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ENVIRONMENT

Mr. Steven Scharf, P.E.
New York State Department of Environmental Conservation (NYSDEC)
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7015

Subject:
Phase 2 Remedial Investigation Work Plan Addendum No. 8,
Former Grumman Settling Ponds (Operable Unit 3, - Bethpage Community Park),
Bethpage, New York.

Date:
December 20, 2006

Contact:
David Stern

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631-391-5284

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Our ref:
NY001348.0806.00003

Dear Mr. Scharf:

On behalf of Northrop Grumman Systems Corporation (NGC), ARCADIS has prepared this Work Plan Addendum No. 8 for continuation of the Phase 2 Remedial Investigation (RI) at the Former Grumman Settling Ponds (Operable Unit 3 – Bethpage Community Park [Park]), Bethpage, New York Site. This Work Plan Addendum presents the rationale and proposed work scope for the following activities:

- Performance of an ambient air study on the Bethpage Community Park to investigate concentrations of site-related volatile organic compounds (VOCs) (if any) in the ambient air.

- Collection and analysis of additional off-site soil gas samples to confirm and further evaluate transport mechanisms and the spatial distribution of VOCs in the vadose zone and assist with refinement of the conceptual site model (CSM) for the Site, in accordance with the objectives of the New York State Department of Environmental Conservation (NYSDEC)-approved Remedial Investigation/ Feasibility Study (RI/FS) Work Plan.

- Collection of shallow groundwater samples to evaluate relationship of VOCs in shallow groundwater to soil gas.

Additionally, this Work Plan Addendum provides OU3 RI data in accordance with Section III of Administrative Order on Consent (AOC) Index # W1-0018-04-01.

The NYSDEC-approved RI/FS Work Plan, dated March 8, 2006, contains the detailed methodologies to be used for soil gas sampling and analysis and is incorporated herein by reference. The remainder of the Work Plan Addendum provides background information on previous soil gas samples collected at the Park and off-site as well as specifications pertaining to the proposed ambient air, soil gas, and groundwater sampling activities.

**Background**

As part of Phase 1 of the RI in October 2004, ARCADIS collected soil gas samples along the NGC Plant 24 Access Road. These data were provided and fully discussed in a report to NYSDEC, entitled Summary of Soil Vapor Sampling Results, Bethpage Community Park – Operable Unit 3, dated, June 23, 2005. In accordance with the approved RI/FS Work Plan and as part of the Phase 2 RI, ARCADIS collected additional soil gas samples both on-site (on Park and adjoining NGC properties) and off-site (along Sycamore and Stewart Avenues, within Town of Oyster Bay [Town] rights of way). Completed soil gas sampling locations are shown on Figure 1. The results of on-site soil gas sampling were provided to the NYSDEC in the September 19, 2006 Consent Order (CO) progress report. The results of off-site soil gas sampling are summarized in Table 1 of this Work Plan Addendum.

Phase 2 RI soil gas points completed on the Park (i.e., SGP-5 to SGP-10) exhibited concentrations of VOCs in soil gas at various depths and locations. As previously presented to the NYSDEC, Soil Gas Point SGP-11, southwest of the Park on NGC property (near former NGC Plant 24), exhibited a trichloroethene (TCE) concentration of 11,000 micrograms per cubic meter ($\mu g/m^3$) at 7 feet below land surface (ft bls).

Phase 2 RI soil gas points were completed on Town rights of way at eight locations along Sycamore Avenue (south of the Park) and Stewart Avenue (east of the Park) (i.e., SGP-100 to SGP-107). TCE was detected above the New York State Department of Health (NYSDOH) Air Guideline Value of 5 $\mu g/m^3$ at soil gas points SGP-106, SGP-107, and the shallow sample from SGP-102. Other shallow soil gas samples in these areas did not exhibit detected concentrations of TCE. Methylene chloride and tetrachloroethene concentrations were below NYSDOH Air Guideline Values. Air Guideline Values for other VOCs are not available from the NYSDOH.

Concurrent lithologic data obtained from RI vertical profile borings (VPBs), cone penetrometer (CPT) borings, soil borings, and soil gas points drilled within and near the Park indicated a significant degree of stratification in the vadose zone. Most notably, two distinct low permeability zones (LPZ) were identified on-site at approximately 10 and 40 ft bls that are overlain and underlain by sequences of coarser grained deposits, characterized as medium sands. The LPZs are generally characterized as interbedded fine sands, silts, and clays and a portion of the deeper LPZ is thought to occasionally be in contact with the water table on a seasonal basis. As such, the coarser-grained deposits (that contain VOCs) beneath the LPZs may serve as lateral preferential pathways for VOCs in soil gas. The lateral and downgradient extent of the LPZs are currently being investigated.

Shallow groundwater samples from VPBs drilled near and along Sycamore Avenue also indicated that VOCs (including TCE) are present at the water table (groundwater data were provided to NYSDEC under separate cover). Therefore, VOCs may potentially be off-gas vertically into overlying soil gas from shallow groundwater. The vertical extent of soil gas movement from groundwater is still under investigation.

Collectively, this information suggests that both VOCs in shallow groundwater and LPZs may be having some influence on the generation, transport, and resultant spatial distribution of VOCs in soil gas. As described below, the soil gas sampling proposed in this Work Plan is designed to help evaluate this issue to refine the soil gas CSM.

**Technical Work Plan**

ARCADIS proposes to conduct an ambient air study at the Park. Although VOCs were detected in soil gas at locations in the Park, ARCADIS believes that sufficient information currently exists to refine the CSM and define the nature and extent of soil gas VOCs in the Park. As such, further soil gas sampling is not proposed in the Park at this time. Instead, the on-site investigation will focus on collection of ambient air samples to investigate the possible presence of site-related VOCs. Overall, a total of four ambient air samples will be collected (identified as AA-1 to AA-4). At least one sample will be collected up-wind of the Park to assess the potential influence of background VOC concentrations. Ambient air samples will be obtained using methods described in the approved RI/FS Work Plan, with the exception that samples will be collected over a 24-hour period, instead of an 8-hour period. The time of sample collection will be biased during periods of low atmospheric air pressure and/or during an extended dry period. These conditions are expected to promote off-gassing of subsurface VOCs to the ambient air. Table 2 provides additional details as to the proposed ambient air study.

In addition to the on-site ambient air study, ARCADIS proposes to collect off-site soil gas samples. As shown on Figure 1 and described on Table 2, a total of eight soil gas point locations are proposed on the Town rights of way, along Sycamore Avenue and Stewart Avenue (identified as SGP-108 to SGP-115). Four soil gas point locations are also proposed in an area southwest of the Park, on NGC property (identified as SGP-11A to SGP-11D). The proposed soil gas samples will serve to develop information as to the various VOC transport mechanisms in soil gas (see above), refine the CSM, and verify the previously detected VOC soil gas concentrations in areas where TCE was detected above the NYSDOH Air Guideline Value. Overall, ARCADIS proposes to collect a total of 32 soil gas samples from up to three different depths at each location (i.e., 8 ft bls, 20 ft bls, 50 ft bls) (see Table

2). Soil gas samples will be collected from temporary soil gas points, consistent with past practices.

For the additional and any future soil gas samples, ARCADIS proposes to reduce the list of parameters selected for laboratory analysis of VOCs to those constituents previously detected either on NGC property or on the Town rights of way. This approach will help focus the analysis on those constituents that are potentially site-related. This approach is consistent with the NYSDOH (2006) Guidance for Evaluating Soil Vapor Intrusion in the State of New York, which states that "Based on the initial sampling results, development and application of a site-specific analyte list may be considered for analysis of subsequent soil vapor ... samples". The reduced analyte list is provided in Table 3 and includes constituents detected in soil gas samples from NGC property (i.e., the Access Road) and the Town rights-of-way (i.e., Sycamore and Stewart Avenues).

Coincident with the off-site soil gas sampling, ARCADIS will conduct groundwater sampling at the water table from soil gas points drilled to 50 ft bls on NGC property and in Town right of ways, as feasible. The purpose of the groundwater sampling is to gather information to assess the relationship of detected VOCs in soil gas to proximal shallow groundwater and possible transport mechanisms described above. The collection of groundwater samples will depend on site access, the ability to achieve target drilling depths, and other potential field factors. The proposed groundwater sampling locations are described in Table 2. Groundwater samples will be collected using methods described in the approved RI/FS Work Plan.

If site-related VOCs are detected in the soil gas samples to be collected along Sycamore Avenue, ARCADIS may propose additional soil gas sampling in more distal area(s), as may be appropriate, to achieve the overarching RI/FS objective of determining the extent of VOCs in soil gas. The specifications for potential additional soil gas samples will be proposed to the NYSDEC in a separate Work Plan Addendum.

**Community Outreach, Schedule, and Logistics**

Consistent with the intent of the NYSDEC-approved Community Participation Plan (CPP) (see RI/FS Work Plan for details), additional community notifications will be made for each off-site proposed sampling location, in a manner similar to recently completed off-site soil gas points.

ARCADIS expects that the proposed soil gas sampling will require approximately eight days to complete. Field work will be initiated in January 2007. The ambient air, soil gas, and groundwater analytical data will be obtained on a two-week turnaround

time. The data will be validated, consistent with the provisions of the RI/FS Work Plan. Consistent with the contents of this Work Plan Addendum, based on the soil gas sampling, if additional soil gas sampling is determined to be needed, then an additional Work Plan Addendum will be prepared for NYSDEC approval that will include the validated soil gas data from the sampling event proposed herein.

The ambient air study will be performed as described above and detailed in Table 2. The scope and schedule for the ambient air sampling will be contingent on weather, site conditions, and Town activities. Since the Town has begun their site work related to the re-development of the Construction Area, the ambient air study portion of this Work Plan Addendum will be conducted after the site redevelopment is completed.

Soil gas, groundwater, and ambient air data will be validated in accordance with the RI/FS Work Plan. The ambient air sample results will be obtained on a two week turn around time. Soil gas, groundwater, and ambient air data collected as part of this Work Plan Addendum will be incorporated into the final RI Report.

ARCADIS appreciates NYSDEC's expedited review and approval of this work plan addendum. If you have questions or comments, please contact us.

Sincerely,

ARCADIS U.S., Inc.

David E. Stern
Senior Hydrogeologist

Carlo San Giovanni
Project Manager

Enclosures

Copies:
John Cofman, Northrop Grumman Corporation
Larry Leskovjan, Northrop Grumman Corporation
Nadine Weinberg, ARCADIS
Mike Wolfert, ARCADIS

Table 1. Concentrations of Volatile Organic Compounds in Off-Site Soil Gas and Ambient Air Samples, Former Grumman Settling Ponds (Operable Unit 3 - Bethpage Community Park), Bethpage, New York.

| Constituent | Sample ID: | SGP100 | SGP101 | SGP101 | SGP101 |
|---|---|---|---|---|---|
| | Depth (ft bls): | 7-7.9 | 7-7.5 | 34-34.5 | 49-49.5 |
| | Date: | 6/29/2006 | 6/29/2006 | 6/29/2006 | 6/29/2006 |
| | Units: | µg/m³ | µg/m³ | µg/m³ | µg/m³ |
| Acetone | | **190** | **120** | **130** | **5000** |
| Benzene | | **10** | **3.8** | **4.2** | <64 |
| Bromodichloromethane | | <2.7 | <2 | <2 | <130 |
| Bromoform | | <4.1 | <3.1 | <3.1 | <210 |
| Bromomethane | | <1.6 | <1.2 | <1.2 | <78 |
| 1,3-Butadiene | | **17** | **12** | **8.2** | **190** |
| Carbon Disulfide | | **8.7** | **5** | **40** | **190** |
| Carbon Tetrachloride | | <2.5 | <1.9 | <1.9 | <130 |
| Chlorobenzene | | <1.8 | <1.4 | <1.4 | <92 |
| Chloroethane | | <2.6 | <2 | <2 | <130 |
| Chloroform | | <2 | **1.9** | <1.5 | <98 |
| Chloromethane | | <2.1 | <1.5 | <1.5 | <100 |
| Dibromochloromethane | | <3.4 | <2.6 | <2.6 | <170 |
| Dichlorodifluoromethane | | <4.9 | **4.9** | **6.4** | <250 |
| 1,1-Dichloroethane | | <1.6 | <1.2 | <1.2 | <81 |
| 1,2-Dichloroethane | | <1.6 | <1.2 | <1.2 | <81 |
| 1,1-Dichloroethene | | <1.6 | <1.2 | <1.2 | <79 |
| cis-1,2-Dichloroethene | | <1.6 | <1.2 | <1.2 | <79 |
| trans-1,2-Dichloroethene | | <1.6 | <1.2 | <1.2 | <79 |
| 1,2-Dichloroethene (total) | | <1.6 | <1.2 | <1.2 | <79 |
| 1,2-Dichloropropane | | <1.8 | <1.4 | <1.4 | <92 |
| cis-1,3-Dichloropropene | | <1.8 | <1.4 | <1.4 | <91 |
| trans-1,3-Dichloropropene | | <1.8 | <1.4 | <1.4 | <91 |
| 1,3-Dichloropropene (total) (a) | | <1.8 | <1.4 | <1.4 | <91 |
| Ethylbenzene | | **2.9** | <1.3 | **1.9** | <87 |
| Freon 22 | | <3.5 | <2.7 | <2.7 | <180 |
| Freon TF | | <3.1 | **10** | **18** | <150 |
| Methyl Butyl Ketone | | **5.3** | <3.1 | **10** | <200 |
| Methylene Chloride | | <3.5 | <2.6 | <2.6 | <170 |
| Methyl Ethyl Ketone | | **44** | **20** | **44** | **710** |
| Methyl Isobutyl Ketone | | <4.1 | <3.1 | <3.1 | <200 |
| Styrene | | **2** | <1.3 | **1.8** | <85 |
| 1,1,2,2-Tetrachloroethane | | <2.7 | <2.1 | <2.1 | <140 |
| Tetrachloroethene | | **24** | **20** | **20** | <140 |
| Toluene | | **14** | **4.1** | **6.4** | **75** |
| 1,1,1-Trichloroethane | | **3.9** | **9.8** | **18** | <110 |
| 1,1,2-Trichloroethane | | <2.2 | <1.6 | <1.6 | <110 |
| Trichloroethene | | <2.1 | **4.2** | **26** | <110 |
| Vinyl Chloride | | <1 | <0.77 | <0.77 | <51 |
| Xylene (m,p) | | <4.3 | <3.3 | <3.3 | <220 |
| Xylene (o) | | **2.5** | <1.3 | **1.9** | <87 |
| Xylene (total) | | **2.5** | <1.3 | **1.9** | <87 |

Notes:

| | |
|---|---|
| ft bls | Feet below land surface |
| µg/m³ | Micrograms per cubic meter |
| (a) | Total represents sum of cis and trans isomers |

**Bold Indicates a detection**

Table 1. Concentrations of Volatile Organic Compounds in Off-Site Soil Gas and Ambient Air Samples, Former Grumman Settling Ponds (Operable Unit 3 - Bethpage Community Park), Bethpage, New York.

| Constituent | Sample ID: | SGP102 | SGP103 | SGP103 | SGP103 |
|---|---|---|---|---|---|
| | Depth (ft bls): | 7-7.5 | 7-7.5 | 34-34.5 | 49-49.5 |
| | Date: | 6/29/2006 | 06/28/2006 | 06/28/2006 | 6/29/2006 |
| | Units: | µg/m³ | µg/m³ | µg/m³ | µg/m³ |
| Acetone | | **130** | **110** | **4000** | **45** |
| Benzene | | **11** | **6.7** | **180** | **5.4** |
| Bromodichloromethane | | <2.7 | <2 | <110 | <1.1 |
| Bromoform | | <4.1 | <3.1 | <170 | <1.7 |
| Bromomethane | | <1.6 | <1.2 | <62 | <0.62 |
| 1,3-Butadiene | | **17** | <1.7 | **120** | **13** |
| Carbon Disulfide | | **16** | **14** | **140** | **1.4** |
| Carbon Tetrachloride | | **3.1** | <1.9 | <100 | <1 |
| Chlorobenzene | | <1.8 | <1.4 | <74 | <0.74 |
| Chloroethane | | <2.6 | <2 | <110 | <1.1 |
| Chloroform | | <2 | <1.5 | <78 | **13** |
| Chloromethane | | <2.1 | <1.5 | <83 | <0.83 |
| Dibromochloromethane | | <3.4 | <2.6 | <140 | <1.4 |
| Dichlorodifluoromethane | | <4.9 | <3.7 | <200 | **6.9** |
| 1,1-Dichloroethane | | <1.6 | <1.2 | <65 | <0.65 |
| 1,2-Dichloroethane | | <1.6 | <1.2 | <65 | <0.65 |
| 1,1-Dichloroethene | | <1.6 | <1.2 | <63 | <0.63 |
| cis-1,2-Dichloroethene | | <1.6 | <1.2 | <63 | <0.63 |
| trans-1,2-Dichloroethene | | <1.6 | <1.2 | <63 | <0.63 |
| 1,2-Dichloroethene (total) | | <1.6 | <1.2 | <63 | <0.63 |
| 1,2-Dichloropropane | | <1.8 | <1.4 | <74 | <0.74 |
| cis-1,3-Dichloropropene | | <1.8 | <1.4 | <73 | <0.73 |
| trans-1,3-Dichloropropene | | <1.8 | <1.4 | <73 | <0.73 |
| 1,3-Dichloropropene (total) (a) | | <1.8 | <1.4 | <73 | <0.73 |
| Ethylbenzene | | **4.3** | <1.3 | <69 | **1.8** |
| Freon 22 | | <3.5 | <2.7 | <140 | <1.4 |
| Freon TF | | **12** | <2.3 | <120 | **5** |
| Methyl Butyl Ketone | | **4.1** | <3.1 | <160 | <1.6 |
| Methylene Chloride | | <3.5 | <2.6 | <140 | <1.4 |
| Methyl Ethyl Ketone | | **29** | **22** | **710** | **15** |
| Methyl Isobutyl Ketone | | <4.1 | <3.1 | <160 | <1.6 |
| Styrene | | <1.7 | <1.3 | <68 | **1.2** |
| 1,1,2,2-Tetrachloroethane | | <2.7 | <2.1 | <110 | <1.1 |
| Tetrachloroethene | | **25** | **15** | <110 | **75** |
| Toluene | | **12** | **3.7** | **280** | **7.9** |
| 1,1,1-Trichloroethane | | **8.7** | **2.1** | <87 | **38** |
| 1,1,2-Trichloroethane | | <2.2 | <1.6 | <87 | <0.87 |
| Trichloroethene | | **11** | <1.6 | <86 | **54** |
| Vinyl Chloride | | <1 | <0.77 | <41 | <0.41 |
| Xylene (m,p) | | **19** | <3.3 | <170 | **1.8** |
| Xylene (o) | | **8.7** | <1.3 | <69 | **1.5** |
| Xylene (total) | | **29** | <1.3 | <69 | **3.4** |

Notes:

| | |
|---|---|
| ft bls | Feet below land surface |
| µg/m³ | Micrograms per cubic meter |
| (a) | Total represents sum of cis and trans isomers |

**Bold Indicates a detection**

Table 1. Concentrations of Volatile Organic Compounds in Off-Site Soil Gas and Ambient Air Samples,
Former Grumman Settling Ponds (Operable Unit 3 - Bethpage Community Park), Bethpage, New York.

| Constituent | Sample ID: | SGP103 | SGP104 | SGP105 | SGP106 |
|---|---|---|---|---|---|
| | Depth (ft bls): | DUP of 49-49.5 | 7-7.5 | 7-7.5 | 7-7.5 |
| | Date: | 06/28/2006 | 06/26/2006 | 06/26/2006 | 06/26/2006 |
| | Units: | µg/m³ | µg/m³ | µg/m³ | µg/m³ |
| Acetone | | **48** | **200** | **120** | **210** |
| Benzene | | **5.4** | **14** | **5.8** | 14 |
| Bromodichloromethane | | <1.3 | <13 | <2.7 | <4 |
| Bromoform | | <2.1 | <21 | <4.1 | <6.2 |
| Bromomethane | | <0.78 | <7.8 | <1.6 | <2.3 |
| 1,3-Butadiene | | <1.1 | **49** | **12** | **19** |
| Carbon Disulfide | | <1.6 | **17** | **9** | **14** |
| Carbon Tetrachloride | | <1.3 | <13 | <2.5 | <3.8 |
| Chlorobenzene | | <0.92 | <9.2 | <1.8 | <2.8 |
| Chloroethane | | <1.3 | <13 | <2.6 | <4 |
| Chloroform | | **14** | <9.8 | **2.7** | **3.2** |
| Chloromethane | | <1 | <10 | <2.1 | <3.1 |
| Dibromochloromethane | | <1.7 | <17 | <3.4 | <5.1 |
| Dichlorodifluoromethane | | **7.4** | <25 | **5.4** | <7.4 |
| 1,1-Dichloroethane | | <0.81 | **530** | <1.6 | <2.4 |
| 1,2-Dichloroethane | | <0.81 | <8.1 | <1.6 | <2.4 |
| 1,1-Dichloroethene | | <0.79 | <7.9 | <1.6 | <2.4 |
| cis-1,2-Dichloroethene | | <0.79 | <7.9 | <1.6 | <2.4 |
| trans-1,2-Dichloroethene | | <0.79 | <7.9 | <1.6 | <2.4 |
| 1,2-Dichloroethene (total) | | <0.79 | <7.9 | <1.6 | <2.4 |
| 1,2-Dichloropropane | | <0.92 | <9.2 | <1.8 | <2.8 |
| cis-1,3-Dichloropropene | | <0.91 | <9.1 | <1.8 | <2.7 |
| trans-1,3-Dichloropropene | | <0.91 | <9.1 | <1.8 | <2.7 |
| 1,3-Dichloropropene (total) (a) | | <0.91 | <9.1 | <1.8 | <2.7 |
| Ethylbenzene | | **2** | <8.7 | <1.7 | **4.3** |
| Freon 22 | | <1.8 | <18 | <3.5 | <5.3 |
| Freon TF | | **5.3** | <15 | <3.1 | <4.6 |
| Methyl Butyl Ketone | | <2 | <20 | <4.1 | <6.1 |
| Methylene Chloride | | <1.7 | <17 | <3.5 | 14 |
| Methyl Ethyl Ketone | | **16** | **38** | **21** | **50** |
| Methyl Isobutyl Ketone | | <2 | <20 | <4.1 | <6.1 |
| Styrene | | **1.2** | <8.5 | <1.7 | **3.7** |
| 1,1,2,2-Tetrachloroethane | | <1.4 | <14 | <2.7 | <4.1 |
| Tetrachloroethene | | **67** | **24** | **15** | **26** |
| Toluene | | **7.9** | **18** | **6** | **53** |
| 1,1,1-Trichloroethane | | **39** | **2100** | **2.4** | <3.3 |
| 1,1,2-Trichloroethane | | <1.1 | <11 | <2.2 | <3.3 |
| Trichloroethene | | **54** | <11 | <2.1 | **120** |
| Vinyl Chloride | | <0.51 | <5.1 | <1 | <1.5 |
| Xylene (m,p) | | <2.2 | <22 | <4.3 | **8.7** |
| Xylene (o) | | **1.7** | <8.7 | <1.7 | **3.8** |
| Xylene (total) | | **1.7** | <8.7 | <1.7 | **13** |

Notes:

| | | |
|---|---|---|
| ft bls | Feet below land surface | Feet below land surface |
| µg/m³ | Micrograms per cubic meter | Micrograms per cubic meter |
| (a) | Total represents sum of cis and trans is | Total represents sum of cis and trans isomers |

**Bold indicates a detection**

Table 1. Concentrations of Volatile Organic Compounds in Off-Site Soil Gas and Ambient Air Samples,
Former Grumman Settling Ponds (Operable Unit 3 - Bethpage Community Park), Bethpage, New York.

| Constituent | Sample ID: | SGP107 | AA062806 | AA062906 |
|---|---|---|---|---|
| | Depth (ft bls): | 7-7.5 | AA062806 | AA062906 |
| | Date: | 06/26/2006 | 06/28/2006 | 6/29/2006 |
| | Units: | µg/m³ | µg/m³ | µg/m³ |
| Acetone | | **150** | <12 | **13** |
| Benzene | | <1.3 | **0.86** | **1.5** |
| Bromodichloromethane | | <2.7 | <1.3 | <1.1 |
| Bromoform | | <4.1 | <2.1 | <1.7 |
| Bromomethane | | <1.6 | <0.78 | <0.62 |
| 1,3-Butadiene | | **7.1** | <1.1 | <0.88 |
| Carbon Disulfide | | **6.5** | <1.6 | <1.2 |
| Carbon Tetrachloride | | <2.5 | <1.3 | <1 |
| Chlorobenzene | | <1.8 | <0.92 | <0.74 |
| Chloroethane | | <2.6 | <1.3 | <1.1 |
| Chloroform | | <2 | <0.98 | <0.78 |
| Chloromethane | | <2.1 | **1.3** | **1.3** |
| Dibromochloromethane | | <3.4 | <1.7 | <1.4 |
| Dichlorodifluoromethane | | **25** | **3.4** | **3** |
| 1,1-Dichloroethane | | <1.6 | <0.81 | <0.65 |
| 1,2-Dichloroethane | | <1.6 | <0.81 | <0.65 |
| 1,1-Dichloroethene | | <1.6 | <0.79 | <0.63 |
| cis-1,2-Dichloroethene | | <1.6 | <0.79 | <0.63 |
| trans-1,2-Dichloroethene | | <1.6 | <0.79 | <0.63 |
| 1,2-Dichloroethene (total) | | <1.6 | <0.79 | <0.63 |
| 1,2-Dichloropropane | | <1.8 | <0.92 | <0.74 |
| cis-1,3-Dichloropropene | | <1.8 | <0.91 | <0.73 |
| trans-1,3-Dichloropropene | | <1.8 | <0.91 | <0.73 |
| 1,3-Dichloropropene (total) (a) | | <1.8 | <0.91 | <0.73 |
| Ethylbenzene | | <1.7 | <0.87 | **1.1** |
| Freon 22 | | **81** | <1.8 | **1.8** |
| Freon TF | | <3.1 | <1.5 | <1.2 |
| Methyl Butyl Ketone | | <4.1 | <2 | <1.6 |
| Methylene Chloride | | <3.5 | <1.7 | <1.4 |
| Methyl Ethyl Ketone | | **25** | <1.5 | **2.4** |
| Methyl Isobutyl Ketone | | <4.1 | <2 | <1.6 |
| Styrene | | <1.7 | <0.85 | <0.68 |
| 1,1,2,2-Tetrachloroethane | | <2.7 | <1.4 | <1.1 |
| Tetrachloroethene | | **10** | <1.4 | <1.1 |
| Toluene | | **4.1** | **2.4** | **5.7** |
| 1,1,1-Trichloroethane | | <2.2 | <1.1 | <0.87 |
| 1,1,2-Trichloroethane | | <2.2 | <1.1 | <0.87 |
| Trichloroethene | | **9.7** | <1.1 | <0.86 |
| Vinyl Chloride | | <1 | <0.51 | <0.41 |
| Xylene (m,p) | | <4.3 | <2.2 | **2.6** |
| Xylene (o) | | <1.7 | <0.87 | **1** |
| Xylene (total) | | <1.7 | <0.87 | **3.8** |

Notes:

| | |
|---|---|
| ft bls | Feet below land surface |
| µg/m³ | Micrograms per cubic meter |
| (a) | Total represents sum of cis and trans isomers |

**Bold indicates a detection**

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Table 2. Summary of Proposed Additional Soil Gas, Ambient Air, and Groundwater Samples, Work Plan Addendum No. 8, Former Grumman Settling Ponds (Operable Unit 3 - Bethpage Community Park), Bethpage, New York.

| Activity | Proposed Sample ID | Proposed Sampling | Proposed Soil Gas Sampling Depths (ft bls) | Proposed Soil Gas Analysis | Proposed Groundwater Sampling Intervals | Proposed Groundwater Analysis | Proposed Soil Sampling Intervals | Proposed Soil Analysis | General Rationale |
|---|---|---|---|---|---|---|---|---|---|
| On-Site Ambient Air Sampling | | | | | | | | | |
| Bethpage Community Park | AA-1 to AA-4 | Ambient Air | NA | VOCs (1) | None | None | NA | NA | Assess potential concentrations of site-related VOCs in the ambient air. |
| On-Site Soil Gas Sampling (3) | | | | | | | | | |
| NGC property | | | | | | | | | |
| | SGP-11A | Soil Gas, Soil | 8, 20, 50 | VOCs (2) | None | None | Continuous | Lithology | Confirm soil gas findings and further evaluate spatial distribution of soil gas. Evaluate possible transport mechanisms (i.e., lateral diffusion, vertical off-gassing from groundwater). |
| | SGP-11B | Soil Gas, Soil | 8 | VOCs (2) | None | None | Continuous | Lithology | |
| | SGP-11C | Soil Gas, Soil | 8 | VOCs (2) | None | None | Continuous | Lithology | |
| | SGP-11D | Soil Gas, Groundwater, Soil | 8, 20, 50 | VOCs (2) | 55-57 (water table) | VOCs (4) | Continuous | Lithology | |
| Off-Site Soil Gas and Groundwater Sampling (3) | | | | | | | | | |
| Sycamore Avenue | | | | | | | | | |
| | SGP-108 | Soil Gas, Groundwater, Soil | 8, 20, 50 (4) | VOCs (2) | 55-57 (water table) | VOCs (5) | Continuous | Lithology | Evaluate the spatial distribution of soil gas with increasing distance from the Park. Evaluate possible transport mechanisms (i.e., lateral diffusion, vertical off-gassing from groundwater). |
| | SGP-109 | Soil Gas, Groundwater, Soil | 8, 20, 50 (4) | VOCs (2) | 55-57 (water table) | VOCs (5) | Continuous | Lithology | |
| | SGP-110 | Soil Gas, Groundwater, Soil | 8, 20, 50 (4) | VOCs (2) | 55-57 (water table) | VOCs (5) | Continuous | Lithology | Confirm soil gas findings and further evaluate spatial distribution of soil gas. Evaluate possible transport mechanisms (i.e., lateral diffusion, vertical off-gassing from groundwater). |
| | SGP-111 | Soil Gas, Groundwater, Soil | 8, 20, 50 (4) | VOCs (2) | 55-57 (water table) | VOCs (5) | Continuous | Lithology | |
| | SGP-112 | Soil gas, Groundwater, Soil | 8, 20, 50 (4) | VOCs (2) | 55-57 (water table) | VOCs (5) | Continuous | Lithology | |
| Stewart Avenue | | | | | | | | | |
| | SGP-113 | Soil Gas, Groundwater, Soil | 8, 20, 50 (4) | VOCs (2) | 55-57 (water table) | VOCs (5) | Continuous | Lithology | Confirm soil gas findings and further evaluate spatial distribution of soil gas. Evaluate possible transport mechanisms (i.e., lateral diffusion, vertical off-gassing from groundwater). |
| | SGP-114 | Soil Gas, Groundwater, Soil | 8, 20, 50 (4) | VOCs (2) | 55-57 (water table) | VOCs (5) | Continuous | Lithology | |
| | SGP-115 | Soil Gas, Groundwater, Soil | 8, 20, 50 (4) | VOCs (2) | 55-57 (water table) | VOCs (5) | Continuous | Lithology | |

Footnotes:

(1) Full TCL list of VOCs to be analyzed via USEPA Method TO-15

(2) Reduced TCL VOC analyte list via USEPA Method TO-15 (see Table 3)

(3) Based on NYSDEC approval obtained during the previous round of soil gas sampling, tracer gas (per NYSDOH guidance) will be performed on 10 percent of samples (3 samples). All soil gas points will be completed as temporary borings.

(4) Based on borehole stratigraphy, the sampling intervals may change.

(5) Target Compound List for VOCs analyzed via NYSDEC ASP Method 2000.

Definitions:

| | |
|---|---|
| NA | Not Applicable |
| ft bls | feet below land surface |
| VOC | Volatile Organic Compound |

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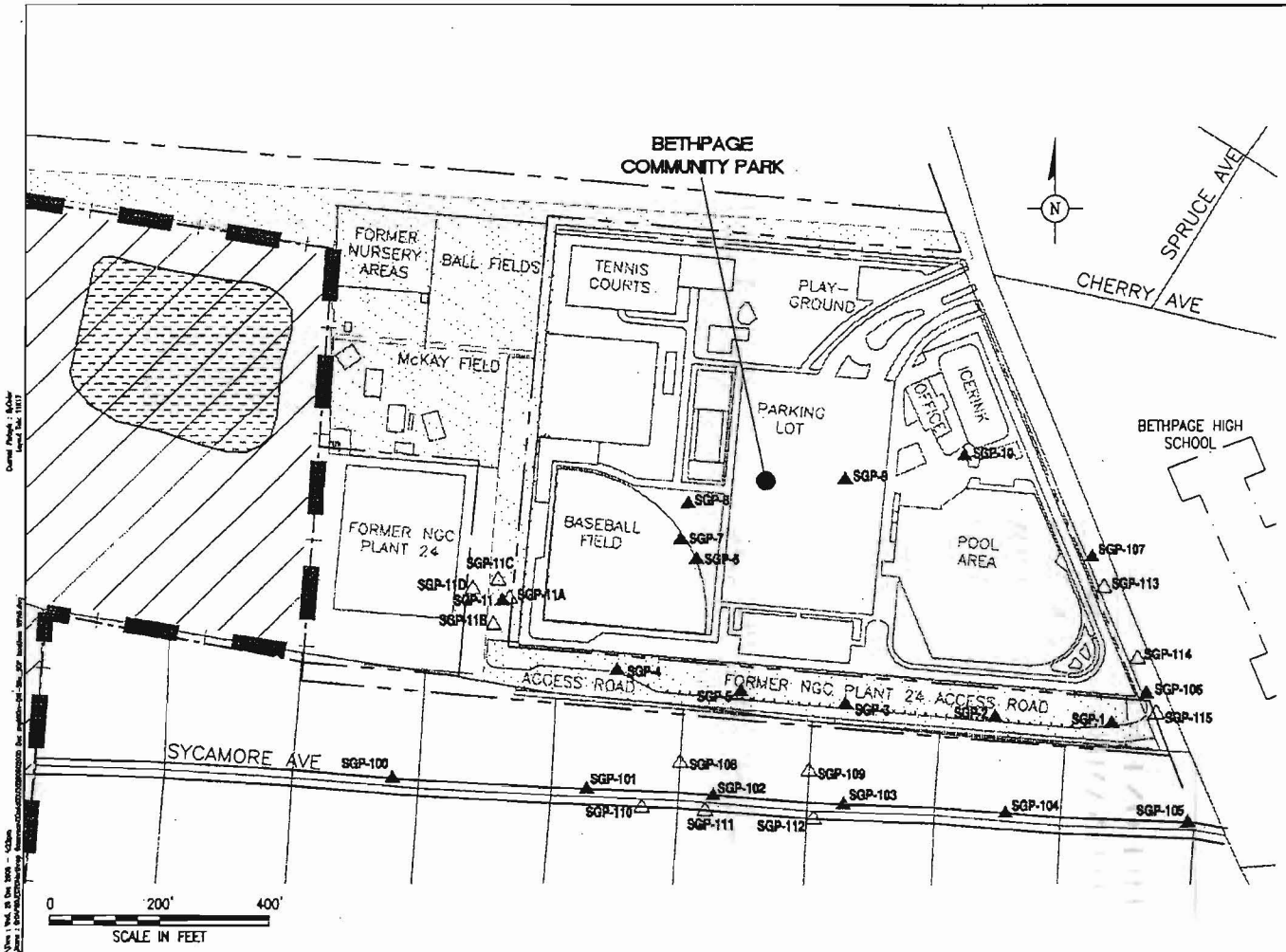
Table 3. Proposed Soil Gas Volatile Organic Compound Analyte List,
Former Grumman Settling Ponds (Operable Unit 3 - Bethpage Community Park), Bethpage,
New York.

| Constituent | Detected Location |
|---|---|
| 1,1,1-Trichloroethane | Access Road, Off-site |
| 1,1-Dichloroethane | Access Road, Off-site |
| 1,1-Dichloroethene | Access Road |
| 1,2,4-Trimethylbenzene | Access Road |
| 1,3-Butadiene | Access Road, Off-site |
| 1,4-Dichlorobenzene | Access Road |
| 2,2,4-Trimethylpentane | Access Road |
| Methyl Ethyl Ketone | Access Road, Off-site |
| 4-Ethyltoluene | Access Road |
| Acetone | Access Road, Off-site |
| Benzene | Access Road, Off-site |
| Carbon Disulfide | Access Road, Off-site |
| Carbon Tetrachloride | Access Road, Off-site |
| Chlorobenzene | Access Road |
| Chloroform | Access Road, Off-site |
| Chloromethane | Access Road, Off-site |
| cis-1,2-Dichloroethene | Access Road |
| Cyclohexane | Access Road |
| Dichlorodifluoromethane | Access Road, Off-site |
| Ethylbenzene | Access Road, Off-site |
| Freon TF | Access Road, Off-site |
| Freon 22 | Access Road, Off-site |
| Methyl Butyl Ketone | Access Road, Off-site |
| Methylene Chloride | Off-site |
| Methyl tert-Butyl Ether | Access Road |
| n-Heptane | Access Road |
| n-Hexane | Access Road |
| Styrene | Access Road, Off-site |
| tert-Butyl Alcohol | Access Road |
| Tetrachloroethene | Access Road, Off-site |
| Toluene | Access Road, Off-site |
| trans-1,2-Dichloroethene | Access Road |
| Trichloroethene | Access Road, Off-site |
| Trichlorofluoromethane | Access Road |
| Xylene (m,p) | Access Road, Off-site |
| Xylene (o) | Access Road, Off-site |
| Xylene (total) | Access Road, Off-site |




LEGEND:

- NORTHROP GRUMMAN CORPORATION PROPERTY LINE
- NWIRP PROPERTY
- NWIRP PROPERTY LINE
- FENCE
- LIMITS OF BETHPAGE HIGH SCHOOL MAIN BUILDING
- BASIN
- SGP-1 ▲ COMPLETED SOIL GAS POINT
- SGP-113 △ PROPOSED SOIL GAS POINT
- NWIRP NAVAL WEAPONS INDUSTRIAL RESERVE PLANT

NOTES:

1. AN AMBIENT AIR STUDY TO BE PERFORMED ON A INDEPENDENT SCHEDULE. AMBIENT AIR SAMPLE LOCATIONS TO BE DETERMINED.
2. SGP-100 TO SGP-105 COMPLETED ON NORTH SIDE OF SYCAMORE AVE. PROPOSED SGP-110; SGP-111; AND SGP-112 WILL BE COMPLETED ON SOUTH SIDE OF SYCAMORE AVE. ALL LOCATIONS SUBJECT TO FIELD VERIFICATION.
3. ALL SGP LOCATIONS PROPOSED FOR AREAS TO THE SOUTH AND EAST OF BETHPAGE COMMUNITY PARK WILL BE DRILLED ON TOWN OF OYSTER BAY RIGHTS-OF-WAY.
4. ALL SGP LOCATIONS WILL BE PROPERLY ABANDONED AFTER COMPLETION OF SAMPLING.

| NO. | ISSUED DATE | REVISION DESCRIPTION | BY/CKD |
|---|---|---|---|
| 1 | 12-20-08 | WPA JB | MR |
| 0 | 12-15-08 | FIGURES FOR DEC MGT. | MR |



ARCADIS

PROJECT TITLE
OPERABLE UNIT 3
FORMER GRUMMAN
SETTLING PONDS
BETHPAGE, NEW YORK

SHEET TITLE
SITE PLAN SHOWING
ON-SITE AND OFF-SITE
SOIL GAS POINTS

PROJECT NUMBER
NY001348.0806

DRAWING NUMBER
1