Mr. Jason Pelton
Project Manager, Division of Environmental Remediation
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ENVIRONMENT

Subject:
Revised Supplemental Work Plan for Delineation of VOCs in Soil,
Operable Unit 3 (Former Grumman Settling Ponds),
Bethpage, New York.

Date:
November 15, 2019

Contact:
David Stern

Phone:
631-391-5284

Email:
David.Stern@arcadis.com

Our ref:
NYNG2019.37LS

Dear Mr. Pelton:

Arcadis of New York, Inc. (Arcadis) has prepared this Work Plan on behalf of Northrop Grumman Systems Corporation (Northrop Grumman) to describe the proposed work that will be implemented to refine the delineation of total volatile organic compound (TVOC) concentrations in the vadose zone soil exceeding 10 milligrams per kilogram (mg/kg) in the low permeability zone (LPZ) northeast and east of the former ballfield area of the Bethpage Community Park, Bethpage, New York (Site). The locations and depths of proposed soil borings described herein were determined based on the findings of the Addendum to the LNAPL Investigation and Supplemental VOC Delineation Report, dated June 28, 2019 (Report). Specifically, TVOC concentrations exceeded the 10 mg/kg VOC source area remedial goal at the following soil boring locations and depths: R-6-19 (36-40 feet below land surface [ft bls]), nS-6-19 (36-38 ft bls), nS-7-19 (50-52 ft bls), and nT-11-19 (44-48 ft bls). The New York State Department of Environmental Conservation (NYSDEC) indicated in a letter dated October 16, 2019 that additional delineation sampling is required for the areas outside of the current in-situ thermal remediation (ISTR) area.

PROPOSED SCOPE OF WORK

The proposed soil boring locations are shown on **Figure 1**. This figure also includes proximal historical soil boring locations, the data from which were used in the development of the scope of sampling proposed in this Work Plan. Consistent with prior investigations, investigation activities proposed herein will be performed using an adaptive approach to allow for flexibility in number and

location of borings. Additional borings may be drilled and samples may be collected if warranted by data collected from the proposed borings.

Additional delineation of TVOCs in soil will consist the following activities:

1. Drilling of five (5) soil borings that step out from the previously completed soil boring locations where TVOC concentrations exceed 10 mg/kg. TVOC concentrations above 10 mg/kg in completed borings were detected between 36 and 48 ft bls in those soil borings (with the exception of Boring nS-7-19 which also exhibited an exceedance at 52 ft bls). Based on the data collected from soil borings R-6-19, nS-6-19, and nT-11-19, soil sampling will be conducted in the vadose zone between 32 and 52 ft bls at the proposed boring locations, with an additional deeper vadose zone sample collected from T-7-19, as indicated below. The table below provides the previously completed soil boring locations and the details of the proposed soil sampling intervals.

Completed Soil Boring Locations	Proposed Soil Boring IDs	Proposed Soil Sampling Intervals (ft bls)
R-6-19, nS-6-19, and nS-7-19	T-5-19	32-34, 34-36, 36-38, 38-40, 40-42, 42-44, 44-46, 46-48, 48-50, and 50-52
R-6-19 and nS-6-19	nR-5-19	32-34, 34-36, 36-38, 38-40, 40-42, 42-44, 44-46, 46-48, 48-50, and 50-52
nS-7-19	T-7-19	32-34, 34-36, 36-38, 38-40, 40-42, 42-44, 44-46, 46-48, 48-50, 50-52, and 52-54
nT-11-19	T-9-19	32-34, 34-36, 36-38, 38-40, 40-42, 42-44, 44-46, 46-48, 48-50, and 50-52
nT-11-19	nU-11-19	32-34, 34-36, 36-38, 38-40, 40-42, 42-44, 44-46, 46-48, 48-50, and 50-52

2. The Geoprobe® Hydraulic Profiling Tool (HPT) may also be employed at selected locations to map hydrostratigraphy at high-resolution, specifically zones of relatively higher and lower permeability (e.g., to understand the depth and morphology of the LPZ at the proposed soil boring locations). The HPT method has been previously approved by NYSDEC for this project and will be utilized in this investigation in a manner consistent with the prior approval.

As warranted, additional soil borings will be advanced based on the results of field observations and the results of soil samples submitted to the laboratory. Specifically, field observations, field screening using a photoionization detector (PID), and laboratory results will collectively be used to determine if additional borings are necessary. Should field observations and PID screening indicate that impacts are present at the proposed terminal depth, the soil boring(s) will be further advanced in the vadose zone until groundwater is encountered or field screening indicates that impacts are no longer evident, whichever occurs first.

Soil borings will be drilled using sonic drilling techniques following methods previously approved by NYSDEC. Soil cores will be collected from the sample intervals identified in the table above and will be screened in the field using a PID. Soil recovered from each sample interval will be visually characterized for color, texture, and moisture content. Upon completion, the borings will be grouted from the bottom up

to land surface and the surface will be restored with cold patch asphalt. A total of 51 soil samples, not including quality assurance/quality control (QA/QC) samples, will be collected from the intervals identified in the table above.

Soil samples will be submitted to a New York State Department of Health (NYSDOH) accredited laboratory for the analysis of Target Compound List (TCL) VOCs under a 24-hour turnaround time. Sample analyses will follow the NYSDEC Analytical Services Protocol (ASP) and will include quality assurance/quality control (QA/QC) samples consisting of trip blanks, equipment blanks, matrix spike/matrix spike duplicate (MS/MSD), and field duplicate samples, in accordance with the NYSDEC-approved Quality Assurance Project Plan (QAPP). Analytical results will be reported using NYSDEC ASP Category B data deliverables. Data obtained from the analytical laboratory will be validated in accordance with the QAPP.

The investigation results will be provided in a summary report at the end of the investigation program and after the data have been evaluated and validated. The findings will be used to complete the delineation of TVOCs exceeding 10 mg/kg in deep soil within the LPZ adjacent to the former ballfield and to support a remedial design to address those areas.

FIELD PROGRAM LOGISTICS

Arcadis will adhere to the provisions of access agreed to between Northrop Grumman and the Town of Oyster Bay (Town) for field activities performed at the Site and will coordinate with the Town during the planning and performance of the work.

Locations will be marked out in the field using a portable Global Positioning System (GPS) unit (coordinates and approximate land surface elevation) prior to commencing intrusive activities. Subsurface utilities will be cleared using a minimum of three lines of evidence (e.g., One Call, soft dig, review of utility maps and previous geophysical survey data, site inspection) in accordance with the existing site-specific health and safety plan (HASP). The boring locations will also be cleared of utilities to a depth of 5 ft bls using soft dig techniques (e.g., hand digging, hand auger, etc.).

It is anticipated that the investigation program described above will be performed as a single mobilization and sampling event. The drilling operations will be overseen continuously by an Arcadis field geologist. Sample collection, coordination with the analytical laboratory and sample shipment, and sample logging will be conducted by Arcadis personnel. Drilling locations may be adjusted in the field based on access restrictions or the presence of utilities. Community air monitoring will be conducted continuously during working hours in accordance with the NYSDEC-approved Community Air Monitoring Plan (CAMP). Messrs. Pelton and Karpinski of NYSDEC and NYSDOH, respectively, will be provided with the CAMP electronic data on a daily basis, when intrusive work is conducted. Mr. Karpinski will be notified within 12 hours of any exceedances of the CAMP-specified response levels, along with a description of corrective actions taken.

Investigation-derived waste (IDW) management, equipment decontamination, and site control will be performed consistent with previous Site work. Soil cuttings and other IDW (e.g., personal protective equipment [PPE], decontamination water, etc.) will be segregated by waste type and placed in appropriate waste containers (e.g., Department of Transportation [DOT]-approved 55-gallon steel drums). The containerized IDW generated during the activities will be temporarily stored at a secure location on

Northrop Grumman property until disposal. IDW (e.g., drill cuttings) samples will be analyzed for total and toxicity characteristic leaching procedure (TCLP) VOCs, semi-volatile organic compounds (SVOCs), Resource Conservation and Recovery Act (RCRA) metals, pesticides, and RCRA characteristics, plus other analytes as may be required by the disposal facility. Waste characterization results will be used to develop waste profiles for disposal of IDW.

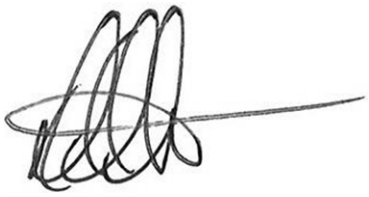
NOTIFICATIONS AND ESTIMATED SCHEDULE

Northrop Grumman will be coordinating access with the Town of Oyster Bay and we anticipate commencing the investigation activities within 15 days after NYSDEC approval of the work plan, contingent on access. The NYSDEC will be notified at least two days prior to the start of field work. Field work is anticipated to require 10 days (actual duration contingent on findings and field conditions) to complete and will be performed Monday to Friday from 8 a.m. to 5 p.m. (work will not be conducted during Town holidays). The NYSDEC will be notified if field observations and laboratory results indicate that additional borings are warranted.

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

Sincerely,

Arcadis of New York, Inc.



David E. Stern
Project Manager

Copies:
Ed Hannon, Northrop Grumman
Steve Karpinski, NYSDOH
John Lovejoy, NCDOH
Richard Lenz, Town of Oyster Bay
Mike Wolfert, Arcadis
William Lais, EMAGIN

Enclosures:

Figure

1 Figure 1: Historical and Proposed Soil Boring Locations

FIGURES

R-6-19	
Sample Date	5/8/2019
Sample Interval (ft bgs)	TVOC (mg/kg)
36-38	**110**

nS-6-19	
Sample Date	5/14/2019
Sample Interval (ft bgs)	TVOC (mg/kg)
36-38	**65**

nS-7-19	
Sample Date	5/14/2019
Sample Interval (ft bgs)	TVOC (mg/kg)
50-52	**69**

nT-11-19	
Sample Date	5/10/2019
Sample Interval (ft bgs)	TVOC (mg/kg)
46-48	**150**

APPROXIMATE LIMIT OF FORMER RAG PIT

LEGEND:

- HISTORICAL (2004-2017) VOC SAMPLE LOCATIONS
- ABANDONED PERCHED WATER PIEZOMETER LOCATION
- 2018 PHASE I LIF-HPT BORING LOCATION
- 2018 PHASE I LIF-HPT/ PHASE II SOIL BORING LOCATION
- 2018 PHASE III SOIL BORING LOCATION
- 2018 PHASE IV SUPPLEMENTAL VOC DELINEATION SAMPLE LOCATION
- 2019 SOIL BORING LOCATION
- LIMIT OF PARK - BALL FIELD
- VOC VOLATILE ORGANIC COMPOUND
- LIF LASER-INDUCED FLUORESCENCE
- HPT HYDRAULIC PROFILING TOOL
- PROPOSED SOIL BORING

NOTES:

1. THE BORINGS WERE FIELD LOCATED USING A HAND-HELD GLOBAL POSITIONING SYSTEM (GPS) UNIT.
2. COORDINATES REFER TO NEW YORK STATE PLANE COORDINATE SYSTEM, LONG ISLAND ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83).
3. DATA SHOWN REPRESENTS HIGHEST TVOC CONCENTRATION IN THE 2019 BORINGS OUTSIDE BALL FIELD. WHERE NO DATA SHOWN IN BORING OUTSIDE BALL FIELD, TVOCS < 10 MG/KG.

0 50' 100'

APPROXIMATE SCALE IN FEET

NORTHROP GRUMMAN SYSTEMS CORPORATION
OPERABLE UNIT 3
BETHPAGE, NEW YORK

HISTORICAL AND PROPOSED SOIL BORING LOCATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE 1

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD:ALS PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
C:\Users\alsanchez\BIM 360\Arcadis\ANA - Northrop Grumman\Project Files\OU3 SUBPROJECT 7 PARK SOILS V2\2019NY001496.37TM\01-DWG\NGC-BP-PSRBB-VOC2019.dwg LAYOUT: 1 SAVED: 10/24/2019 1:17 PM ACADVER: 23.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 10/25/2019 11:24 AM BY: SANCHEZ, ADRIAN
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