ARCADIS

Infrastructure, buildings, environment, communications

ARCADIS G&M, Inc.
88 Duryea Road
Melville
New York 11747
Tel 631 249 7600
Fax 631 249 7610
www.arcadis-us.com

ENVIRONMENTAL

Mr. Steven M. Scharf, P.E.
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, 11th Floor
Albany, New York 12233-7015

Subject:
Data Report for Phase I Groundwater Remedial Investigation,
Former Grumman Settling Ponds, Operable Unit 3, Bethpage, New York.

Date:
1 December 2004

Contact:
Carlo San Giovanni

Phone:
(631) 391-5259

Email:
csangiovanni@arcadis-us.com

Our ref:
NY001348.0304.0003

Dear Mr. Scharf:

On behalf of Northrop Grumman Systems Corporation (NG), ARCADIS is providing this data report for the first phase of the groundwater investigation conducted at the Bethpage Community Park Site, also known as the Former Grumman Settling Ponds (Operable Unit 3) located in Bethpage, New York. As you will recall, NG and ARCADIS had discussed with and received NYSDEC concurrence for this phase of the groundwater investigation during a conference call on June 8, 2004. This report summarizes the methods employed during the groundwater investigation, the results obtained, and our general conclusions. In addition, this report presents the plan for the next phase of work, which is currently underway.

Tables 1, 2, and 3 summarize the groundwater investigation completed, volatile organic compound (VOC) concentrations detected in the groundwater investigation, and the proposed additional groundwater investigation, respectively.

Figures 1, 2, and 3 depict a plan view of the Bethpage Park site showing TVOC, trichloroethene (TCE), and cis-1,2-dichloroethene (cis-1,2-DCE) concentrations in groundwater, respectively. Figure 4, 5, and 6 depict on-site cross sections showing TVOC, TCE, and cis-1,2-DCE concentrations in groundwater, respectively. Figure 7 depicts the site plan showing proposed areas geophysical survey, soil vapor points, and vertical profile borings (VPBs).

Field Methodology

In accordance with the scope, methods, and procedures that were previously agreed to, ARCADIS subcontracted Delta Well and Pump Co., Inc. to drill and sample 12 VPBs between July and September 2004. The VPBs ranged in depth from 110 to 300 feet below land surface (ft bls) and provided for the rapid collection of soil and groundwater samples. The construction details and sampling summary for the VPBs drilled and sampled are provided in Table 1. In general, VPB drilling, sampling, and abandonment consisted of the following methodology:

- VPB borehole drilling was performed using 4¼-inch inner diameter (ID) hollow-stem augers (HSA) and split-spoon soil samples were collected from selected intervals. Soil lithology was described for each split-spoon soil sample collected
- Geophysical logging (natural gamma method) was performed in 11 of 12 VPBs to verify the lithology and determine groundwater sampling intervals
- The 2-inch diameter temporary steel casing and well point with a five-foot length of 10-slot stainless steel screen was installed to the bottom of the borehole and the augers were pulled from the borehole allowing the formation to collapse around the well.
- Groundwater from the temporary well was purged using a 2-inch diameter variable speed submersible pump. Following stabilization of field parameters, groundwater samples were collected. Following collection of the groundwater sample, the temporary well was pulled vertically upward to the next sampling interval.
- Groundwater samples were submitted to the laboratory for analysis of the full Target Compound List (TCL) VOCs using NYSDEC Analytical Services Protocol (ASP) Method 2000.
- Following completion of groundwater sampling at the VPB, the remainder of the temporary well was removed, the rig and tools were decontaminated, investigation-derived waste was containerized, characterized and either staged pending further analysis or transported off-site for disposal, the VPB borehole was abandoned according to NYSDEC protocols, and the rig was mobilized to the next VPB location.

Summary of Findings

Table 2 summarizes the detected VOCs identified in samples obtained from the VPBs and the existing monitoring wells at the site. VP-1 through VP-8 and VP-10 through VP-12 were drilled on the former NG Plant 24 Access Road, which abuts the Park to the south. VP-9 was drilled southeast of the recharge basin located in the Park. Figures 1, 2, and 3 depict the distribution of maximum concentrations of total VOCs (TVOCs), trichloroethene (TCE), and cis-1,2-dichloroethene (cis-1,2-DCE) detected in groundwater, respectively. Figures 4, 5, and 6 are east-west cross sectional views along the former NG Plant 24 Access Road showing the vertical distribution of TVOC, TCE, and cis-1,2-DCE concentrations in groundwater, respectively. A summary of the findings of the field investigation is as follows:

- The depth to groundwater at the site is approximately 60 ft bls.
- Subsurface lithology is characterized as mostly sand; with apparently discontinuous lenses of clay and silt.

- Based on the analytical results obtained from the VPBs drilled on the former NG Plant 24 Access Road, groundwater exhibited dissolved VOCs at concentrations above NYSDEC standards, criteria, and guidance values (SCGs).
- The area of impacted groundwater extends horizontally from VP-1 to VP-7; approximately 1,000 ft in width and extends to a depth beyond 200 ft bls (see Figures 1 to 6 and Table 2).
- The primary VOCs detected in groundwater above NYSDEC SCGs are cis-1,2-DCE; vinyl chloride (VC); and TCE. However, chloroform; 1,1,1-trichloroethane; 1,1-dichloroethene; 1,1-dichoroethane; and toluene also exceeded their respective NYSDEC SCGs.
- Cis-1,2-DCE concentrations ranged up to 860 micrograms per liter (ug/L) in VP-12 versus the NYSDEC SCG of 5 ug/L.
- TCE concentrations ranged up to 190 ug/L in VP-9; versus the NYSDEC SCG of 5 ug/L.
- VC concentrations ranged up to 26 ug/L in VP-4; versus the NYSDEC SCG of 2 ug/L.
- In the western portion of the former NG Plant 24 Access Road, the highest VOC concentrations were found generally near the water table.
- In the eastern portion of the former NG Plant 24 Access Road, the highest VOC concentrations extends deeper than 120 ft bls.
- Based on depth to groundwater measurements, the direction of groundwater flow on the Park is toward is southeast. However, the orientation of the zone of VOC-impacted groundwater delineated to-date appears to be toward the east-southeast.
- Material found at the VP-9 borehole from 5 to 10 ft bls suggests the presence of a sludge-like material at that location.

Conclusions

Based on the above findings, additional on-site data collection is necessary. The purpose of the additional investigation will be to better determine on-site groundwater VOC impacts (location and magnitude) and assist with determining the off-site area of groundwater potentially impacted with VOCs.

Summary of Proposed Additional Investigation

ARCADIS has prepared a plan to conduct the additional on-site investigation. This plan includes the data collection, analysis, and evaluation methodologies as well as the tentative schedule. Table 3 summarizes the proposed field work and Figure 7 shows the proposed drilling locations. In summary, the plan is as follows:

1. **Vertical Profile Borings (VPBs):** Eight VPBs are proposed to investigate the groundwater quality along an east-west transect through the southern portion of the Park property. The groundwater quality data obtained will help to fill in "data gaps" in the current understanding of the groundwater quality at the Park. Additionally, information about the subsurface geology will be obtained.

2. **Soil Vapor Sampling:** Four soil vapor points will be drilled and installed along the former NG Plant 24 access road from which soil vapor samples will be collected. One ambient air sample will also be collected from the area concurrent with the soil vapor sampling. The data from this initial phase of sampling will be used to assess the potential for VOCs detected in the groundwater to migrate into the vadose zone, as well as determine if additional investigation is needed.

3. **Data Evaluation:** ARCADIS will review, summarize, and interpret the data collected in the above tasks. In addition, ARCADIS will review previous site reports and additional aerial photographs (if available) to obtain a better understanding of historical operations conducted at the site.

Vertical Profile Borings

The proposed groundwater investigation includes drilling and sampling groundwater from eight VPBs to a depth of 110 ft bls (VP-13 to VP-20). Five groundwater samples will be collected from each VPB for laboratory analysis of VOCs. The field work will involve drilling, geophysical logging, and collecting soil/groundwater samples in a manner consistent with methods employed during the first phase of investigation that is described above.

Soil Vapor Sampling

ARCADIS will conduct a soil vapor study at the southern boundary of the former NG Plant 24 Access Road along an east-west transect above the currently known area of impacted groundwater. The specific tasks to be completed include soil vapor and ambient air sample collection, laboratory analysis, and data evaluation including a screening-level preliminary human health evaluation.

Soil Vapor Sample Collection

ARCADIS will drill soil vapor points (SVP) via Geoprobe and collect soil vapor samples using the "post-run tubing" methodology along the former NG Plant 24 access road. The objective of this effort is to collect information on soil vapor VOC concentrations and vertical distribution.

ARCADIS will collect samples from four SVPs. At each location, vapor samples will be collected from three different depths (a total of twelve samples). SVP locations will be drilled near VP-2, VP-4, VP-7, and VP-12, near the southern perimeter fence. These SVPs will allow an evaluation of soil vapor along a transect above the currently known area of impacted groundwater. Pairing the SVP locations with existing VPBs will enable ARCADIS to assess the comparability of VOCs detected in soil vapor and groundwater as well as identify potential background VOC concentrations.

The proposed SVP sampling depths will provide information on VOC concentrations close to the water table as well as at depth. Collecting soil vapor samples at multiple depths will provide information about the potential movement of vapors in subsurface soil.

In addition to the soil vapor sampling, ARCADIS will collect a single ambient air sample to assess whether VOCs are present in the ambient air.

Laboratory Analysis

Soil vapor and ambient air samples will be submitted to a New York State-certified laboratory and analyzed for the Target Compound List of VOCs using USEPA Method TO-15. Analytical results will be reported in both part per billion by volume (ppb_v) and micrograms per cubic meter ($\mu g/m^3$).

Data Evaluation

Records Review

ARCADIS will request and review previous site reports and additional aerial photographs of the site, as available, to focus the investigation by determining whether there is additional information available that may refine the limits of known historical operations or identifying other historical operational areas that may have contributed to the groundwater contamination.

Vertical Profile Boring Groundwater Data Evaluation

Data evaluation of the VPB groundwater data will include validation of the data, and updates to the enclosed data tables, cross sections, and plan-view maps.

Soil Vapor Data Evaluation

The data that is collected will be validated, summarized, and evaluated by comparing VOCs detected (if any) in soil vapor to the following:

1. The USEPA (2002) screening benchmark for the protection of indoor air.
2. Groundwater data from the existing VPBs along the Plant 24 access road.
3. Ambient air result collected during the SVP drilling and sample collection.

Tentative Schedule

The mobilization to begin field work occurred on November 16, 2004; ARCADIS anticipates that the field work and data evaluation activities that are described herein can be completed in approximately 18 weeks.

Please contact us if you have any questions or require additional information.

Sincerely,

ARCADIS G&M, Inc.

David E. Stern
Senior Hydrogeologist

Carlo San Giovanni
Project Manager

Michael F. Wolfert
Project Director

Enclosures

Copies:
John Cofman, Northrop Grumman
Larry Leskovjan, Northrop Grumman
Jill Palmer, Northrop Grumman
Frank Amoroso, Nixon Peabody
Terri Bowers, Gradient Corp.
Ted Firetog
Robert Walker, Town of Oyster Bay
John Molloy, H2M

ARCADIS

Table 1. Summary of Remedial Investigation, Former Grumman Settling Ponds (Operable Unit 3 - Bethpage Community Park), Bethpage, New York.

Description of Activity VPB Identification	Total Depth (ft bls)	Soil Sampling Intervals (ft)	Soil Classification/ Analysis	Groundwater Sampling Intervals (ft)	Groundwater Analysis	Geophysical Logging	Sampling Method (ft bls)	Date Drilling Completed	Date Groundwater Sampling Completed
On-Site Shallow Vertical Profile Borings									
VP-1	110	10 (1)	Lithology	20 (1) (2)	VOC	Yes (4)	2" TW	7/21/04	7/28/04
VP-2	110	10 (1)	Lithology	20 (1) (2)	VOC	Yes (4)	2" TW	7/22/04	8/2/04
VP-3	115	10 (1)	Lithology and TOC (2) (3)	20 (1) (2)	VOC	Yes (4)	2" TW	7/26/04	7/30/04
VP-4	110	10 (1)	Lithology and TOC (2) (3)	20 (1) (2)	VOC	Yes (4)	2" TW	7/27/04	8/3/04
VP-5	110	10 (1)	Lithology and TOC (2) (3)	20 (1) (2)	VOC	Yes (4)	2" TW	7/29/04	8/4/04
VP-6	110	10 (1)	Lithology and TOC (2) (3)	20 (1) (2)	VOC	No	2" TW	7/30/04	8/5/04
VP-7	115	10 (1)	Lithology and TOC (2) (3)	20 (1) (2)	VOC	Yes (4)	2" TW	8/2/04	8/4/04
On-Site Deep Vertical Profile Borings									
VP-8	300	None	Lithology	20 (1) (2)	VOC	Yes (4)	2" TW	9/9/04	9/23/04
VP-9	300	None	Lithology and TOC (2) (3)	20 (1) (2)	VOC	Yes (4)	2" TW	8/9/04	8/27/04
VP-10	150	None	Lithology and TOC (2) (3)	20 (1) (2)	VOC	Yes (4)	2" TW	8/18/04	8/23/04
VP-11	150	20 (1)	Lithology and TOC (2) (3)	20 (1) (2)	VOC	Yes (4)	2" TW	8/24/04	8/31/04
VP-12	155	None	Lithology and TOC (2) (3)	20 (1) (2)	VOC	Yes (4)	2" TW	8/27/04	8/31/04

See footnotes and definitions on last page

Table 1. Summary of Remedial Investigation, Former Grumman Settling Ponds (Operable Unit 3 - Bethpage Community Park), Bethpage, New York.

Footnotes:

(1) Sampling commenced at the water table (estimated at 60 ft bls).
(2) Soil and/or water sample analysis performed using the following methods:
- VOCs: TCL List of VOCs using NYSDEC ASP Method 2000.
- TOC: USEPA Method 9060.
(3) TOC samples will be collected from selected intervals below the water table.
(4) Geophysical logging performed using the natural gamma method.

Definitions:

VPB	Vertical Profile Boring
ft bls	feet below land surface
TCL VOC	Target Compound List of Volatile Organic Compounds
USEPA	United States Environmental Protection Agency
TOC	Total Organic Carbon
NYSDEC	New York State Department of Environmental Conservation
TW	VPB temporary well, consisting of 10 or 5 foot lengths of 2-inch dia. threaded low-carbon steel with a 5-ft length of stainless steel 10-slot wellpoint screen.

Table 2. VOC Concentrations in On-Site Wells and VPB Groundwater Samples, Former Grumman Settling Ponds (OU3 - Bethpage Community Park), Bethpage, New York.

Compound (units in ug/L)	NYSDEC SCGs	Sample ID: / Depth bls: / Date:	VP-1 (67-72) 7/28/04	VP-1 (85-90) 7/28/04	VP-1 (105-110) 7/28/04	BCPMW-1 [1] (55-72) 6/19/2003	BCPMW-1 [1] (55-72) 9/12/2003	BCPMW-1 [1] (55-72) 11/25/2003	BCPMW-2 [1] (55-72) 6/19/2003	BCPMW-2 [1] (55-72) 9/12/2003	BCPMW-2 [1] (55-72) 11/25/2003	VP-2 (65-70) 8/2/04	VP-2 (87-92) 8/2/04	VP-2 (105-110) 7/29/04
Ethylbenzeze	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Xylenes	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	**1**	<5	<5
2-Butanone (MEK)	50		<10	<10	<10	<10	<10	<10	<10	<10	<10	**32**	<10	<10
Acetone	50		**3**	**4**	<10	<10	<10	<10	<10	<10	<10	**5**	<10	<10
Bromomethane	5		<5	**3**	**2**	<5	<5	<5	<5	<5	<5	**3**	**2**	**3**
Methylene Chloride	50		**5**	**0.3**	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Site-Related VOCs														
1,1,1-Trichoroethane	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-dichloroethane	5		<5	<5	<5	<5	<5	<5	**18**	**18**	**16**	<5	<5	<5
1,1-dichloroethene	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon disulfide	50		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroethane	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	5		<5	<5	<5	**4**	**3**	**2**	<5	**2**	<5	<5	<5	**0.9**
cis-1,2-dichloroethene	5		**29**	<5	<5	**4**	**6**	**5**	**120**	**150**	**120**	**11**	**5**	**1**
trans-1,2-dichloroethene	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	5		<5	**0.9**	**0.5**	<5	<5	<5	<5	**2**	<5	<5	<5	**0.5**
Trichloroethene	5		**3**	<5	<5	**83**	**76**	**60**	**230**	**280**	**210**	**14**	**10**	**2**
Trichlorotrifluoroethane	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl Chloride	2		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total VOCs	--		**40**	**8**	**3**	**91**	**85**	**67**	**368**	**452**	**346**	**66**	**17**	**7**

[1] Data obtained from Table B-5, Investigation Sampling Program, Bethpage Community Park (Dvirka & Bartilucci 2003).

Exceeds associated SCG value

Bold Detected compound

bls below land surface

J Estimated Value

D Constituent quantified at a secondary dilution.

NYSDEC SCG New York State Department of Environmental Conservation Standards Criteria and Guidance Values.

G:\APROJECT\Northrop Grumman\Superfund\NY001348.0304 Invst\Data\prelim vpb data

Table 2. VOC Concentrations in On-Site Wells and VPB Groundwater Samples, Former Grumman Settling Ponds (OU3 - Bethpage Community Park), Bethpage, New York.

Compound (units in ug/L)	NYSDEC SCGs	Sample ID: BCPMW-3 [1]	BCPMW-3 [1]	BCPMW-3 [1]	VP-3	VP-3	VP-3	VP-4	VP-4	VP-4	VP-5	VP-5	VP-5
		Depth bls: (55-72)	(55-72)	(55-72)	(65-70)	(85-90)	(110-115)	(65-70)	(85-90)	(105-110)	(65-70)	(85-90)	(105-110)
		Date: 6/19/2003	9/12/2003	11/25/2003	7/30/04	7/30/04	7/30/04	8/3/04	8/3/04	7/30/04	8/4/04	8/4/04	7/30/04
Ethylbenzeze	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Xylenes	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	5	<5	<5	<5	**0.5**	<5	<5	<5	<5	<5	<5	<5	<5
2-Butanone (MEK)	50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**5**	<10	<10
Acetone	50	<10	<10	<10	**6**	<10	<10	<10	**3**	<10	**4**	<10	<10
Bromomethane	5	<5	<5	<5	**2**	**4**	**2**	**5**	**2**	**4**	<5	<5	**3**
Methylene Chloride	50	<5	<5	<5	**1**	**0.3**	<5	**3**	<5	<5	<5	<5	**3**
Site-Related VOCs													
1,1,1-Trichoroethane	5	<5	**6**	<5	**0.6**	<5	<5	**1**	<5	<5	<5	<5	<5
1,1-dichloroethane	5	<5	**10**	**18**	**1**	<5	<5	**7**	**5**	<5	<5	**2**	**2**
1,1-dichloroethene	5	<5	**11**	**44**	**2**	<5	<5	**6**	<5	<5	<5	<5	<5
Carbon disulfide	50	<5	<5	<5	**1**	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	5	<5	<5	<5	**0.5**	<5	<5	<5	<5	<5	<5	<5	<5
Chloroethane	5	<5	<5	<5	**0.7**	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	5	<5	**6**	<5	**4**	**19**	**4**	<5	**2**	**7**	<5	**3**	**15**
cis-1,2-dichloroethene	5	**5300**	**2900**	**5200**	**160**	**70**	**2**	**420 D**	**240 D**	**2**	**62**	**690 D**	**240 D**
trans-1,2-dichloroethene	5	<5	**2**	<5	**1**	<5	<5	**2**	<5	<5	<5	**1**	<5
Tetrachloroethene	5	<5	<5	<5	**5**	**2**	**0.3**	**2**	**3**	<5	**2**	**2**	<5
Trichloroethene	5	**620**	**760**	**1800**	**5**	**6**	**3**	**94**	**82**	**9**	**12**	**69**	**80**
Trichlorotrifluoroethane	5	<5	<5	<5	**0.8**	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl Chloride	2	<2	**6**	**70**	**18**	**5**	<2	**26**	<2	<2	<2	<2	<2
Total VOCs	--	**5,920**	**3,701**	**7,132**	**209**	**106**	**11**	**566**	**337**	**22**	**85**	**767**	**343**

[1] Data obtained from Table B-5, Investigation Sampling Program, Bethpage Community Park (Dvirka & Bartilucci 2003).

	Exceeds associated SCG value
Bold	Detected compound
bls	below land surface
J	Estimated Value
D	Constituent quantified at a secondary dilution.
NYSDEC SCG	New York State Department of Environmental Conservation Standards Criteria and Guidance Values.

G:\APROJECT\Northrop Grumman\Superfund\NY001348.0304 Invst\Data\prelim vpb data

Table 2. VOC Concentrations in On-Site Wells and VPB Groundwater Samples, Former Grumman Settling Ponds (OU3 - Bethpage Community Park), Bethpage, New York.

Compound (units in ug/L)	NYSDEC SCGs	Sample ID: / Depth bls: / Date:	VP-6 (65-70) 8/5/04	VP-6 (85-90) 8/5/04	VP-6 (105-110) 8/5/04	VP-7 (65-70) 8/4/04	VP-7 (85-90) 8/4/04	VP-7 (105-110) 8/4/04		VP-8 (75-80) 9/23/04	VP-8 (95-100) 9/23/04	VP-8 (115-120) 9/22/04	VP-8 (135-140) 9/21/04	VP-8 (155-160) 9/21/04	VP-8 (175-180) 9/21/04
Ethylbenzeze	5		<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
Xylenes	5		<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
Toluene	5		**2**	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
2-Butanone (MEK)	50		<10	<10	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
Acetone	50		<10	<10	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10
Bromomethane	5		<5	<5	<5	<5	**2**	<5		<5	<5	<5	<5	<5	<5
Methylene Chloride	50		<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
Site-Related VOCs															
1,1,1-Trichoroethane	5		<5	<5	<5	<5	<5	<5		**6**	<5	<5	<5	<5	<5
1,1-dichloroethane	5		<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
1,1-dichloroethene	5		<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
Carbon disulfide	50		<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
Carbon tetrachloride	5		<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
Chloroethane	5		<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
Chloroform	5		**34**	**58**	**17**	**15**	**8**	<5		**37**	**4**	**4**	**0.7**	**2**	**12**
cis-1,2-dichloroethene	5		**2**	**3**	**54**	<5	<5	**3**	J	**10**	**81**	**28**	**8**	<5	<5
trans-1,2-dichloroethene	5		<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
Tetrachloroethene	5		**2**	**2**	<5	**5**	**3**	<5		<5	<5	<5	<5	<5	<5
Trichloroethene	5		**2**	**2**	**24**	**1**	<5	**9**		**10**	**47**	**11**	**6**	**3**	**7**
Trichlorotrifluoroethane	5		<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5
Vinyl Chloride	2		<2	<2	<2	<2	<2	<2		<2	<2	<2	<2	<2	<2
Total VOCs	--		**42**	**65**	**95**	**21**	**13**	**12**		**63**	**132**	**43**	**14.7**	**5**	**19**

(1) Data obtained from Table B-5, Investigation Sampling Program, Bethpage Community Park (Dvirka & Bartilucci 2003).

	Exceeds associated SCG value
Bold	Detected compound
bls	below land surface
J	Estimated Value
D	Constituent quantified at a secondary dilution.
NYSDEC SCG	New York State Department of Environmental Conservation Standards Criteria and Guidance Values.

G:\APROJECT\Northrop Grumman\Superfund\NY001348.0304 Invst\Data\prelim vpb data

Table 2. VOC Concentrations in On-Site Wells and VPB Groundwater Samples, Former Grumman Settling Ponds (OU3 - Bethpage Community Park), Bethpage, New York.

Compound (units in ug/L)	NYSDEC SCGs	Sample ID: / Depth bls: / Date:	VP-8 (204-209) 9/20/04	VP-8 (226-231) 9/17/04	VP-8 (235-240) 9/17/04	VP-8 (255-260) 9/16/04	VP-8 (275-280) 9/16/04	VP-8 (296-301) 9/10/04	VP-9 (65-70) 8/27/04	VP-9 (75-80) 8/26/04	VP-9 (95-100) 8/26/04	VP-9 (115-120) 8/26/04
Ethylbenzeze	5		<5	<5	<5	<5	<5	<5	**3**	**0.8**	<5	<5
Xylenes	5		<5	<5	<5	<5	<5	<5	**4**	**2**	<5	<5
Toluene	5		<5	<5	<5	<5	<5	<5	**43**	**16**	<5	**2**
2-Butanone (MEK)	50		<10	<10	<10	<10	<10	<10	**3**	<10	<10	**4**
Acetone	50		<10	<10	<10	<10	<10	<10	**8**	<10	<10	<10
Bromomethane	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Methylene Chloride	50		<5	<5	<5	<5	<5	<5	**3**	<5	<5	<5
Site-Related VOCs												
1,1,1-Trichoroethane	5		<5	<5	<5	<5	<5	<5	**3**	<5	<5	<5
1,1-dichloroethane	5		<5	<5	<5	<5	<5	<5	**2**	<5	<5	<5
1,1-dichloroethene	5		<5	<5	<5	<5	<5	<5	**1**	<5	<5	<5
Carbon disulfide	50		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroethane	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	5		**1**	1	2	<5	<5	0.7	**1**	**2**	**13**	**8**
cis-1,2-dichloroethene	5		<5	<5	<5	<5	<5	<5	**96**	**9**	**2**	<5
trans-1,2-dichloroethene	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	5		<5	<5	**6**	**13**	**4**	**5**	<5	<5	<5	<5
Trichloroethene	5		**14**	**13**	**2**	**3**	**6**	**7**	**190**	**30**	**7**	**2**
Trichlorotrifluoroethane	5		<5	<5	<5	<5	<5	<5	3	<5	<5	<5
Vinyl Chloride	2		<2	<2	<2	<2	<2	<2	**7**	**2**	<2	<2
Total VOCs	--		**15**	**14**	**10**	**16**	**10**	**13**	**360**	**59**	**22**	**16**

(1) Data obtained from Table B-5, Investigation Sampling Program, Bethpage Community Park (Dvirka & Bartilucci 2003).

	Exceeds associated SCG value
Bold	Detected compound
bls	below land surface
J	Estimated Value
D	Constituent quantified at a secondary dilution.
NYSDEC SCG	New York State Department of Environmental Conservation Standards Criteria and Guidance Values.

G:\APROJECT\Northrop Grumman\Superfund\NY001348.0304 Invst\Data\prelim vpb data

Table 2. VOC Concentrations in On-Site Wells and VPB Groundwater Samples, Former Grumman Settling Ponds (OU3 - Bethpage Community Park), Bethpage, New York.

Compound (units in ug/L)	NYSDEC SCGs	Sample ID: / Depth bls: / Date:	VP-9 (135-140) 8/25/04	VP-9 (153-158) 8/25/04	VP-9 (175-180) 8/23/04	VP-9 (195-200) 8/20/04	VP-9 (215-220) 8/19/04	VP-9 (235-240) 8/19/04	VP-9 (255-260) 8/18/04	VP-9 (296-301) 8/17/04	VP-10 (65-70) 8/23/04	VP-10 (85-90) 8/20/04	VP-10 (105-110) 8/20/04
Ethylbenzeze	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Xylenes	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
2-Butanone (MEK)	50		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Acetone	50		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Methylene Chloride	50		<5	<5	<5	<5	<5	**3** J	**2** J	<5	<5	<5	<5
Site-Related VOCs													
1,1,1-Trichoroethane	5		<5	<5	<5	<5	<5	<5	<5	<5	**0.7**	<5	<5
1,1-dichloroethane	5		<5	<5	<5	<5	<5	<5	<5	<5	**2**	<5	<5
1,1-dichloroethene	5		<5	<5	<5	<5	<5	<5	<5	<5	**1**	<5	<5
Carbon disulfide	50		<5	<5	<5	<5	<5	<5	**1** J	<5	<5	<5	<5
Carbon tetrachloride	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroethane	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	5		**0.7**	<5	<5	<5	<5	<5	<5	<5	**2**	**11**	**5**
cis-1,2-dichloroethene	5		<5	<5	<5	<5	<5	<5	<5	<5	**160**	**15**	**2** J
trans-1,2-dichloroethene	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	5		<5	<5	<5	<5	<5	**2** J	**2** J	**2** J	**4**	<5	<5
Trichloroethene	5		<5	<5	<5	**1** J	**3** J	**4** J	**5** J	**5** J	**47**	**13**	**6** J
Trichlorotrifluoroethane	5		<5	<5	<5	<5	<5	<5	**2** J	**2** J	<5	<5	<5
Vinyl Chloride	2		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total VOCs	--		**0.7**	0	0	**1**	**3**	**9**	**12**	**9**	**217**	**39**	**13**

(1) Data obtained from Table B-5, Investigation Sampling Program, Bethpage Community Park (Dvirka & Bartilucci 2003).

	Exceeds associated SCG value
Bold	Detected compound
bls	below land surface
J	Estimated Value
D	Constituent quantified at a secondary dilution.
NYSDEC SCG	New York State Department of Environmental Conservation Standards Criteria and Guidance Values.

G:\APROJECT\Northrop Grumman\Superfund\NY001348.0304 Invst\Data\prelim vpb data

Table 2. VOC Concentrations in On-Site Wells and VPB Groundwater Samples, Former Grumman Settling Ponds (OU3 - Bethpage Community Park), Bethpage, New York.

Compound (units in ug/L)	NYSDEC SCGs	Sample ID: / Depth bls: / Date:	VP-10 (125-130) 8/19/04	VP-10 (145-150) 8/19/04	VP-11 (65-70) 8/31/04	VP-11 (85-90) 8/31/04	VP-11 (105-110) 8/31/04	VP-11 (125-130) 8/30/04	VP-11 (145-150) 8/30/04	VP-12 (70-75) 8/31/04	VP-12 (90-95) 8/31/04	VP-12 (110-115) 8/31/04
Ethylbenzeze	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Xylenes	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
2-Butanone (MEK)	50		<10	<10	<5	<5	<5	<10	<10	<10	<10	<10
Acetone	50		<10	<10	<10	<10	<10	<10	<10	<10	**23**	<10
Bromomethane	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Methylene Chloride	50		<5	<5	<5	<5	<5	<5	<5	**7** J	<5	**8** J
Site-Related VOCs												
1,1,1-Trichoroethane	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-dichloroethane	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-dichloroethene	5		<5	<5	**1** J	**8** J	**2** J	<5	<5	<5	<5	<5
Carbon disulfide	50		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroethane	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	5		**8**	**2** J	<5	<5	**7**	**6**	**0.7** J	**23**	**43**	**35**
cis-1,2-dichloroethene	5		**2** J	**4** J	**68**	**280**	**150**	**3** J	<5	**860**	**690**	**690**
trans-1,2-dichloroethene	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	5		<5	<5	**3** J	<5	<5	**2** J	<5	<5	<5	<5
Trichloroethene	5		**4** J	**6**	**16**	**100**	**48**	**71**	**4** J	**66**	**79**	**110**
Trichlorotrifluoroethane	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl Chloride	2		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total VOCs	--		**14**	**12**	**88**	**388**	**207**	**82**	**5**	**956**	**835**	**843**

(1) Data obtained from Table B-5, Investigation Sampling Program, Bethpage Community Park (Dvirka & Bartilucci 2003).

[ ] Exceeds associated SCG value

Bold Detected compound

bls below land surface

J Estimated Value

D Constituent quantified at a secondary dilution.

NYSDEC SCG New York State Department of Environmental Conservation Standards Criteria and Guidance Values.

G:\APROJECT\Northrop Grumman\Superfund\NY001348.0304 Invst\Data\prelim vpb data

Table 2. VOC Concentrations in On-Site Wells and VPB Groundwater Samples, Former Grumman Settling Ponds (OU3 - Bethpage Community Park), Bethpage, New York.

Compound (units in ug/L)	NYSDEC SCGs	Sample ID: VP-12 Depth bls: (130-135) Date: 8/30/04		Sample ID: VP-12 Depth bls: (150-155) Date: 8/30/04
Ethylbenzeze	5	<5		<5
Xylenes	5	<5		<5
Toluene	5	<5		<5
2-Butanone (MEK)	50	<10		<10
Acetone	50	<10		<10
Bromomethane	5	<5		<5
Methylene Chloride	50	<5		<5
Site-Related VOCs				
1,1,1-Trichoroethane	5	<5		<5
1,1-dichloroethane	5	<5		<5
1,1-dichloroethene	5	<5		<5
Carbon disulfide	50	<5		<5
Carbon tetrachloride	5	<5		<5
Chloroethane	5	<5		<5
Chloroform	5	**5**		**14**
cis-1,2-dichloroethene	5	**2**	**J**	**1**
trans-1,2-dichloroethene	5	<5		<5
Tetrachloroethene	5	<5		<5
Trichloroethene	5	**4**	**J**	**6**
Trichlorotrifluoroethane	5	<5		<5
Vinyl Chloride	2	<2		<2
Total VOCs	--	**11**		**21**

(1) Data obtained from Table B-5, Investigation Sampling Program, Bethpage Community Park (Dvirka & Bartilucci 2003).

[ ] Exceeds associated SCG value

Bold Detected compound

bls below land surface

J Estimated Value

D Constituent quantified at a secondary dilution.

NYSDEC SCG New York State Department of Environmental Conservation Standards Criteria and Guidance Values.

G:\APROJECT\Northrop Grumman\Superfund\NY001348.0304 Invst\Data\prelim vpb data

Table 3. Summary of Additional On-Site Remedial Investigation and Rationale, Former Grumman Settling Ponds (Operable Unit 3 - Bethpage Community Park), Bethpage, New York.

Description of Activity Location Identification	Proposed Total Depth (ft bls)	Proposed Soil Sampling Intervals (ft)	Proposed Soil Analysis	Proposed Soil Vapor Sampling Intervals (ft)	Proposed Soil Vapor Analysis	Proposed Groundwater Sampling Intervals (ft)	Proposed Groundwater Analysis	Proposed Geophysical Logging	General Rationale
Vertical Profile Borings									
VP-13	110	10 (1)	Lithology	None	None	10 (1)	VOC (2)	Yes (4)	On-site shallow VPBs will be drilled to better define the vertical and horizontall extent of the on-site portion of groundwater VOC standard exceedences that were identified in the Phase 1 VPBs and on-site monitoring wells. VPBs will be drilled in the Park (Figure 1). Geophysical logging will be performed to provide a continuous profile of borehole lithology. Based on lithology in VPBs the groundwater sampling interval may be adjusted.
VP-14	110	10 (1)	Lithology, TOC (2) (3)	None	None	10 (1)	VOC (2)	Yes (4)	
VP-15	110	10 (1)	Lithology	None	None	10 (1)	VOC (2)	Yes (4)	
VP-16	110	10 (1)	Lithology, TOC (2) (3)	None	None	10 (1)	VOC (2)	Yes (4)	
VP-17	110	10 (1)	Lithology	None	None	10 (1)	VOC (2)	Yes (4)	
VP-18	110	10 (1)	Lithology, TOC (2) (3)	None	None	10 (1)	VOC (2)	Yes (4)	
VP-19	110	10 (1)	Lithology	None	None	10 (1)	VOC (2)	Yes (4)	
VP-20	110	10 (1)	Lithology	None	None	10 (1)	VOC (2)	Yes (4)	
Soil Vapor Points									
SVP-1	40	None	None	(5)	VOC (5)	None	None	No	Soil vapor samples will be collected using the Post-Run Tubing method near existing VPBs along an east-west transect of the VOC plume. Soil vapor samples will be obtained close to the water table (to assess the comparability of detections with groundwater quality obtained from the VPBs), at an intermediate depth that closely approximates the depth of basements, and near land surface (thereby minimizing potential interferences with soil vapor-atmospheric air exchange) to assess the potential variations in detected compounds and concentrations with depth. In addition a sample of ambient air will be collected over an eight hour period.
SVP-2	40	None	None	(5)	VOC (5)	None	None	No	
SVP-3	40	None	None	(5)	VOC (5)	None	None	No	
SVP-4	40	None	None	(5)	VOC (5)	None	None	No	

See footnotes and definitions on last page

Table 3. Summary of Additional On-Site Remedial Investigation and Rationale, Former Grumman Settling Ponds (Operable Unit 3 - Bethpage Community Park), Bethpage, New York.

Footnotes:

(1) Sampling shall commence at the water table (estimated at 60 ft bls) and will proceed at the following intervals: 60-65 ft bls, 70-75 ft bls, 80-85 ft bls, 90-95 ft bls, and 105-110 ft bls.

(2) Soil and/or water sample analysis shall be performed using the following methods:
- VOCs: TCL List of VOCs using NYSDEC ASP Method 2000.
- TOC: USEPA Method 9060.

(3) TOC samples will be collected from three VPBs at a selected interval below the water table.

(4) Geophysical logging will be performed using the natural gamma method.

(5) Soil vapor samples shall be collected at 5 ft, 15 ft and at 40 ft bls. Soil vapor samples will be analyzed for VOCs using USEPA Method TO-15.

Definitions:

VPB	Vertical Profile Boring
ft bls	feet below land surface
TCL VOC	Target Compound List of Volatile Organic Compounds
USEPA	United States Environmental Protection Agency
TOC	Total Organic Carbon
NYSDEC	New York State Department of Environmental Conservation
SVP	Soil Vapor Point