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Infrastructure, environment, facilities

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ENVIRONMENT

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

Subject:
Off-Site (Groundwater) Remedial Investigation Work Plan, Northrop Grumman Systems Corporation, Operable Unit 3 (Former Grumman Settling Ponds) Bethpage, New York.

Date:
January 10, 2008

Contact:
David Stern

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Email:
david.stern@arcadis-us.com

Our ref:
NY001464.0707.00003

Dear Mr. Scharf:

In accordance with the New York State Department of Environmental Conservation (NYSDEC)-approved Remedial Investigation/Feasibility Study (RI/FS) Work Plan for Operable Unit 3 (OU3) (Former Grumman Settling Ponds) site (Site), ARCADIS of New York, Inc. (ARCADIS) is submitting this RI work plan, on behalf of the Northrop Grumman Systems Corporation (Northrop Grumman), for approval for the continuation of the off-site component of the OU3 RI (groundwater). In accordance with the provisions of the NYSDEC-approved RI/FS Work Plan, this work plan is intended to be dynamic in nature to allow flexibility in scope, based on findings. Tables 1 and 2 summarize the proposed vertical profile borings (VPBs) and permanent monitoring wells to be drilled and laboratory analyses, respectively. Figure 1 depicts the site plan showing the proposed VPB and well locations.

In summary, the following work scope for the off-site component of the OU3 RI is proposed:

1. **Vertical Profile Borings (VPBs):** Six VPBs (VP-109R, VP-110R, VP-113, VP-114, VP-115, and VP-116) (latter two borings will serve as contingency VPBs; VP-116 is not shown on Figure 1 due to the uncertainty in the location) are proposed to be drilled, sampled, and abandoned (VPB borehole may be used to accommodate permanent monitoring well, if appropriate) in accordance with RI/FS Work Plan protocols. The VPBs general purpose is to investigate site-related volatile organic compounds (VOCs) in groundwater off-site, while also collecting information as to the regional extent of perchlorate in groundwater. The locations of the VPBs have been selected based on existing data from off-

site VPBs VP-100 to VP-112 and also by utilizing the NYSDEC-accepted three-dimensional Environmental Visualization Software (EVS). Based on the results of the VPBs proposed herein, additional VPBs may be considered. Conversely, some of the VPBs may not be drilled or their locations/depths adjusted based on the data to be collected. VPB specifications are provided in Table 1.

2. **Monitoring Wells:** A total of six permanent monitoring wells (MW-111-4, MW-112-4, MW-113-4, MW-114-5, MW-115-5, and MW-116-5) (the latter two wells will serve as contingency monitoring wells; MW-116-5 is not shown on Figure 1 due to the uncertainty in the location) are proposed to be drilled, installed, developed and sampled (the plan for sampling permanent wells will be provided at a later date) to investigate and monitor off-site groundwater quality. The locations of the permanent monitoring wells are currently proposed to be co-located with selected VPBs, however the final locations as well as the depths of the screened intervals will be determined based on all available data Monitoring well specifications are provided in Table 2.

ARCADIS will utilize existing NYSDEC-approved subcontractors for this phase of work. The driller will mobilize a mud rotary (MR) drilling rig to drill and sample VPBs and drill and install the wells. This phase of the RI will utilize drilling, geophysical logging, groundwater sampling, surveying, and laboratory analysis methodologies consistent with work previously performed for the OU3 RI.

Groundwater samples will be collected from each VPB for laboratory analysis of VOCs and perchlorate. The proposed groundwater sampling schedule and analytical parameters associated with the monitoring wells have not been determined at this time and will be included in a subsequent work plan.

The previously-designated staging area on McKay Field (owned by Northrop Grumman) will be used to store and decontaminate equipment, as well as temporarily store investigation derived wastes until characterization and disposal are completed. In keeping with past practices, waters are proposed to be disposed of to the Nassau County Publicly Owned Treatment Works (POTW) intake located on Northrop Grumman property. The approval from the Nassau County Department of Public Works (DPW) is currently pending.

The OU3 RI is expected to resume early in February 2008, contingent on NYSDEC and DPW approvals. It is expected that each VPB and monitoring well will require 4 to 5 weeks to complete. The RI field work will be conducted in accordance with the

existing Site Operations Plan submitted at the initiation of the RI to the Town of Oyster Bay, in accordance with the existing Site Access Agreement. The field work will be coordinated with Northrop Grumman's ongoing construction of the Soil Gas Interim Remedial Measure (IRM) as well as the upcoming Groundwater IRM, located at McKay Field and the Former Grumman Plant 24 Access Road property. To optimize the RI drilling program, ARCADIS may adjust laboratory turnaround times, VPB and/or well depths and locations, and number of rigs operating simultaneously, based on the timing of groundwater quality results obtained.

The results of the off-site RI proposed in this work plan will be incorporated into the RI Report addressing the off-site area, to be submitted after the completion of the off-site RI.

If you have any questions or comments, please feel free to contact us.

Sincerely,

ARCADIS of New York, Inc.

David E. Stern
Senior Hydrogeologist

Michael F. Wolfert
Project Director

Enclosures

Copies:
John Cofman, Northrop Grumman
Larry Leskovjan, Northrop Grumman
Gary Litwin, NYSDOH
Peter A. Scully, NYSDEC Region 1
Rosalie K. Rusinko, Esq., NYSDEC
File

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Table 1. Summary of Phase 3 Remedial Investigation Off-Site Vertical Profile Borings and Rationale, Northrop Grumman Systems Corporation, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Activity Sample ID	VPB Total Depth (ft bls)	Soil Sampling Intervals [1] (ft bls)	Groundwater Sampling Intervals (ft bls)	Groundwater Sampling Frequency (ft)	Groundwater Analysis	Geophysics	Rationale
Proposed Primary VPBs							
VP-109R	600	None	300 - 600 [2]	20	TCL VOC [3], ClO_4-	Gamma/ Electric	Determine thickness of VOC plume identified at VP-109. Collect data pertaining to regional perchlorate concentrations per NYSDEC request.
VP-110R	700	None	380 - 700 [2]	20	TCL VOC [3], ClO_4-	Gamma/ Electric	Determine thickness of VOC plume identified at VP-110. Collect data pertaining to regional perchlorate concentrations per NYSDEC request.
VP-113	700	None	50 - 700 [2]	20	TCL VOC [3], ClO_4-	Gamma/ Electric	Eastern/sidegradient extent of VOC plume identified at VP-103. At depth, the boring will be terminated if three consecutive groundwater sample results show trace or no detectable concentrations of VOCs. Collect data pertaining to regional perchlorate concentrations per NYSDEC request.
VP-114	700	None	50 - 700 [2]	50 / 20 [4]	TCL VOC [3], ClO_4-	Gamma/ Electric	Southwestern/downgradient extent of VOC plume identified at VP-112. At depth, the boring will be terminated if three consecutive groundwater sample results show trace or no detectable concentrations of VOCs. Collect data pertaining to regional perchlorate concentrations per NYSDEC request.
Proposed Contingency VPBs							
VP-115	700	None	50 - 700 [2]	20	TCL VOC [3], ClO_4-	Gamma/ Electric	If needed, determine southwestern/downgradient extent of VOC plume identified at VP-114. At depth, the boring will be terminated if three consecutive groundwater sample results show trace or no detectable concentrations of VOCs. Collect data pertaining to regional perchlorate concentrations per NYSDEC request.
VP-116	700	None	50 - 700 [2]	20	TCL VOC [3], ClO_4-	Gamma/ Electric	If needed, determine downgradient extent of VOC plume identified at VP-115. At depth, the boring will be terminated if three consecutive groundwater sample results show trace or no detectable concentrations of VOCs. Collect data pertaining to regional perchlorate concentrations per NYSDEC request.

See footnotes on last page

Table 1. Summary of Phase 3 Remedial Investigation Off-Site Vertical Profile Borings and Rationale,
Northrop Grumman Systems Corporation, Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York.

Footnotes:

(1) Soil samples may be collected from selected intervals for lithologic analysis, based on field conditions and results obtained.

(2) Groundwater Hydropunch sampling will commence at the water table (approximately 50 ft bls) and proceed over the specified intervals at the indicated frequency to terminal depth. Terminal depth will be determined based on the analytical data obtained from the VPB groundwater samples.

(3) Laboratory analysis of groundwater samples shall be performed using the following methods (see Revised RI/FS Work Plan QAPP
- Appendix B for details). VOCs: TCL List of VOCs using NYSDEC ASP 2000 Method OLM 4.2. Results will be obtained on a 24-48 hour TAT.
- Perchlorate will be analyzed using USEPA Method 314.0, or equivalent, for groundwater samples.

(4) Hydropunch groundwater samples collected at 50 ft intervals to 400 ft bls, then at 20 ft intervals from 400 ft bls to terminal depth.

Definitions:

USEPA	United States Environmental Protection Agency
ASP	Analytical Services Protocol
TCL	Target Compound List
ft bls	feet below land surface
VPB	Vertical Profile Boring
QAPP	Quality Assurance Project Plan
TAT	turnaround time
VOC	Volatile Organic Compound
NGC	Northrop Grumman Corporation

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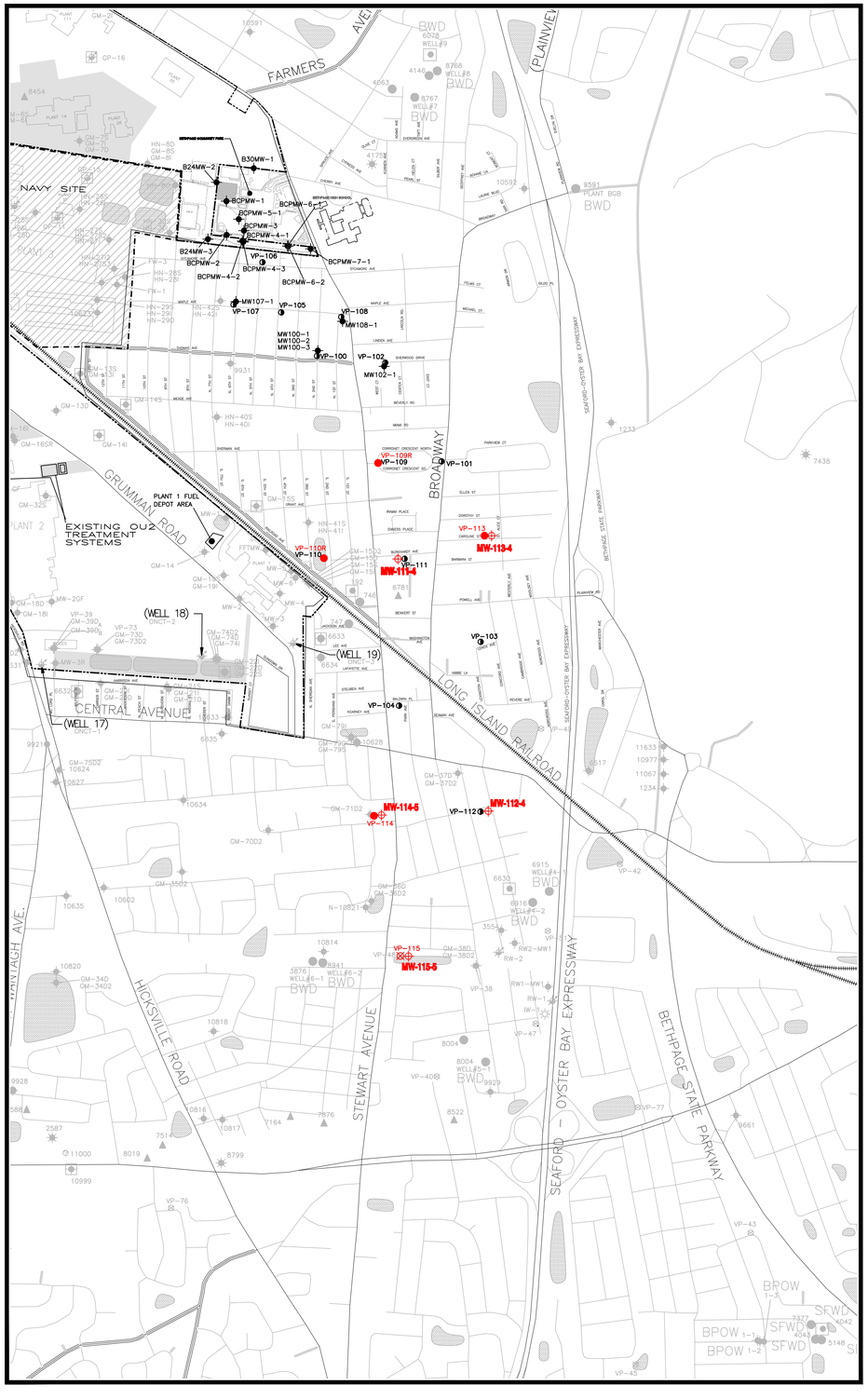
Table 2. Summary of Proposed Monitoring Well Construction Details, Northrop Grumman Systems Corporation, Operable Unit 3, (Former Grumman Settling Ponds), Bethpage, New York.

Well Identification	Nominal Borehole/ Well Diameter (inches)	Casing/ Screen Material	Screen Slot Size (in)	Screened interval (ft bmp)		Total Depth (ft bmp)	No. Split Spoons [1]	Split Spoon Sampling Intervals	Gamma Log	Well Development	Surface Casing	Rationale
Proposed Monitoring Wells												
Primary Monitoring Wells												
BCP-MW111-4	10 / 4	Sch.80 PVC/ SS	0.01	435	455	460	N	N	N [2]	Y	8" Ø FM	Characterize and monitor maximum VOC concentrations in groundwater that were identified at VPB VP-111.
BCP-MW112-4	10 / 4	Sch.80 PVC/ SS	0.01	573	593	598	N	N	N [2]	Y	8" Ø FM	Characterize and monitor maximum VOC concentrations in groundwater that were identified at VPB VP-112.
BCP-MW113-4	10 / 4	Sch.80 PVC/ SS	0.01	475	495	500	N	N	N [2]	Y	8" Ø FM	Delineate and monitor eastern extent of VOCs in groundwater, depth/screen zone contingent on results obtained from VPB VP-113.
BCP-MW114-5	10 / 4	Sch.80 PVC/ SS	0.01	625	645	650	N	N	N [2]	Y	8" Ø FM	Delineate and monitor hydraulically downgradient extent of VOCs in groundwater that were identified at VPB VP-104. Depth/screen zone contingent on results of VPB-114
Contingency Monitoring Wells												
BCP-MW115-5	10 / 4	Sch.80 PVC/ SS	0.01	625	645	650	N	N	N [2]	Y	8" Ø FM	If VOCs identified at VP-114, delineate and monitor hydraulically downgradient extent of VOCs identified at VP-114. Depth/screen zone contingent on results of VPB-115.
BCP-MW116-5	10 / 4	Sch.80 PVC/ SS	0.01	625	645	650	N	N	N [2]	Y	8" Ø FM	If VOCs identified at VP-115, delineate and monitor hydraulically downgradient extent of VOCs identified at VP-115. Depth/screen zone contingent on results of VPB-116.

[1] Soil samples may be collected for lithologic/laboratory analysis, depending on field conditions.
[2] Gamma/Electric Log run in associated VPB.
OU3 RI Operable Unit 3 Remedial Investigation
FM Flush Mount
SS Stainless Steel
PVC Polyvinyl chloride
NGC Northrop Grumman Systems Corporation



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EXPLANATION

- PROPERTY BOUNDARY OF THE FORMER GRUMMAN AEROSPACE SITE
- PROPERTY BOUNDARY OF U.S. NAVY SITE
- LONG ISLAND RAILROAD
- DENOTES NORTHROP GRUMMAN OWNED PROPERTY (AS OF 2003)
- DENOTES U.S. NAVY OWNED PROPERTY (AS OF 2003)
- RECHARGE BASIN
- LIMITS OF BETHPAGE HIGH SCHOOL MAIN BUILDING
- 10592 OBSERVATION, MONITORING WELL
- 6781 INDUSTRIAL WELL
- 9591 PUBLIC SUPPLY WELL
- 4175 IRRIGATION WELL
- WELL-17 NORTHROP GRUMMAN OR NAVY PRODUCTION WELL
- ABANDONED WELL
- VP-49 COMPLETED OU2 VERTICAL PROFILE BORING
- VP-100 COMPLETED OU3 VERTICAL PROFILE BORING
- VP-113 PROPOSED OU3 VERTICAL PROFILE BORING
- VP-115 PROPOSED OU3 CONTINGENCY VERTICAL PROFILE BORING
- BCP-MW-2 COMPLETED OU3 MONITORING WELL OR WELL CLUSTER
- MW-111-4 PROPOSED MONITORING WELL (PRIMARY OR CONTINGENCY)
- BWD BETHPAGE WATER DISTRICT
- VPB VERTICAL PROFILE BORING
- RI REMEDIAL INVESTIGATION
- OU2 OPERABLE UNIT 2
- OU3 OPERABLE UNIT 3

GENERAL NOTES:

1. THIS FIGURE INCLUDES LOCATIONS OF PUBLIC SUPPLY WELLS BASED ON INFORMATION RECEIVED BY ARCADIS IN RESPONSE TO A SEPTEMBER 2001 LETTER TO WATER DISTRICTS.
2. BASIN LOCATIONS OBTAINED FROM USGS TOPOGRAPHIC MAPS (HUNTINGTON, HICKSVILLE, FREEPORT AND AMITYVILLE QUADRANGLES) AND INFORMATION PROVIDED BY NORTHROP GRUMMAN.
3. NORTHROP GRUMMAN PROPERTY HOLDINGS BASED ON DATA PROVIDED IN JUNE 2003.
4. LOCATIONS OF MONITORING WELLS INSTALLED BY DVIRKA & BARTILUCCI (D&B) AT PLANT 1 (i.e., MW-1 TO MW-6) ARE APPROXIMATE BASED ON D&B SITE PLAN, PROVIDED ON DECEMBER 19, 2002.
5. PROPOSED CONTINGENCY VPBs VP-116 AND CONTINGENCY MONITORING WELL MW-116-5 NOT SHOWN DUE TO THE UNCERTAINTY IN LOCATION. IT IS EXPECTED THAT THESE LOCATIONS WILL BE SITUATED HYDRAULICALLY DOWNGRADENT OF VPB VP-115.

0 800' 1600'
SCALE IN FEET

NO.	ISSUED DATE	REVISION DESCRIPTION	BY/CKD
3	04-09-07	PROPOSED PHASE 3 VP LOCATIONS	MR
2	03-07-07	COMPLETED VP LOCATIONS	MR
1	02-05-07	PROPOSED LOCATIONS	MR
0	01-09-07	UPDATED	AS

KEY PLAN

PROJECT TITLE

NORTHROP GRUMMAN SYSTEMS CORPORATION
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

SHEET TITLE

SITE PLAN
SHOWING PROPOSED AND
COMPLETED VPBs AND
MONITORING WELL LOCATIONS

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SEAL	SEAL
PROJECT MANAGER: C. SAN GIOVANNI	DEPARTMENT MANAGER: M. WOLFERT
LEAD DESIGN PROF.	CHECKED BY: M. REINDL
TASK/PHASE NUMBER: 00003	DRAWN BY: A. SANCHEZ
PROJECT NUMBER: NY001464.0707	DRAWING NUMBER: 1

DRAFT

ALL COORDINATES REFERENCED TO NORTH AMERICAN DATUM 1983

Current Plotstyle : ByColor
Layout Tab: OU3
Acad Version : R17.0s (LMS Tools)
User Name : absanchez
Time : Fri, 11 Jan 2008 - 9:42am
Path Name : G:\PROJECT\Northrop Grumman\Cadd\OU3\2008\Off-Site\Proposed & Completed Monitoring Well Locations.dwg