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ENVIRONMENT

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

Subject:
Final Closure Report, Former Grumman Plant 2 Soil Vapor Extraction System, Operable Unit 1, Bethpage, New York.

Date:
April 16, 2008

Contact:
David E. Stern

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Our ref:
NY001464.0608.00003

Dear Mr. Scharf:

On behalf of Northrop Grumman Systems Corporation (Northrop Grumman), ARCADIS has prepared this final closure report providing the results of the field investigation conducted at the Soil Vapor Extraction (SVE) System located at former Grumman Plant 2 building, in Bethpage, New York. The investigation was conducted to determine whether the SVE system remedial objectives and termination criteria have been satisfied. The SVE system is associated with Operable Unit 1 (OU1) of the former Grumman Aerospace Corporation (GAC) State Superfund Site (NYSDEC Site #1-30-003A) (Site).

Background

Figure 1 shows the location of the Site and the Plant 2 SVE system. In 1991, analytical results of soil samples obtained from GAC Remedial Investigation Borings B-2, B-3 and B-5 indicated VOC concentrations (primarily trichloroethene [TCE]) from land surface to depths of 20 ft bls with TCE concentrations ranging up to 1,200,000 micrograms per kilogram (µg/kg) (Geraghty & Miller, Inc 1994).

The Plant 2 SVE system commenced operation on December 6, 1994, initially as an interim remedial measure (IRM), at former Grumman Plant 2. Subsequently, the SVE system was selected by the New York State Department of Environmental Conservation (NYSDEC) as the permanent remedy for OU1, as stated in the March 1995 NYSDEC Record of Decision (ROD).

The Plant 2 SVE system consists of a single vapor extraction well (SVE-1); the off-gas treatment via vapor phase granular activated carbon, and several monitoring wells. The SVE system was designed to remove chlorinated volatile organic compounds (VOCs), primarily trichloroethene (TCE), from unsaturated subsurface

soil in an area adjacent to the former TCE aboveground storage tank, which had been located at the northern perimeter of former Grumman Plant 2 (Figure 2). The SVE system has operated historically on a continuous and pulsed (i.e., on/off) basis, and is currently in operation.

Plant 2 SVE System Performance Assessment

Table 1 provides the past two years of sampling results of the Plant 2 SVE system influent. Using the airflow rate and VOCs concentrations detected in the SVE system influent, the monthly total VOC mass removal rate for the SVE system in 2006 and 2007 ranged from 0.3 to 1.3 pounds/month (lb/mo). These data are consistent with overall downward and asymptotic trend in VOC concentrations observed over the last seven years and indicate that the system has achieved the limit of its effectiveness.

Well GM-32S (Table 2; Figure 2) has been sampled in accordance with the NYSDEC-approved Groundwater Monitoring Plan (ARCADIS Geraghty & Miller, Inc. 2001; ARCADIS G&M, Inc. 2004; 2006). Since 1998, the analytical results of samples collected have been provided to NYSDEC on a quarterly basis. Based on the most recent three rounds of groundwater samples from Well GM-32S, VOC concentrations have ranged from non-detect to 6.6 micrograms per liter (µg/L) (Figure 2) and two of the three results did not exceed the Standards, Criteria, and Guidance Values (SCGs) that are promulgated in 6 NYCRR, Part 703. These data, in conjunction with the soils data (below), indicate that the area subject to the SVE system is not a significant source of VOCs in groundwater.

Based on the above information, it was determined that the Plant 2 SVE system appeared to have achieved the limits of its effectiveness. Therefore, the Former Plant 2 Soil Vapor Extraction System Closure Work Plan (Work Plan) was prepared and submitted on March 5, 2007 to Northrop Grumman and the NYSDEC. With NYSDEC acceptance of the Work Plan, the work was performed in November 2007. In general, the sample collection and analytical methods were implemented as described in the Work Plan, with the minor exceptions noted below.

Plant 2 SVE System Closure Sampling Program

In accordance with the provisions of the Work Plan, the scope of work for investigation of soil and soil gas was implemented, with modifications to the scope of work, based on field conditions, as noted below. Field records and analytical laboratory reports are provided as Attachments 1 and 2, respectively, to this report.

Soil Investigation

The soil component to the closure investigation was conducted by drilling soil vertical profile borings (VPBs) by using direct push technology (e.g. Geoprobe®) and soil samples were collected in Geoprobe Macrocore™ samplers.

Modifications to the work plan included deepening of the shallowest soil samples to an interval of 1 to 3 ft bls due to the presence of a 1-ft thick concrete slab that and terminating the borings at 40 ft bls due to Geoprobe unit refusal.

Soil samples obtained from the VPBs were utilized to characterize borehole geology. Based on these data, the lithologic sequence from land surface downward generally consists of concrete and asphalt, underlain by native soils primarily consisting of interbedded fine to coarse sands.

Two soil borings (SB-1 and SB-2) were completed and four samples per boring were collected for laboratory analysis from each boring (total of eight samples). Soil samples were analyzed for Total Compound List (TCL) volatile organic compounds (VOC) using NYSDEC Method ASP 2000 and validated using United States Environmental Protection Agency (USEPA) 1999 protocols. Sample results are provided in Table 3 and soil boring locations and detected constituents are shown in Figure 2.

Soil Gas Investigation

The soil gas component to the closure investigation was conducted by using direct push technology (e.g. Geoprobe®) and post-run tubing (PRT), with samples collected using SUMMA canisters. Soil gas was sampled at a total of four locations. At each location, samples were collected from 2 ft bls, with samples collected at one location also from 15 and 40 ft bls. Soil gas locations are shown on Figure 3. Soil gas samples were analyzed for TCL VOCs under the USEPA Method TO-15 and validated using USEPA 1999 protocols. Results are provided in Table 4; sample locations and detections are shown on Figure 3.

Discussion of Findings

The March 1995 ROD indicates that the remedial goals for soil were to be those specified in the formerly-used Technical and Administrative Guidance Memorandum (TAGM) #4046. Since that time, the NYSDEC has developed soil cleanup objectives (SCOs) under Part 375 of Section 6 of the New York State Code of Rules and

Regulations (6 NYCRR). The Part 375 SCOs are used to evaluate the soil data presented herein. Based on property usage, the soil samples were compared to the Part 375-6 Remedial Program Soil Cleanup Objectives for Industrial Use (Industrial SCOs). Based on VOCs detected in groundwater (in Well GM-32S), the soil data were also compared to the 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives for Protection of Groundwater (Protection of Groundwater SCOs); SCOs for the VOC analyzed for are presented in Table 3.

No standards currently exist for evaluation of soil gas samples, therefore a correlative evaluation of the soil gas data to soil and groundwater data was performed.

Soil Closure Investigation Findings

Analytical results of soil samples obtained from soil VPBs are provided in Table 3 and on Figure 2 of this report. In general, the soil sampling program indicated no exceedances of the Industrial SCO and only three exceedances of the Protection of Groundwater SCO. Exceedances were limited to the shallowest soil samples and the VOC soil exceedances were consistent with VOCs detected in groundwater. All other samples and compounds analyzed were either non-detect or were detected at a concentration at least a factor of three below SCOs. The data indicate that the SVE system has met the remedial objective in that the results reflect a reduction in VOC concentrations in soil by more than 99 percent (using the maximum soil TCE concentrations detected in 1991 and the 2008 concentration from the same soil horizon). A more detailed evaluation of the soil data is provided below.

For Soil Boring SB-1, the sample obtained from 1 to 3 ft bls exhibited the highest number of detections as well as concentration of total VOCs. In total, 11 constituents were detected, however only four constituent concentrations exceeded 10 µg/kg (1,1,1-trichloroethene [1,1,1-TCA], acetone, tetrachloroethene [PCE], and TCE); and only TCE exceeded the Protection of Groundwater SCO. TCE was detected at the highest concentration (45,000 micrograms per kilogram [µg/kg]). At the 8 to 10 and 18 to 20 ft bls sample intervals, TCE concentrations decreased by two and thee orders of magnitude, respectively, compared to the shallow sample and no constituents exceeded the Industrial SCOs. No constituents were detected at the 38 to 40 ft bls sample interval.

Soil Boring SB-02 exhibited detections of five constituents at the 1 to 3 ft bls interval, four of which were detected above 100 µg/kg (i.e., acetone, cis-1,2-dichloroethene [cis, 1,2-DCE], and TCE), with TCE and cis-1,2-DCE detected above the Protection

of Groundwater SCO. Similar to SB-01, TCE was detected at the highest concentration. For the samples obtained from 8 to 10 ft bls; 18 to 20 ft bls; and 38 to 40 ft bls, no constituents were detected.

Soil Gas Closure Investigation Findings

In general, the soil gas sampling program indicated the presence of VOCs, apparently originating from residual VOCs in shallow soils and possibly low concentrations of VOCs in groundwater. It is important to note that reduction of VOCs in soil gas was not specified as an objective of the SVE system. A more detailed evaluation of the soil gas data is provided below.

Five constituents were detected in the soil gas sample obtained from SB-01 with only TCE detected above 100 ug/m^3. Five constituents were detected the soil gas sample obtained from SB-02 with cis-1,2-DCE and TCE being detected above 100 ug/m^3. These data show good correlation with the VOC analytical results obtained from the soil samples collected (see above).

A single soil gas sample was collected at 2 ft bls at SG-04C, located south of the SVE system and south of the former TCE tank. Four constituents were detected, with cis-1,2-DCE and TCE being detected above 100 ug/m^3. Soil gas point SG-04D, located to the east of the former TCE Tank had soil gas samples collected at 2 ft bls, 15 ft bls, and 40 ft bls. Acetone and TCE were detected at all three depths. The highest concentration of acetone was detected at 40 ft bls at 130 ug/m^3. The highest concentration of TCE was detected at 4,500 ug/m^3 at 2 ft bls. The TCE concentration of 2,500 ug/m^3 at 40 ft bls is likely the result of the partitioning of TCE from shallow groundwater to soil gas, as a similar TCE soil gas concentration is calculated using it's Henry's Law Constant of 0.421 and with a water-table groundwater TCE concentration of 6 µg/L (see above).

At 40 ft bls, benzene, 1,2-dichloropropane, and toluene were detected at concentrations less than 50 ug/m^3.

Conclusions

Based on the closure data, ARCADIS concludes the following:

1. There were no exceedances of the Part 375 Industrial SCOs.

2. A significant source of VOCs to groundwater is no longer present in the soils within the subject area.

3. The SVE system has achieved its remedial objectives and criteria for permanent termination.

Recommendation

Based on the conclusions presented above, ARCADIS recommends that the Plant 2 SVE system and all attendant features be permanently closed and dismantled, in accordance with prevailing state and local requirements. ARCADIS requests NYSDEC concurrence with this recommendation prior to implementation.

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

Sincerely,

ARCADIS

David E. Stern
Associate Project Manager/Senior Hydrogeologist

Carlo San Giovanni

Carlo San Giovanni
Project Manager

Enclosures

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Table 1. Mass Loading Rates for SVE System, Plant 2 SVE System, Northrop Grumman Corporation.

Sample ID:	SVE-INFLUENT		SVE-INFLUENT		SVE-INFLUENT		SVE-INFLUENT		
Date Sampled:	3/29/2006		8/7/2006		4/4/2007		7/2/2007		
Units:	(ppmv)	(Lbs/Hr)	(ppmv)	(Lbs/Hr)	(ppmv)	(Lbs/Hr)	(ppmv)	(Lbs/Hr)	
Chloroform	0	0.0000	0	0.0000	0	0.0000	0	0.0000	
1,1,1-Trichloroethane	0.0108	0.0000	0.0164	0.0000	0.0066	0.0000	0.0081	0.0000	
Trichloroethylene	0.3749	0.0009	0.6908	0.0017	0.1574	0.0004	0.4247	0.0011	
Tetrachloroethylene	0	0.0000	0	0.0000	0	0.0000	0	0.0000	
TOTAL VOCs:	**0.3857**		**0.7072**		**0.164**		**0.4328**		
Emissions Rate (Lbs/Hr):		0.0010		0.0018		0.0004		0.0011	Mean
Emissions Rate (Lbs/mo.):		0.69253939		1.26971131		0.2945238		0.77699839	
Emissions Rate (Lbs/yr.):		8.42589597		15.4481542		3.58337289		9.45348042	

Table 2. Concentrations of Volatile Organic Compounds Detected in Well GM-32S, Operable Unit 1, Northrop Grumman Corporation, Bethpage, New York.

CONSTITUENT (Units in ug/L)	NYSDEC Standards Criteria and Guidance Values[1]	WELL: / SAMPLE ID: / DATE:	GM-32S GM-32S 4/18/2005	GM-32S GM-32S 9/22/2005	GM-32S GM-32S 03/17/06
Chloromethane	5		<5	<5	< 5
Bromomethane	5		<5	<5	< 5
Vinyl Chloride	2		<2	<2	< 2
Chloroethane	5		<5	<5	< 5
Methylene chloride	5		<5	<5	< 5
Acetone	50		<10	<10	< 10
Carbon disulfide	50		<5	<5	< 5
1,1-Dichloroethene	5		<5	<5	< 5
1,1-Dichloroethane	5		<5	<5	< 5
cis-1,2-Dichloroethene	5		<5	**0.6J**	< 5
trans-1,2-Dichloroethene	5		<5	<5	< 5
Chloroform	7		<5	<5	< 5
1,2-Dichloroethane	5		<5	<5	< 5
2-Butanone	50		<10	<10	< 10
1,1,1-Trichloroethane	5		<5	<5	< 5
Carbon tetrachloride	5		<5	<5	< 5
Bromodichloromethane	50		<5	<5	< 5
1,2-Dichloropropane	5		<5	<5	< 5
cis-1,3-Dichloropropene	5		<5	<5	< 5
Trichloroethene	5		**4J**	**6**	< 5
Dibromochloromethane	5		<5	<5	< 5
1,1,2-Trichloroethane	5		<5	<5	< 5
Benzene	0.7		<0.7	<0.7	< 0.7
trans-1.3-Dichloropropene	5		<5	<5	< 5
Bromoform	50		<5	<5	< 5
4-Methyl-2-pentanone	50		<10	<10	< 10
2-Hexanone	50		<10	<10	< 10
Tetrachloroethene	5		<5	<5	< 5
1,1,2,2-Tetrachloroethane	5		<5	<5	< 5
Toluene	5		<5	<5	< 5
Chlorobenzene	5		<5	<5	< 5
Ethylbenzene	5		<5	<5	< 5
Styrene	5		<5	<5	< 5
Xylene (total)	5		<5	<5	< 5
Vinyl Acetate	NE		<5	<5	< 5
Freon-113 *	5		<5	<5	< 5
Total VOCs			**4**	**6.6**	0

(1) Standards, Criteria, and Guidance (SCG) values based on documents referenced in the Groundwater Feasibility Study Report (ARCADIS Geraghty & Miller 2000) that are based on the NYSDEC TOGS (NYSDEC 1998); most stringent value listed.

VOCs Volatile organic compounds

ug/L Micrograms per liter

J Estimated value

NYSDEC New York State Department of Environmental Conservation

* Freon 113 also known as 1,1,1-Trichloro-2,2,2-trifluoroethane.

[ ] Value exceeds associated SCG value.

NE No SCG established

TOGS Technical and Operational Guidance Series memorandum.

Bold value indicates a detection.

Table 3. Concentrations of Volatile Organic Compounds in Soil Samples, Northrop Grumman Systems Corporation, Operable Unit 1, Bethpage, New York.

CONSTITUENT (ug/kg)	NYSDEC Soil Industrial Soil Cleanup Obj.	NYSDEC Soil Prot. Groundwater Criteria	Sample Location: SB-01 Sample Depth (ft bls): 1-3 Sample Date: 11/27/2007	SB-01 8-10 11/27/2007	SB-01 18-20 11/27/2007	SB-01 38-40 11/27/2007
1,1,1-Trichloroethane	1,000,000	680	**24 J**	< 5.1	< 5.1	< 5.2
1,1,2,2-Tetrachloroethane	NE	NE	< 5.4 J	< 5.1	< 5.1	< 5.2
1,1,2-Trichloroethane	NE	NE	**3 J**	< 5.1	< 5.1	< 5.2
1,1-Dichloroethane	480,000	270	< 5.4 J	< 5.1	< 5.1	< 5.2
1,1-Dichloroethylene	1,000,000	330	< 5.4 J	< 5.1	< 5.1	< 5.2
1,2-Dichloroethane	60,000	20	< 5.4 J	< 5.1	< 5.1	< 5.2
1,2-Dichloropropane	NE	NE	< 5.4 J	< 5.1	< 5.1	< 5.2
2-Hexanone	NE	NE	< 54 J	< 51	< 51	< 52
Acetone	1,000,000	100,000	**30 J**	< 51	< 51	< 52
Benzene	89,000	60	< 5.4 J	< 5.1	< 5.1	< 5.2
Bromodichloromethane	NE	NE	**0.6 J**	< 5.1	< 5.1	< 5.2
Bromoform	NE	NE	< 5.4 J	< 5.1	< 5.1	< 5.2
Bromomethane	NE	NE	< 5.4 J	< 5.1	< 5.1	< 5.2
Carbon disulfide	NE	NE	**3 J**	< 51	< 51	< 52
Carbon tetrachloride	44,000	2,400	< 5.4 J	< 5.1	< 5.1	< 5.2
Chlorobenzene	1,000,000	100,000	< 5.4 J	**2 J**	< 5.1	< 5.2
Chloroethane	NE	NE	< 5.4 J	< 5.1	< 5.1	< 5.2
Chloroform	700,000	370	**2 J**	< 5.1	< 5.1	< 5.2
Chloromethane	NE	NE	< 5.4 J	< 5.1	< 5.1	< 5.2
cis-1,2-Dichloroethene	1,000,000	250	**2 J**	< 5.1	< 5.1	< 5.2
cis-1,3-Dichloropropene	NE	NE	< 5.4 J	< 5.1	< 5.1	< 5.2
Dibromochloromethane	NE	NE	< 5.4 J	< 5.1	< 5.1	< 5.2
Dichlorodifluoromethane	NE	NE	< 5.4 J	< 5.1	< 5.1	< 5.2
Ethylbenzene	780,000	1,000	< 5.4 J	< 5.1	< 5.1	< 5.2
Freon 113	NE	NE	< 5.4 J	< 5.1	< 5.1	< 5.2
Methyl ethyl ketone	1,000,000	100,000	**4 J**	< 51	< 51	< 52
Methyl isobutylketone (MIBK)	NE	NE	< 54 J	< 51	< 51	< 52
Methylene chloride	1,000	100,000	< 5.4 J	< 5.1	< 5.1	< 5.2
Styrene	NE	NE	< 5.4 J	< 5.1	< 5.1	< 5.2
Tetrachloroethene	300,000	19,000	**13 J**	< 5.1	< 5.1	< 5.2
Toluene	1,000,000	700	**3 J**	**0.4 J**	**0.4 J**	< 5.2
trans-1,2-Dichloroethylene	1,000,000	190	< 5.4 J	< 5.1	< 5.1	< 5.2
trans-1,3-Dichloropropene	NE	NE	< 5.4 J	< 5.1	< 5.1	< 5.2
Trichloroethene	400,000	470	**45000 D**	**180 D**	**27**	< 5.2
Vinyl chloride	27,000	20	< 5.4 J	< 5.1	< 5.1	< 5.2
m&p-Xylenes	NE	1,600	< 5.4 J	< 5.1	< 5.1	< 5.2
o-Xylene	NE	1,600	< 5.4 J	< 5.1	< 5.1	< 5.2
TVOC			**45084.6**	**182.4**	**27.4**	**0**

Notes and Abbreviations on last page.

Table 3. Concentrations of Volatile Organic Compounds in Soil Samples, Northrop Grumman Systems Corporation, Operable Unit 1, Bethpage, New York.

CONSTITUENT (ug/kg)	NYSDEC Soil Industrial Soil Cleanup Obj.	NYSDEC Soil Prot. Groundwater Criteria	Sample Location: SB-02 Sample Depth (ft bls): 1-3 Sample Date: 11/26/2007	SB-02 8-10 11/26/2007	SB-02 18-20 11/26/2007	SB-02 38-40 11/26/2007
1,1,1-Trichloroethane	1,000,000	680	< 5.7	< 5.3	< 5.2	< 5.2
1,1,2,2-Tetrachloroethane	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
1,1,2-Trichloroethane	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
1,1-Dichloroethane	480,000	270	< 5.7	< 5.3	< 5.2	< 5.2
1,1-Dichloroethylene	1,000,000	330	**1 J**	< 5.3	< 5.2	< 5.2
1,2-Dichloroethane	60,000	20	< 5.7	< 5.3	< 5.2	< 5.2
1,2-Dichloropropane	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
2-Hexanone	NE	NE	< 57	< 53	< 52	< 52
Acetone	1,000,000	100,000	**110**	< 53	< 52	< 52
Benzene	89,000	60	< 5.7	< 5.3	< 5.2	< 5.2
Bromodichloromethane	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
Bromoform	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
Bromomethane	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
Carbon disulfide	NE	NE	**2 J**	< 53	< 52	< 52
Carbon tetrachloride	44,000	2,400	< 5.7	< 5.3	< 5.2	< 5.2
Chlorobenzene	1,000,000	100,000	< 5.7	< 5.3	< 5.2	< 5.2
Chloroethane	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
Chloroform	700,000	370	< 5.7	< 5.3	< 5.2	< 5.2
Chloromethane	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
cis-1,2-Dichloroethene	1,000,000	250	**1200 D**	< 5.3	< 5.2	< 5.2
cis-1,3-Dichloropropene	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
Dibromochloromethane	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
Dichlorodifluoromethane	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
Ethylbenzene	780,000	1,000	< 5.7	< 5.3	< 5.2	< 5.2
Freon 113	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
Methyl ethyl ketone	1,000,000	100,000	< 57	< 53	< 52	< 52
Methyl isobutylketone (MIBK)	NE	NE	< 57	< 53	< 52	< 52
Methylene chloride	1,000	100,000	< 5.7	< 5.3	< 5.2	< 5.2
Styrene	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
Tetrachloroethene	300,000	19,000	**0.8 J**	< 5.3	< 5.2	< 5.2
Toluene	1,000,000	700	< 5.7	< 5.3	< 5.2	< 5.2
trans-1,2-Dichloroethylene	1,000,000	190	**4 J**	< 5.3	< 5.2	< 5.2
trans-1,3-Dichloropropene	NE	NE	< 5.7	< 5.3	< 5.2	< 5.2
Trichloroethene	400,000	470	**3100 D**	< 5.3	< 5.2	< 5.2
Vinyl chloride	27,000	20	< 5.7	< 5.3	< 5.2	< 5.2
m&p-Xylenes	NE	1,600	< 5.7	< 5.3	< 5.2	< 5.2
o-Xylene	NE	1,600	< 5.7	< 5.3	< 5.2	< 5.2
TVOC			**4417.8**	**0**	**0**	**0**

Notes and Abbreviations on last page.

Table 3. Concentrations of Volatile Organic Compounds in Soil Samples, Northrop Grumman Systems Corporation, Operable Unit 1, Bethpage, New York.

Notes and Abbreviations:

1. Results validated following protocols specified in Former Plant 2 Soil Vapor Extraction System Closure Plan and Sub-Slab Soil Gas Testing Work Plan.
2. Samples analyzed for the TCL VOCs using NYSDEC ASP 2000 Method OLM4.2.
3. Samples analyzed on a dry weight basis.

Bold value indicates a detection

ASP	Analytical Services Protocol
TCL	Target compound list
VOC	Volatile Organic Compound
ft bls	Feet below land surface
ug/kg	Micrograms per kilogram
TVOC	Total volatile organic compounds
J	Value is estimated
D	Value from a secondary dilution

Table 4. Concentrations of Volatile Organic Compounds in Soil Gas Samples, Northrop Grumman Systems Corporation, Operable Unit 1, Bethpage, New York.

	Sample Location:	SB-01	SB-02	SB-04C	SG-04D
	Sample Depth (ft bls):	2	2	2	2
CONSTITUENT (ug/m^3)	Sample Date:	11/27/2007	11/26/2007	11/26/2007	11/27/2007
1,1,1-Trichloroethane		**50**	< 17	< 17	< 17
1,1,2,2-Tetrachloroethane		< 4.3	< 4.2	< 4.2	< 4.3
1,1,2-Trichloroethane		< 17	< 17	< 17	< 17
1,1-Dichloroethane		< 13	< 12	< 12	< 13
1,1-Dichloroethylene		< 12	< 12	< 12	< 13
1,2-Dichloroethane		< 13	< 12	< 12	< 13
1,2-Dichloropropane		< 14	< 14	< 14	< 15
1,3-Butadiene		< 14	< 13	< 14	< 14
2-Hexanone		< 13	< 12	< 13	< 13
Acetone		**39**	**50**	< 33	< 34
Benzene		< 10	< 9.7	< 9.8	< 10
Bromodichloromethane		< 4.2	< 4.1	< 4.1	< 4.2
Bromoform		< 32	< 31	< 32	< 33
Bromomethane		< 12	< 12	< 12	< 12
Carbon disulfide		**46**	< 9.5	**13**	**75**
Carbon tetrachloride		< 3.9	< 3.8	< 3.8	< 4
Chlorobenzene		< 14	< 14	< 14	< 15
Chloroethane		< 16	< 16	< 16	< 17
Chloroform		< 15	< 15	< 15	< 15
Chloromethane		< 13	< 13	< 13	< 13
cis-1,2-Dichloroethene		**18**	**2000 D**	**710**	< 13
cis-1,3-Dichloropropene		< 28	< 28	< 28	< 29
Dibromochloromethane		< 5.3	< 5.2	< 5.2	< 5.4
Ethylbenzene		< 27	< 26	< 27	< 28
Freon 113		< 4.8	< 4.7	< 4.7	< 4.9
Methyl ethyl ketone		< 18	< 18	< 18	< 19
Methyl isobutylketone (MIBK)		< 26	< 25	< 25	< 26
Methyl tert-butyl ether		< 23	< 22	< 22	< 23
Methylene chloride		< 11	< 11	< 11	< 11
Styrene		< 27	< 26	< 26	< 27
Tetrachloroethene		< 4.2	**21**	**5.7**	< 4.3
Toluene		< 12	< 11	< 12	< 12
trans-1,2-Dichloroethylene		< 12	< 12	< 12	< 13
trans-1,3-Dichloropropene		< 14	< 14	< 14	< 14
Trichloroethene		**15000 D**	**7500 D**	**15000 D**	**4800 D**
Trichlorofluoromethane		< 18	< 17	< 17	< 18
Vinyl chloride		< 8	**9.9**	< 7.8	< 8.1
m&p-Xylenes		< 54	< 53	< 53	< 55
o-Xylene		< 27	< 26	< 27	< 28
TVOC		**15153**	**9580.9**	**15728.7**	**4875**

Notes and Abbreviations on last page.

Table 4. Concentrations of Volatile Organic Compounds in Soil Gas Samples, Northrop Grumman Systems Corporation, Operable Unit 1, Bethpage, New York.

CONSTITUENT (ug/m^3)	Sample Location:	SG-04D	SG-04D(REP)	SG-04D
	Sample Depth (ft bls):	15	15	40
	Sample Date:	11/27/2007	11/27/2007	11/27/2007
1,1,1-Trichloroethane		< 18	< 18	< 19
1,1,2,2-Tetrachloroethane		< 4.4	< 4.4	< 4.7
1,1,2-Trichloroethane		< 18	< 18	< 19
1,1-Dichloroethane		< 13	< 13	< 14
1,1-Dichloroethylene		< 13	< 13	< 14
1,2-Dichloroethane		< 13	< 13	< 14
1,2-Dichloropropane		< 15	< 15	< 16
1,3-Butadiene		< 14	< 14	**27**
2-Hexanone		< 13	< 13	< 14
Acetone		**41**	**39**	**130**
Benzene		< 10	< 10	**31**
Bromodichloromethane		< 4.3	< 4.3	< 4.6
Bromoform		< 33	< 33	< 35
Bromomethane		< 12	< 12	< 13
Carbon disulfide		< 10	< 10	< 11
Carbon tetrachloride		< 4	< 4	< 4.3
Chlorobenzene		< 15	< 15	< 16
Chloroethane		< 17	< 17	< 18
Chloroform		< 16	< 16	< 17
Chloromethane		< 13	< 13	< 14
cis-1,2-Dichloroethene		< 13	< 13	< 14
cis-1,3-Dichloropropene		< 29	< 29	< 31
Dibromochloromethane		< 5.5	< 5.5	< 5.8
Ethylbenzene		< 28	< 28	< 30
Freon 113		< 4.9	< 4.9	< 5.2
Methyl ethyl ketone		< 19	< 19	**27**
Methyl isobutylketone (MIBK)		< 26	< 26	< 28
Methyl tert-butyl ether		< 23	< 23	< 25
Methylene chloride		< 11	< 11	< 12
Styrene		< 27	< 27	< 29
Tetrachloroethene		< 4.4 J	< 4.4 J	< 4.6
Toluene		< 12	< 12	**23**
trans-1,2-Dichloroethylene		< 13	< 13	< 14
trans-1,3-Dichloropropene		< 15	< 15	< 15
Trichloroethene		**170**	**190**	**2500 D**
Trichlorofluoromethane		< 18	< 18	< 19
Vinyl chloride		< 8.2	< 8.2	< 8.7
m&p-Xylenes		< 56	< 56	< 59
o-Xylene		< 28	< 28	< 30
TVOC		**211**	**229**	**2738**

Notes and Abbreviations on last page.

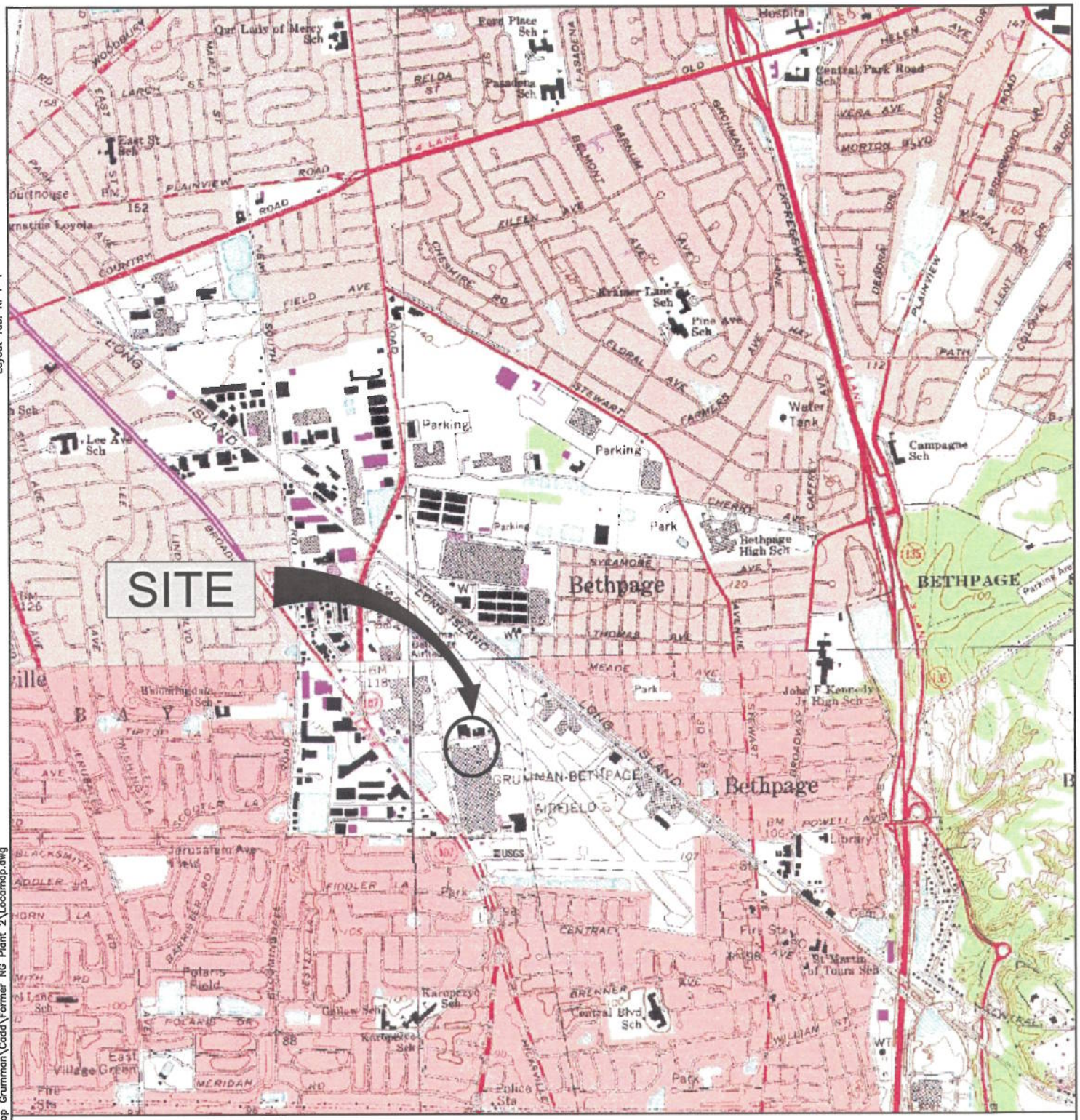
Table 4. Concentrations of Volatile Organic Compounds in Soil Gas Samples, Northrop Grumman Systems Corporation, Operable Unit 1, Bethpage, New York.

Notes and Abbreviations:

1. Results validated following protocols specified in Former Plant 2 Soil Vapor Extraction System Closure Plan and Sub-Slab Soil Gas Testing Work Plan.
2. Samples analyzed for TCL VOCs using USEPA Method TO-15.

Bold value indicates detection.

USEPA	United States Environmental Protection Agency
ft bls	Feet below land surface
ug/m3	Micrograms per meter cubed
TCL	Total compound list
VOC	Volatile organic compound
TVOC	Total volatile organic compounds
D	Value is from secondary dilution
REP	Field replicate



SITE LOCATION

0 2000' 4000'

SCALE IN FEET

SOURCE:
USGS 7.5 MIN. AMITYVILLE QUADRANGLE, AMITYVILLE, NY. 1994
USGS 7.5 MIN. FREEPORT QUADRANGLE, FREEPORT, NY., 1994
USGS 7.5 MIN. HICKSVILLE QUADRANGLE, HICKSVILLE, NY., 1967, PHOTOREVISED 1979
USGS 7.5 MIN. HUNTINGTON QUADRANGLE, HUNTINGTON, NY. 1967, PHOTOREVISED 1979

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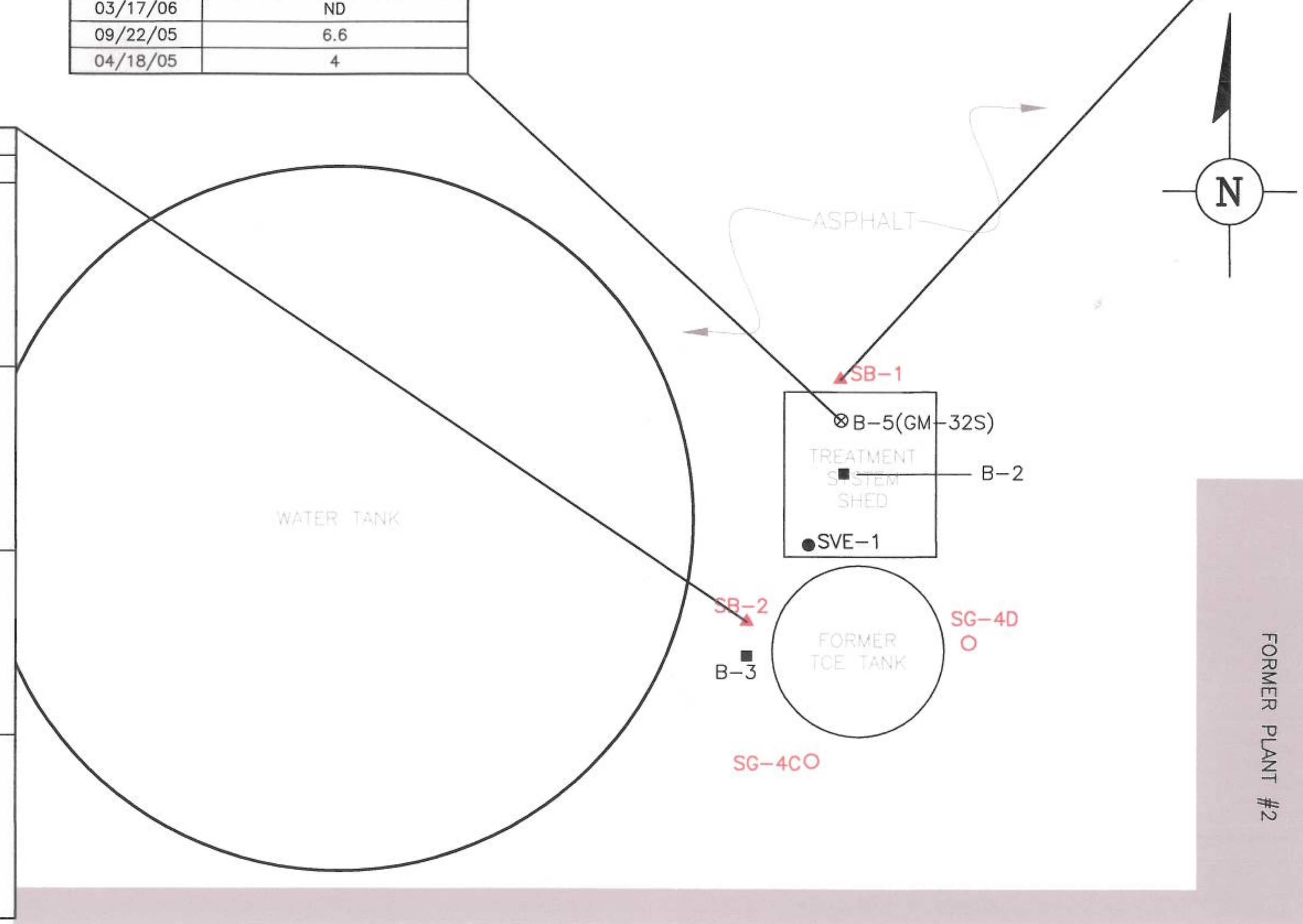
PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
C. SAN GIOVANNI	M. WOLFERT		M. REINDL
SHEET TITLE: NORTHROP GRUMMAN SYSTEMS CORPORATION OPERABLE UNIT 1 BETHPAGE, NEW YORK		TASK/PHASE NUMBER 00003	DRAWN BY A. SANCHEZ
		PROJECT NUMBER NY001464.0608	DRAWING NUMBER 1

Acad Version : R17.0s (LMS Tech) Time : Thu, 27 Mar 2008 – 3:37pm
User Name : alsanchez Path\Name : G:\APROJECT\Northrop Grumman\Cadd\Former NG Plant 2\VOC Conc. SS.dwg
Current Plotstyle : ByColor
Layout Tab: Layout1

GM-32S	
DATE	TVOC CONCENTRATION (µg/L)
03/17/06	ND
09/22/05	6.6
04/18/05	4

SB-2		
DEPTH (FT BLS)	COMPOUND	CONCENTRATION
1–3	1,1–DICHLOROETHYLENE	**1**
	ACETONE	**110**
	CARBON DISULFIDE	**2**
	CIS–1,2–DICHLOROETHENE	**1,200**
	TETRACHLOROETHYLENE	**0.8**
	TRANS–1,2–DICHLOROETHENE	**4**
	TRICHLOROETHENE	**3,100**
8–10	1,1–DICHLOROETHYLENE	ND
	ACETONE	ND
	CARBON DISULFIDE	ND
	CIS–1,2–DICHLOROETHENE	ND
	TETRACHLOROETHYLENE	ND
	TRANS–1,2–DICHLOROETHENE	ND
	TRICHLOROETHENE	ND
18–20	1,1–DICHLOROETHYLENE	ND
	ACETONE	ND
	CARBON DISULFIDE	ND
	CIS–1,2–DICHLOROETHENE	ND
	TETRACHLOROETHYLENE	ND
	TRANS–1,2–DICHLOROETHENE	ND
	TRICHLOROETHENE	ND
38–40	1,1–DICHLOROETHYLENE	ND
	ACETONE	ND
	CARBON DISULFIDE	ND
	CIS–1,2–DICHLOROETHENE	ND
	TETRACHLOROETHYLENE	ND
	TRANS–1,2–DICHLOROETHENE	ND
	TRICHLOROETHENE	ND



SB-1		
DEPTH (FT BLS)	COMPOUND	CONCENTRATION
1–3	1,1,1–TRICHLOROETHENE	**24**
	1,1,2–TRICHLOROETHANE	**3**
	ACETONE	**30**
	BROMODICHLOROMETHANE	**0.6**
	CARBON DISULFINE	**3**
	CLOROBENZENE	ND
	CHLOROFORM	**2**
	CIS–1,2–DICHLOROETHENE	**2**
	METHYL ETHYL KETONE	**4**
	TETRACHLOROETHYLENE	**13**
	TOLUENE	**3**
	TRICHLOROETHENE	**45,000**
8–10	1,1,1–TRICHLOROETHENE	ND
	1,1,2–TRICHLOROETHANE	ND
	ACETONE	ND
	BROMODICHLOROMETHANE	ND
	CARBON DISULFINE	ND
	CLOROBENZENE	**2**
	CHLOROFORM	ND
	CIS–1,2–DICHLOROETHENE	ND
	METHYL ETHYL KETONE	ND
	TETRACHLOROETHYLENE	ND
	TOLUENE	ND
	TRICHLOROETHENE	**180**
18–20	1,1,1–TRICHLOROETHENE	ND
	1,1,2–TRICHLOROETHANE	ND
	ACETONE	ND
	BROMODICHLOROMETHANE	ND
	CARBON DISULFINE	ND
	CLOROBENZENE	ND
	CHLOROFORM	ND
	CIS–1,2–DICHLOROETHENE	ND
	METHYL ETHYL KETONE	ND
	TETRACHLOROETHYLENE	**0.4**
	TOLUENE	ND
	TRICHLOROETHENE	**27**
38–40	1,1,1–TRICHLOROETHENE	ND
	1,1,2–TRICHLOROETHANE	ND
	ACETONE	ND
	BROMODICHLOROMETHANE	ND
	CARBON DISULFINE	ND
	CLOROBENZENE	ND
	CHLOROFORM	ND
	CIS–1,2–DICHLOROETHENE	ND
	METHYL ETHYL KETONE	ND
	TETRACHLOROETHYLENE	ND
	TOLUENE	ND
	TRICHLOROETHENE	ND

LEGEND:

SVE–1 ●	EXISTING SOIL VAPOR EXTRACTION WELL
GM–32S/B–5 ⊗	PREVIOUSLY DRILLED SOIL BORING/EXISTING MONITORING WELL
SB–2 ▲	SOIL VAPOR SAMPLING/VERTICAL PROFILE BORING LOCATION
SG–4D ○	SOIL VAPOR SAMPLING LOCATION
B–3 ■	PREVIOUSLY DRILLED SOIL BORING
FT	FEET
BLS	BELOW LAND SURFACE
ND	NOT DETECTED
TCE	TRICHLOROETHENE
TVOC	TOTAL VOLATILE ORGANIC COMPOUND

NOTES:

1. SOIL VOC CONCENTRATIONS ARE EXPRESSED IN MICROGRAMS PER KILOGRAM (µg/kg).
2. GROUNDWATER VOC CONCENTRATIONS ARE EXPRESSED IN MICROGRAMS PER LITER (µg/L)
3. PLEASE SEE TABLE 2 FOR COMPLETE SOIL ANALYTICAL RESULTS.

0 10' 20'

SCALE IN FEET

NO.	ISSUED DATE	REVISION DESCRIPTION	BY/CKD

KEYPLAN

SEAL

ARCADIS OF NEW YORK, INC.
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PROJECT TITLE

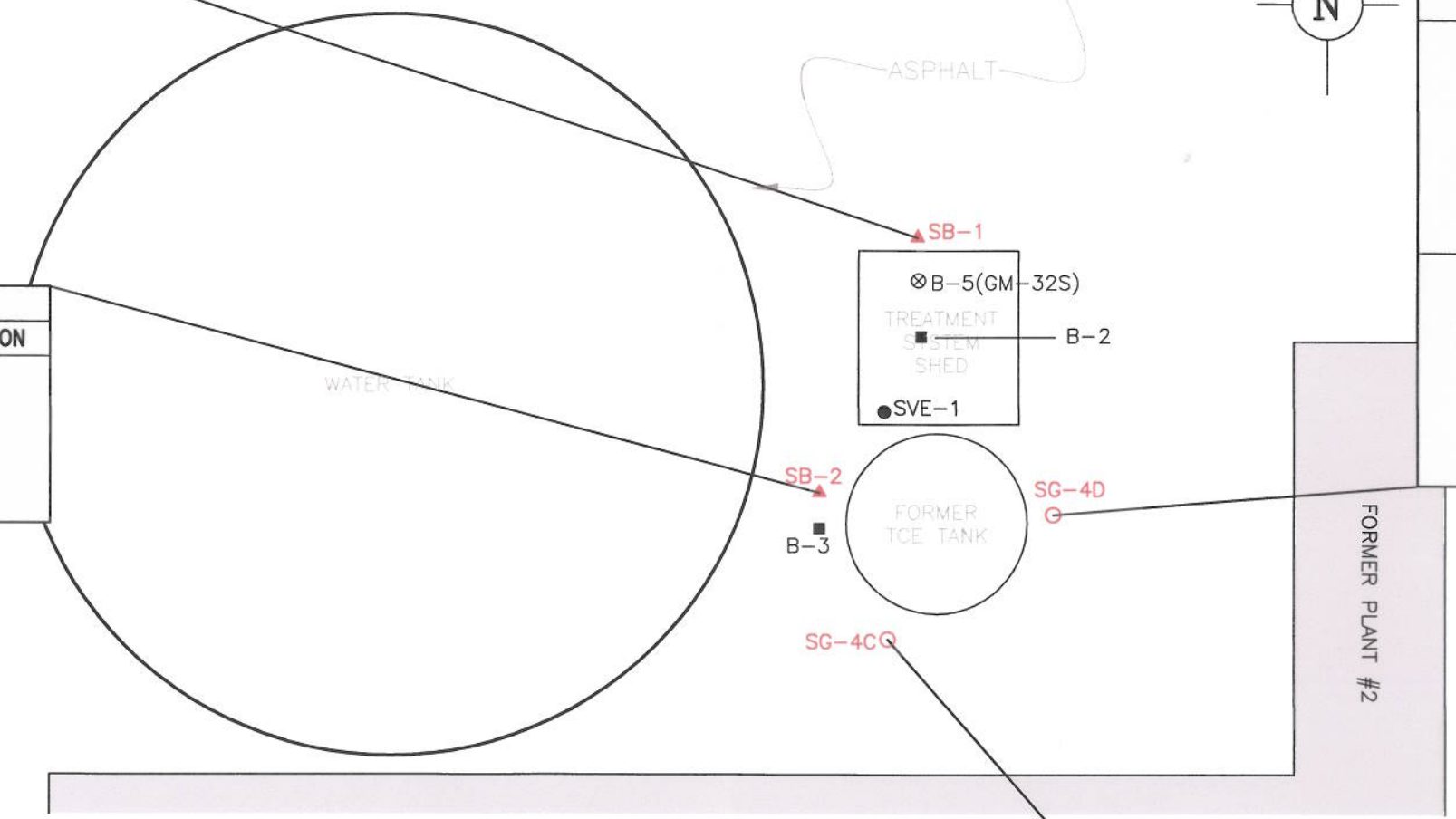
NORTHROP GRUMMAN SYSTEMS CORPORATION
OPERABLE UNIT 1

BETHPAGE, NEW YORK

PROJECT MANAGER C. SAN GIOVANNI	DEPARTMENT MANAGER M. WOLFERT	LEAD DESIGN PROF.	CHECKED BY D. STERN
SHEET TITLE CONCENTRATIONS OF VOLATILE ORGANIC COMPOUNDS IN SOIL AND GROUNDWATER SAMPLES		TASK/PHASE NUMBER 00003	DRAWN BY A. SANCHEZ
		PROJECT NUMBER NY001464.0608	DRAWING NUMBER 2

SB-1		
DEPTH BLS.	COMPOUND	CONCENTRATION
2 FEET	1,1,1–TRICHLOROETHANE	**50**
	ACETONE	**39**
	CARBON DISULFIDE	**46**
	CIS–1,2–DICHLOROETHENE	**18**
	TRICHLOROETHENE	**15,000**

SB-2		
DEPTH BLS.	COMPOUND	CONCENTRATION
2 FEET	ACETONE	**50**
	CIS–1,2–DICHLOROETHENE	**2,000**
	TETRACHLOROETHYLENE	**21**
	TRICHLOROETHENE	**7,500**
	VINYL CHLORIDE	**9.9**



SG-4D		
DEPTH BLS.	COMPOUND	CONCENTRATION
2 FEET	1,3–BUTADIENE	ND
	ACETONE	ND
	BENZENE	ND
	CARBON DISULFIDE	**75**
	METHYL ETHYL KETONE	ND
	TOLUENE	ND
	TRICHLOROETHENE	**4,800**
15 FEET	1,3–BUTADIENE	ND
	ACETONE	**41**
	BENZENE	ND
	CARBON DISULFIDE	ND
	METHYL ETHYL KETONE	ND
	TOLUENE	ND
	TRICHLOROETHENE	**170**
40 FEET	1,3–BUTADIENE	**27**
	ACETONE	**130**
	BENZENE	**31**
	CARBON DISULFIDE	ND
	METHYL ETHYL KETONE	**27**
	TOLUENE	**23**
	TRICHLOROETHENE	**2,500**

SG-4C		
DEPTH BLS.	COMPOUND	CONCENTRATION
2 FEET	CARBON DISULFIDE	**13**
	CIS–1,2–DICHLOROETHENE	**710**
	TETRACHLOROETHYLENE	**5.7**
	TRICHLOROETHENE	**15,000**

LEGEND:

SVE–1 ●	EXISTING SOIL VAPOR EXTRACTION WELL
GM–32S/B–5 ⊗	PREVIOUSLY DRILLED SOIL BORING/EXISTING MONITORING WELL
SB–2 ▲	SOIL VAPOR SAMPLING/VERTICAL PROFILE BORING LOCATION
SG–4D ○	SOIL VAPOR SAMPLING LOCATION
B–3 ■	PREVIOUSLY DRILLED SOIL BORING
FT	FEET
BLS	BELOW LAND SURFACE

NOTES:

1. ALL CONCENTRATIONS ARE EXPRESSED IN MICROGRAMS PER METER CUBED ($\mu g/m^3$).

0 10' 20'

SCALE IN FEET

NO.	ISSUED DATE	REVISION DESCRIPTION	BY/CKD

KEYPLAN

SEAL

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OPERABLE UNIT 1

BETHPAGE, NEW YORK

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
C. SAN GIOVANNI	M. WOLFERT		D. STERN
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
CONCENTRATIONS OF VOLATILE ORGANIC COMPOUNDS IN SOIL GAS SAMPLES		00003	A. SANCHEZ
		PROJECT NUMBER	DRAWING NUMBER
		NY001464.0608	3

Sample Log

Well/Boring SB-1 Project Name and No. NGC-OU-1

Site Location Bethpage, NY Drilling Started 11/27/07 Drilling Completed 11/27/07

Total Depth Drilled 40 feet Hole Diameter 2 inches Sampling Interval 0-40 feet

Length and Diameter of Sampling Device 5 ft length/2 In DIAMETER Type of Sampling Device Geoprobe Macrocore

Drilling Method Geoprobe Direct Push Drilling Fluid Used None

Drilling Contractor Zebra Driller Evan Moraitis Helper Ryan Heischman

Prepared By John Corral Hammer Weight NA Hammer Drop NA inches

Sample Depth (feet below land surface) From	To	Sample Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample Description	PID (ppm)
0	1	1	NA	Concrete	-
1	3	2	NA	top 6" med Sand mixed with black asphalt material, moist next 18" fine sand & silt with little med sand and fine gravel, qtz, subrounded moist	0
3	5	2	NA	light brown med to course sand, with little black asphalt like material, and some fine to course gravel, qtz, subrounded, moist	0
5	6	1	NA	med to course sand with some fine gravel, from 5.5' to 5.6' dark brown/black fine to med sand layer, qtz, subrounded, moist	0
6	8	2	NA	Same as 5-6 without dark brown layers	0
8	10	2	NA	Same as 5-6 with dark brown sand layers at 3" intervals from 8 to 9 ft	0

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Sample Log (Cont.d)

Well/Boring SB-1 Project Name and No. NGC-OU-1 / NY001464.0607.00001

Prepared By John Corral

Sample Depth (feet below land surface) From	To	Sample Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample Description	PID (ppm)
10	12.5'	1	NA	med to course brown sand with some fine gravel, qtz, subrounded, moist,	0
11	12	1	NA	fine and med sand with little fine gravel tightly packed, qtz, subrounded, dry	0
12	15	5	NA	med to course brown sand with some fine gravel, qtz, subrounded, moist	0
15	20	5	NA	med to course sand with little fine sand fine gravel, qtz, subrounded, dry.	0
20	25	4	NA	med to course light brown sand with little fine gravel, moist	0
25	30	4	NA	same as 20-25, except two 1" pieces of redish granite like rock from 29.25' to 29.75' is fine sand, qtz, subrounded brown, dry	0
30	35	4	NA	top 3" grey fine sand silt, next 4 ft med to course light brown sand with little fine gravel qtz, subrounded, moist,	0
35	40	4	NA	med brown sand with little fine gravel, qtz, subrounded, dry	0
40ft	Geoprobe	Refusal		End of Boring	

Sample Log

Well/Boring SB-2 Project Name and No. N6C-OU-1/NY001464.0607.00001

Site Location Bethpage, NY Drilling Started 11/26/07 Drilling Completed 11/26/07

Total Depth Drilled 40 feet Hole Diameter 2 inches Sampling Interval 0-40 feet

Length and Diameter of Sampling Device 5 ft length / 2 In diameter Type of Sampling Device Geoprobe / Macrocore

Drilling Method Geoprobe Direct Push Drilling Fluid Used None

Drilling Contractor Zebra Driller Evan Moraitis Helper Ryan Heischman

Prepared By John Corral Hammer Weight NA Hammer Drop NA inches

Sample Depth (feet below land surface) From	To	Sample Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample Description	PID (ppm)
0	1	1	NA	Concrete	—
1	3	2	NA	Fine sand + silt with little medium sand and fine	0
				to medium gravel, qtz, subrounded, moist	
3	5	2	NA	Med to course brown sand with little fine gravel,	0
				moist, qtz, subrounded	
5	10	5	NA	Med to course brown sand with little fine grad	0
				qtz, subrounded, moist	
10	15	5	NA	med to course, brown sand with some med	0
				to course gravel, qtz, subrounded, moist	
15	20	5	NA	same as 10-15	0
20	25	4	NA	same as 15-20	0
25	30	4	NA	same as 20-25 with little black stained	0
				sand from 28-29 ft	
30	35	3	NA	top 1 ft fine to med gray sand dry, next 2ft med to course	0
				brown sand with little fine gravel, qtz, subrounded, moist	

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Sample Log (Cont.d)

Well/Boring SB-2 Project Name and No. N6C-04-1

Prepared By John Corral

Sample Depth (feet below land surface) From	To	Sample Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample Description	PID (ppm)
35	40	3		top 3 ft same as botton 2 ft from 30-35, ~~next 1ft fine to med grey sand, qtz, sub with~~ course gravel at bottom of collected sample, qtz, subrounded, dry	0
				~40 Ft Geoprobe Refusal End of Boring	

G:\TECHNICL\WOLFERT\Technical Forms\2006\Sample Core Log - Sheet1

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Soil-Vapor Sample Log

Sample ID SB-1 (2)
Date 11/27/07
Time 12:30
Weather Sunny, Windy, 50°F

Project Name and Number NGC-OU-1 / NY001464.0607.00001
Sampling Personnel John Corral

DESCRIPTION OF SAMPLE LOCATION

X Outdoor

Location Bethpage, NY
Est. depth to water (ft) 50
Soil type JHC ~~Fine Sand~~ Fine to Med Sand, + Silt
Odor None
Color Dark Brown

Indoor

Location
Basement yes / no
Room size ft x ft
Floor material cement / wood / dirt
Slab Thickness (ft)
Visible cracks yes / no
Sub-slab mater dirt / gravel

PROBE INSTALLATION

Date 11/27/07
Method Geoprobe PRT System (Temporary)
Diameter 1.25"
Depth 2 ft below grade
Packing Material None

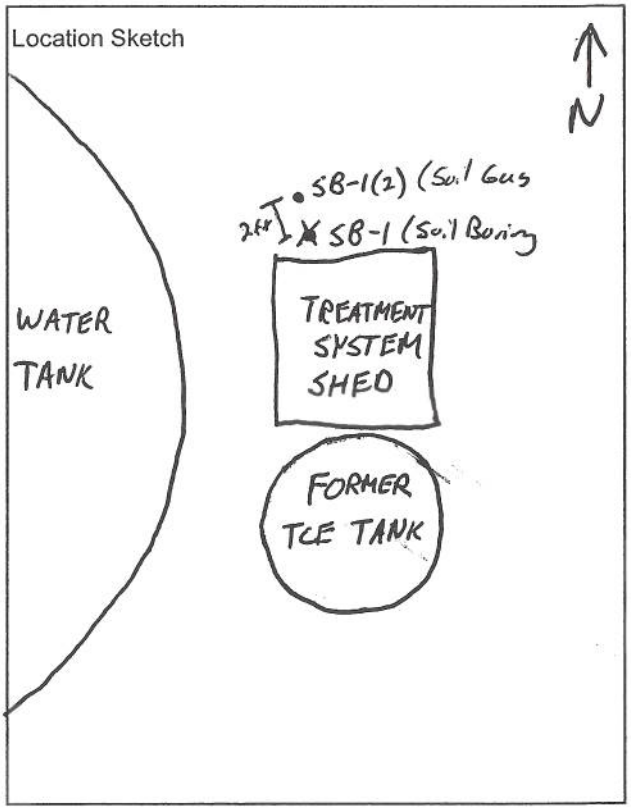
PURGE

Date 11/27/07
Time 12:30 - 12:36
Rate 200 ml/min
Volume 1200 ml

SAMPLE COLLECTION

Sample Time 12:36 - 13:10
Sample Rate Aprox 167 ml/min
Sample Volume 6 L

Location Sketch



CONTAINER DESCRIPTION

6 L Summa Canister ID → K662 Initial Pressure - 28 In Of Hg
Final Pressure - 5 In of Hg

Tracer Gas Test [ ] Pass [ ] Fail [X] Not Applicable

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Infrastructure, environment, facilities

Soil-Vapor Sample Log

Sample ID: SB-2(2)
Date: 11/26/07
Time: 14:20
Weather: Cloudy, Humid, 50°F, No Wind

Project Name and Number: NGC-OU-1 / NY001464.0607.00001
Sampling Personnel: John Corral

DESCRIPTION OF SAMPLE LOCATION

X Outdoor

Location: Bethpage, NY
Est. depth to water (ft): 50 ft
Soil type: fine to med sand + silt
Odor: None
Color: Brown

_____ Indoor

Location
Basement yes / no
Room size ft x ft
Floor material cement / wood / dirt
Slab Thickness (ft)
Visible cracks yes / no
Sub-slab mater dirt / gravel

PROBE INSTALLATION (Temporary)

Date: 11/26/07
Method: Geoprobe with PRT System
Diameter: 1.25"
Depth: 2'
Packing Material: NA

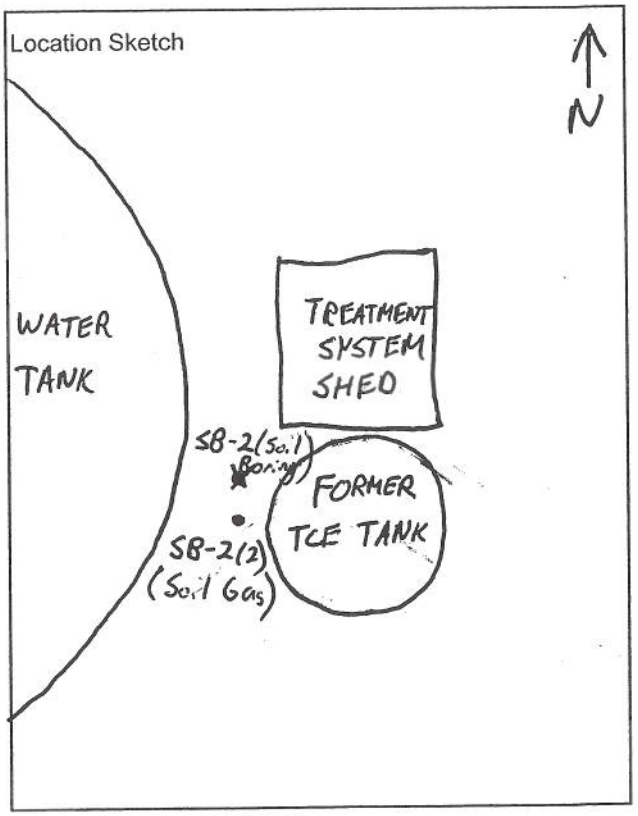
PURGE

Date: 11/26/07
Time: 14:20 - 14:30
Rate: 125 ml/min
Volume: 1,250 ml

SAMPLE COLLECTION

Sample Time: 14:42 - 15:12
Sample Rate: ~167 ml/min
Sample Volume: 6L

Location Sketch



CONTAINER DESCRIPTION

6 L Summa Canister → ID: K729

Initial Pressure = 28PSI
Final Pressure = 4PSI

Tracer Gas Test ☐ Pass ☐ Fail ☐ Not Applicable

ARCADIS
Infrastructure, environment, facilities

Soil-Vapor Sample Log

Sample ID: SG-4C (2)
Date: 11/26/07
Time: 3:40
Weather: Cloudy, Humid, 50°F, No Wind

Project Name and Number: NGC-OU-1 / NY001464.0607.00001
Sampling Personnel: John Corral

DESCRIPTION OF SAMPLE LOCATION

X Outdoor

Location: Bethpage, NY
Est. depth to water (ft): 50
Soil type: Fine to med sand + silt
Odor: None
Color: Brown

____ Indoor

Location
Basement yes / no
Room size ft x ft
Floor material cement / wood / dirt
Slab Thickness (ft)
Visible cracks yes / no
Sub-slab mater dirt / gravel

PROBE INSTALLATION (Temporary)

Date: 11/26/07
Method: Geoprobe PRT System
Diameter: 1.25"
Depth: 2 ft
Packing Material: NA

PURGE

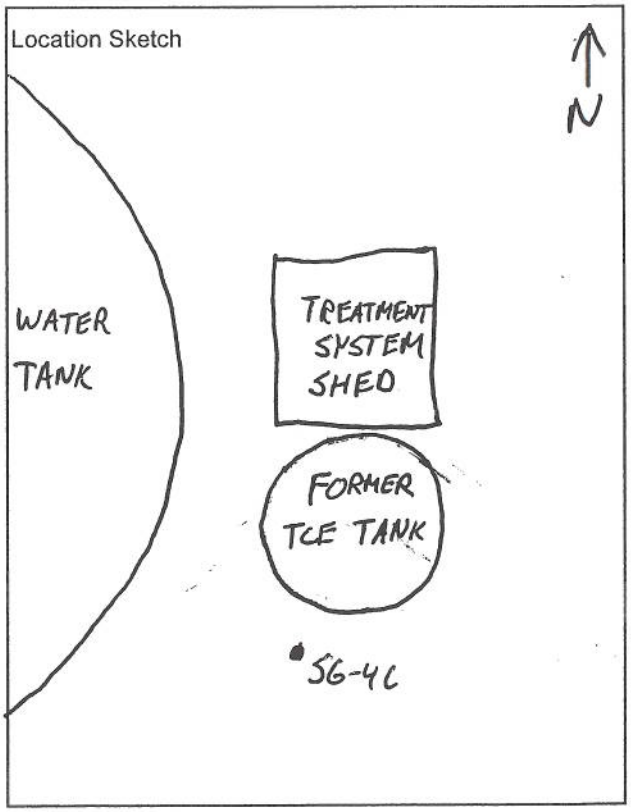
Date: 11/26/07
Time: 15:35 - 15:45
Rate: 500 ml/min *
Volume: ~2500 ml

* Higher Rate to prevent pump from stopping

SAMPLE COLLECTION

Sample Time: 15:45 - 16:15
Sample Rate: ~@ 167 ml/min
Sample Volume: 6 Liters

Location Sketch



CONTAINER DESCRIPTION

6 L Summa Canister → ID = K675

Starting Pressure = 29 In of Hg
Final Pressure = 5 In of Hg

Tracer Gas Test [ ] Pass [ ] Fail [ ] Not Applicable

ARCADIS
Infrastructure, environment, facilities

Soil-Vapor Sample Log

Sample ID: SG-4D(2)
Date: 11/27/07
Time: 13:30
Weather: Sunny, Windy, 50°F

Project Name and Number: NGC-OU-1 / NY001464.0607.00001
Sampling Personnel: John Corral

DESCRIPTION OF SAMPLE LOCATION

X Outdoor

Location: Bethpage, NY
Est. depth to water (ft): 50
Soil type: fine to medium sand + silt
Odor: None
Color: Brown

____ Indoor

Location
Basement yes / no
Room size ft x ft
Floor material cement / wood / dirt
Slab Thickness (ft)
Visible cracks yes / no
Sub-slab mater dirt / gravel

PROBE INSTALLATION (Temporary)

Date: 11/27/07
Method: Geoprobe PRT System
Diameter: 1.25" Diameter
Depth: 2 ft
Packing Material: NA

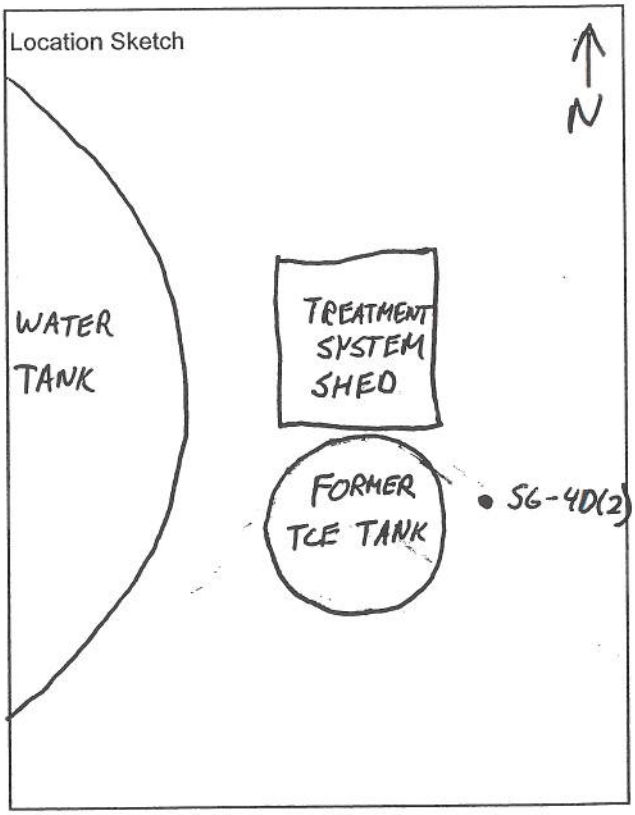
PURGE

Date: 11/27/07
Time: 13:39 - 13:35
Rate: 200 ml/min
Volume: 1200 ml

SAMPLE COLLECTION

Sample Time: 13:36 - 14:06
Sample Rate: 167 ml/min
Sample Volume: 6 Liters

Location Sketch



CONTAINER DESCRIPTION

6 L Summa Canister

Initial Pressure 29 In of Hg
Final Pressure 5 In of Hg

Tracer Gas Test ☐ Pass ☐ Fail ☐ Not Applicable

ARCADIS
Infrastructure, environment, facilities

Soil-Vapor Sample Log

Sample ID SG-4D(15)
Date 11/27/07
Time 14:50
Weather Sunny, Windy, 50°F

Project Name and Number NGC-OU-1 / NY001464.0607.00001
Sampling Personnel John Corral

DESCRIPTION OF SAMPLE LOCATION

X Outdoor

Location Bethpage, NY
Est. depth to water (ft) 50
Soil type med to course sand with little fine gravel
Odor None
Color brown

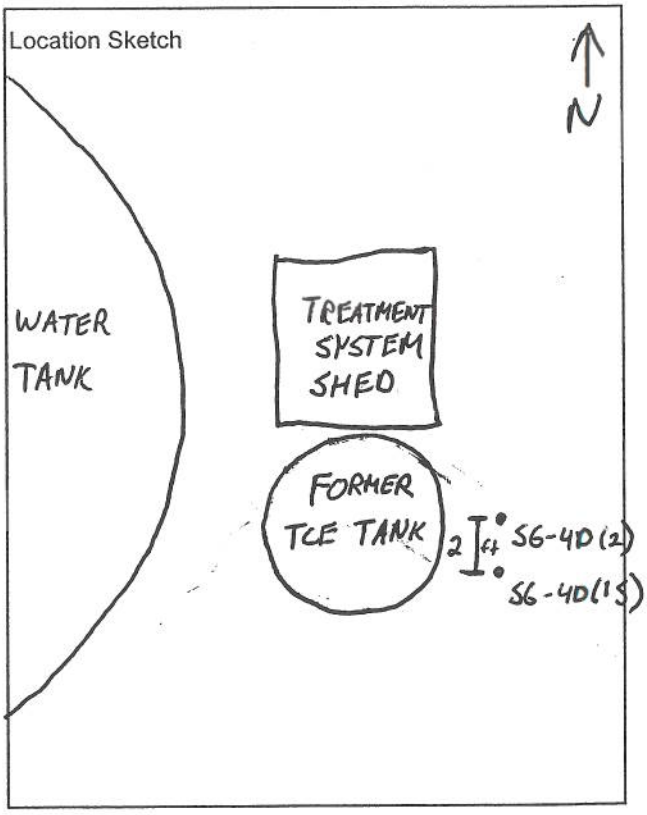
____ Indoor

Location
Basement yes / no
Room size ft x ft
Floor material cement / wood / dirt
Slab Thickness (ft)
Visible cracks yes / no
Sub-slab mater dirt / gravel

PROBE INSTALLATION (Temporary)

Date 11/27/07
Method Geoprobe PRT System
Diameter 1.25"
Depth 15 ft
Packing Material NA

Location Sketch



PURGE

Date 11/27/07
Time 2nd 14:48 - 15:07
Rate 162 ml/min
Volume ~3000 ml

SAMPLE COLLECTION

Sample Time 15:07 - 15:37
Sample Rate ~167 ml/min
Sample Volume 6 L

CONTAINER DESCRIPTION

6 L Summa Canister → ID K705 - REP112707 Initial Pressure 29 In Hg Final Pressure 5
→ ID K707 - SG-4D(15) Initial Pressure 29 In Hg Final Pressure 5 In Hg

Tracer Gas Test ____ Pass ____ Fail ____ Not Applicable

ARCADIS
Infrastructure, environment, facilities

Soil-Vapor Sample Log

Sample ID: SG-4D(40)
Date: 11/27/07
Time: 14:20
Weather: Clear, Windy, 45°F

Project Name and Number: NGC-OU-1 / NY001464.0607.00001
Sampling Personnel: John Corral

DESCRIPTION OF SAMPLE LOCATION

X Outdoor

Location: Bethpage, NY
Est. depth to water (ft): 50 ft
Soil type: med sand
Odor: None
Color: brown

____ Indoor

Location
Basement yes / no
Room size ft x ft
Floor material cement / wood / dirt
Slab Thickness (ft)
Visible cracks yes / no
Sub-slab mater dirt / gravel

PROBE INSTALLATION (Temporary)

Date: 11/27/07
Method: Geoprobe PRT System
Diameter: 1.25"
Depth: 40 ft
Packing Material: None

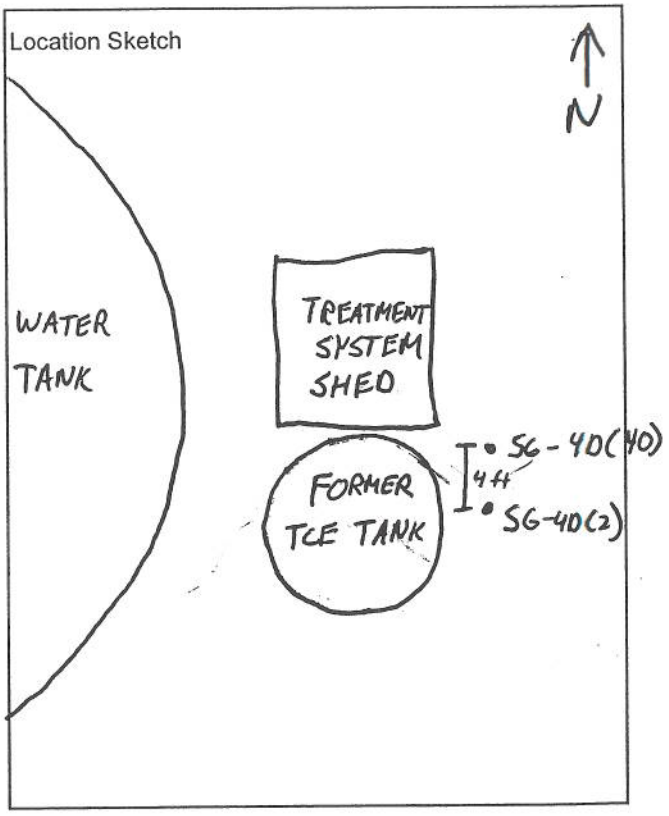
PURGE

Date: 11/27/07
Time: 16:20 - 16:40
Rate: 194 ml/min
Volume: ~ 3900 ml

SAMPLE COLLECTION

Sample Time: 16:40 - 17:15
Sample Rate: ~167 ml/min
Sample Volume: 6L

Location Sketch



CONTAINER DESCRIPTION

6 L Summa Canister → Initial Pressure = 29 In of Hg
Final Pressure = 5 In of Hg

Tracer Gas Test ☐ Pass ☐ Fail ☐ Not Applicable

ARCADIS

Laboratory Task Order No./P.O. No. NGC OU1 MER

CHAIN-OF-CUSTODY RECORD

Project Number/Name NGC-OU-1/NY001464.0607.00001
Project Location Bethpage, NY
Laboratory Columbia Analytical
Project Manager Dave Stern
Sampler(s)/Affiliation JHC /Arcadis

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	TCL VOCs NYSDEC ASP 2000 2 oz Glass Jar (UNP)	%Solids 4 oz Glass Jar (UNP)	TCL VOCs NYSDEC ASP 2000 40ml VOA Vial (HCl)				Remarks	Total
SB-1(1-3)	S	11/27/07		1	1					Normal Turn Around Time	2
SB-1(8-10)	S	↓		1	1						2
SB-1(18-20)	S	↓		1	1						2
SB-1(38-40)	S	↓		1	1						2
FB112707	L	↓				3					3
TB112707	L	↓				3					3

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers: 14

Relinquished by: John Cormt	Organization: Arcadis	Date 11/27/07	Time 6:45	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks: Please Send Results to Melissa Reindl, Please Use Normal TAT

Delivery Method: ☐ In Person ☒ Common Carrier FEDEX (SPECIFY) ☐ Lab Courier ☐ Other ______ (SPECIFY)

ARCADIS

Laboratory Task Order No./P.O. No. NGC-OU-1 AIR **CHAIN-OF-CUSTODY RECORD** Page 1 of 1

Project Number/Name NGC-OU-1/NY001464.0607.0001

Project Location Bethpage, NY

Laboratory Columbia Analytical Services

Project Manager Dave Stein

Sampler(s)/Affiliation JHC/Arcadis

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	TCL VOCs NYSDEC ASP 2000 2oz Glass Jar (UNP)	TCL VOCs NYSDEC ASP 2000 40ml VOA Vials (HCL)	TCL VOCs ID Solids 4oz Glass Jar UNP	Remarks	Total
SB-2(1-3)	S	11/26/07		1	1	1	Normal Turn Around Time	2
SB-2(8-10)	S			1	1	1		2
SB-2(18-20)	S			1		1		2
SB-2(38-40)	S			1		1		2
FB112607	L				3			3
TB112607	L				3			3
							Total No. of Bottles/ Containers	14

Sample Matrix: L = Liquid; S = Solid; A = Air

Relinquished by: John Corral	Organization: Arcadis	Date 11/26/07	Time 6:30	Seal Intact?	
Received by:	Organization:	Date / /	Time	Yes	No N/A
Relinquished by:	Organization:	Date / /	Time	Seal Intact?	
Received by:	Organization:	Date / /	Time	Yes	No N/A

Special Instructions/Remarks: Please Send Results to Melissa Reindl, Use Normal Turn Around Time

Delivery Method: ☐ In Person ☒ Common Carrier FEDEX ☐ Lab Courier ☐ Other

SPECIFY

ARCADIS

Laboratory Task Order No./P.O. No. N6C-044 **CHAIN-OF-CUSTODY RECORD** Page 1 of 1

Project Number/Name N6C-044 / NY001464.0607.0001

Project Location Bethpage, NY

Laboratory Columbia Analytical Services (Rochester)

Project Manager Dave Stern

Sampler(s)/Affiliation JHC / Arcadis

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	ANALYSIS / METHOD / SIZE: TCL VOCs USEPA Method TO-15 6L SUMMA CANISTER						Remarks	Total
SB-2(2)	Air	11/26/07		1		Normal Turn Around Time					1
SB-4C(2)	Air	11/26/07		1							1
										Total No. of Bottles/ Containers	2

Sample Matrix: L = Liquid; S = Solid; A = Air

					Seal Intact?
Relinquished by: John Corral	Organization: Arcadis	Date 11/26/07	Time 6:30		
Received by:	Organization:	Date / /	Time		Yes No N/A
Relinquished by:	Organization:	Date / /	Time		Seal Intact?
Received by:	Organization:	Date / /	Time		Yes No N/A

Special Instructions/Remarks: Please Send Results to Melissa Reindl, Use Normal Turn Around Time

ARCADIS

Laboratory Task Order No./P.O. No. NGC011AIR **CHAIN-OF-CUSTODY RECORD** Page 1 of 1

Project Number/Name NGC-011-1/NY001464.0607.00001

Project Location Bethpage, NY

Laboratory Columbia Analytical Services

Project Manager Dave Stern

Sampler(s)/Affiliation JHC/Arcadis

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	TCL VOCs USEPA METHOD TO-15 6L SUMMA CANISTER	ANALYSIS / METHOD / SIZE				Remarks	Total
SG-4D(2)	A	11/27/07		1						1
SG-4D(15)	A	11/27/07		1						1
SG-4D(40)	A	11/27/07		1						1
SB-1(2)	A	11/27/07		1						1
REP112800										
REP112707	A	11/27/07		1						1

Please Use Normal Turn Around Time

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/ Containers 5

Relinquished by: John Corral	Organization: Arcadis	Date 11/28/07	Time 12:00	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks: Please Send Results To Melissa Reindl, Please Use Normal Turn Around Time

Delivery Method: ☐ In Person ☒ Common Carrier FED EX (SPECIFY) ☐ Lab Courier ☐ Other (SPECIFY)