



FOSTER WHEELER ENVIRONMENTAL CORPORATION

May 9, 2002  
File No.2282-0711-02-0089

Department of the Navy  
Engineering Field Activity, Northeast  
Naval Facilities Engineering Command  
10 Industrial Highway, Mail Stop #82  
Lester, Pennsylvania 19113-2090  
Attn: Code 18 (Mr. J. Colter)

**SUBJECT:** U.S. NAVY CONTRACT N62472-99-D-0032  
CONTRACT TASK ORDER NO. 0071  
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT  
CALVERTON, NEW YORK  
FINAL GROUNDWATER SAMPLING AND ANALYSIS RESULTS

Dear Mr. Colter:

This letter report has been prepared for the Engineering Field Activity – Northeast of the Naval Facilities Engineering Command under Contract Task Order (CTO) No. 0071 issued to Foster Wheeler Environmental Corporation (Foster Wheeler) under Remedial Action Contract (RAC) No. N62472-99-D-0032. This CTO includes excavation and offsite disposal of the Site 1- Northeast Pond Disposal Area at the Naval Weapons Industrial Reserve Plant (NWIRP) located in Calverton, New York. This letter provides the results of the sampling and analysis of groundwater collected from seven monitoring wells at the site.

## 1.0 SITE DESCRIPTION

The NWIRP is located in Calverton, Suffolk County on Long Island, New York, approximately 70 miles east of New York City. The Site 1 - Northeast Pond Disposal Area is located approximately 1,000 feet south of Middle County Road (NY Route 25) and 0.95 miles east of NWIRP's north gate. Site 1 consists of a relatively flat borrow and disposal area that encompasses approximately two acres. The apparent disposal area is approximately 400 feet by 200 feet and is oriented south-southwest to north-northeast.

The topography of Site 1 slopes gently from west-southwest to east followed by a steep 15 to 20 foot drop to the Northeast Pond. The steep slope is unstable, contains sinkholes, and is eroding into the pond. The Northeast Pond is glacially formed and encompasses an area of approximately 2.3 acres. The pond has no outlet. Based on observed water levels in soil borings previously installed at the site, the surface water elevation of the pond approximates the local groundwater elevation. The center of the pond is covered by a thick marsh growth that forms an island. The pond and disposal area are surrounded by woodlands, except for a long, narrow clearing leading west from the southwest corner of the disposal area



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Site 1 is reported to have been used primarily for the disposal of demolition debris such as concrete, brick, wood, and other construction materials until 1984. Other materials reportedly disposed in this area include aircraft sections, junked aircraft assembly tooling, office materials and furniture, pallets, and paint cans. Waste materials were reportedly placed in low-lying areas near the edge of the pond. In 1984, clean fill material was excavated from the hillside located along the western and northern edges of the disposal area, creating an approximate 8-foot high embankment in the adjacent hillside. The excavated material was used to cover the waste.

Hazardous materials are not known to have been purposely disposed in this area. However, it is reported that any of the following materials may be present in the disposal area: petroleum, oils and lubricants (POL), asphalt paving materials, halogenated and non-halogenated solvents, and paint sludge.

## **2.0 PREVIOUS INVESTIGATIONS**

A remedial investigation (RI) was conducted on Site 1 from 1994 to 1995 to determine the nature and extent of contamination by Halliburton NUS (HNUS, now TtNUS) to determine any impacts from Site 1 on the groundwater, and to determine if threats to human health and the environment were present. The RI is summarized in the 1995 RCRA Facility Investigation and RCRA Facility Investigation Addendum Reports prepared by HNUS Corporation. The investigation determined that approximately 21,000 cubic yards of contaminated soils would be required to be removed from this disposal area to remediate the site.

In general, volatile organic compounds (VOCs) were detected sporadically and at relatively low concentrations in the soil and fill material. Semi-volatile organic compounds (SVOCs) including polynuclear aromatic hydrocarbons (PAHs), pesticides, and polychlorinated biphenyls (PCBs) were detected throughout the fill material. Metals including chromium, copper, lead, nickel, silver, and zinc were detected in a portion of the fill material at concentrations approximately 100 to 1,000 times above background concentrations. Other metals were also detected above background concentrations. Based on sampling results, some of the fill material (at one location) could be classifiable as a characteristic hazardous waste for chromium. The estimated areal extent of the fill material is approximately 70,000 square feet (1.6 acres). At an average depth of 8 feet, the estimated volume of fill is 21,000 cubic yards.

Groundwater testing during the RI found the presence of aldrin and other pesticides, PCBs, hexavalent chromium, lead, mercury, and zinc at concentrations above federal and New York State drinking water standards and/or state groundwater quality standards. However, it was suspected that the detected chemicals resulted from fill intrusion into the well and did not reflect mobile groundwater contamination. Consequently, additional groundwater testing was conducted during the Phase 2 RI.

Three temporary monitoring wells were installed downgradient of the former buried drum that contained chlorinated solvents. Groundwater samples were collected at two depths and analyzed for VOCs, which were not detected.

One intermediate depth monitoring well was installed in the disposal area and two shallow monitoring wells were installed downgradient of the disposal area. Two rounds of groundwater samples were collected from all permanent wells using low flow sampling methods and analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Two VOCs were detected at concentrations above New York State groundwater quality standards in the intermediate well, with one VOC being detected in each sampling round. Sampling of shallow wells indicated that iron, manganese, and thallium were detected at concentrations above state groundwater quality standards. The detection of thallium is not expected to be site-related because this metal was not detected in soil, surface water, or sediment samples. The Phase 2 RI results confirmed that many of the chemicals detected during the RI were false positives.

### **3.0 GROUNDWATER INVESTIGATION**

An evaluation of groundwater contamination beneath the site is being conducted prior to the initiation of the excavation activities that will result in the removal of several pre-existing groundwater monitoring wells. During the week of March 18, 2001, seven groundwater samples from existing monitoring wells (NP-MW01-S, NP-MW02-S, NP-MW02-I, NP-MW03-S, NP-MW04-S, NP-MW05-S and NP-MW06-S) were collected and analyzed for TCL VOCs, SVOCs, pesticides, PCBs, and TAL metals. The laboratory reporting protocol was New York State Category B.

The wells were purged and sampled using U.S. Environmental Protection Agency (EPA) recommended low flow techniques with an electrical submersible pump. The groundwater samples were shipped to an offsite Navy-approved, New York State certified laboratory for analysis. The sampling procedures used are briefly described in the following sections.

#### **Headspace Monitoring**

Prior to collection of groundwater samples, the headspace was monitored in all wells to evaluate the presence of volatile organic vapors in the well casings. A micro flame ionization detector (FID) was used for this purpose. As each well was opened, the tip of the instrument was inserted into the casing and the self-contained pump allowed to draw a sample into the FID. An average value from the direct-read instrument was recorded for each well.

#### **Groundwater Level Measurements**

Depth to water measurements were made from the top of each inner casing using an electrical water level probe. Values were subtracted from the surveyed elevation of the top of the corresponding casing to obtain groundwater elevations for each well.

#### **Sampling Methodology**

Wells were purged and sampled using EPA-recommended low flow techniques utilizing a Grundfos Rediflo® controller box and electrical submersible pump. Each well was pumped at a rate of approximately 0.2 to 0.5 liters per minute in order to limit agitation of the water column, thereby minimizing turbidity in the sample. Discharge water was monitored regularly for temperature, pH, electrical conductivity, total dissolved solids, dissolved oxygen, and turbidity. Sampling was conducted when readings stabilized to within 10% in three consecutive readings, or upon recovery if the well was purged dry.

Samples were collected and transferred directly into sample bottles from the pump discharge.

#### **Sample Shipment**

Chemtech Consulting Group performed the laboratory analysis of the groundwater samples collected at the site. The laboratory supplied all of the pre-cleaned, pre-packaged sample bottles and other materials for sample collection and shipment. Samples for VOC analysis were collected from each well into 40-milliliter vials and capped with a plastic cap with Teflon<sup>®</sup> septum such that the samples contained no air bubbles. Samples were shipped via overnight carrier, under appropriate chain-of-custody procedures to the laboratory.

#### **Sample Analysis**

Groundwater samples were analyzed for Target Compound List (TCL) VOCs; TCL SVOCs; pesticides; PCBs; and Target Analyte List (TAL) metals. In addition, one trip blank, one field duplicate, and one field blank, as well as an internal laboratory matrix spike/matrix spike duplicate (MS/MSD), were analyzed for quality assurance purposes. A three-week turnaround for analytical results was requested. The results reporting protocol was New York State Category B. Table 1 provides a summary of the analytical parameters, test methods, containers, preservation, and holding times for the samples. No analytes were detected in any of the QA/QC samples.

### **4.0 INVESTIGATION RESULTS**

#### **Vapor Monitoring**

A Micro FID was utilized to monitor the breathing zone and the wellhead space for volatile organic vapors. The greatest detection of vapors was measured within the well space upon opening the protective cap of each well. The highest value detected was measured in well NP-MW02-S at 1,600 ppm. The remaining five wells had relatively low to non-detectable readings.

#### **Groundwater Elevations**

Water levels measured in site wells are presented in Table 2.

#### **VOC Distribution in Groundwater**

VOCs in groundwater samples collected at the site are listed on Table 3. No VOCs were detected with the exception of chloroform in NP-MW04-S. The value of 1 ug/l is an estimated value at the method detection limit.

#### **SVOC Distribution in Groundwater**

SVOCs are listed in Table 4. No SVOCs were detected in any of the groundwater samples.

#### **Metals Distribution in Groundwater**

Metals in groundwater samples collected at the site are listed in Table 5. Aluminum was detected in NP-MW04-S, NP-MW05-S and NP-MW06-S at 213, 665 and 245 ug/l, respectively. Barium was detected in NP-MW02-S at 252 ug/l. Calcium was found above its method detection limit (MDL) in all wells except NP-MW01-S and NP-MW04-S at values ranging from 6,240 to 376,000 ug/l. Iron was detected in NP-MW02-S, NP-

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MW05-S and NP-MW06-S at 277, 3,700, and 10,500 ug/l, respectively. Lead was detected in NP-MW02-I at 3.6 ug/l, in NP-MW02-S at 7.3 ug/l, and in NP-MW05-S at 6.7 ug/l. Manganese was detected above the MDL in all wells except NP-MW02-I and NP-MW03-S at values ranging from 16.9 to 1,200 ug/l. Potassium was detected at 13,400 ug/l in NP-MW02-S. Sodium was found in NP-MW02-S at 10,700 ug/l. Zinc was detected above the MDL in all wells except NP-MW03-S at values ranging from 24.4 to 122 ug/l. The preliminary remediation goals (PRGs) for metals in groundwater are included in Table 5.

**PESTICIDE DISTRIBUTION IN GROUNDWATER**

Pesticides are listed in Table 6. No pesticides were detected in any samples.

**PCB DISTRIBUTION IN GROUNDWATER**

PCBs are listed in Table 7. No PCB's were detected in any samples.

If you have any questions or comments, please contact me at (973) 630-8413.

Sincerely,



Marlene B. Lindhardt, CHMM  
Senior Project Manager

cc: C. Davis, EFA-NE  
S. Beebe, EFA-NE  
B. Ingram, EFA-NE ROICC  
C. Tippman, Foster Wheeler

**Table 1 Summary of Analytical Parameters, Test Methods, Containers, Preservation, and Holdings Times for Samples**

Matrix	Parameter	Test Method	Container	Preservation	Holding Time
Groundwater	TCL VOCs	8260B	(2) 40 ml glass vials w/ Teflon-lined septum; No headspace	Ice to 4°C	7 Days
	TCL SVOCs	8270D	(2) 1-liter amber glass w/ Teflon-lined cap	Ice to 4°C	7 Days to Extract; 40 Days to Analyze
	TAL Metals	6010A/7471A	(1) 1-liter polyethylene	Nitric Acid to pH <2; Ice to 4°C	6 Months (Hg – 28 days)
	Pesticides	8081B	(1) 1-L amber glass w/ Teflon-lined cap	Ice to 4°C	7 Days to Extract; 40 Days to Analyze
	PCBs	8082A	(1) 1-L amber glass w/ Teflon-lined cap	Ice to 4°C	7 Days to Extract; 40 Days to Analyze

**Table 2 Water Level Measurements (March 19-20, 2002)**

Well ID	Elevation (top of riser pipe)	DTW	Groundwater Elevation
NP-MW01-S	78.75	46.43	32.32
NP-MW02-I	52.30	19.51	32.79
NP-MW02-S	52.34	19.80	32.54
NP-MW03-S	50.41	18.38	32.03
NP-MW04-S	74.49	42.65	31.84
NP-MW05-S	NA	11.05	NA
NP-MW06-S	NA	7.00	NA

Note: DTW – Depth to water measured in tenths of feet from top of riser pipe to groundwater surface in well.  
 NA – Not available

**Table 3 Volatile Organic Compound Results**

Sample ID	NP-MW02 -													
	NP-MW01-S		I		NP-MW02-S		NP-MW03-S		NP-MW04-S		NP-MW05-S		NP-MW06-S	
Lab Sample ID	P1973-09		P1973-02		P1973-03		P1973-04		P1973-05		P1973-06		P1973-08	
Sample Collection Date	03/27/2002		03/26/2002		03/26/2002		03/26/2002		03/27/2002		03/27/2002		03/27/2002	
Units	ug/L		ug/L											
	MDL	CONC	Q											
Chloromethane	2.8	ND		ND										
Vinyl Chloride	1.8	ND		ND										
Bromomethane	1.9	ND		ND										
Chloroethane	2.3	ND		ND										
1,1-Dichloroethene	1.6	ND		ND										
Acetone	5.8	ND		ND										
Carbon Disulfide	1	ND		ND										
Methylene Chloride	1.1	ND		ND										
trans-1,2-Dichloroethene	1.7	ND		ND										
1,1-Dichloroethane	1	ND		ND										
2-Butanone	5.6	ND		ND										
cis-1,2-Dichloroethene	1.8	ND		ND										
Chloroform	1	ND		ND		ND		ND		1	J	ND		ND
1,1,1-Trichloroethane	1.5	ND		ND										
Carbon Tetrachloride	1	ND		ND										
Benzene	1	ND		ND										
1,2-Dichloroethane	2.5	ND		ND										
Trichloroethene	2.8	ND		ND										
1,2-Dichloropropane	3.6	ND		ND										
Bromodichloromethane	1	ND		ND										
4-Methyl-2-Pentanone	3	ND		ND										
Toluene	1.2	ND		ND										
trans-1,3-Dichloropropene	1.7	ND		ND										
cis-1,3-Dichloropropene	1	ND		ND										
1,1,2-Trichloroethane	1.1	ND		ND										
2-Hexanone	1.2	ND		ND										
Dibromochloromethane	1	ND		ND										
Tetrachloroethene	1.6	ND		ND										
Chlorobenzene	1	ND		ND										
Ethyl Benzene	1.5	ND		ND										
m/p-Xylenes	1.5	ND		ND										
o-Xylene	1.7	ND		ND										
Styrene	1	ND		ND										
Bromoform	1	ND		ND										
1,1,2,2-Tetrachloroethane	2.2	ND		ND										

Note: MDL- Method detection limit  
 ND - Not Detected

J - Laboratory Estimated Value above MDL



Client Sample ID	NP-MW02-I														
	NP-MW01-S		P1973-02		NP-MW02-S		NP-MW03-S		NP-MW04-S		NP-MW05-S		NP-MW06-S		
Lab Sample ID	P1973-09		P1973-02		P1973-03		P1973-04		P1973-05		P1973-06		P1973-08		
Sample Collection Date	03/28/2002		03/28/2002		03/28/2002		03/28/2002		03/28/2002		03/28/2002		03/28/2002		
Units	ug/L														
	MDL	CONC	Q	CONC	Q										
Fluorene	10	ND		ND											
4-Nitroaniline	10	ND		ND											
4,6-Dinitro-2-methylphenol	10	ND		ND											
n-Nitrosodiphenylamine	10	ND		ND											
4-Bromophenyl-phenylether	10	ND		ND											
Hexachlorobenzene	10	ND		ND											
Pentachlorophenol	10	ND		ND											
Phenanthrene	10	ND		ND											
Anthracene	10	ND		ND											
Carbazole	10	ND		ND											
Di-n-butylphthalate	10	ND		ND											
Fluoranthene	10	ND		ND											
Pyrene	10	ND		ND											
Butylbenzylphthalate	10	ND		ND											
3,3'-Dichlorobenzidine	10	ND		ND											
Benzo(a)anthracene	10	ND		ND											
Chrysene	10	ND		ND											
bis(2-Ethylhexyl)phthalate	10	ND		ND											
Di-n-octyl phthalate	10	ND		ND											
Benzo(b)fluoranthene	10	ND		ND											
Benzo(k)fluoranthene	10	ND		ND											
Benzo(a)pyrene	10	ND		ND											
Indeno(1,2,3-cd)pyrene	10	ND		ND											
Dibenzo(a,h)anthracene	10	ND		ND											
Benzo(g,h,i)perylene	10	ND		ND											

Note: MDL- Method detection limit  
 ND - Not Detected

**Table 5 Metals Analytical Results**

Client Sample ID	NP - MW02 - I														Preliminary				
	NP - MW01 - S			NP - MW02 - S			NP - MW03 - S			NP - MW04 - S			NP - MW05 - S			NP - MW06 - S			Remediation
Lab Sample ID	P1973-09		P1973-02		P1973-03		P1973-04		P1973-05		P1973-06		P1973-08					Goals	
Collection Date	03/27/2002		03/26/2002		03/26/2002		03/26/2002		03/27/2002		03/27/2002		03/27/2002						
Units	UG/L			UG/L			UG/L			UG/L			UG/L			UG/L			(1)
	MDL	CONC	Q	CONC	Q	CONC	Q	CONC	Q	CONC	Q	CONC	Q	CONC	Q	CONC	Q		
Aluminum	8.5	57.1	B	59.6	B	40.6	B	51.9	B	213		665		245					
Antimony	5.9	ND		ND		ND		ND		ND		ND		ND					
Arsenic	3.2	ND		ND		ND		ND		ND		ND		ND				50	
Barium	1.6	11	B	6.3	B	252		13.4	B	24.7	B	9	B	11.4	B			1,000	
Beryllium	0.2	ND		ND		ND		ND		0.42	B	0.26	B	ND				4	
Cadmium	0.6	ND		0.76	B	1.7	B	1	B	0.67	B	ND		ND				5	
Calcium	6.3	3190	B	6610		376000		29500		763	B	6240		10400					
Chromium	0.9	1.3	B	1.8	B	4.7	B	2.2	B	1.4	B	4.5	B	1.6	B			50	
Cobalt	1	ND		ND		1.1	B	ND		ND		1.6	B	ND					
Copper	1.6	5.6	B	4.3	B	6.1	B	5.6	B	5.1	B	5	B	4.4	B			200	
Iron	17.3	85	B	47.3	B	277		51.3	B	44.6	B	3700		10500				300	
Lead	2.5	ND		3.6		7.3		ND		2.6	B	6.7		ND				15	
Magnesium	7.3	914	B	2070	B	19900		1560	B	1080	B	785	B	1020	B			35,000	
Manganese	0.4	21.4		0.83	B	1200		9.4	B	16.9		30.6		111				300	
Mercury	0.2	ND		ND		ND		ND		ND		ND		ND					
Nickel	2.1	ND		ND		ND		ND		ND		ND		ND				100	
Potassium	137	402	B	1630	B	13400		1310	B	390	B	251	B	168	B				
Selenium	3.4	ND		ND		ND		ND		ND		ND		ND				10	
Silver	1.6	ND		ND		ND		ND		ND		ND		ND					
Sodium	291	2680	B	4710	B	10700		2100	B	4540	B	3320	B	3100	B			20,000	
Thallium	5.7	ND		ND		ND		ND		ND		ND		ND				2	
Vanadium	1.5	ND		ND		1.7	B	3.2	B	ND		5.8	B	2.2	B				
Zinc	1.3	28.4		31.9		122		18.9	B	24.4		33.6		28.4				2,000	

Note: (1) - Draft Phase 2 Remedial Investigation and Focused Feasibility Study, TtNUS, July 2001  
 MDL- Method detection limit  
 B - Value less than method detection limit; concentration provided by laboratory reporting procedures.  
 ND - Not Detected

**Table 6 Pesticides Analytical Results**

Client Sample ID	NP-MW01-S	NP-MW02-I	NP-MW02-S	NP-MW03-S	NP-MW04-S	NP-MW05-S	NP-MW06-S		
Lab Sample ID	P1973-09	P1973-02	P1973-03	P1973-04	P1973-05	P1973-06	P1973-08		
Collection Date	03/27/2002	03/26/2002	03/26/2002	03/26/2002	03/27/2002	03/27/2002	03/27/2002		
Units	UG/L		UG/L		UG/L		UG/L		
	MDL	CONC	Q	CONC	Q	CONC	Q	CONC	Q
alpha-BHC	0 01	ND		ND		ND		ND	
beta-BHC	0 01	ND		ND		ND		ND	
delta-BHC	0 004	ND		ND		ND		ND	
gamma-BHC (Lindane)	0 009	ND		ND		ND		ND	
Heptachlor	0 007	ND		ND		ND		ND	
Aldrin	0 02	ND		ND		ND		ND	
Heptachlor epoxide	0 008	ND		ND		ND		ND	
Endosulfan I	0 01	ND		ND		ND		ND	
Dieldrin	0 009	ND		ND		ND		ND	
4,4'-DDE	0 005	ND		ND		ND		ND	
Endrin	0 02	ND		ND		ND		ND	
Endosulfan II	0 01	ND		ND		ND		ND	
4,4'-DDD	0 01	ND		ND		ND		ND	
Endosulfan Sulfate	0 02	ND		ND		ND		ND	
4,4'-DDT	0 01	ND		ND		ND		ND	
Methoxychlor	0 008	ND		ND		ND		ND	
Endrin ketone	0 009	ND		ND		ND		ND	
Endrin aldehyde	0 02	ND		ND		ND		ND	
alpha-Chlordane	0 02	ND		ND		ND		ND	
gamma-Chlordane	0 01	ND		ND		ND		ND	
Toxaphene	0 12	ND		ND		ND		ND	
Chlordane	0 14	ND		ND		ND		ND	

Note MDL- Method detection limit  
 ND - Not Detected

**Table 7 Polychlorinated Biphenyl Analytical Results**

Client Sample ID	NP-MW01-S		NP-MW02-I		NP-MW02-S		NP-MW03-S		NP-MW04-S		NP-MW05-S		NP-MW06-S		
Lab Sample ID	P1973-09		P1973-02		P1973-03		P1973-04		P1973-05		P1973-06		P1973-08		
Collection Date	03/27/2002		03/26/2002		03/26/2002		03/26/2002		03/27/2002		03/27/2002		03/27/2002		
Units	UG/L														
	MDL	CONC	Q	CONC	Q										
Aroclor-1016	0.24	ND		ND											
Aroclor-1221	0.08	ND		ND											
Aroclor-1232	0.09	ND		ND											
Aroclor-1242	0.08	ND		ND											
Aroclor-1248	0.12	ND		ND											
Aroclor-1254	0.05	ND		ND											
Aroclor-1260	0.01	ND		ND											

Note: MDL- Method detection limit  
 ND - Not Detected