PLANT 3 DRY WELLS 20-08 AND 34-07 SOIL INVESTIGATION SUPPLEMENTAL FIELD CHARACTERIZATION FINAL WORK PLAN

Northrop Grumman Corporation
Bethpage Plant 3 Facility
Bethpage, New York

November 18, 1999

Prepared for:

Northrop Grumman Corporation
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FIGURES

APPENDIX

1.0 INTRODUCTION

On behalf of Northrop Grumman Corporation (NGC), Roux Associates, Inc. (Roux Associates) and our associated engineering firm, Remedial Engineering, P.C. (Remedial Engineering), have prepared this document entitled, "Plant 3 Dry Wells 20-08 and 34-07 Soil Investigation Supplemental Field Characterization Draft Work Plan," (Work Plan) for the investigative/remedial work being performed at NGC Bethpage, New York Facility (Site). The main objective of this Work Plan is to present the scope of work required to perform a field characterization that supplements the work that was previously performed within this area. The focus of the scope of work is to fully delineate the nature and extent of polychlorinated biphenyl (PCB) soil and ground water contamination in the vicinity of Plant 3 Dry Wells 20-08 and 34-07. This supplemental Work Plan was prepared in response to the United States Environmental Protection Agency's (USEPA's) September 14, 1998 written response to NGC's no further action request for Dry Wells 20-08 and 34-07.

Previously, NGC has conducted several Phase I and Phase II environmental site assessments of the Plant 3 facility, which identified several areas within the Site requiring remediation. Areas identified in these assessments included soil in the vicinity of Dry Wells 20-08 and 34-07 (Figure 1). Consequently, each Dry Well was remediated to depths that were deemed feasible by NGC using a shoring system. Upon the completion of these remediation efforts, and subsequent efforts to delineate soil contamination beneath each Dry Well, NGC requested that no further action be required for these Dry Wells from the USEPA on June 26, 1998 and, again, on September 14, 1998. The USEPA denied both requests, requiring that NGC perform additional remediation via excavation or other innovative remediation technology. The USEPA also required that ground-water conditions in the vicinity of each Dry Well at the Site be characterized. As a result of the USEPA requirements, an additional investigation was subsequently performed in the third quarter of 1999 to delineate the soil and ground water impacts within these areas. Based on the initial findings of these delineation efforts, additional delineation is warranted in the vicinity of each drywell. The supplemental field characterization described in this Work Plan will be performed to obtain the additional data necessary to further delineate the impacted areas.

The remaining sections of the Work Plan include:

- Section 2.0 provides a summary of the pertinent Site background information, including a description of the previous investigations at the Site;
- Section 3.0 provides a description of the scope of work; and
- Section 4.0 provides the schedule to complete the scope of work.

2.0 BACKGROUND INFORMATION

The NGC facility is located on South Oyster Bay Road in Bethpage, New York. The Site is located in an industrial/commercial area.

Plant 3 was a government owned, contractor operated (GOCO) facility that NGC elected to return to the Navy. Plant 3 is part of the 105 Acre Naval Weapons Industrial Reserve GOCO property in Bethpage, New York. The facility was transferred back to the Navy in the fall of 1998 after extensive environmental remediation and building restoration activities were performed. The Site is currently owned and maintained by the Navy. Nassau County has developed a Reuse Plan for the property, which calls for redevelopment as industrial/ commercial land use. Although NGC is responsible for performing the engineering services described in this Work Plan, the Navy has agreed to perform the design, construction, operation and monitoring of the remedial action selected by this study. This Work Plan focuses on the supplemental delineation and characterization of PCB contaminated soil in the vicinity of Plant 3 Dry Wells 20-08 and 34-07.

Dry Wells 20-08 and 34-07 have been found to be contaminated with PCBs and have partially been remediated under the Nassau County Department of Health (NCDH) Underground Injection Control (UIC) program. Closure of these Dry Wells is required in accordance with the UIC program currently administrated by the NCDH and the United Stated Environmental Protection Agency (USEPA). Previously, these Dry Wells functioned as a component of the Site's storm-water drainage system. The Dry Wells functioned as catch basins, with some stormwater infiltration capability, and were also interconnected to other catch basins, which ultimately discharged into the Navy recharge basins within the Site. Consequently, Dry Well contamination may have resulted from the collection of oil containing PCBs released during ongoing Site maintenance activities.

Previously, NGC conducted Phase I and Phase II environmental site assessments of the Plant 3 facility, which identified Dry Wells 20-08 and 34-07 as requiring remediation. Consequently, in June 1998, the Dry Wells were excavated to depths feasible using a shoring system. Although, post-remediation samples revealed levels of contamination above the cleanup criteria, NGC submitted a letter on June 26, 1998 to the NCDH and USEPA requesting no further action based

on acceptable risk, technical impracticality, and extreme cost factors. The USEPA denied this request on August 4, 1998, stating that the Dry Wells should receive additional remediation. In anticipation of such a response, NGC proceeded to install an additional soil boring down to the water table at approximately 55 feet below land surface (bls) which revealed contamination at a depth of approximately 56 feet bls and 50 feet bls at both Dry Wells 34-07 and 20-08, respectively. Subsequently, NGC requested no further action on September 14, 1998 on the basis that additional remediation would be extremely costly and would result in minimal reduction of health risk. The USEPA denied this request on December 8, 1998, stating that NGC should perform remediation via additional excavation or other innovative remediation technology. As part of its response, the USEPA required NGC to determine ground-water quality conditions in the vicinity of each Dry Well at the Site. Subsequently, NGC performed an additional soil and ground-water investigation at Dry Wells 34-07 and 20-08 during the third quarter of 1999. As part of the soil investigation, a total of four soil borings (SB-1 through SB-4) were performed. Locations of each boring are presented in Figures 2 and 3. The analytical results from these soil borings and previous investigations in these areas are presented in cross sections to depict PCB concentration verses relative depth below land surface. These cross sections are provided in Figures 4 and 5.

Although the initial soil remediation was performed under the UIC program and inspected by the NCDH and USEPA, any subsequent remediation efforts will be governed by the NYSDEC Division of Environmental Remediation, as inclusion of these Dry Wells in the Navy's Installation Restoration (IR) Program, which is regulated by the NYSDEC, has been accepted.

This Supplemental Field Characterization is proposed to add to the information obtained during the previous field investigations, which included the installation of four soil borings (SB-1 through SB-4), two at each Dry Well. The following scope of work will be performed to complete supplemental delineation efforts.

3.0 SCOPE OF WORK

The Scope of Work proposed for the Supplemental Dry Well Soil Investigation consists of the following tasks:

- Task 1: Soil Borings Installation, Screening and Sampling;
- Task 2: Quality Assurance/Quality Control Sampling; and
- Task 3: Data Evaluation and Field Characterization Report.

3.1 Task 1: Soil Borings Installation, Screening and Sampling

A total of eight soil borings (SB-5 through SB-12) will be performed in the vicinity of Dry Wells 20-08 and 34-07 as part of this task. These samples will be performed in conformance with the Standard Operating Procedures (SOPs) presented in Appendix B. These soil borings will be constructed to a maximum depth of approximately 60 feet below land surface or to ground water using the hollow-stem auger method in conjunction with split spoon sampling techniques. Specifically, a total of 240 split spoon samples from the eight soil borings will be obtained as outlined in the tables presented in Appendix A. The soil borings will be performed as shown in Figure 6 and at Dry Well 34-07, as shown in Figure 7.

Each soil sample collected will be inspected for lithology and contamination (e.g., staining and odors). Soil samples will be taken at the elevations outlined in the sampling plan presented below. A total of 240 samples will be collected and analyzed for PCBs using USEPA Method 8082 with Category B deliverables provided within two weeks.

All of the soil samples will be sent to a New York State Department of Health (NYSDOH) environmental laboratory approval programs (ELAP) laboratory certified for Contract Laboratory Protocol (CLP) work.

Soil generated during the installation of each boring will be stockpiled on site in an area directly adjacent to the borings. The soil will subsequently be characterized and disposed of properly in accordance with regulatory requirements.

3.1.1 Dry Well 20-08 Supplemental Characterization

Based on the results of the previous field characterizations, 30 split spoon samples will be collected from each of the four soil borings (SB-5 through SB-8) installed around Dry Well 20-08. Samples from each of the intervals described in the following schedule will be analyzed for PCBs using USEPA Method 8082.

3.1.2 Dry Well 34-07 Supplemental Characterization

Based on the results of the previous field characterizations, 30 split spoon samples will be collected from each of the four soil borings (SB-9 through SB-12) installed around Dry Well 34-07. Samples from each of the intervals described in the following schedule will be analyzed for PCBs using USEPA Method 8082.

3.2 Quality Assurance/Quality Control Sampling

The following Quality Assurance/Quality Control sampling will be performed as part of the Supplemental Field Characterization.

3.2.1 Task 2: Quality Assurance/Quality Control Sampling

All soil samples obtained during this Supplemental Field Characterization will be handled as described below. Sample containers will be pre-labeled before sample collection. The labels will include the sample number, parameter sampled, date, time, sampler's initials, and the site name. A Chain of Custody (COC) form will be maintained as the record of possession for the sample. The COC will remain with the sample at all times, and will bear the name of the person assuming responsibility for the sample.

Disposable gloves and a stainless steel trowel will be used to collect a discrete soil sample from the split spoon and place it in the sample container. After the analytical samples are collected, the sample bottles will be appropriately labeled and packed in coolers for shipment to the laboratory.

Field blanks for soil samples will be collected at the rate of one per day. They will be prepared by pouring deionized water provided by the analytical laboratory over decontaminated sample collection apparatus and then into a laboratory prepared bottle. The field blanks will be analyzed

for the same parameters as the samples collected that day. Duplicate samples will be included at a rate of five percent of each sample media. If less than 20 samples are collected during a particular sampling episode, then one duplicate will be performed. The duplicate will be analyzed for the same parameters as its corresponding sample. Field blanks and duplicate samples will travel with the sample containers and will arrive on-site shortly after their preparation in the laboratory. After the analytical samples and field blanks are collected, the sample bottles will be appropriately labeled and packed in coolers for shipment to the laboratory.

The criteria for quality assurance deliverable requirements for this supplemental investigation is proposed to be defined in terms of USEPA Contract Laboratory Program (CLP) protocol. All the analytical data and quality assurance (QA) deliverables will comply with NYSDEC ASP Category B reporting requirements.

The selected laboratory will demonstrate analytical precision and accuracy by the analysis of laboratory duplicates and matrix spike duplicates. Precision, as well as instrument stability, will also be demonstrated by comparison of response factors for calibration standards. Laboratory accuracy will be evaluated by the addition of surrogate and matrix spikes compounds, and will be presented as percent recovery. Precision will be presented as RPD, percent relative standard deviation (%RSD), or percent difference (%D), whichever is appropriate for the number of quality control (QC) samples analyzed. Laboratory blanks can also be used to demonstrate the accuracy of the analyses.

3.2.2 Sampling Cleaning Procedures

Prior to each sampling interval, all tools used for sample collection will be cleaned in the following manner:

- remove all loose material and soil;
- wash thoroughly with detergent and tap water, utilizing a scrub brush;
- rinse with tap water;
- rinse with distilled or deionized water;

- rinse with pesticide-grade methanol; and
- rinse with distilled or deionized water.

3.3 Task 3: Data Evaluation and Field Characterization Report

After receipt of the analytical data, the data will be evaluated and summarized in a report along with the data obtained from the previous investigations. This Field Characterization Report will include a description of the field methodology for the borings and sampling. The report will provide tables summarizing the analytical results for both soil and ground water and a summary that defines the nature and extent of PCB contamination in the dry well areas. The Field Characterization Report will be finalized and submitted to the appropriate agencies for review after all field investigations for the dry well areas are complete.

4.0 SCHEDULE

Tasks 1 (Soil Borings Installation, Screening and Sampling) and Task 2 (Laboratory Analysis) are anticipated to collectively take a total of approximately 25 working days to complete. The final analytical data and data validation package are anticipated to be received from the laboratory three weeks after their receipt of the last samples. Note that, based on sampling results, there may be a potential for multiple analysis iterations. Task 3 (Data Evaluation and Field Characterization Report) is anticipated to take four weeks to complete. The work is scheduled to proceed upon receipt of approval from the NYSDEC.

The schedule for these tasks, along with the remaining tasks outlined in this Work Plan, are outlined in the following table.

Task	Description	Scheduled Week
1	Soil Borings	1-2
2	Laboratory Analysis	3-5*
3	Data Evaluation/Field Characterization Report	6-9

* if no additional iterations of sampling are required.

Respectfully submitted,

ROUX ASSOCIATES, INC.

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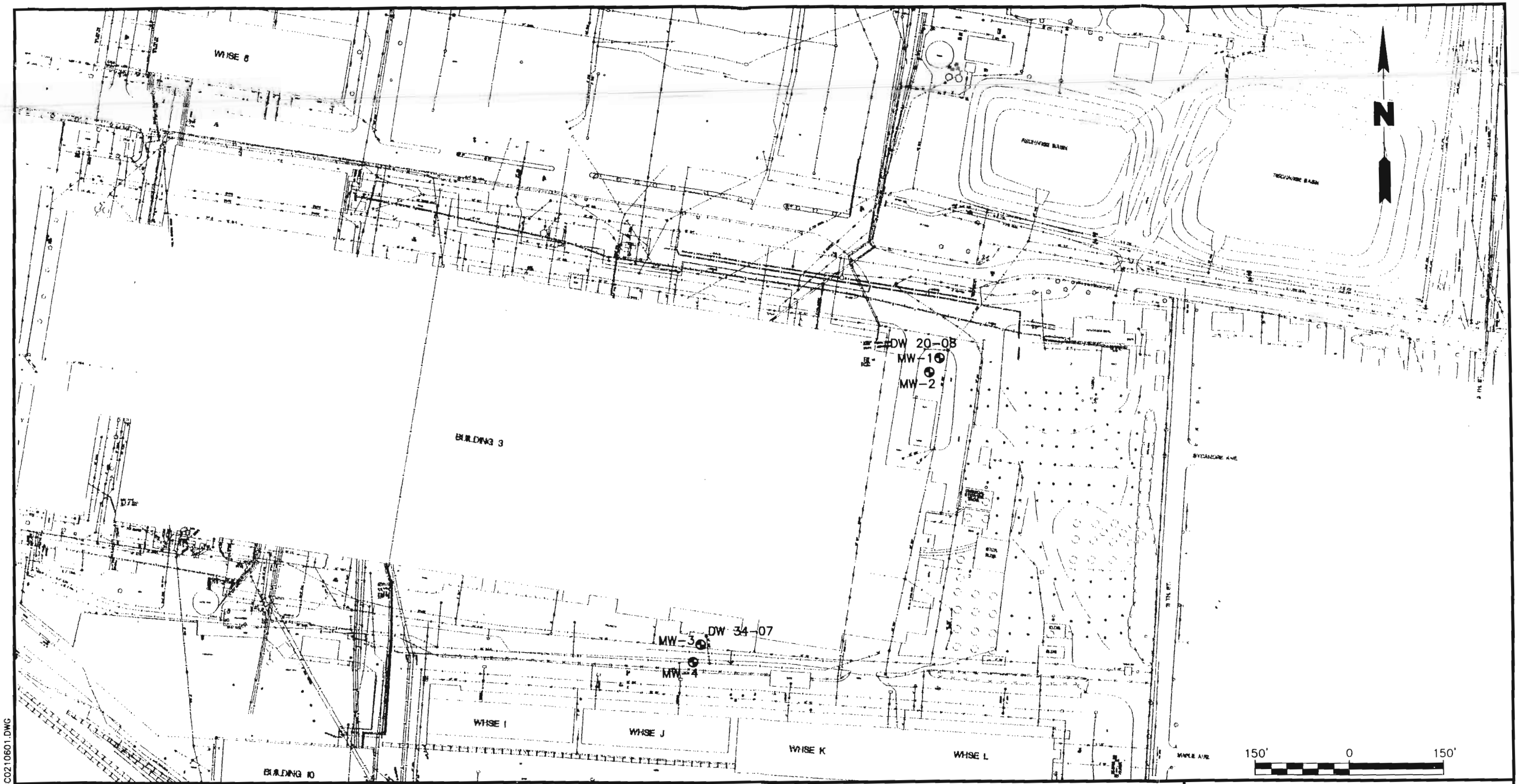
Senior Engineer/
Project Manager

REMEDIAL ENGINEERING, P.C.

Peter J. Gerbasi, P.E.
Principal Engineer



LEGEND

DW 20-08 . APPROXIMATE LOCATION AND DESIGNATION OF NAVAL PROPERTY DRY WELL

MW-1 ⊕ APPROXIMATE LOCATION AND DESIGNATION OF MONITORING WELL

Title:

SITE PLAN

PLANT 3 DRY WELLS 20-08 AND 34-07
SUPPLEMENTAL FIELD CHARACTERIZATION
WORK PLAN

Prepared For: NORTHROP GRUMMAN CORPORATION
SOUTH OYSTER BAY ROAD
BETHPAGE, NEW YORK

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: N.G.	Date: 3NOV99	FIGURE
Prepared by: G.M./R.K.	Scale: AS SHOWN	1
Project Mgr: B.F.	Office: NY	
File No: NGC0210601	Project: 70902Y	

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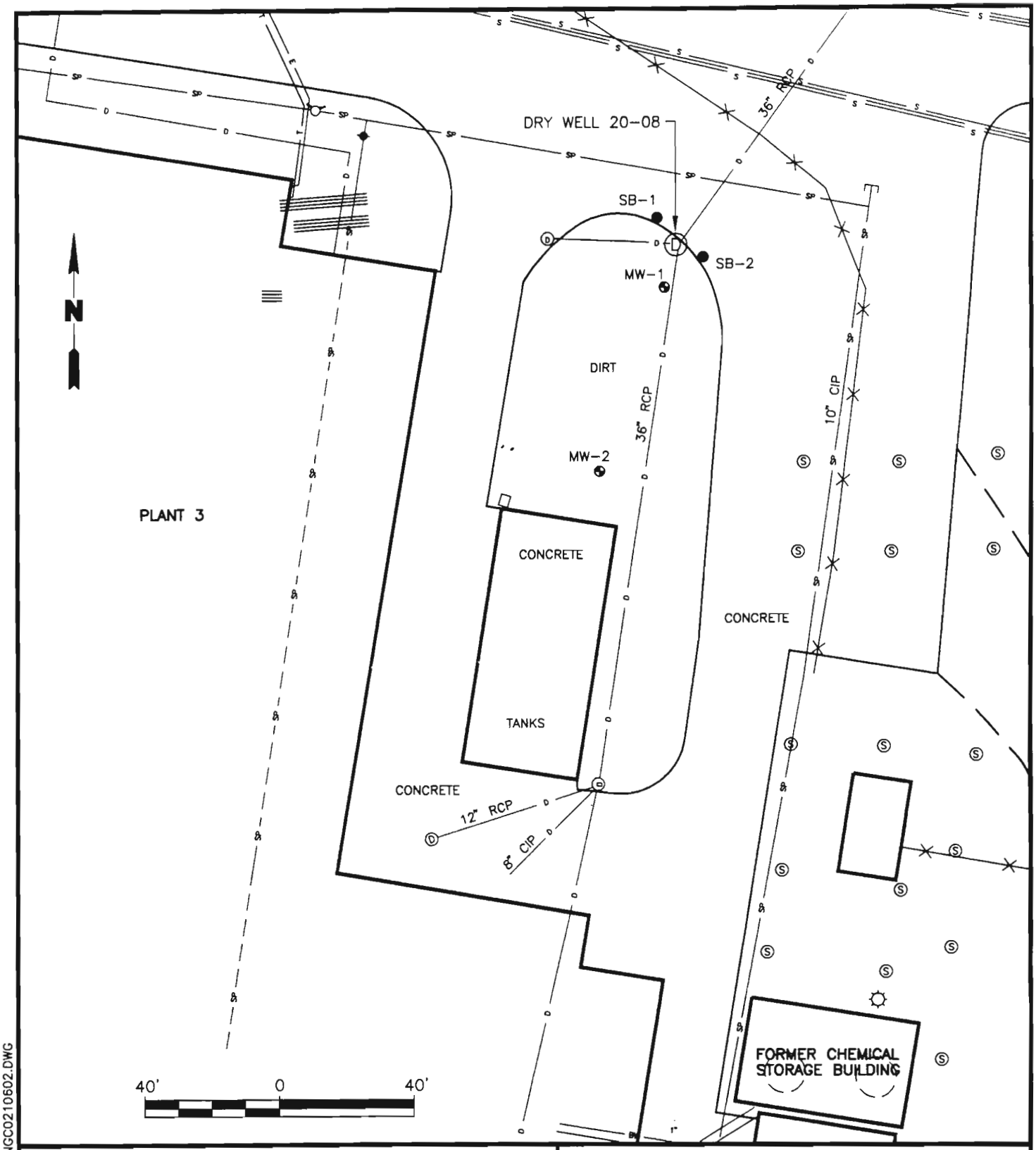

LEGEND

SB-2 ● LOCATION AND DESIGNATION OF PROPOSED SOIL BORING

MW-1 ⊕ LOCATION AND DESIGNATION OF PROPOSED *MONITORING* WELL

Title:

SOIL BORING LOCATION PLAN
DRY WELL 20-08

PLANT 3 DRY WELLS 20-08 AND 34-07
SUPPLEMENTAL FIELD CHARACTERIZATION
WORK PLAN

Prepared For: NORTHROP GRUMMAN CORPORATION
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Environmental Consulting & Management

Compiled by: O.R.	Date: 3NOV99	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	2
Project Mgr: W.F.	Office: NY	
File No: NGC0210601	Project: 70902Y	

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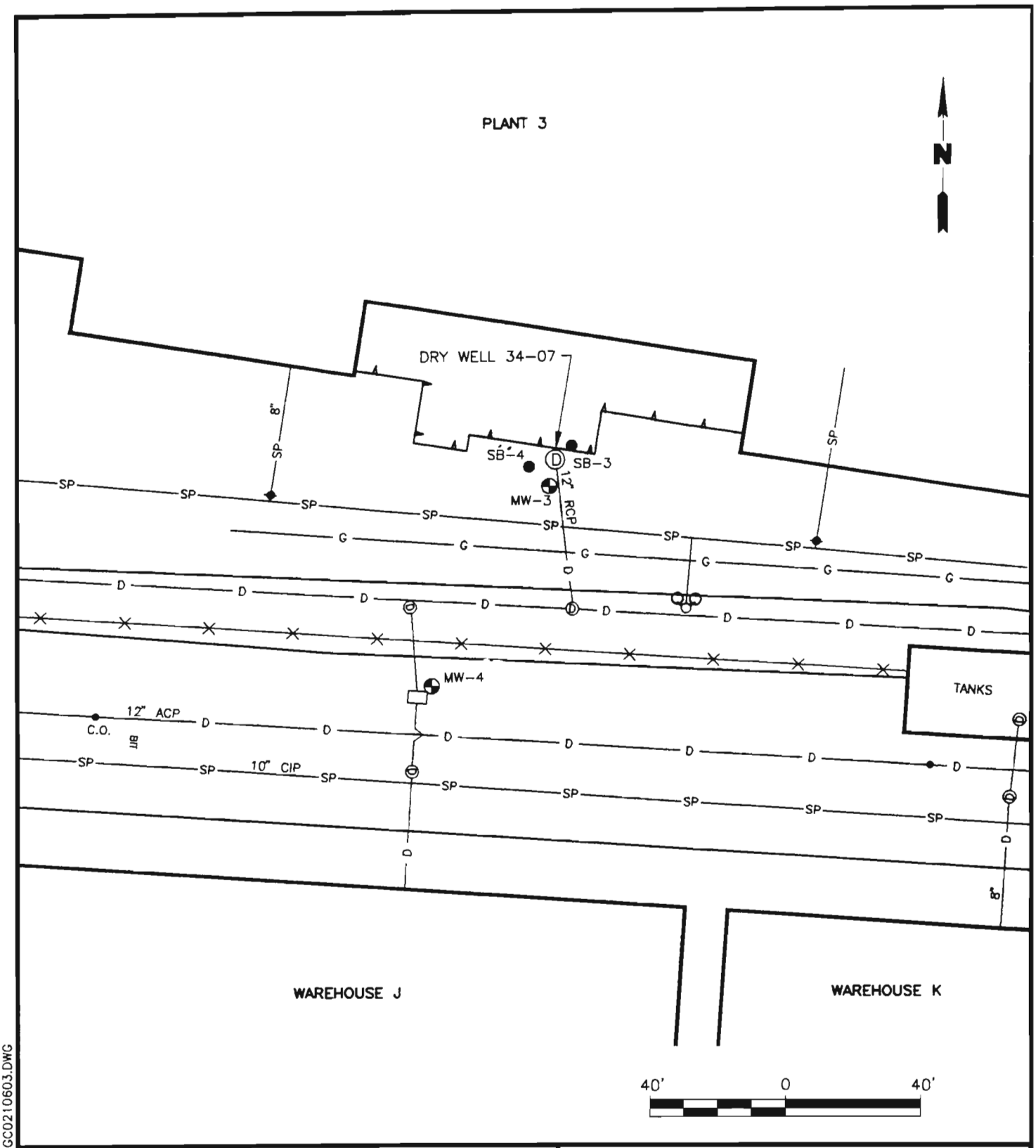

LEGEND

SB-3 ● LOCATION AND DESIGNATION OF PROPOSED SOIL BORING

MW-4 ⊕ LOCATION AND DESIGNATION OF PROPOSED MONITORING WELL

Title:

SOIL BORING LOCATION PLAN
DRY WELL 34-07

PLANT 3 DRY WELLS 20-08 AND 34-07
SUPPLEMENTAL FIELD CHARACTERIZATION
WORK PLAN

Prepared For: NORTHROP GRUMMAN CORPORATION
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ROUX ASSOCIATES, INC.
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Compiled by: O.R.	Date: 3NOV99	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	3
Project Mgr: W.F.	Office: NY	
File No: NGC0210603	Project: 70902Y	

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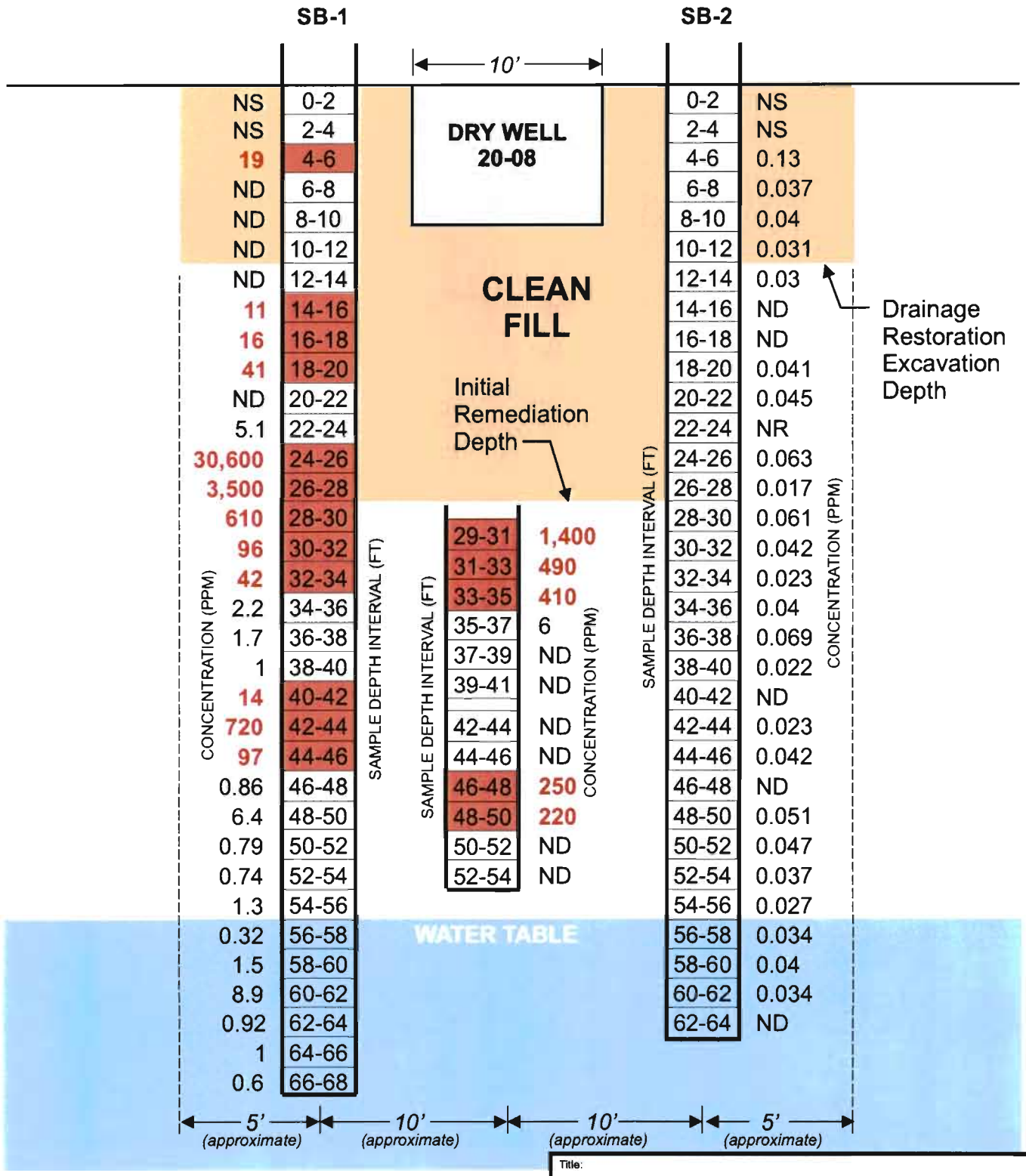

CONCENTRATION (PPM)	SAMPLE DEPTH INTERVAL (FT)
NS	0-2
NS	2-4
19	4-6
ND	6-8
ND	8-10
ND	10-12
ND	12-14
11	14-16
16	16-18
41	18-20
ND	20-22
5.1	22-24
30,600	24-26
3,500	26-28
610	28-30
96	30-32
42	32-34
2.2	34-36
1.7	36-38
1	38-40
14	40-42
720	42-44
97	44-46
0.86	46-48
6.4	48-50
0.79	50-52
0.74	52-54
1.3	54-56
0.32	56-58
1.5	58-60
8.9	60-62
0.92	62-64
1	64-66
0.6	66-68

SAMPLE DEPTH INTERVAL (FT)	CONCENTRATION (PPM)
29-31	1,400
31-33	490
33-35	410
35-37	6
37-39	ND
39-41	ND
42-44	ND
44-46	ND
46-48	250
48-50	220
50-52	ND
52-54	ND

SAMPLE DEPTH INTERVAL (FT)	CONCENTRATION (PPM)
0-2	NS
2-4	NS
4-6	0.13
6-8	0.037
8-10	0.04
10-12	0.031
12-14	0.03
14-16	ND
16-18	ND
18-20	0.041
20-22	0.045
22-24	NR
24-26	0.063
26-28	0.017
28-30	0.061
30-32	0.042
32-34	0.023
34-36	0.04
36-38	0.069
38-40	0.022
40-42	ND
42-44	0.023
44-46	0.042
46-48	ND
48-50	0.051
50-52	0.047
52-54	0.037
54-56	0.027
56-58	0.034
58-60	0.04
60-62	0.034
62-64	ND

LEGEND

5.1	concentration below 10 ppm cleanup threshold
19	concentration above 10 ppm cleanup threshold
ND	non detect
NR	no recovery
NS	no sample
SB-1	soil boring designation
	1.3 — sample taken above water table
	1.5 — sample taken below water table

Title:

CROSS-SECTION OF PCB CONCENTRATIONS IN SOIL BORINGS SB-1 & SB-2 AT DRY WELL 20-08

PLANT 3 DRY WELLS 20-08 AND 34-07
SUPPLEMENTAL FIELD CHARACTERIZATION
WORK PLAN

Prepared for: NORTHROP GRUMMAN CORPORATION
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Compiled by: N.G.		Date: 3NOV99	FIGURE
Prepared by: B.H.CICIO		Scale: AS SHOWN	4
Project Mgr.: W.F.		Office: NY	
File No.: NGC0210604.CDR		Project No.: 70902Y	

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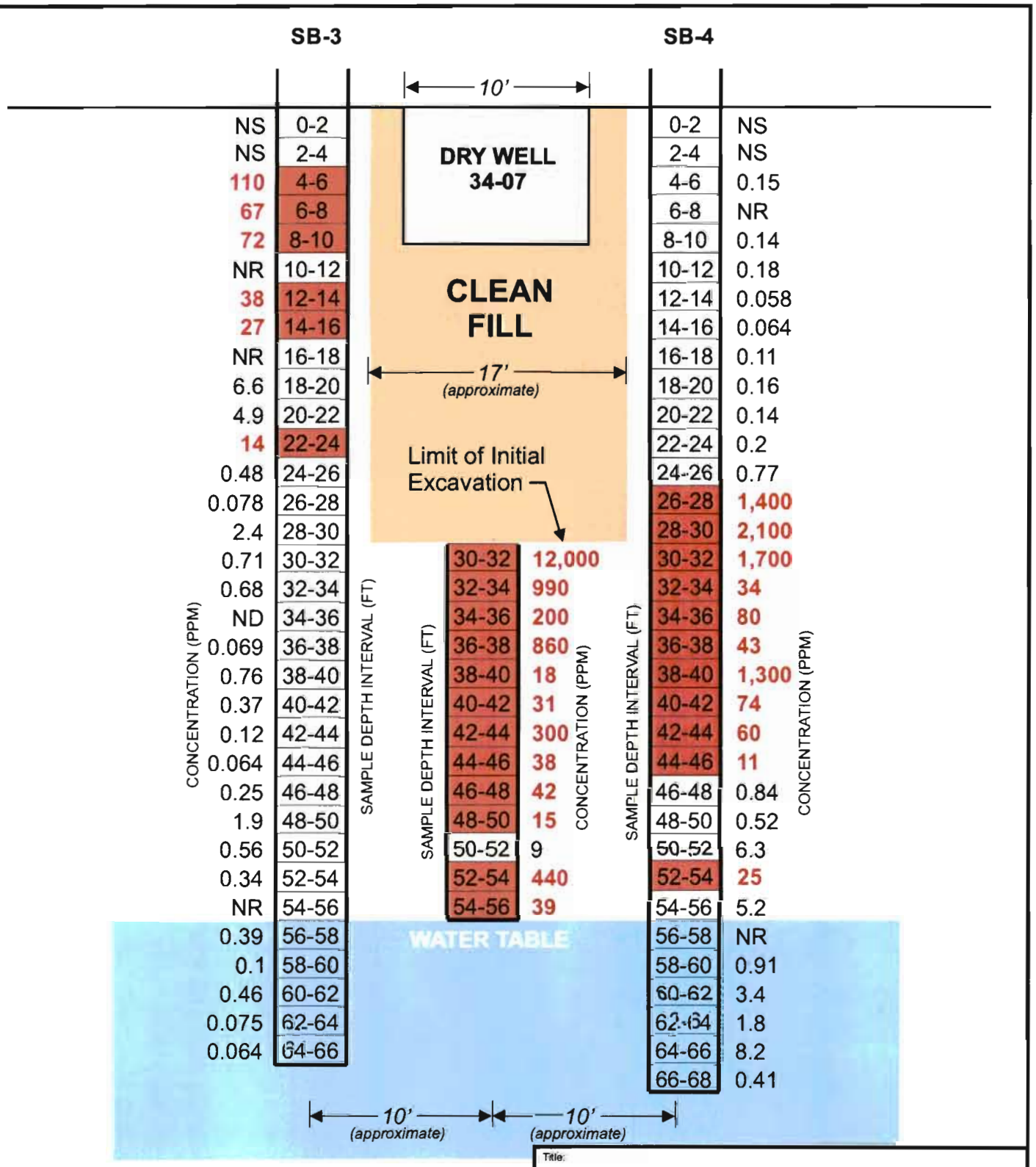

LEGEND

2.4	concentration below 10 ppm cleanup threshold
110	concentration above 10 ppm cleanup threshold
ND	non detect
NR	no recovery
NS	no sample
SB-3	*soil boring* designation
5.2	sample taken above water table
8.2	sample taken below water table

Title:

CROSS-SECTION OF PCB CONCENTRATIONS IN SOIL BORINGS SB-3 & SB-4 AT DRY WELL 34-07

PLANT 3 DRY WELLS 20-08 AND 34-07
SUPPLEMENTAL FIELD CHARACTERIZATION
WORK PLAN

Prepared for: NORTHROP GRUMMAN CORPORATION
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ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: N.G.		Date: 3NOV99	FIGURE
Prepared by: B.H.CICIO		Scale: AS SHOWN	5
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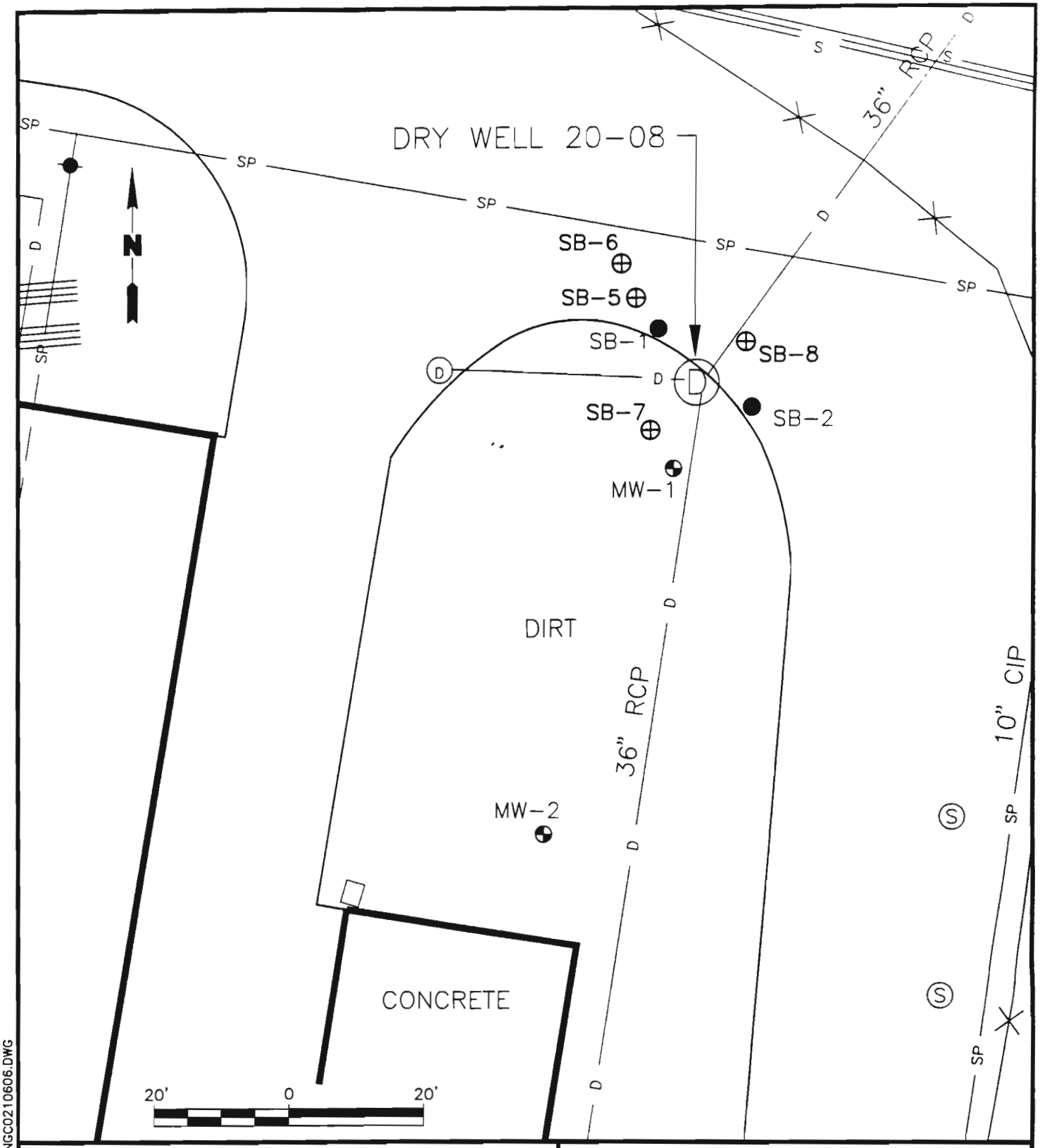

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LEGEND

SB-1 ⊕ LOCATION AND DESIGNATION OF PROPOSED SOIL BORING

SB-2 ● LOCATION AND DESIGNATION OF PREVIOUS SOIL BORING

MW-1 ◒ LOCATION AND DESIGNATION OF PROPOSED MONITORING WELL

Title:

PROPOSED SOIL BORING LOCATION PLAN DRY WELL 20-08 SB-5 THROUGH SB-8

PLANT 3 DRY WELLS 20-08 AND 34-07
SUPPLEMENTAL FIELD CHARACTERIZATION
WORK PLAN

Prepared For: NORTHROP GRUMMAN CORPORATION
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BETHPAGE, NEW YORK

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Environmental Consulting & Management

Compiled by: O.R.	Date: 3NOV99	FIGURE
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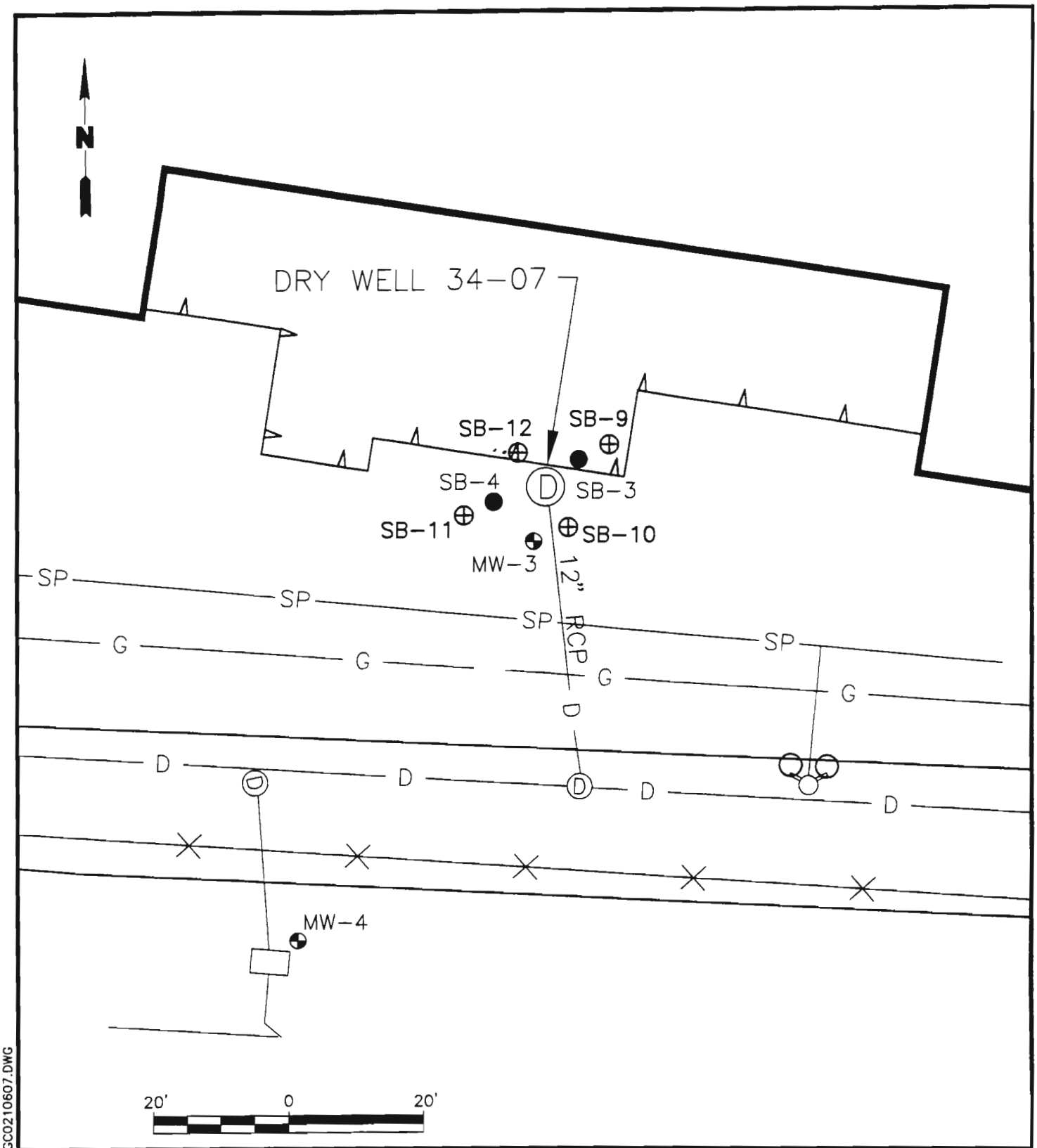

LEGEND

SB-1 ⊕ LOCATION AND DESIGNATION OF PROPOSED SOIL BORING

SB-2 ● LOCATION AND DESIGNATION OF PREVIOUS *SOIL BORING*

MW-1 ◒ LOCATION AND DESIGNATION OF PROPOSED MONITORING WELL

Title:

PROPOSED SOIL BORING LOCATION PLAN DRY WELL 34-07 SB-9 THROUGH SB-12

PLANT 3 DRY WELLS 20-08 AND 34-07
SUPPLEMENTAL FIELD CHARACTERIZATION
WORK PLAN

Prepared For: NORTHROP GRUMMAN CORPORATION
SOUTH OYSTER BAY ROAD
BETHPAGE, NEW YORK

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Compiled by: O.R.	Date: 3NOV99	FIGURE
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Project Mgr: W.F.	Office: NY	
File No: NGC0210607	Project: 70902Y	

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APPENDIX A

Summary of Sampling
and Analytical Requirements

Table A-1. Summary of Dry Well 20-08 Sampling and Analysis Requirements, Plant 3 Drywells 20-08 and 34-07 Soil Remediation Supplemental Draft Work Plan, Northrup Grumman Corporation, Bethpage, New York.

Soil Boring SB-5

Sample Designation	Sample Collection	Sample Analysis
SB-5 / 0-2	X	X
SB-5 / 2-4	X	X
SB-5 / 4-6	X	X
SB-5 / 8-10	X	X
SB-5 / 10-12	X	X
SB-5 / 12-14	X	X
SB-5 / 14-16	X	X
SB-5 / 16-18	X	X
SB-5 / 18-20	X	X
SB-5 / 20-22	X	X
SB-5 / 22-24	X	X
SB-5 / 24-26	X	X
SB-5 / 26-28	X	X
SB-5 / 28-30	X	X
SB-5 / 30-32	X	X
SB-5 / 32-34	X	X
SB-5 / 34-36	X	X
SB-5 / 36-38	X	X
SB-5 / 38-40	X	X
SB-5 / 40-42	X	X
SB-5 / 42-44	X	X
SB-5 / 44-46	X	X
SB-5 / 46-48	X	X
SB-5 / 48-50	X	X
SB-5 / 50-52	X	X
SB-5 / 52-54	X	X
SB-5 / 54-56	X	X
SB-5 / 56-58	X	X
SB-5 / 58-60	X	X
Total	30	30

Soil Boring SB-6

Sample Designation	Sample Collection	Sample Analysis
SB-6 / 0-2	X	X
SB-6 / 2-4	X	X
SB-6 / 4-6	X	X
SB-6 / 8-10	X	X
SB-6 / 10-12	X	X
SB-6 / 12-14	X	X
SB-6 / 14-16	X	X
SB-6 / 16-18	X	X
SB-6 / 18-20	X	X
SB-6 / 20-22	X	X
SB-6 / 22-24	X	X
SB-6 / 24-26	X	X
SB-6 / 26-28	X	X
SB-6 / 28-30	X	X
SB-6 / 30-32	X	X
SB-6 / 32-34	X	X
SB-6 / 34-36	X	X
SB-6 / 36-38	X	X
SB-6 / 38-40	X	X
SB-6 / 40-42	X	X
SB-6 / 42-44	X	X
SB-6 / 44-46	X	X
SB-6 / 46-48	X	X
SB-6 / 48-50	X	X
SB-6 / 50-52	X	X
SB-6 / 52-54	X	X
SB-6 / 54-56	X	X
SB-6 / 56-58	X	X
SB-6 / 58-60	X	X
Total	30	30

Soil Boring SB-7

Sample Designation	Sample Collection	Sample Analysis
SB-7 / 0-2	X	X
SB-7 / 2-4	X	X
SB-7 / 4-6	X	X
SB-7 / 8-10	X	X
SB-7 / 10-12	X	X
SB-7 / 12-14	X	X
SB-7 / 14-16	X	X
SB-7 / 16-18	X	X
SB-7 / 18-20	X	X
SB-7 / 20-22	X	X
SB-7 / 22-24	X	X
SB-7 / 24-26	X	X
SB-7 / 26-28	X	X
SB-7 / 28-30	X	X
SB-7 / 30-32	X	X
SB-7 / 32-34	X	X
SB-7 / 34-36	X	X
SB-7 / 36-38	X	X
SB-7 / 38-40	X	X
SB-7 / 40-42	X	X
SB-7 / 42-44	X	X
SB-7 / 44-46	X	X
SB-7 / 46-48	X	X
SB-7 / 48-50	X	X
SB-7 / 50-52	X	X
SB-7 / 52-54	X	X
SB-7 / 54-56	X	X
SB-7 / 56-58	X	X
SB-7 / 58-60	X	X
Total	30	30

Soil Boring SB-8

Sample Designation	Sample Collection	Sample Analysis
SB-8 / 0-2	X	X
SB-8 / 2-4	X	X
SB-8 / 4-6	X	X
SB-8 / 8-10	X	X
SB-8 / 10-12	X	X
SB-8 / 12-14	X	X
SB-8 / 14-16	X	X
SB-8 / 16-18	X	X
SB-8 / 18-20	X	X
SB-8 / 20-22	X	X
SB-8 / 22-24	X	X
SB-8 / 24-26	X	X
SB-8 / 26-28	X	X
SB-8 / 28-30	X	X
SB-8 / 30-32	X	X
SB-8 / 32-34	X	X
SB-8 / 34-36	X	X
SB-8 / 36-38	X	X
SB-8 / 38-40	X	X
SB-8 / 40-42	X	X
SB-8 / 42-44	X	X
SB-8 / 44-46	X	X
SB-8 / 46-48	X	X
SB-8 / 48-50	X	X
SB-8 / 50-52	X	X
SB-8 / 52-54	X	X
SB-8 / 54-56	X	X
SB-8 / 56-58	X	X
SB-8 / 58-60	X	X
Total	30	30

Total Samples Collected:	120
Total Duplicate Samples Collected:	6
Total Matrix Spike Samples Collected:	6
Total Matrix Spike Duplicate Samples Collected:	6
Total Samples Submitted to Laboratory:	138

Total Samples Analyzed:	120
Total Duplicate Samples Analyzed:	6
Total Matrix Spike Samples Analyzed:	6
Total Matrix Spike Duplicate Samples Analyzed	6
Total Samples Submitted to Laboratory for Analysis:	138

Note: Based on the analytical results of the first round, additional samples, which will be held at the laboratory, may be selected for analysis.

Table A-2. Summary of Dry Well 20-08 Sampling and Analysis Requirements, Plant 3 Drywells 20-08 and 34-07 Soil Remediation Supplemental Draft Work Plan, Northrup Grumman Corporation, Bethpage, New York.

Soil Boring SB-9

Sample Designation	Sample Collection	Sample Analysis
SB-9 / 0-2	X	X
SB-9 / 2-4	X	X
SB-9 / 4-6	X	X
SB-9 / 6-8	X	X
SB-9 / 8-10	X	X
SB-9 / 10-12	X	X
SB-9 / 12-14	X	X
SB-9 / 14-16	X	X
SB-9 / 16-18	X	X
SB-9 / 18-20	X	X
SB-9 / 20-22	X	X
SB-9 / 22-24	X	X
SB-9 / 24-26	X	X
SB-9 / 26-28	X	X
SB-9 / 28-30	X	X
SB-9 / 30-32	X	X
SB-9 / 32-34	X	X
SB-9 / 34-36	X	X
SB-9 / 36-38	X	X
SB-9 / 38-40	X	X
SB-9 / 40-42	X	X
SB-9 / 42-44	X	X
SB-9 / 44-46	X	X
SB-9 / 46-48	X	X
SB-9 / 48-50	X	X
SB-9 / 50-52	X	X
SB-9 / 52-54	X	X
SB-9 / 54-56	X	X
SB-9 / 56-58	X	X
SB-9 / 58-60	X	X
Total	30	30

Soil Boring SB-10

Sample Designation	Sample Collection	Sample Analysis
SB-10 / 0-2	X	X
SB-10 / 2-4	X	X
SB-10 / 4-6	X	X
SB-10 / 6-8	X	X
SB-10 / 8-10	X	X
SB-10 / 10-12	X	X
SB-10 / 12-14	X	X
SB-10 / 14-16	X	X
SB-10 / 16-18	X	X
SB-10 / 18-20	X	X
SB-10 / 20-22	X	X
SB-10 / 22-24	X	X
SB-10 / 24-26	X	X
SB-10 / 26-28	X	X
SB-10 / 28-30	X	X
SB-10 / 30-32	X	X
SB-10 / 32-34	X	X
SB-10 / 34-36	X	X
SB-10 / 36-38	X	X
SB-10 / 38-40	X	X
SB-10 / 40-42	X	X
SB-10 / 42-44	X	X
SB-10 / 44-46	X	X
SB-10 / 46-48	X	X
SB-10 / 48-50	X	X
SB-10 / 50-52	X	X
SB-10 / 52-54	X	X
SB-10 / 54-56	X	X
SB-10 / 56-58	X	X
SB-10 / 58-60	X	X
Total	30	30

Soil Boring SB-11

Sample Designation	Sample Collection	Sample Analysis
SB-11 / 0-2	X	X
SB-11 / 2-4	X	X
SB-11 / 4-6	X	X
SB-11 / 6-8	X	X
SB-11 / 8-10	X	X
SB-11 / 10-12	X	X
SB-11 / 12-14	X	X
SB-11 / 14-16	X	X
SB-11 / 16-18	X	X
SB-11 / 18-20	X	X
SB-11 / 20-22	X	X
SB-11 / 22-24	X	X
SB-11 / 24-26	X	X
SB-11 / 26-28	X	X
SB-11 / 28-30	X	X
SB-11 / 30-32	X	X
SB-11 / 32-34	X	X
SB-11 / 34-36	X	X
SB-11 / 36-38	X	X
SB-11 / 38-40	X	X
SB-11 / 40-42	X	X
SB-11 / 42-44	X	X
SB-11 / 44-46	X	X
SB-11 / 46-48	X	X
SB-11 / 48-50	X	X
SB-11 / 50-52	X	X
SB-11 / 52-54	X	X
SB-11 / 54-56	X	X
SB-11 / 56-58	X	X
SB-11 / 58-60	X	X
Total	30	30

Soil Boring SB-12

Sample Designation	Sample Collection	Sample Analysis
SB-12 / 0-2	X	X
SB-12 / 2-4	X	X
SB-12 / 4-6	X	X
SB-12 / 6-8	X	X
SB-12 / 8-10	X	X
SB-12 / 10-12	X	X
SB-12 / 12-14	X	X
SB-12 / 14-16	X	X
SB-12 / 16-18	X	X
SB-12 / 18-20	X	X
SB-12 / 20-22	X	X
SB-12 / 22-24	X	X
SB-12 / 24-26	X	X
SB-12 / 26-28	X	X
SB-12 / 28-30	X	X
SB-12 / 30-32	X	X
SB-12 / 32-34	X	X
SB-12 / 34-36	X	X
SB-12 / 36-38	X	X
SB-12 / 38-40	X	X
SB-12 / 40-42	X	X
SB-12 / 42-44	X	X
SB-12 / 44-46	X	X
SB-12 / 46-48	X	X
SB-12 / 48-50	X	X
SB-12 / 50-52	X	X
SB-12 / 52-54	X	X
SB-12 / 54-56	X	X
SB-12 / 56-58	X	X
SB-12 / 58-60	X	X
Total	30	30

Total Samples Collected:	120
Total Duplicate Samples Collected:	6
Total Matrix Spike Samples Collected:	6
Total Matrix Spike Duplicate Samples Collected:	6
Total Samples Submitted to Laboratory:	138

Total Samples Analyzed:	120
Total Duplicate Samples Analyzed:	6
Total Matrix Spike Samples Analyzed:	6
Total Matrix Spike Duplicate Samples Analyzed	6
Total Samples Submitted to Laboratory for Analysis:	138

APPENDIX B

SOPs for Soil Sample Collection

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to establish guidelines for the collection of soil samples for laboratory analysis. This SOP is applicable to soil samples collected from split-spoon samplers during drilling, hand auger samples, grab samples from stockpiled soils, surface samples, test pit samples, etc.

2.0 CONSIDERATIONS

Soil samples may be collected in either a random or biased manner. Random samples can be based on a grid system or statistical methodology. Biased samples can be collected in areas of visible impact or suspected source areas. Soil samples can be collected at the surface, shallow subsurface, or at depth. When samples are collected at depth the water content should be noted, since generally "soil sampling" is restricted to the unsaturated zone. Equipment selection will be determined by the depth of the sample to be collected. A thorough description of the sampling locations and proposed methods of sample collection should be included in the work plan.

Commonly, surface sampling refers to the collection of samples at a 0 to 6 inch depth interval. Certain regulatory agencies may define the depth interval of a surface sample differently, and this must be defined in the work plan. Collection of surface soil samples is most efficiently accomplished with the use of a stainless steel trowel or scoop. For samples at greater depths a decontaminated bucket auger or power auger may be needed to advance the hole to the point of sample collection. Another clean bucket auger should then be used to collect the sample. To collect samples at depths of greater than approximately six feet the use of a drill rig and split spoon samples will usually be necessary. In some situations, sample locations are accessed with the use of a backhoe.

3.0 MATERIALS/EQUIPMENT

a. A work plan which outlines soil sampling requirements.

b. Field notebook, field form(s), maps, chain-of-custody forms, and custody seals.

c. Decontamination supplies (including: non-phosphate, laboratory grade detergent, buckets, brushes, potable water, distilled water, regulatory-required reagents, aluminum foil, plastic sheeting, etc.).

d. Sampling device (split-spoon sampler, stainless steel hand auger, stainless steel trowel, etc.).

e. Stainless steel spoons or spatulas.

f. Disposable sampling gloves.

g. Laboratory-supplied sample containers with labels.

h. Cooler with blue or wet ice.

i. Plastic sheeting.

j. Black pen and indelible marker.

k. Zip-lock bags and packing material.

l. Tape measure.

m. Paper towels or clean rags.

n. Masking and packing tape.

o. Overnight (express) mail forms.

4.0 DECONTAMINATION

All reusable sampling equipment will be thoroughly cleaned according to the decontamination SOP. Where possible, thoroughly pre-cleaned and wrapped sampling equipment should be used and dedicated to individual sampling locations. Disposable items such as sampling gloves, aluminum foil, and plastic sheeting will be changed after each use and discarded in an appropriate manner.

5.0 PROCEDURE

5.1 Prior to collecting soil samples, ensure that all sampling equipment has been thoroughly cleaned according to the decontamination SOP. If samples are to be collected at depth, then the boring must be advanced with thoroughly cleaned equipment to the desired sampling horizon and a different thoroughly cleaned sampler must be used to collect the sample.

5.2 Using disposable gloves and a pre-cleaned, stainless steel spatula or spoon, extract the soil sample from the sampler, measure the recovery, and separate the wash from the true sample. Where allowed by regulatory agency(ies), disposable plastic spoons may be used.

5.3 Place the sample in a laboratory-supplied, pre-cleaned sample container. This should be done as quickly as possible and this is especially important when sampling for volatile organic compounds (VOCs). Samples to be analyzed for VOCs must be collected prior to other constituents.

5.4 The sample container will be labeled with appropriate information such as, client name, site location, sample identification (location, depth, etc.), date and time of collection, and sampler's initials.

5.5 Using the remaining portion of soil from the sampler, log the sample in detail and record sediment characteristics (color, odor, moisture, texture, density, consistency, organic content, layering, grain size, etc.).

5.6 If soil samples are to be composited in the field, then equal portions from selected locations will be placed on a clean plastic sheet and homogenized. Alternately, several samples may be submitted to the laboratory for compositing by weight. The method used is dependent upon regulatory requirements. Specific compositing procedures shall be approved by the appropriate regulatory agency and described in the work plan. Samples to be analyzed for VOCs will not be composited unless required by a regulatory agency.

5.7 After the sample has been collected, labeled, and logged in detail, it is placed in a zip-lock bag and stored in a cooler at 4°C.

5.8 A chain-of-custody form is completed for all samples collected. One copy is retained and two are sent with the samples in a zip-lock bag to the laboratory. A custody seal is placed on the cooler prior to shipment.

5.9 Samples collected from Monday to Friday are to be delivered to the laboratory within 24 hours of collection. If Saturday delivery is unavailable, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if any analytes require a shorter delivery time.

5.10 The field notebook and appropriate forms should include, but not be limited to the following: client name, site location, sample location, sample depth, sample identification, date and time collected, sampler's name, method of sample collection, number and type of containers, geologic description of material, description of decontamination procedures, etc. A site map should be prepared with exact measurements to each sample location in case follow-up sampling is necessary.

5.11 All reusable sampling equipment must be thoroughly cleaned in accordance with the decontamination SOP. Following the final decontamination (after all samples are collected) the sampling equipment is wrapped in aluminum foil. Discard any gloves, foil, plastic, etc. in an appropriate manner that is consistent with site conditions.