12.7 mg/kg. Lead concentrations of 9.7 in sample TTNUS-20-SB-04-0305 and 4070 mg/kg in sample 03-22-15A-S-1 were in excess of the TAGM of 7.8 mg/kg. The mercury concentration of 0.47 mg/kg in sample 03-22-15A-S-1 was in excess of the TAGM of 0.1 mg/kg. Zinc concentrations of 25.9 mg/kg in sample TTNUS-20-SB-04-0305 and 119 mg/kg in sample 03-22015A-S-1 were in excess of the TAGM of 20 mg/kg.

As per Table 3-1, all zinc results for samples collected by TtNUS were assigned the "R" qualifier during data validation. Generally, this qualifier indicates that positive results are rejected and should be considered unusable. However, these zinc results were rejected as a result of field blank contamination, as per USEPA Region 2 data validation guidance. This finding implies that the laboratory reported zinc concentrations may be biased high or perhaps not present at all in these samples. Because the data user cannot be certain if the zinc concentrations reported are real or artifacts, Region 2 recommends not using the results. However, this approach creates a data gap. Therefore, TtNUS is provisionally using the zinc data because most of the positive results were higher than both the Instrument Detection Limit (IDL 0.03 mg/kg) and the Reporting Limit (RL 2 mg/kg) but less than the TAGM of 20 mg/kg. The only exception is the zinc result of 25.9 mg/kg in sample TTNUS-20-SB-04-0305 and this result only marginally exceeds the TAGM of 20 mg/kg. Appendix B contains copies of the data validation memoranda.

In summary, the highest concentration of lead, mercury, and zinc at AOC 20 were found in the 1998 Northrop Grumman sample 03-22-15A-S-1. The detected concentrations in this sample were in excess of the TAGMs by a factor of 5 to 500. The samples collected by the Navy were found to contain the same metals. However, the detected concentrations were much lower, and only 3 of 12 current samples had one or metal results exceeding a TAGM. In addition, the maximum TAGM exceedance was for chromium at a concentration of 17 mg/kg versus the TAGM of 12.7 mg/kg.

4.0 CONTAMINANT FATE AND TRANSPORT

Metals are the only site-related contaminants at AOC 20 and metals in general are highly persistent environmental contaminants. They do not biodegrade, photolyze or hydrolyze. The major fate mechanisms for metals are adsorption to the soil matrix (as compared to being part of the soil structure) and bioaccumulation.

The mobility of metals is influenced primarily by their physical and chemical properties in combination with the physical and chemical characteristics of the soil matrix. Factors that assist in predicting the mobility of inorganic species are the soil/pore water pH, soil/pore water specific conductance, and cation exchange capacity. The mobility of metals generally increases with decreasing soil pH and cation exchange capacity.

Because metals are frequently incorporated into the soil matrix and remain bound to particulate matter, they also migrate from the source areas via bulk movement processes (erosion). The larger particles (>0.45 microns, which are removed via the filtration step prior to water analysis) are not generally considered to be mobile in groundwater.

There are some instances, however, where these metals are found at such concentrations or in such form as to be able to migrate in solution. It is possible that industrial activities could saturate all available exchange sites in soil and hence a metal may be mobilized. Metals are also more mobile under acidic conditions, which are not present at this site. Finally, a metal solution may be utilized in some industrial applications. In these cases, it is possible for metals to migrate vertically through the soil column and reach the groundwater. However, elevated metal concentrations are generally found in the underlying soils.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations were developed based on the findings of this investigation.

1. Historically, a dry well south of Plant No. 3 received water containing several metals including lead, mercury, and zinc. Based on the historic dry well operation, the metals would have been introduced below ground surface. Therefore, overlying soils form a barrier between contaminants and potential receptors.

2. The presence of similar metals in the current Navy samples and the observation of gravel in the soil borings confirmed the location of the previous Northrop Grumman sample and AOC 20 dry well.

3. Based on testing, the extent of the metal contaminated soils is very small. In fact, samples collected within a few horizontal feet of the original Northrop Grumman sample did not contain these metals in excess of NYSDEC TAGM levels. Also, samples collected below the former dry well did not contain any metals in excess of the NYSDEC TAGMs. The remaining TAGM exceedances were relatively minor and were not significantly greater than background values.

4. Based on the results of this evaluation, no additional activities at this former dry well are proposed. The results will be included in property transfer documents.

REFERENCES

Halliburton NUS Environmental Corporation May 1992. "Final Remedial Investigation Report for Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York."

USEPA June 1997. "Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), third edition, Update 3."

New York State Department of Environmental Conservation Revised January 24, 1994. "Division of Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Clean-up Objectives and Clean-up Levels"

APPENDIX A
FIELD DOCUMENTATION

APPENDIX A.1
BORING LOGS

Tetra Tech NUS, Inc.

BORING LOG

Page 1 of 1

PROJECT NAME: NWIRP Bethpage (AOC 20) BORING NUMBER: TT20 - SB01
PROJECT NUMBER: 7576 DATE: 06-29-99
DRILLING COMPANY: AOT GEOLOGIST: S. Pelgate
DRILLING RIG: Mobile Drill B-59 DRILLER: J. Bitti

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
1105	0								hand auger				
									first 3'				
1121	3	4/6	15/24		loose		5" brn, orange-brn silty clay, tr. gravel		damp	0	0	0	0
		18/20			medense		10" M. brn to brn. m. to v.c. sand & gravel, tr. clay at top to true silt below		damp/dry				
1124	6	5/6	15/24		loose		6" lay as previous 9" M. brn / brn-orange		damp damp/dry	0	0	0	0
		12/16			m.dense		orange m. to c. sand & gravel, tr. silt		Fe staining				
1135	10	21/20	12/24		m.dense		M. brn/ brn-orange/orange m. to v.c. sand & gravel, tr. silt		damp/dry	0	0	0	0
		23/28			m.dense								
1142	13	7/8	15/24		loose		2" dk brn, brn silty clay & gravel		damp	0	0	0	0
		5/8		T.D=15'	loose		4" brn-orange m. to c. sand & gravel, tr. silt						
							2" lt brn, white gravel						
							7" lt. brn, brn-orange mostly m. to c. sand, sm. gravel, tr. silt						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0 PID NV1095 0

Remarks: 5' Auger Casts, 3 1/4" I.D. 6" O.D.
Samples TTNUS-20-SB-01-0305, TTNUS-20-SB-01-0812, and TTNUS-20-SB-01-1315 collected @ 1205

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NWIRP Bethpage (AOC 20) BORING NUMBER: TT20-SB02
PROJECT NUMBER: 7576 DATE: 06-29-99
DRILLING COMPANY: AOT GEOLOGIST: S. Prispko
DRILLING RIG: Mobile Drill B-59 DRILLER: J. Bitic

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
1250	0								hand auger first 3'				
1306	3	10/17	19/24		m. dense		lt. brn m. to c. sand + gravel, tr. silt		dump/dry	0	0	0	0
		25/25			m. dense								
1313	8	18/13	14/24		m. dense		1" dk brn / brn-orange silty clay + gravel		dump poss. bkrk cont?	0	0	0	0
		22/22			m. dense		13" lt. brn to brn, brn-orange, orange m. to c. sand + gravel, tr. silt		dmp/dry for staining				
1320	13	11/14	3/24		m. dense		3" lt brn, brn-orange, orange m. to c.		damp	0	0	0	0
		20/20			m. dense		sand, tr. silt, + gravel		note: not enough sample recovery to complete sample volume, drive additional spoon (15'-17')				
1326	15	14/20	14.5/24		m. dense		1.5" brn-orange, orange-brn m. to c. sand + gravel, tr. silt		dump	0	0	0	0
		20/17		TD=17'	m. dense		13" lt. brn m. to c. sand + gravel, tr. silt						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: 5' Auger Cuttings, 3 1/4" I.D., 6" O.D. PID MU10E50
Samples TTNUS-20-SB-02-0305, TTNUS-20-SB-02-0810, and TTNUS-20-SB-02-1317 collected @ 1330

Converted to Well: Yes _____ No ✓ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NWIRP Bethpage (AOC 20) BORING NUMBER: TT20-SB03
PROJECT NUMBER: 7576 DATE: 06-29-99
DRILLING COMPANY: ADT GEOLOGIST: S. Pelepko
DRILLING RIG: Mobil Drill B-59 DRILLER: J. Bittle

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
1400	0								hand auger				
									first 3'				
1414	3	11/12	12.5/24		m.dense		3" brn silty clay, tr. gravel		damp	0	0	0	0
		15/20			m.dense		9.5" lt. brn to brn m. to c. sand + gravel, tr. silt tr. clay at top of interval		damp/dry				
1421	8	7/11			loose		2" dk brn silty/clayey sand + gravel		damp	0	0	0	0
		19/14			m.dense		1" brn/orange, sandy + silty clay						
							10" orange, lt. brn, brn-orange m. to c. sand + gravel, tr. silt		dump/dry				
									Fe staining				
1429	13	14/17	0/24		m.dense		trace brn to dk brn, orange, brn-orange		damp to	0	0	0	0
		22/28			m.dense		silty clay, sands, + gravel		dump/dry				
									note: not enough recovery to complete sample volume, drive additional span (15' - 17')				
1434	15	8/11	13.5/24		loose		2" brn to dk brn silty clay, sm. sand, tr. gravel		damp/dry	0	0	0	0
		14/12		TD=17'	m.dense		3" orange, brn-orange m. to v.c. sand + gravel, tr. silt						
							9.5" lt. brn m. to v.c. sand + gravel, tr. silt. Fining downward to m. to c. sand		Fe staining				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: 5' Auger Casts, 3 1/4" I.D., 6" O.D. PID NJH0850
Samples TTNUS-20-SB-03-0305, TTNUS-20-SB-03-0510, and TTNUS-20-SB-03-1517 collected at 1440

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

Page 1 of 1

PROJECT NAME: NWIRP Bethpage (AOC 20) BORING NUMBER: TT20-SB04
PROJECT NUMBER: 7576 DATE: 06-29-99
DRILLING COMPANY: ADT GEOLOGIST: S. Pekala
DRILLING RIG: Mobile Drill B-59 DRILLER: J. Bitis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
1445	0								hand auger				
									first 2'				
1502	3	5/6	18/24		loose		3" dk brn clayey silt/ silty clay + gravel		dump	0	0	0	0
		12/14			m. dense		15" lt. brn, brn-orange, gray, brn-gray, silty clay + gravel		Fe staining?				
1509	8	6/11	20.5/24		loose		4" dk brn clayey		dump	0	0	0	0
		12/14			m dense		silt/silty clay, sm. gravel. Brn-orange						
							+ brn-gray silty clay near bottom		Fe staining?				
							of interval 16.5" brn-orange,		Fe staining				
							orange, lt. brn m. to v. c. sand +						
							gravel, tr. silt						
1517	13	4/6	11/24		loose		3" dk brn clayey silt/ silty clay + gravel		dump	0	0	0	0
		10/13		TD=15'	m. dense		brn-gray, brn-orange silty clay near						
							bottom of interval 5" mostly m. to c.		dump/dry				
							sand, tr. silt (orange, brn-orange)						
							3" lt. brn m. to						
							v. c. sand + gravel, tr. silt						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: 5' Auger Casts, 3 1/4" I.D., 6" O.D. PID NU10650
Samples TTNUS-20-SB-04-0305, TTNUS-20-SB-04-0810, and TTNUS-20-SB-04-1315 collected at 1540

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

APPENDIX A.2
SOIL SAMPLE LOG SHEET

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 7576

[] Surface Soil
[■] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: TTNUS-20-SB-01-0305
Sample Location: AOC 20 SB01 (Dry Well)
Sampled By: S. Pelaske
C.O.C. No.: 06480, 06481

Type of Sample:
[■] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 06-29-99 / Time: 1205 / Method: Grab / Monitor Reading (ppm): 0.0	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	3' - 5'	brn, dusty brn, lt brn	silty clay + m. to v.c. sand + gravel, trace silt + clay dump/dry to dump

COMPOSITE SAMPLE DATA:

Date: / Method: / Monitor Readings (Range in ppm):	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)

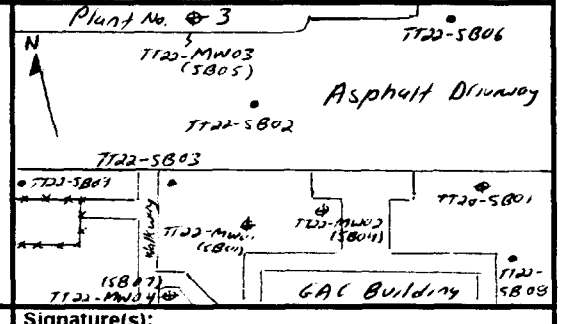
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL RCRA Metals + Zinc	(1) 40z Glass Jar	✓	-N.A.-

OBSERVATIONS / NOTES:

Sample volume acquired at 1121 Hrs in sealed plastic baggie until 1205. Sample transferred directly from baggie to sample container using plastic trowel.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Scott Jelaske

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 7576

[] Surface Soil
[■] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: TTNUS-20-SB-01-0812
Sample Location: AOC 20, SB01 (Dry Well)
Sampled By: S. Pollock
C.O.C. No.: 06460, 06461

Type of Sample:
[■] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 06-29-99	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1205	9' - 12'	lt. brn, brn-orange, orange	M. to V.C. sand + gravel, trace silt, Fe staining damp/dry to damp
Method: Grab			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

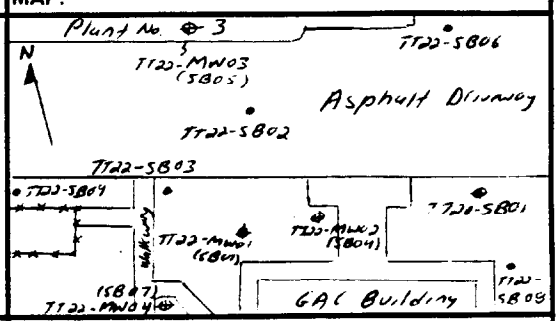
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
8 RCRA Metals + Zinc	(4) 4oz Gluss Jars	✓	MS/MSD, Blind Dup

OBSERVATIONS / NOTES:

Sample volume acquired at 1129 and 1135. Held in sealed plastic baggies until 1205. Composited in plastic-lined stainless steel bowl and transferred to sample containers using plastic trowel.

MAP:



Circle if Applicable:

(MS/MSD) (Duplicate ID No.) Blind Field Duplicate TTNUS-20-SB-01-4852

Signature(s):

Seth Pollock

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 7576

Sample ID No.: TTNUS-20-SB-01-1315
Sample Location: AOC 20 SB01 (Dry Well)
Sampled By: S. Pelaske
C.O.C. No.: 06460, 06461

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

Date: 06-29-94	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1205	13' - 15'	lt. to dk tan, brn-orange, white	silty clay + m. to c. sand + gravel, trace silt damp
Method: Grab			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

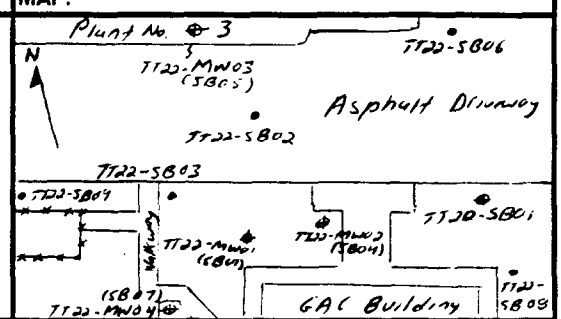
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
8 RCRA Metals + Zinc	(1) 40z Glass Jar	✓	-N.A.-

OBSERVATIONS / NOTES:

Sample Volume acquired at 1142. Held in sealed plastic baggie until 1205. Sample transferred directly from baggie to sample container using plastic trowel.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 7576

[] Surface Soil
[■] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: TTNUS-20-SB-02-6305
Sample Location: AOC 20, SB02 (Dry Well)
Sampled By: S. Prioske
C.O.C. No.: 06480, 06481

Type of Sample:
[■] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 06-29-99	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1330	3' - 5'	lt. brn	m. to c. sand + gravel, trace silt
Method: Grab			damp / dry
Monitor Reading (ppm): 0', 0'			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

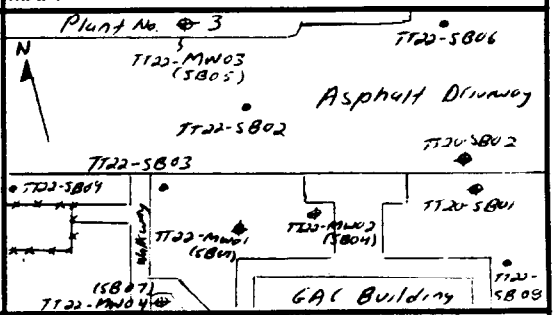
Analysis	Container Requirements	Collected	Other
8 RCRA Metals + Zinc	(1) 4oz Glass Jar	✓	-n.a.-

OBSERVATIONS / NOTES:

Sample volume acquired at 1306. Held in sealed plastic baggie until 1330.

Sample transferred directly from baggie to sample container using plastic trowel

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Scott Prioske

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 7576

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: TTNUS-20-SB-02-0810
Sample Location: AOC 20 SB02 (Dry Well)
Sampled By: S. Peloake
C.O.C. No.: 06480, 06481

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 06-29-99 Time: 1330 Method: Grab Monitor Reading (ppm): 0.0	8' - 10'	lt. brn to dk brn, brn-orange, orange	Silty clay + m. to c. sand + gravel, tr. silt poss. black cinder, Fe staining damp / dry to damp

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

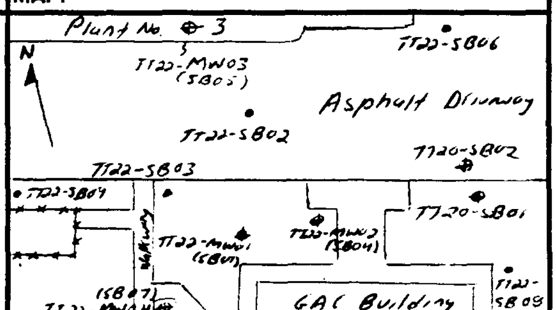
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
8 RCRA Metals + Zinc	(1) 4oz Glass Jar	✓	- n.a. -

OBSERVATIONS / NOTES:

Sample volume acquired at 1313. Held in sealed plastic baggie until 1330. Sample transferred directly from baggie to sample container using plastic trowel.

MAP:



Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): [signature]

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 7576

Sample ID No.: TTNUS-20-SB-02-1317
Sample Location: AOC 20 SB02 (Dry Well)
Sampled By: S. Pelgate
C.O.C. No.: 06480, 06481

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

Date: 06-29-99	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1330	13' - 17'	M. brn, brn-orange, orange, orange-brn	m. to c. sand + gravel, tr. silt
Method: Grab			damp
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

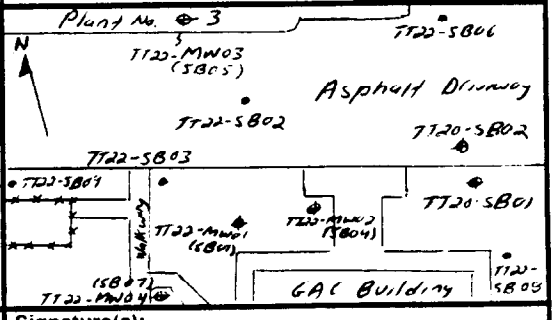
Analysis	Container Requirements	Collected	Other
8 RCRA Metals + Zinc	(1) 4oz Glass Jar	✓	-N.A.-

OBSERVATIONS / NOTES:

Sample volume acquired at 1320 and 1326. Held in sealed plastic baggies until 1330.

Sample transferred directly from baggies to sample container using plastic trowel.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Seth Pelgate

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 7576

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: TTNUS-20-SB-03-0305
Sample Location: AOC 20 SB03 (Dry Well)
Sampled By: S. Pelcake
C.O.C. No.: 06460, 06461

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 06-29-99 Time: 1440 Method: Grab Monitor Reading (ppm): 0.0	3' - 5'	lt. brn to brn	silty clay + m. to c. sand + gravel, tr. silt damp/dry to damp

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

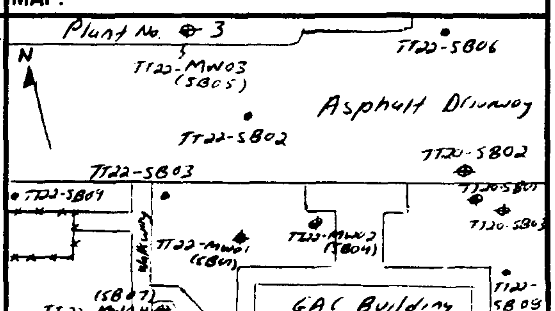
Analysis	Container Requirements	Collected	Other
8 RCRA Metals + Zinc	(1) 4oz Glass Jar	✓	-n.a.-

OBSERVATIONS / NOTES:

Sample volume acquired at 1414. Held in sealed plastic baggie until 1440.

Sample transferred directly from baggie to sample container using plastic trowel.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [signature]

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 7576

[] Surface Soil
[■] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: TTNUS-20-SB-03-0810
Sample Location: AOC 20, SB03 (Dry Well)
Sampled By: S. Pclosky
C.O.C. No.: 06480, 06481

Type of Sample:
[■] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 06-29-99	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1440	8' - 10'	lt. brn to mk brn, brownish orange	silty/clayey sand + sandy/silty clay + m. to c. sand + gravel, trace silt, Fe staining damp/dry to damp
Method: Grab			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

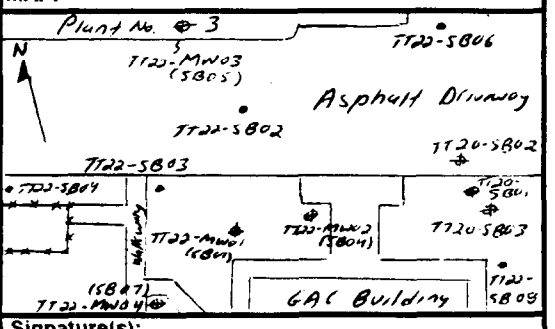
Analysis	Container Requirements	Collected	Other
8 RCRA Metals + Zinc	(1) 4oz Glass Jar	✓	-N.A.-

OBSERVATIONS / NOTES:

Sample volume acquired at 1421. Held in sealed plastic baggie until 1440.

Sample transferred directly from baggie to sample container using plastic trowel.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 7576

Sample ID No.: TTNUS-20-SB-03-1517
Sample Location: AOC 20, SB03 (Dry Well)
Sampled By: S. Pelopke
C.O.C. No.: 06480, 06481

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

Date: 06-29-94	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1440	15' - 17'	lt. to dk brn, brn-orange, orange	silty clay + m. to v.c. sand + gravel, tr. silt Fe staining damp/dry
Method: Grab			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

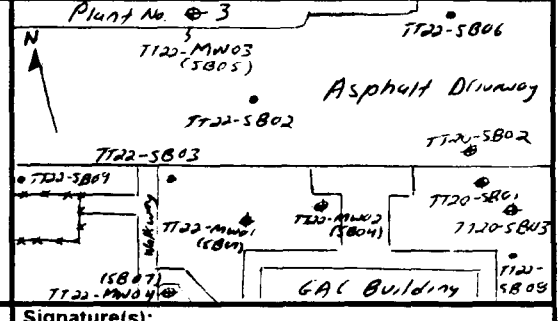
Analysis	Container Requirements	Collected	Other
8 RCRA Metals + Zinc	(1) 4oz Glass Jar	✓	-N.A.-

OBSERVATIONS / NOTES:

Sample volume acquired at 1434. Held in sealed plastic baggie until 1440.

Sample transferred directly from baggie to sample container using plastic trowel.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Scott Pelopke

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 7576

[] Surface Soil
[■] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: TTNUS-20-SB-04-0305
Sample Location: AOC 20, SB04 (Dry Well)
Sampled By: S. Pelcake
C.O.C. No.: 06460, 06461

Type of Sample:
[■] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 06-29-99	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1540	3' - 5'	lt. to dk. brn, brn-orange, gray, brn-gray	clayey silt + silty clay + gravel poss. ft staining damp
Method: Grab			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

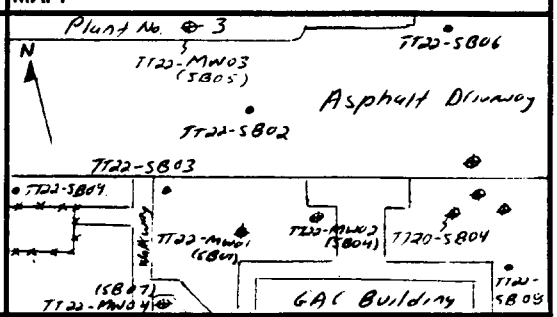
Analysis	Container Requirements	Collected	Other
8 RCRA Metals + Zinc	(1) 4oz Glass Jar	✓	-n.a.-

OBSERVATIONS / NOTES:

Sample volume acquired at 1502. Held in sealed plastic baggie until 1540.

Sample volume transferred directly from baggie to sample container using plastic trowel.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Scott Pelcake

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 7576

[] Surface Soil
[■] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: TTNUS-20-SB-04-0910
Sample Location: AOC 20, SB04 (Dry Well)
Sampled By: S. Pelcak
C.O.C. No.: 06460, 06461

Type of Sample:
[■] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 06-29-99	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1540	8' - 10'	lt. to dk. brn, brn-orange, orange, brn-gray	clayey silt / silty clay + m. to c. sand + gravel, trace silt Fe staining dump
Method: Grab			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

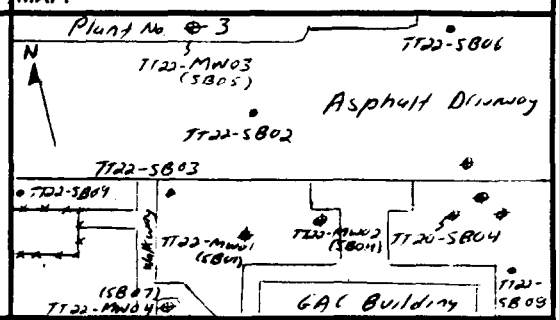
Analysis	Container Requirements	Collected	Other
8 RCRA Metals + Zinc	(1) 40z Glass Jar	✓	-n.a.-

OBSERVATIONS / NOTES:

Sample volume acquired at 1509. Held in sealed plastic baggie until 1540.

Sample volume transferred directly from baggie to sample container using plastic trowel.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Scott Pelcak

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 7576

[] Surface Soil
[■] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: TTNUS-20-SB-04-1315
Sample Location: AOC 20, SB04 (Dry Well)
Sampled By: S. Prloak
C.O.C. No.: 06460, 06461

Type of Sample:
[■] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 06-29-99	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1540	13' - 15'	lt. to dk. brn, brn-gray, brn-orange, orange	clayey silt / silty clay + m. fine. sand + gravel, trace silt damp/dry to dump
Method: Grab			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

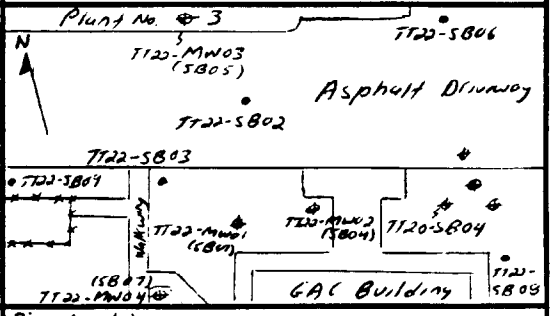
Analysis	Container Requirements	Collected	Other
8 RCRA Metals + Zinc	(1) 40z Glass Jar	✓	-N.A.-

OBSERVATIONS / NOTES:

Sample volume acquired at 1517. Held in sealed plastic baggie until 1540.

Sample volume transferred directly from baggie to sample container using plastic trowel.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Scott Johnson

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NWIRP Bethpage
Project No.: 7576

Sample ID No.: FB063099
Sample Location: Drum Marshalling Area
Sampled By: S. Pilepko
C.O.C. No.: 06480, 06481

[] Stream
[] Spring
[] Pond
[] Lake
■ Other: Prior Outflow (Recon. Water Source)
■ QA Sample Type: Field Blank

Type of Sample:
■ Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 06-30-99 Time: 1430 Depth: -n.a.- Method: Grab	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	clear	6.79	0.154	23.3	0	15.60	-n.a.-	-n.a.-

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL RCRA Metals + Zinc	*HNO3	(1) 1-Liter Amber	✓

OBSERVATIONS / NOTES:

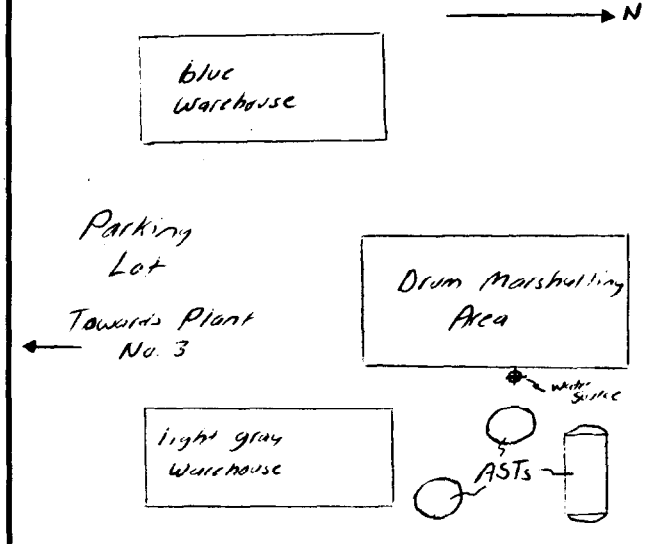
* Preservative will be added at laboratory prior to analysis

Open valve, sample directly from pipe outflow.

Flow rate ≈ 500 mL/min

Water Quality Parameters measured on 07-01-99.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Scott Pilepko

APPENDIX A.3
CHAIN OF CUSTODY FORMS

Chain of Custody Record

Quanterra

QUA-4124 0797

Client	Project Manager	Date	Chain of Custody Number
TETRA TECH NUS	DAVID BRAYACK	06-30-99	06480
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 2**
FOSTER PLAZA VII, 661 ANDERSON DRIVE	(412) 921-7090	—	
City / State / Zip Code	**Site Contact**	**Lab Contact**	
PITTSBURGH / PA / 15220	AL TARMINA, SETH PELEPKO	VERONIKA BORTET	
Project Name	**Carrier/Waybill Number**		
NWIRP BETHPAGE	FED EX / 910817873155		
Contract/Purchase Order/Quote No.			
—			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	9 RCRA METALS + ZINC	Analysis (Attach list if more space is needed)	Special Instructions/ Conditions of Receipt
TTNUS-20-SB-01-0305	06-29-99	1205			X	1						1		
* TTNUS-20-SB-01-0912	06-29-99	1205			X	3						3		
TTNUS-20-SB-01-1315	06-29-99	1205			X	1						1		
TTNUS-20-SB-01-4852	06-29-99	1205			X	1						1		
TTNUS-20-SB-02-0305	06-29-99	1330			X	1						1		
TTNUS-20-SB-02-0810	06-29-99	1330			X	1						1		
TTNUS-20-SB-02-1317	06-29-99	1330			X	1						1		
TTNUS-20-SB-03-0305	06-29-99	1440			X	1						1		
TTNUS-20-SB-03-0810	06-29-99	1440			X	1						1		
TTNUS-20-SB-03-1517	06-29-99	1440			X	1						1		
TTNUS-20-SB-04-0305	06-29-99	1540			X	1						1		
TTNUS-20-SB-04-0810	06-29-99	1540			X	1						1		

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify)

* COMPLETE MS/MSD FOR TTNUS-20-SB-01-0912 (9 RCRA METALS + ZINC

1. Relinquished By	Date	Time	1. Received By	Date	Time
[signature]	06-30-99	1830			
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

* SEE ADDITIONAL SAMPLE INFORMATION CONTINUED ON CHAIN OF CUSTODY 06481

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

[redacted]

Chain of Custody Record

Quanterra

QUA-4124 0797

Client	Project Manager	Date	Chain of Custody Number 06481
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page 2 of 2
City / State / Zip Code	Site Contact / Lab Contact		
Project Name	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Matrix: Sed.	Matrix: Soil	Containers & Preservatives: Unpres.	H2SO4	HNOS	HCl	NaOH	ZnAc/NaOH		Analysis: 8 RCRA METALS + ZINC	Analysis: TEMP BLANK (WATER)											Special Instructions/ Conditions of Receipt
TTNUS-20-SB-01-1315	06-29-99	1540			X	1							1												CONTINUED FROM COC 06480
TEMPERATURE BLANKS	06-29-99	–	X			2								2											
* FB063099	06-30-99	1430	X			1							1												1 L AMBER → PLEASE PRESERVE WITH HNO3 BEFORE ANALYSIS

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other______

QC Requirements (Specify)

1. Relinquished By	Date	Time	1. Received By	Date	Time
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments
* PLEASE PRESERVE FB063099 (DECON. WATER) W/ HNO3 (TO PH< 2) BEFORE ANALYSIS

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

APPENDIX B
DATA VALIDATION MEMORANDA

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-08-9-155

TO:	**D. BRAYACK**	**DATE:**	**AUGUST 23, 1999**
FROM:	**JENNIFER MALLE**	**COPIES:**	**DV FILE**
SUBJECT:	**INORGANIC DATA VALIDATION-SELECT METALS** **CTO 283 – BETHPAGE** **SDG – BR498**		

SAMPLES: 1/Aqueous

FB063099

13/Soil

TTNUS-20-SB-01-0305	TTNUS-20-SB-01-0812	TTNUS-20-SB-01-1315
TTNUS-20-SB-04-1315	TTNUS-20-SB-01-4852	TTNUS-20-SB-02-0305
TTNUS-20-SB-02-0810	TTNUS-20-SB-02-1317	TTNUS-20-SB-03-0305
TTNUS-20-SB-03-0810	TTNUS-20-SB-03-1517	TTNUS-20-SB-04-0305
TTNUS-20-SB-04-0810		

Overview

The sample set for CTO 283, BethPage, SDG BR498, consists of thirteen (13) soil environmental samples and one (1) field blank.

The samples were analyzed for selected metals including, arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and zinc. The samples were collected by Tetra Tech NUS on June 29, 1999 and analyzed by Quanterra Laboratory under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Metal analyses was conducted using SW846 method 6010B. Mercury analyses were conducted using SW846 method 7470/7471A.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Initial and Continuing Calibration Recoveries
* • Laboratory Blank Analyses
• Field Blank Analyses
* • Detection Limits

* - All quality control criteria were met for this parameter.

Field Blank Analyses

Field blank results for zinc exceeding the CRDL have been circled on the Form 1's. Soil sample results for zinc less than or equal to five (5) times the field blank values have been rejected, "R" ,due to field blank contamination.

Notes

Sample nomenclature and values reported in the Electronic Deliverable Data (EDD) were incorrect for sample TTNUS-20-SB-04-1315. The correct values were reported on the Form 1's. Changes to the EDD were made by the data reviewer.

The reporting limits in the EDD for sample FB063099 for cadmium, lead and silver were inconsistent with the Form 1's. The results reported for cadmium, lead and silver had been rounded on the EDD. The appropiate changes were made to the EDD by the data reviewer.

Executive Summary

Laboratory Performance: None

Other Factors Affecting Data Quality: The field blank results for zinc exceeded the CRDL.

The data for these analyses were reviewed with reference to the "Evaluation of Metals Data for the Contract Laboratory Program" (January 1992 Revision) as amended for use within US EPA Region II.

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

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS
Jennifer Malle
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

APPENDIX A

Qualified Analytical Results

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCB D% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = % Solid content is less than 30%

CTO283 - NWIRP BETHPAGE
WATER DATA
QUANTERRA
SDG: BR498

SAMPLE NUMBER:	FB-063099											
SAMPLE DATE:	06/29/99			/ /			/ /			/ /		
LABORATORY ID:	C9G010157014											
QC_TYPE:	NORMAL											
% SOLIDS:	100.0 %			100.0 %			100.0 %			100.0 %		
UNITS:	UG/L											
FIELD DUPLICATE OF:												
	RESULT	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**
INORGANICS												
ARSENIC	1.3	U										
BARIUM	16.5											
CADMIUM	0.18	U										
CHROMIUM	0.60											
LEAD	0.92	U										
MERCURY	0.10	U										
SELENIUM	2.0	U										
SILVER	0.55	U										
ZINC	41.4											

CTO283 - NWIRP BETHPAGE
SOIL DATA
QUANTERRA
SDG: BR498

SAMPLE NUMBER:	TTNUS-20-SB-01-0305			TTNUS-20-SB-01-0812			TTNUS-20-SB-01-1315			TTNUS-20-SB-01-4852		
SAMPLE DATE:	06/29/99			06/29/99			06/29/99			06/29/99		
LABORATORY ID:	C9G010157001			C9G010157002			C9G010157003			C9G010157004		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	92.7 %			96.3 %			97.0 %			95.9 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:												
	RESULT	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**
INORGANICS												
ARSENIC	2.7			2.3			1.1			4.1		
BARIUM	15.2			8.8			6.1			9.9		
CADMIUM	0.03			0.02	U		0.02	U		0.02	U	
CHROMIUM	16.1			7.6			3.6			9.0		
LEAD	4.3			2.7			2.0			2.7		
MERCURY	0.04			0.02	U		0.02	U		0.06		
SELENIUM	0.35			0.21			0.21	U		0.25		
SILVER	0.06	U		0.06	U		0.06	U		0.06	U	
ZINC	19.7	R	B	7.8	R	B	7.5	R	B	10.9	R	B

CTO283 - NWIRP BETHPAGE
SOIL DATA
QUANTERRA
SDG: BR498

SAMPLE NUMBER:	TTNUS-20-SB-02-0305			TTNUS-20-SB-02-0810			TTNUS-20-SB-02-1317			TTNUS-20-SB-03-0305		
SAMPLE DATE:	06/29/99			06/29/99			06/29/99			06/29/99		
LABORATORY ID:	C9G010157005			C9G010157006			C9G010157007			C9G010157008		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	98.6 %			97.6 %			97.0 %			97.4 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:												
	RESULT	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**
INORGANICS												
ARSENIC	0.87			0.88			1.2			1.4		
BARIUM	5.1			7.3			6.6			8.1		
CADMIUM	0.02	U		0.02	U		0.02	U		0.02	U	
CHROMIUM	4.6			2.7			5.2			4.7		
LEAD	1.4			1.6			1.4			2.4		
MERCURY	0.04			0.02	U		0.02	U		0.03		
SELENIUM	0.27			0.20	U		0.24			0.21	U	
SILVER	0.06	U		0.06	U		0.06	U		0.06	U	
ZINC	6.8	R	B	5.5	R	B	4.5	R	B	10.6	R	B

CTO283 - NWIRP BETHPAGE
SOIL DATA
QUANTERRA
SDG: BR498

SAMPLE NUMBER:	TTNUS-20-SB-03-0810			TTNUS-20-SB-03-1517			TTNUS-20-SB-04-0305			TTNUS-20-SB-04-0810		
SAMPLE DATE:	06/29/99			06/29/99			06/29/99			06/29/99		
LABORATORY ID:	C9G010157009			C9G010157010			C9G010157011			C9G010157012		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	97.3 %			97.4 %			53.9 %			97.4 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:												
	RESULT	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**
INORGANICS												
ARSENIC	1.5			0.67			6.3			0.83		
BARIUM	6.2			4.8			46.1			8.3		
CADMIUM	0.02	U		0.02	U		0.02	U		0.02	U	
CHROMIUM	3.4			2.3			17.0			3.4		
LEAD	2.3			1.2			9.7			1.2		
MERCURY	0.03			0.04			0.03			0.02	U	
SELENIUM	0.21	U		0.21	U		0.47			0.21	U	
SILVER	0.06	U		0.06	U		0.07	U		0.06	U	
ZINC	7.4	R	B	6.2	R	B	25.9	R	B	4.7	R	B

CTO283 - NWIRP BETHPAGE
SOIL DATA
QUANTERRA
SDG: BR498

SAMPLE NUMBER:	TTNUS-20-SB-04-1315											
SAMPLE DATE:	06/29/99			/ /			/ /			/ /		
LABORATORY ID:	C9G010157013											
QC_TYPE:	NORMAL											
% SOLIDS:	95.7 %			100.0 %			100.0 %			100.0 %		
UNITS:	MG/KG											
FIELD DUPLICATE OF:												

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ARSENIC	2.4											
BARIUM	3.0											
CADMIUM	0.02	U										
CHROMIUM	13.3											
LEAD	1.2											
MERCURY	0.02	U										
SELENIUM	0.22	U										
SILVER	0.06	U										
ZINC	7.3	R	B									