REMEDIAL INVESTIGATION/FEASIBILITY STUDY

WORK PLAN

FOR

HARDER TREE SERVICES

63 JERUSALEM AVENUE

HEMPSTEAD, NEW YORK

NYSDEC REGISTRY # 130035

FOR SUBMITTAL TO

THE NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PREPARED BY

FPM group

909 MARCONI AVENUE
RONKONKOMA, NEW YORK 11779

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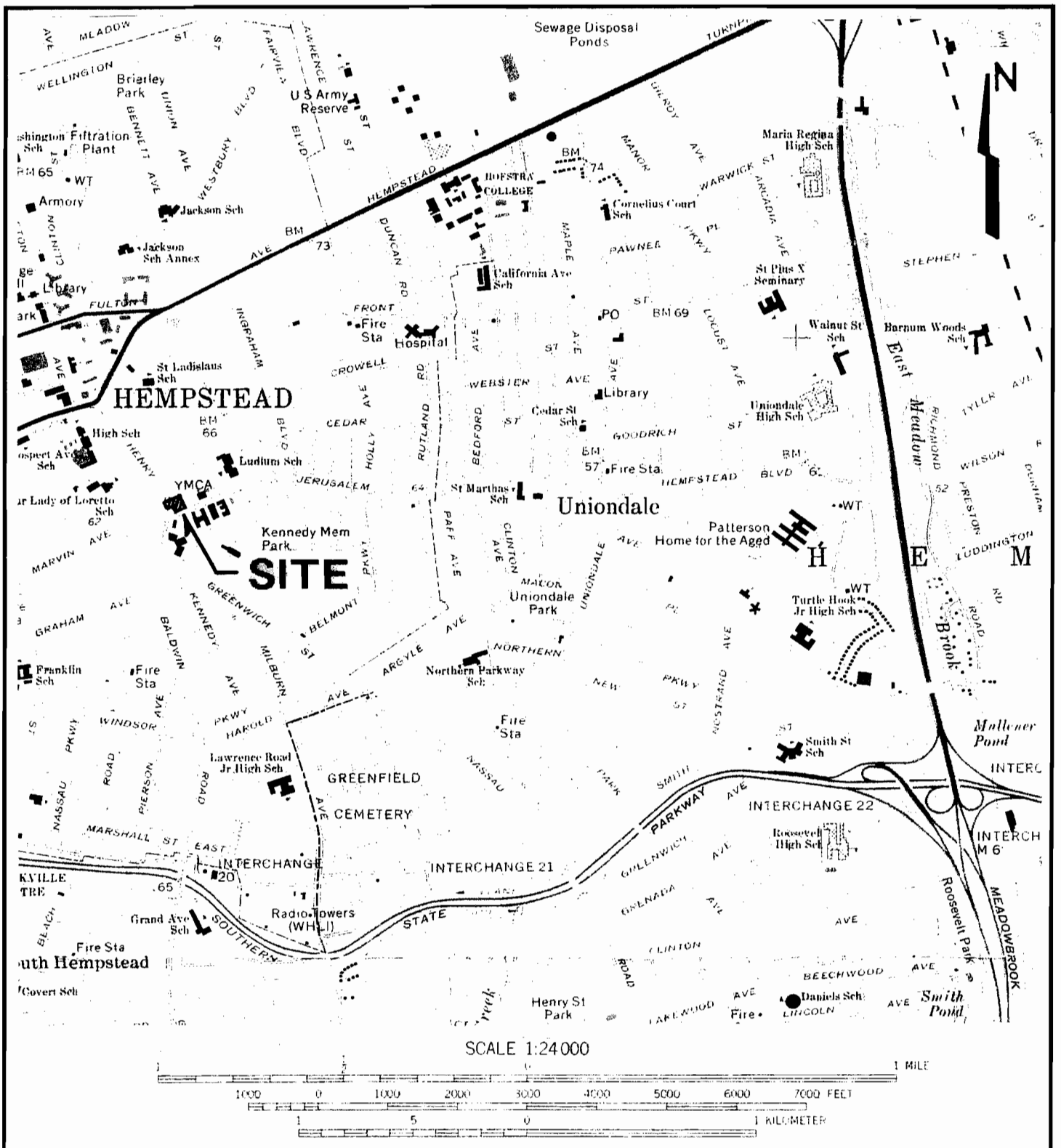
SECTION 1.0
INTRODUCTION

1.1 Overview

This Remedial Investigation/Feasibility Study (RI/FS) Work Plan (WP) has been prepared by FPM Group (FPM) for the New York State Department of Environmental Conservation (NYSDEC) Inactive Hazardous Waste Disposal Site (IHWDS) identified as Harder Tree Services (Harder), Registry #1-30-035 (the Site). This RI/FS WP was developed to address additional areas of concern identified at the Site based on the results of the Site Assessment Update Investigation (FPM, May 1999) and subsequent comments by the NYSDEC and the New York State Department of Health (NYSDOH). It is proposed to perform the additional sampling as part of an RI prior to evaluating potential remedial alternatives or performing remediation. An FS will be performed following the completion of the RI to evaluate potential remedial actions for the Site. This RI/FS WP also includes a Health and Safety Plan (HASP) and a Citizen's Participation Plan (CPP).

The Harder Site is located at 63 Jerusalem Avenue in Hempstead, New York and was the site of a methoxychlor spill in 1984. The Site location is shown in Figure 1.1.1. Most of the spilled material was recovered and the NYSDEC and Nassau County Department of Health (NCDOH) monitored the remediation activities. During the winter of 1984 and 1985 sampling was conducted by the NYSDEC during a Phase I Investigation at the Site. The samples reportedly contained concentrations of methoxychlor, technical chlordane, and heptachlor. A Phase II Investigation was subsequently performed in 1986 and 1987 (EEA, 1987). This investigation indicated the presence of pesticides, primarily chlordane, in groundwater upgradient and beneath the Site. Additional soil and groundwater sampling was performed by Energy & Environmental Analysts, Inc. (EEA) in 1988. The results of this additional



Fanning, Phillips & Molnar Engineers		
FIGURE 1.1.1 SITE LOCATION HARDER TREE SERVICES SITE 63 JERUSALEM AVENUE HEMPSTEAD, NEW YORK		
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investigation indicated that soil in a 50 by 50-foot area of the Site had been impacted by pesticides, primarily chlordane. Additional groundwater samples were collected which indicated that although pesticides were present in the groundwater beneath the Site, an upgradient source of chlordane may be present. The Site was subsequently placed on the NYSDEC Registry as a Class 2 IHWDS.

A Site Assessment Update Investigation (SI) was performed in 1999 to provide additional soil and groundwater data to characterize the Site. Soil and leaching pool sediment sampling was performed during the SI for the purposes of delineating the extent of the previously-identified impacts and evaluating the potential for additional source areas. The sampling results were used to identify potential remediation targets, however, additional sampling was recommended to further delineate the vertical and lateral extent of contamination. Groundwater sampling was performed to evaluate current Site groundwater conditions. These data indicated that an upgradient chlordane groundwater source may be present and that the chlordane concentration in groundwater is decreasing away from the presumed on-Site source area (50 by 50-foot area). The data also suggested that an additional on-Site source area may be present. Based on the results of the SI, additional sampling was recommended to further evaluate the potential for an off-Site source and to delineate the extent of the impacted groundwater.

It was also recommended to perform a receptor survey of the area within one-half mile downgradient of the Site to evaluate the potential for human exposure to groundwater.

Following completion of the RI, an FS will be performed to evaluate potential remedial alternatives for the Site.

SECTION 2.0
SITE BACKGROUND AND SETTING

A detailed description of the Site was previously presented in the Phase II Investigation Report (EEA, 1987). This information will be summarized below.

2.1 Site History

Harder has operated at 63 Jerusalem Avenue, Hempstead since 1939. Between 1945 and 1952 the rear portion of this property was paved. In 1965, two lots on the north side of the Site were acquired. Pesticide operations managed at the Site have varied over time. A variety of materials associated with pesticide control and tree-related services, including chlordane, have been present at the Site.

In 1984, a several-hundred-gallon spill of methoxychlor occurred on the Site (EEA, 1987). Most of the spilled material was collected and returned to its original containers. Some of the methoxychlor entered a stormwater leaching pool, LP-1, located immediately south of a 50 by 50-foot area on the north side of the Site (see Plate 1 for Site layout). The leaching pool was remediated by Marine Pollution Control (now known as Miller Environmental Group). Soil and sediment were excavated from LP-1, the pool was backfilled to grade and sealed with concrete, and a new leaching pool (LP-2) was constructed to the southwest. The NYSDEC and NCDOH monitored the remediation operations and the NYSDEC assigned NYSDEC Spill No. 84-2123.

The NYSDEC subsequently conducted a Phase I Investigation at the Site in 1985 and additional investigations have been performed at the Site between 1986 and the present. The results of these investigations are discussed in the following section.

2.2 Previous Investigation Results

The NYSDEC performed sampling at the Site during 1984 and 1985. The results from drain and sludge pile soil samples collected in December, 1985 were presented in the 1987 Phase II Investigation Report (EEA, March, 1987) and indicated the presence of methoxychlor, technical chlordane, and heptachlor in the sampled materials. A Consent Order was executed on January 22, 1986.

A Phase II Investigation was performed by EEA in 1986 and 1987. Six groundwater monitoring wells were installed and associated soil and groundwater samples were collected and analyzed. The data from these samples are shown in Tables 2.2.1 and 2.2.2. Concentrations of chlordane and other pesticides were detected in the soil samples. However, none of the detected concentrations exceeded the NYSDEC Recommended Soil Cleanup Objectives (Objectives) with the exception of four samples collected from the boring for well MW-1 which exhibited chlordane concentrations ranging from 0.59 to 5.1 parts per million (ppm) with the highest concentrations in the near-surface samples. These data were also compared to the NYSDEC Soil Cleanup Objectives Protective of Groundwater Quality (Objectives-GW). Only the two near-surface samples exceeded the NYSDEC Objective-GW for chlordane (2 mg/kg).

The groundwater samples from the Phase II Investigation exhibited concentrations of various pesticides. Exceedances of the NYSDEC Class GA Ambient Water Quality Standards (standards) were noted for the pesticides lindane (well 4 at 0.21 to 0.51 ppb), dieldrin (well 2 at 2.5 to 6 ppb, well 3 at 0.05 to 0.08 ppb, well 5 at 0.05 ppb and well 6 at 0.05 ppb), heptachlor epoxide (well 3 at 0.07 ppb and well 5 at 0.05 ppb), chlordane (well 1 at 0.19 ppb, well 2 at 9 ppb, well 5 at 0.42 ppb, and well 6 at 0.49 ppb), and 4,4'-DDT (well 1 at 0.24 ppb, well 3 at 0.43 ppb, well 4 at 0.48 ppb, well 5 at 0.38 ppb, and well 6 at 0.48 ppb). An exceedance of the NYSDEC standard for benzene was also noted at well 4 (26 ppb). The shallow groundwater flow was found to be to the south which indicates that wells 2, 3, 4, 5,

TABLE 2.2.1
SOIL CHEMICAL ANALYTICAL DATA
HARDER TREE SERVICES SITE
1986 PHASE II SAMPLING EVENT

Well No.	Well 1							Well 2		Well 3			Well 4		Well 5			NYSDEC Recommended Soil Cleanup Objectives
Depth (in feet) / Analyte	Surface	1-6	6-12	12-18	18-24	24-30	30-36	1-6	6-12	1-6	6-12	18-24	1-6	6-12	1-6	6-12	30-36	
Pesticides in ppm																		
Chlordane	**5.100**	**4.500**	0.220	0.530	**0.590**	**0.700**	0.1200	ND	-	0.460	-	0.035	ND	-	-	-	ND	0.54
4,4'-DDD	-	0.160	-	-	-	0.018	-	-	-	-	-	-	-	-	-	-	-	2.9
4,4'-DDT	-	0.280	0.024	-	-	-	-	-	-	0.260	-	-	-	-	-	-	-	2.1
4,4-DDE	-	-	-	-	-	-	-	-	-	0.160	-	-	-	-	-	-	-	2.1
Total Pesticides	5.100	4.940	0.244	0.530	0.590	0.718	0.120	ND	-	0.880	-	0.035	ND	-	-	-	ND	10
Total Petroleum Hydrocarbons in ppm	-	0.322	ND	-	-	-	-	9.600	8.500	0.148	0.151	-	ND	ND	ND	ND	-	*

Notes: Data obtained from Phase II Investigation Report (EEA, March, 1997).
ND = Not Detected.
- = Not Sampled.
ppm = parts per million.
* = No NYSDEC Recommended Soil Cleanup Objective established.
Bold values exceed NYSDEC Recommended Soil Cleanup Objectives.

TABLE 2.2.2
GROUNDWATER CHEMICAL ANALYTICAL DATA
HARDER TREE SERVICES SITE
1986 AND 1987 SAMPLING EVENTS

Well No.	Well 1		Well 2		Well 3		Well 4		Well 5		Well 6		NYSDEC Class GA Ambient Water Quality Standards
Date / Analyte	1986	1987	1986	1987	1986	1987	1986	1987	1986	1987	1986	1987	
Pesticides in ppb													
Lindane (Hexachlorocyclohexane)	ND	ND	ND	ND	ND	ND	**0.51**	**0.21**	ND	ND	ND	ND	0.05
Dieldrin	ND	ND	**6.0**	**2.5**	**0.08**	**0.05 J**	ND	ND	ND	**0.05 J**	ND	**0.05 J**	0.004
Heptechlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04 J	0.19	0.04
Heptachlor Epoxide	ND	NA	ND	NA	**0.07**	NA	ND	NA	**0.05 J**	NA	ND	NA	0.03
Endrine Ketone	ND	ND	0.2	1.8	ND	ND	1.0	0.31	ND	ND	ND	ND	5
alpha-BHC	NA	ND	NA	ND	NA	ND	NA	0.03	NA	ND	NA	ND	*
Chlordane	NA	**0.19**	NA	**9.0**	NA	ND	NA	ND	NA	**0.42**	NA	**0.49**	0.05
4,4'-DDD	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	0.09 J	0.3
4,4'-DDT	NA	**0.24**	NA	ND	NA	**0.43**	NA	**0.48**	NA	**0.38**	NA	**0.48**	0.2
Volatile Organic Compounds in ppb													
1,1-Dichloroethane	ND	NA	1.1	NA	ND	NA	ND	NA	ND	NA	ND	NA	5
Tetrachloroethene	ND	NA	3.1	NA	ND	NA	ND	NA	ND	NA	ND	NA	5
1,1,1-Trichloroethane	ND	NA	2.4	NA	ND	NA	ND	NA	ND	NA	ND	NA	5
Trichloroethene	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	4.4	NA	5
Benzene	ND	NA	ND	NA	ND	NA	**26.0**	NA	ND	NA	ND	NA	1
Xylene	ND	NA	ND	NA	ND	NA	4.4	NA	ND	NA	ND	NA	5

Notes: ppb = parts per billion.
ND = Not Detected.
NA = Not Analyzed.
J = Estimated value, within laboratory analytical error.
* = No NYSDEC Class GA Ambient Water Quality Standard established for this analyte.
Bold values exceed NYSDEC Class GA Ambient Water Quality Standard.
Data obtained from Phase II Investigation Report (EEA, March, 1997).

and 6 were located downgradient of the release area. The vertical hydraulic gradient was noted to be downward and chlordane was noted to be present in the deep well which had been installed in the Magothy Aquifer approximately 120 feet below grade (well 6). However, it was noted that no upgradient groundwater sampling had been conducted and, therefore, it was possible that the chlordane may have originated from an off-Site source since chlordane had been used extensively on Long Island.

Additional soil and groundwater samples were collected by EEA in 1988. The resulting chemical analytical data are presented in Tables 2.2.3 and 2.2.4. The soil samples were collected at various depths in the 50 by 50-foot area and the data indicated that the soil had been impacted by pesticides, primarily chlordane. The locations of these samples within the 50 by 50-foot area are not known and, therefore, these data cannot be utilized to accurately define the lateral and vertical extent of contamination. However, although exceedances of the NYSDEC Objective for chlordane were noted for samples from five soil borings at depths up to 30 feet below grade, it was also noted that the concentrations generally decreased significantly with increasing depth. It was also noted that, in general, only the soil samples collected at the shallower depths exceeded the NYSDEC Objective-GW to be protective of groundwater. Most of the pesticide impact appeared to be limited to within six feet of the ground surface. Exceedances of the NYSDEC Objectives for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT and/or Dieldrin were noted in the near-surface samples from two borings.

Two additional groundwater monitoring wells were installed during this investigation and all of the groundwater monitoring wells were sampled in 1988. The groundwater samples exhibited concentrations of several pesticides exceeding the NYSDEC standards, including chlordane (0.8 ppb in well 6, 0.31 ppb in well 7, and 44 ppb in well 8), dieldrin (0.46 ppb in well 2, 0.04 ppb in well 3, 0.3 ppb in well 4, and 0.047 in well 5), and heptachlor epoxide (0.085 ppb in well 3 and 0.12 ppb in well 5).

TABLE 2.2.3
SOIL CHEMICAL ANALYTICAL DATA
HARDER TREE SERVICES SITE
1988 SAMPLING EVENT

Location	1A					2A					3A					NYSDEC Recommended Soil Cleanup Objectives
Depth (in feet) Analyte	**0-6**	**7-12**	**13-18**	**19-24**	**25-30**	**0-6**	**7-12**	**13-18**	**19-24**	**25-30**	**0-6**	**7-12**	**13-18**	**19-24**	**25-30**	
Pesticides and PCBs in mg/kg																
Chlordane	**4,600**	**32**	**1.9**	**1.0**	**1.7**	**2,300**	**2,600**	**1,000**	**86**	**54**	**200**	**2.3**	**1.4**	**1.1**	**3.4**	0.54
Methoxychlor	ND	ND	0.34	ND	ND	ND	1,200	9,200	49	1.6	ND	ND	ND	ND	ND	-
Dursban	ND	ND	ND	ND	ND	1.3	109	265	12.8	0.2	0.1	0.006	ND	ND	ND	-
Carbaryl	ND	ND	ND	ND	ND	ND	1.160	18.500	ND	ND	ND	ND	ND	ND	ND	-
Baygon	ND	ND	ND	ND	ND	ND	ND	3.400	ND	ND	ND	ND	ND	ND	ND	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.98**	ND	ND	ND	ND	0.044
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**10**	ND	ND	ND	ND	2.9
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.1
4,4-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.1
Total Pesticides	**4,600**	**32**	3.24	1.0	1.7	**2,301.3**	**3,910.16**	**10,517.5**	**147.8**	**55.8**	**211.08**	2.306	1.4	1.1	3.4	10.0
Total Petroleum Hydrocarbons in mg/kg	37	ND	ND	ND	ND	857	17,000	6,200	52	ND	870	ND	ND	ND	ND	-

Notes: ND = Not Detected.
NA = Not Analyzed.
* = Estimated depth.
\- = No NYSDEC Recommended Soil Cleanup Objective established for this analyte.

Bold values exceed NYSDEC Recommended Soil Cleanup Objectives.

TABLE 2.2.3 (CONTINUED)
SOIL CHEMICAL ANALYTICAL DATA
HARDER TREE SERVICES SITE
1988 SAMPLING EVENT

Location	4A					5A					6A					NYSDEC Recommended Soil Cleanup Objectives
Depth (in feet) Analyte	**0-6**	**7-12**	**13-18**	**19-24**	**25-30**	**0-6**	**7-12***	**13-18***	**19-24***	**25-30***	**0-6***	**7-12***	**13-18***	**19-24***	**25-30***	
Pesticides and PCBs in mg/kg																
Chlordane	**6,600**	**790**	0.36	0.31	0.28	**1,200**	**60**	**460**	**3,600**	**220**	ND	ND	ND	ND	ND	0.54
Methoxychlor	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Dursban	ND	ND	ND	ND	ND	ND	ND	ND	0.005	ND	0.006	ND	ND	ND	ND	-
Carbaryl	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-
Baygon	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.044
4,4'-DDD	ND	ND	ND	ND	ND	**59**	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.9
4,4'-DDE	ND	ND	ND	ND	ND	**44**	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.1
4,4-DDT	ND	ND	ND	ND	ND	**540**	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.1
Total Pesticides	**6,600**	**790**	0.36	0.31	0.28	**1,843**	**60**	**460**	**3,600.005**	**220**	0.006	ND	ND	ND	ND	10.0
Total Petroleum Hydrocarbons in mg/kg	480	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-

Notes: ND = Not Detected.
NA = Not Analyzed.
* = Estimated depth.
\- = No NYSDEC Recommended Soil Cleanup Objective established for this analyte.
Bold values exceed NYSDEC Recommended Soil Cleanup Objectives.

TABLE 2.2.4
GROUNDWATER CHEMICAL ANALYTICAL DATA
HARDER TREE SERVICES SITE
1988 SAMPLING EVENT

Well No. / Analyte	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6	Well 7	Well 8	NYSDEC Class GA Ambient Water Quality Standards
Pesticides in ppb									
a-BHC	ND	0.46	ND	ND	ND	ND	ND	ND	*
d-BHC	ND	0.47	ND	ND	ND	ND	ND	ND	*
g-BHC	ND	ND	ND	0.25	ND	ND	ND	ND	*
Chlordane	ND	ND	ND	ND	ND	**0.80**	**0.31**	**44**	0.05
Dieldrin	ND	**0.46**	**0.040**	**0.30**	**0.047**	ND	ND	ND	0.004
Heptachlor Epoxide	ND	ND	**0.085**	ND	**0.12**	ND	ND	ND	0.03
4,4'-DDD	ND	ND	ND	ND	ND	0.089	ND	ND	0.3
Volatile Organic Compounds in ppb									
Tetrachloroethene	**332**	2.4	**12**	ND	**720**	**5.8**	ND	ND	5
1,1,1-Trichloroethane	ND	ND	ND	ND	1.2	ND	ND	1.4	5
Trichloroethene	ND	ND	ND	ND	ND	**10**	ND	ND	5

Notes: ppb = parts per billion.
ND = Not Detected.
* = No NYSDEC Class GA Ambient Water Quality Standard established for this anlayte.
Bold values exceed NYSDEC Class GA Ambient Water Quality Standard.

Well 7 is located approximately 260 feet upgradient of the release area. The detection of 0.31 ppb of chlordane in this well suggests that chlordane is present regionally in the groundwater in this area. A review of the Suffolk County Department of Health Services (SCDHS) report regarding pesticide contamination in groundwater in Nassau and Suffolk Counties (SCDHS, June, 1999) indicates that chlordane has been detected in groundwater in various areas of Nassau County at concentrations up to 6.1 ug/l. The areas where chlordane has been detected have mixed residential and commercial uses and it is interpreted that these chlordane detections have resulted from use of chlordane to control termites.

Concentrations of two VOCs exceeding the NYSDEC standards were also detected during this investigation, including tetrachloroethene (332 ppb in well 1, 12 ppb in well 3, 720 ppb in well 5, and 5.8 ppb in well 6), and trichloroethene (10 ppb in well 6). The source of these VOCs is unknown, although it appears likely that they originated from an off-Site source.

The SI was performed in 1999 (FPM, May 1999) to provide additional soil and groundwater data to characterize the Site. Soil sampling results (Table 2.2.5) indicate that the Site soil in the 50 by 50-foot area is impacted with pesticides, but that the depth of the impact varies. In general, the majority of the impact appears to be limited to the upper two to four feet of soil. However, in the vicinity of the pesticide storage area (GP-4) and former leaching pool LP-1 (GP-3) it appears that the impact extends to greater depths. The impacted soil generally appears to be limited at depth, although additional near-surface soil sampling was recommended.

Near-surface soil samples were collected from several areas of the Site during the SI. Several of these samples exhibited pesticide concentrations (Table 2.2.6) and it was recommended that the vertical and lateral extent of the pesticide impact be evaluated in the vicinity of soil samples SS-1 and SS-4. In addition, the vertical and lateral extent of the pesticide impact will be evaluated in the vicinity of soil

TABLE 2.2.5
SOIL BORING CHEMICAL ANALYTICAL DATA, 50 BY 50-FOOT AREA
1999 SITE ASSESSMENT UPDATE INVESTIGATION
HARDER TREE SERVICES SITE
HEMPSTEAD, NEW YORK

Location	GP-1					GP-2			GP-3					GP-4			NYSDEC Recommended Soil Cleanup Objectives
Depth (in feet) / Analyte	0-2	4-6	8-10	18-20	28-30	0-2	4-6	8-10	0-2	4-6	8-10	18-20	28-30	0-2	4-6	8-10	
TCL Pesticides in mg/kg																	
delta-BHC	ND	ND	ND	ND	ND	ND	0.0026 J	ND	ND	ND	ND	ND	ND	**65.000 J**	**44.000 J**	ND	0.3
gamma-BHC (Lindane)	**0.190 J**	ND	ND	ND	ND	**0.170 J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06
Heptachlor	**1.100 J**	**0.240**	**0.580 J**	**0.140 J**	0.011 J	**4.400**	0.047	0.058	**23.000**	0.036	**0.160 J**	**0.790 J**	**1.200 J**	**1,100.000**	**740.000**	**740.000**	0.10
Aldrin	ND	ND	ND	ND	0.0054 J	**2.400**	0.0048 J	0.010 J	**14.000 J**	ND	ND	ND	ND	ND	ND	ND	0.041
Dieldrin	ND	ND	ND	ND	0.022 J	**5.700**	0.027	0.031 J	ND	ND	ND	ND	ND	ND	ND	ND	0.044
4,4'-DDE	ND	ND	ND	ND	ND	**4.500**	0.021	ND	**39.000**	ND	ND	ND	ND	ND	ND	ND	2.1
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2.300 J**	ND	ND	**110.000 J**	ND	0.9
4,4'-DDD	ND	ND	ND	ND	0.027 J	**10.000**	0.035	0.041	ND	ND	ND	ND	ND	ND	ND	ND	2.9
4,4'-DDT	1.600 J	0.110 J	ND	ND	0.0067 J	**19.000**	0.074	0.039	**9.100 J**	ND	ND	ND	ND	**140.000 J**	ND	ND	2.1
Methoxychlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.750 J	ND	ND	ND	ND	-
alpha-Chlordane	**35.000**	**1.600**	**3.500**	0.480	0.120	**32.000**	0.140	0.170	**190.000**	0.210	**1.600**	**12.000**	**17.000**	**3,700.000**	**2,400.000**	**2,500.000**	0.54
gamma-Chlordane	**27.000**	**1.400**	**2.900**	0.440	0.096	**33.000**	0.120	0.180	**160.000**	0.180	**1.300**	**11.000**	**16.000**	**3,300.000**	**2,200.00**	**1,800.000**	0.54
Total Pesticides	**64.89**	3.35	6.98	1.06	0.2881	**110.17**	0.4714	0.529	**435.1**	0.426	3.06	**26.86**	**34.2**	**8,305**	**5,494**	**5,040**	10

Notes: TCL = Target Compound List.
mg/kg = Milligrams per kilogram.
ND = Not Detected.
J = Concentration is estimated.
- = No NYSDEC Recommended Soil Cleanup Objective established for this analyte.
Bold values exceed NYSDEC Recommended Soil Cleanup Objective.

TABLE 2.2.6
NEAR-SURFACE SOIL SAMPLE CHEMICAL ANALYTICAL DATA
1999 SITE ASSESSMENT UPDATE INVESTIGATION
HARDER TREE SERVICES SITE
HEMPSTEAD, NEW YORK

Location / Analyte	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7	NYSDEC Recommended Soil Cleanup Objectives
TCL Pesticides in mg/kg								
beta-BHC	ND	ND	0.030 J	ND	ND	ND	ND	0.2
delta-BHC	ND	ND	0.022 J	ND	ND	ND	ND	0.3
Heptachlor	**4.200 J**	0.016 J	0.071	**340.000**	0.047 J	0.058 J	0.078 J	0.10
Aldrin	ND	ND	**0.120**	**10.000 J**	ND	ND	ND	0.041
Heptachlor Epoxide	ND	0.0078 J	ND	**22.000**	**0.210 J**	**1.300**	**1.200**	0.02
Dieldrin	**33.000 J**	**0.150**	ND	**610.000**	**0.390 J**	ND	ND	0.044
4,4'-DDE	**22.000 J**	0.066	0.210	**20.000 J**	1.400	0.860 J	1.100	2.1
Endrin	ND	0.0066 J	ND	**32.000 J**	ND	ND	ND	0.1
4,4'-DDD	**240.000**	0.028 J	0.570	**52.000**	0.940	0.970	0.870 J	2.9
Endosulfan Sulfate	ND	ND	ND	ND	0.290 J	ND	ND	1.0
4,4'-DDT	**1,100.000**	0.200	0.280	**180.000**	**5.700**	0.980	2.000	2.1
Endrin ketone	ND	0.0017 J	0.010 J	7.900 J	ND	ND	ND	-
alpha-Chlordane	**9.600 JB**	0.024 B	0.160 B	**60.000**	**0.600 B**	**4.600 B**	**4.400 B**	0.54
gamma-Chlordane	**13.000 JB**	0.047 B	0.300 B	**160.000**	**0.560 B**	**4.100 B**	**4.200 B**	0.54
Total Pesticides	**1,421.8**	0.5471	1.743	**1,493.9**	**10.137**	**12.568**	**13.848**	10

Notes: TCL = Target Compound List.
mg/kg = Milligrams per kilogram.
ND = Not Detected.
B = Analyte was detected in blank sample(s).
J = Concentration is estimated.
- = No NYSDEC Recommended Soil Cleanup Objective established for this analyte.
Bold values exceed NYSDEC Recommended Soil Cleanup Objective.

samples SS-6 and SS-7. These data would be utilized together with previously-collected data to evaluate potential remedial alternatives for the Site soil.

Pesticides were detected in all of the leaching pool samples (Table 2.2.7), although the level of impact varies. Additional data were requested by the NYSDEC to evaluate the lateral extent of impact at leaching pool D-2. The existing and proposed data will be utilized to select remedial alternatives for the Site leaching pools.

Pesticides were detected in all of the groundwater samples collected during the SI (Table 2.2.8). However, the chlordane concentration in groundwater was noted to decrease away from the presumed source area (the 50 by 50-foot area). The groundwater data suggest that an additional source area may be present on the west side of the Site. Previously-collected data also suggest a potential upgradient off-Site source. It was recommended that additional groundwater data be collected from wells that were not sampled during the SI and that a well which may be located on an adjoining property be sampled for the purpose of providing additional groundwater information downgradient of the Site. Off-site well MW-5 will also be resampled to further evaluate the downgradient groundwater.

It was also recommended to perform a receptor survey of the area within one-half mile downgradient of the Site to evaluate the potential for human exposure to groundwater.

Following completion of the RI, an FS will be performed to evaluate potential remedial alternatives for the Site.

In summary, the previous investigation results at the Site have shown that soil and groundwater at the Site has been impacted by pesticides, primarily chlordane. The data also indicate that the groundwater upgradient of the Site is impacted with chlordane. The extent of soil contamination was generally limited to shallow depths in the vicinity of the 50 by 50-foot area. However, potential additional

TABLE 2.2.7
LEACHING POOL SEDIMENT/SOIL CHEMICAL ANALYTICAL DATA
1999 SITE ASSESSMENT UPDATE INVESTIGATION
HARDER TREE SERVICES SITE
HEMPSTEAD, NEW YORK

Location	D-1	D-2	D-3	LP-1		LP-2	LP-3	NYSDEC Recommended Soil Cleanup Objectives
Depth (in feet) / Analyte	1-2	0.5-1	0-1	15-17	24-25	0-1	1-2	
TCL Pesticides in mg/kg								
beta-BHC	ND	**36.000 J**	ND	ND	ND	ND	ND	0.2
delta-BHC	ND	**15.000 J**	ND	ND	ND	ND	ND	0.3
Heptachlor	**0.580 J**	**15.000 J**	**0.270 J**	**1,000.000**	**51.000**	ND	0.037 J	0.10
Aldrin	ND	**39.000 J**	**2.100 J**	**750.000**	ND	ND	ND	0.041
Endosulfan I	ND	**610.000**	ND	**570.000**	ND	ND	**2.800**	0.9
Dieldrin	**3.000**	ND	ND	**490.000**	**23.000**	**0.280 J**	ND	0.044
4,4'-DDE	1.300 J	**69.000 J**	**13.000**	ND	ND	1.200	0.660 J	2.1
Endrin	ND	**260.000**	ND	ND	ND	ND	ND	0.10
4,4'-DDD	**5.700**	**1,600.000**	**12.000**	**150.000 J**	**13.000 J**	0.680 J	2.400	2.9
4,4'-DDT	**2.800**	**1,200.000**	ND	ND	**3.300 J**	0.190 J	ND	2.1
alpha-Chlordane	**17.000 B**	**520.000 B**	**28.000 B**	**490.000 B**	**61.000 B**	**1.500**	**2.800 B**	0.54
gamma-Chlordane	**13.000 B**	**420.000 B**	**23.000 B**	**1,200.000 B**	**66.000 B**	**1.400**	**2.100 B**	0.54
Total Pesticides	**43.38**	**4,784**	**78.37**	**4,650**	**217.3**	5.25	**10.797**	10

Notes: TCL = Target Compound List.
mg/kg = Milligrams per kilogram.
ND = Not Detected.
B = Analyte was detected in blank sample(s).
J = Concentration is estimated.
Bold values exceed NYSDEC Recommended Soil Cleanup Objectives.

TABLE 2.2.8
GROUNDWATER SAMPLE CHEMICAL ANALYTICAL DATA
1999 SITE ASSESSMENT UPDATE REPORT
HARDER TREE SERVICES SITE
HEMPSTEAD, NEW YORK

Location / Analyte	MW-2	MW-3	MW-4	MW-5	MW-6	MW-8	NYSDEC Class GA Ambient Water Quality Standards
TCL Pesticides in ug/l							
alpha-BHC	**0.11 J**	ND	**0.21 J**	ND	ND	ND	0.01
beta-BHC	**1.3**	ND	**0.35 J**	ND	ND	ND	0.04
delta-BHC	**1.0**	ND	ND	ND	ND	ND	0.04
gamma-BHC (Lindane)	ND	ND	**0.35 J**	ND	ND	ND	0.05
Heptachlor	ND	ND	ND	0.022 J	**0.058**	ND	0.04
Heptachlor Epoxide	ND	**0.11**	ND	ND	ND	ND	0.03
Dieldrin	**1.7 J**	**0.28**	**1.9**	**1.4**	ND	ND	0.004
4,4'-DDE	**0.42 J**	ND	ND	ND	0.11	ND	0.2
4,4'-DDD	**0.86 J**	ND	ND	ND	0.17	ND	0.3
4,4'-DDT	ND	ND	ND	ND	**0.32**	ND	0.2
Endrin Ketone	0.14 J	ND	1.3	0.065 J	ND	ND	5
alpha-Chlordane	**3.4 B**	**0.58 B**	**2.5 B**	**0.94 B**	**0.20 B**	**28 B**	0.05
gamma-Chlordane	**4.8 B**	**0.53 B**	ND	**0.92 B**	**0.20 B**	**32 B**	0.05

TABLE 2.2.8 (CONTINUED)
GROUNDWATER SAMPLE CHEMICAL ANALYTICAL DATA
1999 SITE ASSESSMENT UPDATE REPORT
HARDER TREE SERVICES SITE
HEMPSTEAD, NEW YORK

Location / Analyte	MW-2	MW-3	MW-4	MW-5	MW-6	MW-8	NYSDEC Class GA Ambient Water Quality Standards
TCL Volatile Organic Compounds in ug/l							
Chloroform	ND	ND	1.9	ND	ND	ND	7
Tetrachloroethene	ND	ND	ND	4.0	ND	ND	5
Toluene	ND	ND	0.8	ND	ND	ND	5
Ethylbenzene	ND	ND	4.8	ND	ND	ND	5
Xylene (total)	ND	ND	19	ND	ND	ND	5

Notes: TCL = Target Compound List.
ug/l = Micrograms per liter.
ND = Not Detected.
B = Analyte was detected in blank sample(s).
J = Concentration is estimated.
Bold values exceed NYSDEC Class GA Ambient Water Quality Standards.

source areas were indicated by the data collected during the SI and additional sampling was recommended. This RI/FS WP includes the following scope of work:

- Off-Site near-surface soil sampling in the vicinity of the 50 by 50-foot area to define the lateral extent of pesticide-impacted soil;
- Near-surface and subsurface soil sampling in the vicinity of two potential additional source areas to define the lateral and vertical extent of impacted soil;
- Near-surface and subsurface soil sampling in the vicinity of the SS-6 and SS-7 locations to define the lateral and vertical extent of impacted soil;
- Subsurface soil sampling in the vicinity of leaching pool D-2 to evaluate the lateral extent of impacted soil in the vicinity of the structure;
- Groundwater sampling at four existing wells to evaluate potential impacts from upgradient off-Site sources and to evaluate the downgradient extent of impacted groundwater to the southwest of the Site; and
- A receptor survey to evaluate if there is the potential for Site groundwater to impact downgradient receptors.

Following completion of the above-described scope of work, an RI report will be prepared documenting the investigation results. An FS will also be prepared to evaluate potential remedial alternatives for the Site.

SECTION 3.0
ENVIRONMENTAL SETTING

3.1 Topography and Drainage

The elevation of the Site is approximately 65 feet above mean sea level (MSL) and the surface drainage is predominantly to the southwest, as controlled by Site topography. Since the surface grade at the Site is generally flat and the majority of the Site is paved or covered by the Site buildings, most of the surface water runoff is captured by on-Site stormwater leaching pools. The regional topographic gradient was obtained from the US Geological Survey Freeport, NY 7.5-minute topographic quadrangle (1979). The topographic gradient in the vicinity of the Site slopes gently to the southwest at the average rate of approximately 26 feet per mile (0.5 percent). There are no natural surface water bodies (streams, rivers, or lakes) within one mile downgradient of the Site.

3.2 Soil and Surface Geology

To assess the soil types at the Site, the U.S. Soil Conservation Service Soil Survey for Nassau County, New York (1987) was reviewed. The Site was determined to be underlain by "Urban land - Hempstead Complex " soil. The Urban land-Hempstead complex soil is generally described as silt loam which has been urbanized.

The surficial geology of the Site was obtained from US Geological Survey Water-Supply Paper 1613-A entitled "Geology and Ground-Water Conditions in Southern Nassau and Southeastern Queens Counties, Long Island, N.Y." (1963). The surface materials at the Site (prior to urbanization) consisted of glacial outwash deposits of the Wisconsinan glaciation. These deposits include stratified sand and gravel which were deposited in meltwater stream channels and outwash plains.

3.3 Geology

The generalized regional geology of the Site area consists of a base of Precambrian crystalline bedrock predominantly composed of schist and gneiss overlain by the Cretaceous Lloyd Sand Member of the Raritan Formation. The Lloyd Sand Member is predominantly composed of light-colored sand and gravel and lenses of clay and silty clay.

The clay member of the Raritan Formation overlies the Lloyd Sand Member and acts as a confining unit. It is referred to as the Raritan Clay. The Raritan Clay is composed of multicolored clay, silt, and some very fine-grained to fine-grained sand.

Overlying the Raritan Formation is the Cretaceous Magothy Formation which consists of nonfossiliferous beds and lenses of gray and white fine-grained quartz sand, clayey and silty sand, and clay.

The upper Pleistocene Glacial Deposits overlie the Magothy Formation in the Site vicinity. These deposits consist primarily of stratified sand, silt, and gravel outwash deposits and are approximately 100 feet thick beneath the Site.

Site-specific geologic information was obtained from boring logs prepared by EEA in 1986 and from observations recorded during the SI. In general, fill material consisting of brown to dark brown sandy loam is present to a depth of approximately two to three feet beneath the Site. Beneath the fill material is approximately 100 feet of upper Pleistocene Glacial Deposits. These deposits consist of well-graded to poorly-graded fine to coarse-grained sand with gravel.

The base of the upper Pleistocene Glacial Deposits was observed in the boring for well MW-6 at a depth of 105 feet and was marked by a dark silty sand and clay. Several silt or clay intervals were also noted in the lower portion of the Upper Pleistocene Glacial Deposits above this contact. Generally, a

brown/gray to orange-brown silt and fine sand with fine gravel is present in the Magothy Formation below the Upper Glacial Deposits.

3.4 Hydrogeology

There are two primary aquifers beneath the Site. The Upper Glacial Aquifer is a shallow water table aquifer and is associated with the upper Pleistocene Glacial Deposits. The depth to water in the Site area is approximately 25 to 30 feet and the base of the Upper Glacial Aquifer is approximately 100 feet below grade. Therefore, this aquifer has a saturated thickness of approximately 70 to 75 feet beneath the Site. The regional groundwater flow direction across the Site is generally to the south-southwest.

The deeper aquifer is the Magothy Aquifer, which underlies the Upper Glacial Aquifer. It is estimated to be approximately 400 feet thick in the Site area and is associated with the Magothy Formation. The regional groundwater flow direction in this aquifer is also to the south-southwest.

Beneath the Magothy Aquifer, the Raritan Clay is expected to be present and act as a confining layer beneath the Magothy Aquifer.

The water table elevation and the regional flow direction in the vicinity of the Site were obtained from the March, 1997 Nassau County Water Table Elevation map (NCDPW, 1997). The groundwater elevation at the Site is approximately 35 feet above MSL. Based on a surface elevation of approximately 65 feet, the depth to groundwater below ground surface at the Site is approximately 30 feet. This is consistent with the depth to groundwater measurements obtained during the SI and previous investigations. The generalized regional horizontal groundwater flow direction in the Site area is south-southwest.

Site-specific groundwater flow direction information was obtained during the Phase II Investigation (EEA, 1987) and indicated that the groundwater at the Site flows generally to the south. Additional

groundwater level measurements were obtained during the SI and indicate a similar groundwater flow direction. Groundwater elevation contours determined during the 1999 SI are shown on Plate 2.

An estimate of the average hydraulic conductivity of the Upper Glacial Aquifer for the Site area is given in the U.S. Geological Survey Paper 627-E, "Water Transmitting Properties of Aquifers on Long Island, New York" (1972). The estimated average hydraulic conductivity for the Site area is 250 cubic feet per day per square foot ($ft^3/d/ft^2$).

3.5 Climatology

The Site is located in Nassau County, New York. The Nassau County climate is characterized as coastal, being influenced by the adjacent water masses. The prevailing wind directions are northeast and south, reflecting the dominance of the cold Arctic air masses in the winter and cooling ocean breezes in the summer. Rainfall averages between 42 and 45 inches per year (USGS, 1963). Water losses occur due to evapotranspiration and direct runoff with the remainder of the precipitation being recharged to the aquifers. This recharge predominately occurs in the late fall and early spring.

SECTION 4.0
PROPOSED REMEDIAL INVESTIGATION

Based on a review of the previous sampling results and historical records for the Site, additional data needs were identified to fully characterize the nature and extent of contamination at the Site and to evaluate potential remedial actions for the Site. The following data needs were noted and will be addressed during the RI/FS:

- Evaluation of the lateral extent to the north, east, and west of near-surface soil contamination present in the 50 by 50-foot area;
- Evaluation of the lateral and vertical extent of soil contamination present in the vicinity of former surface soil samples SS-1 and SS-4. The evaluation of the SS-1 area will also include the area of well MW-8 and behind the adjoining one-story building;
- Evaluation of the lateral extent of contamination identified in leaching pool D-2;
- Additional groundwater data from wells MW-1 and MW-7 and groundwater data from an appropriate well located at the adjoining property to the southwest; and
- Performance of a receptor survey to evaluate potential impacts to downgradient groundwater receptors.

Additional data needs were also noted, however, these data needs are proposed to be addressed following the RI/FS and were discussed with the NYSDEC and NYSDOH on September 2, 1999. These additional data needs include the following:

- The depth of pesticide-impacted soil in the 50 by 50-foot area is not well defined. It is proposed to address this issue by confirmatory sampling during remediation;

- The extent of pesticide-impacted soil located on the southeast portion of the Site has not been fully evaluated. Additional soil sampling is proposed in the vicinity of SS-6 and SS-7 to evaluate the vertical and lateral extent of impacted soil.
- The downgradient extent of the pesticide-impacted groundwater has not been defined beyond well MW-5. It is proposed to utilize the results of the receptor survey to evaluate the need for additional downgradient monitoring wells. Well MS-5 will also be resampled to evaluate downgradient groundwater quality.

The following sections present the proposed RI field investigation scope and procedures, analytical methods, and quality assurance/quality control procedures. The CPP is presented in Section 5 and the HASP is included in Appendix A.

4.1 Proposed RI Scope of Work

4.1.1 Soil Sampling near the 50 by 50-Foot Area

Soil samples were obtained at various depths from four locations in the 50 by 50-foot area during the SI. Pesticides which exceeded their respective NYSDEC Objectives were present in most of the samples and primarily included the pesticides heptachlor and alpha and gamma chlordane. Based on the SI data, it appears that the Site soil in the 50 by 50-foot area is impacted with pesticides, but that the depth of the impact varies. Issues regarding the depth of impacted soil will not be addressed in the RI/FS, as previously discussed.

The lateral extent of the soil contamination at depth appears to be limited, however, the lateral extent of the near-surface soil contamination was not clearly defined. Therefore, additional soil sampling was recommended to assess potential off-Site impacts to the west, north, and east of the 50 by 50-foot area.

Based on discussions at a September 2, 1999 meeting with the NYSDEC, it was agreed that one near-surface (0 to three inches below grade) soil sample would be collected from each of three off-Site locations on the west, north, and east sides of the 50 by 50-foot area. The proposed sampling locations (SS-8 through SS-10) are shown on Plate 3. In addition, one deeper soil sample (three to four feet below grade) would be collected from the location to the west of the 50 by 50-foot area (SS-8), near the former GP-4 location. Each of these samples will be analyzed for Target Compound List (TCL) pesticides as described in Section 4.2. The results from these samples will be utilized to evaluate potential off-Site impacts to soil in the vicinity of the 50 by 50-foot area.

4.1.2 Soil Sampling in the Vicinity of SS-4

Near surface soil sample SS-4, collected during the SI, exhibited elevated concentrations of pesticides. SS-4 was collected from soil located adjacent to a concrete-paved area on the northeast corner of the Site in the general vicinity of the 50 by 50-foot area. This soil may have originated from the 50 by 50-foot area. Additional soil sampling is proposed to delineate the vertical and lateral extent of impacted soil in the vicinity of SS-4.

Based on discussions with the NYSDEC, it was agreed that four near-surface (0 to three inches below grade) soil samples would be collected from the vicinity of SS-4. Three sample locations (SS-11 through SS-13) will be located on-Site to the south, west, and north, respectively, of SS-4 and one sample location (SS-14) will be located off-Site to the east of SS-4 (see Plate 3). In addition, one subsurface soil sample will be obtained from three to four feet below grade at the SS-4 location. Each of these samples will be analyzed for TCL pesticides as described in Section 4.2. The results from these samples will be utilized to evaluate the vertical and lateral extent of impacted soil previously identified at SS-4.

4.1.3 Soil Sampling in the Vicinity of SS-1 and MW-8

Near-surface soil sample SS-1, collected during the SI, exhibited elevated concentrations of pesticides. SS-1 was collected from beneath the asphalt pavement of the driveway on the western portion of the Site. Nearby well MW-8 exhibited elevated concentrations of pesticides. Additional soil sampling is proposed to delineate the vertical and lateral extent of impacted soil in the vicinity of SS-1 and to evaluate soil conditions in the vicinity of MW-8 and behind the nearby one-story building.

Based on discussions with the NYSDEC, it was agreed that four near-surface (zero to three inches below grade) and deeper (three to four feet below grade) soil samples would be collected from nine locations (SS-15 through SS-23) in the vicinity of SS-1 and MW-8 as shown on Plate 3. In addition, a deeper soil sample will be collected at the SS-1 location. Each of these samples will be analyzed for TCL pesticides as described in Section 4.2. The results from these samples will be utilized to evaluate the vertical and lateral extent of impacted soil previously identified at SS-1 and to evaluate soil conditions in the vicinity of MW-8 and the adjoining building.

4.1.4 Soil Sampling in the Vicinity of SS-6 and SS-7

Near-surface soil samples SS-6 and SS-7, collected during the SI, exhibited somewhat elevated concentrations of pesticides. Additional soil sampling is proposed to delineate the vertical and lateral extent of impacted soil in the vicinity of these locations.

Based on discussions with the NYSDEC, it was agreed that four near-surface (zero to three inches below grade) would be collected from four locations (SS-24 through SS-27), in the vicinity of SS-6 and SS-7, as shown on Plate 3. In addition, a deeper soil sample will be collected at each of the SS-6 and SS-7 locations. Each of these samples will be analyzed for TCL pesticides as described in Section 4.2. The

results from these samples will be utilized to evaluate the vertical and lateral extent of impacted soil previously identified at SS-6 and SS-7.

4.1.5 Leaching Pool D-2 Soil Sampling

Sediments in leaching pool D-2 were sampled during the SI and found to contain elevated concentrations of pesticides. The lateral extent of pesticide soil contamination from the sediments in D-2 is unknown. This information is necessary to evaluate potential remedial alternatives for the impacted sediments in D-2. Therefore, it is proposed to obtain two subsurface soil samples at each of two locations approximately five feet from the outer edge of the D-2 structure for the purpose of evaluating the lateral and vertical extent of potential soil contamination associated with D-2.

Based on discussions with the NYSDEC it was agreed that soil samples would be obtained from 9 to 10 feet and 14 to 15 feet below grade at locations D-2A and D-2B (see Plate 3). Each of these samples will be analyzed for TCL pesticides as described in Section 4.2. The results from these samples will be utilized to evaluate the vertical and lateral extent of potential impacted in the vicinity of leaching pool D-2.

4.1.6 Groundwater Sampling

Groundwater sampling performed during the SI was intended to evaluate groundwater conditions downgradient of the presumed source area (50 by 50-foot area). However, previous data suggest that an upgradient off-Site source may be present. In addition, a second potential source of groundwater contamination may be present on the west side of the Site. The downgradient extent of this contamination has not been evaluated. Groundwater samples were not collected from off-Site well MW-7 or on-Site well MW-1 during the SI; it was recommended that additional groundwater data be collected from wells MW-1 and MW-7 during the RI/FS. In addition, if possible, groundwater data should be obtained from an

appropriately-located groundwater monitoring well on the adjoining property to the southwest of the Site and well MW-5 should be resampled. The proposed groundwater sampling locations are shown on Plate 3.

Each of the groundwater samples will be analyzed for TCL pesticides and TCL volatile organic compounds (VOCs) as described in Section 4.3. The results from these samples will be utilized to evaluate the potential of an upgradient off-Site source and to evaluate the extent of impacted groundwater downgradient of the southwest side of the Site.

4.1.7 Receptor Survey

It was also recommended in the SI to perform a receptor survey of the area within one-half mile downgradient of the Site to evaluate the potential for human exposure to groundwater via either private or public drinking water wells of other types of wells (irrigation, cooling water, etc.). The results of the receptor survey will be used together with the additional and previously-collected groundwater data to evaluate potential remedial alternatives for the Site.

4.2 Soil Sampling Procedures

Soil sampling will be performed using several methodologies, including a Geoprobe sampling rig and a hand auger. In general, a decontaminated stainless steel hand auger will be used to obtain the near-surface and deeper soil samples in the unpaved areas and a Geoprobe sampling rig will be used to obtain the soil samples from paved areas. The soil samples obtained using a Geoprobe will be contained in a decontaminated large-bore or Macro-core sampler lined with a disposable acetate sleeve. The retrieved soil samples will be screened with a photoionization detector (PID) to evaluate the potential presence of organic vapors and then the material from the pre-selected sampling interval will be homogenized by

placing the material from the entire sample interval into a decontaminated stainless steel bowl and mixing the sample prior to placement in the sample jars.

Each homogenized sample will be transferred to a laboratory-supplied sample container using a dedicated sampling spoon. Each sample container will be labeled with the Site location, boring number, depth interval, date and time of sampling, and analysis to be performed. The labeled sample containers will be placed in laboratory-supplied coolers with ice packs to depress the temperature to four degrees Celsius. A chain-of-custody form will be completed and kept with the samples in the cooler to document the sequence of sample possession. The filled sample cooler will be delivered by an overnight courier to the laboratory on the day following sample collection. The proposed chemical analytical laboratory is Severn Trent Laboratories of Monroe, Connecticut. This laboratory is a NYSDOH-certified ELAP facility and the analyses were performed using USEPA Contract Laboratory Protocol (CLP) with NYSDEC ASP Category B deliverables. All soil samples will be analyzed for TCL pesticides by USEPA Method 8081A.

4.3 Groundwater Sampling Procedures

FPM will attempt to obtain permission from the owner of the property located adjoining the southwest side of the Site to sample one of the existing wells at this property. If permission is granted, FPM will access an appropriately-located well, evaluate its configuration, and determine that it is functioning properly. This evaluation will be performed by first determining the well depth and the depth to water. Only a well that is screened across the water table and is completed between 5 and 15 feet below the water table will be used for sampling purposes. To confirm that the selected well is functioning properly, approximately one gallon of water will be purged from the well and then the static water level will be re-measured to confirm that the selected well is hydraulically connected to the aquifer.

At each well to be sampled, the depth to the static water level and depth of the well will be measured. Then a decontaminated Teflon bailer or a decontaminated submersible pump will be used to purge a minimum of three to a maximum of five casing volumes of water from each well. Following the removal of each casing volume, field parameters, including pH, turbidity, specific conductivity, and temperature, will be monitored. When all stability parameters vary by less than 10 percent between the removal of successive casing volumes, the wells will be sampled. Well sampling forms documenting the well purging and sampling procedures will be completed.

Following purging, sampling will be performed. Samples will be obtained using dedicated disposable polyethylene bailers suspended from dedicated cotton or polypropylene lines. The retrieved samples will be decanted into laboratory-supplied sample containers. Each sample container will be labeled, transported, and tracked as described in Section 4.2. The groundwater samples will be analyzed by a NYSDOH-certified laboratory for TCL pesticides and TCL VOCs. The analytical methods used will be as per ASP 95-1. The detection limits for these methods are included in Appendix B.

Following well sampling, a survey will be performed in which the relative elevation of the top of the PVC casing for the recently-sampled well on the adjoining property to the southwest will be determined to the nearest 0.01 foot. The static water levels for each of the Site wells will be measured and will be used in conjunction with the previously-surveyed well casing elevations to calculate the Site-specific groundwater flow direction.

4.4 Receptor Survey Procedures

A receptor survey will be performed to evaluate the potential for public exposure to Site groundwater. The depth to groundwater at the Site is approximately 30 feet below grade and, as discussed in Section 3.1, there are no natural surface water bodies (streams, rivers, or lakes) which might receive

groundwater discharge within one mile downgradient of the Site. Therefore, it appears that there are no surface water receptors for groundwater discharge originating from the Site.

A survey of public and private supply wells within one-half mile downgradient of the Site will be conducted to evaluate the potential presence of groundwater receptors. The NYSDEC databases of public water supply wells and other types of wells (irrigation, non-contact cooling water, etc.) will be accessed and reviewed to evaluate if any of these types of wells are located within one-half mile downgradient of the Site.

To identify potential private wells, a survey will be performed by examining each residence or other building in this area from the vantage point of public streets to confirm that a public water supply connection is present as evidenced by the presence of a water meter or street markings. A list of properties which do not appear to have a public water supply connection will be compiled and transmitted to the local public water supply company (Village of Hempstead Water District) which will be requested to confirm that each of the listed addresses has a public water supply connection. The Nassau County Department of Health will also be contacted for information regarding the potential for private wells in this area. These data will be evaluated to ascertain if a potential for public exposure to Site groundwater is present.

4.5 RI Report and Feasibility Study

Following completion of the RI, an RI Report will be prepared documenting the investigation procedures and results. An FS will also be prepared to evaluate potential remedial alternatives for the Site. The FS will be prepared in accordance with the NYSDEC-approved RI/FS WP, and in a manner consistent with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), the National Contingency Plan (NCP), and the guidance documents identified in the Order on Consent.

4.6 Waste Management

During soil sampling at the Site, soil samples that are not retained for analysis will be replaced into the boring from which they were collected or will be placed on the ground in the vicinity of the borehole.

During purging prior to groundwater sampling, the produced water will be discharged onto the ground in the vicinity of the wells and allowed to infiltrate.

4.7 Quality Assurance/Quality Control

The Data Quality Objectives (DQOs) for the RI/FS will be applicable to all data-gathering activities at the Site. DQOs will be incorporated into sampling, analysis, and quality assurance tasks associated with the investigation.

The primary data user for this project is FPM. The secondary data user will be the data validator. NYSDEC will also be provided with the data. No other data users are anticipated.

The collected data are intended to assess the nature and extent of soil and groundwater impacts at the Site. These data will allow for the evaluation and possible implementation of potential remedial alternatives.

For this project, field screening will be performed during soil and groundwater sampling. Field screening includes monitoring for organic vapors in the soil samples prior to placement in the sample jars and in the air in the work zone using a Photovac MicroTIP PID and visual observations of soil or groundwater characteristics. All readings and observations will be recorded by the FPM hydrogeologist in his or her field notebook.

4.7.1 Applicable or Relevant and Appropriate Requirements

The following applicable or relevant and appropriate requirements for the Site have been identified:

- The NYSDEC Recommended Soil Cleanup Objectives (TAGM #HWR-94-4046, 1995) which are used to evaluate soil sample chemical analytical results; and
- The NYSDEC Class GA Ambient Water Quality Standards (1998) which are used to evaluate the groundwater chemical analytical results.

4.7.2 Quality Assurance/Quality Control Procedures

Quality Assurance/Quality Control (QA/QC) procedures will be utilized during the performance of the RI/FS field work to ensure that the resulting chemical analytical data accurately represent subsurface conditions at the Site. The following sections include descriptions of the QA/QC procedures to be utilized.

Equipment Decontamination Procedures

All non-disposable downhole equipment (i.e., Geoprobe rods, submersible pump) used during the subsurface investigation will be decontaminated by washing in a potable water and Alconox solution and rinsing in potable water prior to use at each location to reduce the potential for cross contamination. All sampling equipment will be either dedicated disposable equipment or will be decontaminated prior to use at each location. For groundwater sampling, dedicated disposable bailers will be used to obtain groundwater samples. The decontamination procedures utilized for all non-disposable equipment sampling equipment will be as follows:

1. The equipment will be scrubbed in a bath of potable water and low-phosphate detergent followed by a potable water rinse;
2. The equipment will be rinsed with distilled water; and
3. The equipment will be allowed to air dry, if feasible, and wrapped in aluminum foil (shiny side out) for storage and transportation.

QA/QC Samples

The decontamination procedures will be evaluated by the use of equipment blank samples. These samples consist of aliquots of laboratory-supplied water which are poured over or through the dedicated or decontaminated sampling equipment and then submitted to the laboratory for analysis. An equipment blank sample will be prepared for each matrix for each day that sampling is conducted at the Site and will be analyzed for the target constituents for that day. The equipment blanks will be labeled in a manner to prevent identification by the analytical laboratory.

Trip blank samples will be utilized to evaluate the potential for VOC cross-contamination between samples in the same cooler. Trip blank samples consist of aliquots of laboratory water which are sealed in sample bottles at the laboratory and which are then transported to the field with the empty sample bottles. A trip blank will be placed in each cooler containing samples to be analyzed for VOCs and will be managed in the field and analyzed in the laboratory in the same manner as the primary environmental samples.

Blind duplicate samples for each matrix will be obtained at a frequency of at least one per every 10 environmental samples (10 percent) and will be used to attest to the precision of the laboratory. A blind duplicate consists of a separate aliquot of sample collected at the same time, in the same manner, and analyzed for the same parameters as the primary environmental sample. The blind duplicate samples are labeled in a manner such that they cannot be identified by the laboratory. The sample results are compared to those of the primary environmental sample to evaluate if the results are similar.

Matrix spike/matrix spike duplicate (MS/MSD) samples will be collected at a frequency of one per 20 environmental samples for each matrix. The purpose of the MS/MSD samples is to confirm the

accuracy and precision of laboratory results based on a particular matrix. The MS/MSD results will be evaluated during the preparation of the Data Usability Summary Report (DUSR) as discussed below.

Chain-of-Custody Procedures

For each day of sampling, chain-of-custody (COC) sheets will be completed and submitted to the laboratory with the samples collected that day. A copy of each COC sheet will be retained by FPM for sample tracking purposes. Each COC sheet will include the project name, the sampler's signature, the sampling locations and intervals, and the analytical parameters requested.

Data Usability Summary Report

All chemical analytical results will be evaluated by the Quality Assurance Officer (QAO) using the sample data packages, sample data summary packages, and case narratives provided by the analytical laboratory. The resume of the proposed QAO is included in Appendix C. The data evaluation will be performed to verify that the analytical results are of sufficient quality to be relied upon to assess the potential contamination in the soil and groundwater at the Site.

SECTION 5.0
CITIZENS PARTICIPATION PLAN

A Citizen Participation Plan (CPP) will be implemented during the RI/FS at the Harder Site. This CPP was prepared in accordance with the NYSDEC CPP Guidebook (NYSDEC June, 1998) and 6NYCRR Part 375.5. The purpose of the CPP is to promote public understanding of the proposed remedial program.

This CPP is a working document. The CPP program of community relation activities is flexible and may be changed over the course of the RI/FS to accommodate community interests as well as new information generated during the RI/FS.

5.1 Site Background and Project Description

The Site background information and RI/FS tasks to be performed at the Harder Site are fully explained in the preceding sections of this RI/FS WP. The purpose of the RI/FS is to more fully delineate the extent of soil and groundwater contamination at the Site and to provide information necessary to evaluate potential remedial actions.

5.2 Interested/Affected Members of the Public

The following is an initial list of contacts for the Site. This list will be updated throughout the RI/FS process to ensure that it includes all interested people.

Village of Hempstead Offices

The Honorable James Garner
Mayor
99 Nichols Court
Hempstead, New York
489-3400

Tax and Water Department
99 Nichols Court
Hempstead, New York
489-3400

Engineering Department
99 Nichols Court
Hempstead, New York
489-3400

Village of Rockville Centre Offices

Mr. Richard Tobin
Superintendent of Water Utilities
Village of Rockville Centre
Water Department
142 Maple Avenue
Rockville Centre, NY 11570

Town of Hempstead Offices

Mr. Joseph Simone
Superintendent of Water Plant
Town of Hempstead
Water Department
PO Box 32
Hempstead, NY 11550

County Offices

The Honorable Thomas Gulotta
Nassau County Executive
1 West Street
Mineola, New York
571-3131

Nassau County Legislature
1 West Street
Mineola, New York
571-6200

Ms. Karen Murphy
County Clerk
Nassau County
240 Old Country Road
Room 109
Mineola, NY 11501

Ms. Cynthia Brown
Public Information Officer
Nassau County Department of Health
240 Old Country Road
Mineola, NY 11501

State Offices

The Honorable Dean Skelos
New York State Senate
55 Front Street
Rockville Centre, NY 11570

The Honorable Earlene Hooper-Hill
New York State Assembly
80 N. Franlin Street, Ste. 304
Hempstead, NY 11550

Local Newspapers

Newsday
Long Island Desk
235 Pinelawn Road
Melville, NY 11747-4250

Mr. Peter Mastro
Nassau Newsgroup
216 E. 2nd Street
Mineola, NY 11501

Beacon Newspaper
Assignment Desk
1 Jonathon Avenue
Hicksville, NY 11801

Hempstead Times
Assignment Desk
167 Henry Avenue
Hempstead, NY 11550

Ms. Maggie Whitely
Editor
Nassau Illustrated
2nd Street
Mineola, NY 11501

Business Interests

Hempstead Chamber of Commerce
80 N. Franklin Street
Hempstead, NY 11550

Mr. Louis Mirando
President
Long Island Water Corporation
733 Sunrise Highway
Lynbrook, NY 11563

Civic Groups

Citizen Action of New York
90 Pennsylvania Avenue
Massapequa, NY 11758
541-1006

Citizens Campaign for the Environment
518 Broadway
Massapequa, NY 11758
798-6556

Hempstead Community
Action Program
134 Jackson Avenue
Hempstead, NY 11550

Hempstead Hispanic Civic Association
232 Main Street
Hempstead, NY 11550

Hempstead Jewish Center
94 Fulton Avenue
Hempstead, NY 11550

School District

Hempstead Public Schools
District Office
185 Peninsula Boulevard
Hempstead, NY
292-7001

Local Residents

Residents in the vicinity of the Site and any other persons who contact the NYSDEC regarding environmental matters at the Site will be included in the contact list.

5.3 New York State Department of Environmental Conservation Contacts

The following NYSDEC personnel may be contacted for information regarding the Site:

NYSDEC Project Manager

David A. Camp, P.E.
Project Engineer
Bureau of Eastern Remedial Action, Room 242
Division of Environmental Remediation
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-7010
(518) 457-7924

NYSDOH Contact

Jacquelyn Nealon
Health Specialist
NYS Department of Health
Flanigan Square
547 River Street
Troy, NY 12180
1-800-458-1158, ext. 27880

NYSDEC Inactive Hazardous Waste Disposal Site Program Information Number:

1-800-342-9296
Calls are recorded 24 hours a day. Calls are returned during business hours.

5.4 Document Repositories

The following locations will serve as repositories for documents related to remedial activities at the Site. Documents in the repositories are available for public review and copying.

Local Library

Hempstead Public Library
115 Nichols Court
Hempstead, New York
481-6990
contact: Reference Desk

NYSDEC Office

NYSDEC Offices
SUNY at Stony Brook
Building 40
Stony Brook, New York
(631) 444-0240

Documents that will be included in the repositories as they become available include:

Site Assessment Update Report
Remedial Investigation Work Plan
Remedial Investigation Report
Citizen Participation Plan
Health and Safety Plan
Fact Sheets
Other Pertinent Documents

5.5 Specific Citizen Participation Activities

This section describes the citizen participation activities that are planned during the RI/FS process. These activities satisfy the requirements of 6 NYCRR Part 375.7. All citizen participation materials will be approved by the NYSDEC prior to their release to the public.

Completion of RI/FS WP

- Prepare Citizen Participation Record. The Citizen Participation Record and associated Site Issues and Community Profile Sheet will be initiated by the Site owner's consultant and submitted to the

NYSDEC Project Manager for review and approval. Blank copies of these documents are included in Appendix D.

- Establish a local document repository. An information repository will be established at each of the locations described in Section 5.4. The available documents will be placed in the repositories. Other Site-related documents will be placed in the repositories as they become available over the course of the project.
- Preparation of fact sheet. A fact sheet providing information regarding the Site will be prepared, approved by the NYSDEC, and disseminated to the public contact list after the RI/FS WP is finalized. A copy of the fact sheet will also be placed in the document repositories.

Other CP Activities

Additional citizen participation activities will be planned as remedial activities continue and Site conditions warrant. Citizen participation activities will satisfy the requirements of 6 NYCRR Part 375.7 and will be approved by the NYSDEC. Additional activities may include mailing of Fact Sheets, placement of documents into the repositories, press notices, and/or public meetings.

5.6 Glossary of Key Terms

Key terms and phrases used in the CPP are defined in this section.

Site Placed on Registry of Inactive Hazardous Waste Disposal Sites: Each inactive site known or suspected of containing hazardous waste must be included in the Registry. Therefore, all sites which state or county environmental or public health agencies identify as known or suspected of having received hazardous waste should be listed in the Registry as they are identified. Whenever possible, the NYSDEC carries out an initial evaluation at the site before listing.

Remedial Investigation (RI/FS): A process to determine the nature and extent of contamination by collecting data and analyzing the site. The RI/FS includes sampling and monitoring, as necessary, and the gathering of sufficient information to determine the necessity for, and proposed extent of, a remedial program for the site.

Feasibility Study (FS): A process for developing, evaluating, and selecting remedial actions using data gathered during the remedial investigation to: define the objectives of the remedial program for the site and broadly develop remedial action alternatives; perform an initial screening of these alternatives; and, perform a detailed analysis of a limited number of alternatives which remain after the initial screening stage.

Remedial Design: Once a remedial action has been selected, technical drawings and specifications for remedial construction at a site are developed as specified in the final RI/FS report. Design documents are used to bid and construct the chosen remedial actions. Remedial design is performed by consulting professionals with experience in Inactive Hazardous Waste Disposal Site remedial actions.

6 NYCRR Part 375.7: State regulations establishing citizen participation requirements for Inactive Hazardous Waste Disposal Sites.

Citizen Participation: A process to inform and involve the public in the decision-making process during identification, assessment, and remediation of Inactive Hazardous Waste Disposal Sites. This process helps to assure that the best decisions are made from environmental, human health, economic, social and political perspectives.

Citizen Participation Plan (CPP): A document that describes the site-specific citizen participation activities that will take place to complement the "technical" (remedial) activities.

Citizen Participation Specialist: A NYSDEC staff member within the Division of Public Affairs and Education who provides guidance, evaluation, and assistance to help the project manager carry out his/her site-specific citizen participation program.

Contact List: Names, addresses, and/or telephone numbers of individuals, groups, organizations, and media interested and/or affected by a particular hazardous waste site. Interest in the site, stage of remediation, and other factors guide how comprehensive the list becomes. It is used to assist the NYSDEC and to inform and involve the public.

Document Repository: Typically, a regional NYSDEC office and/or public building, such as a library, near a particular site at which documents related to remedial and citizen participation activities at the site are available for public review. Provides access to documents at times and a location convenient to the public.

Downgradient: A term used to describe an area of relatively lower groundwater elevation. Groundwater flows from upgradient to downgradient areas.

Fact Sheet: A written discussion of a site's remedial process, or some part of it, prepared by the NYSDEC for the public in easily understandable language. A fact sheet will be prepared for the general public or a particular segment. Uses may include, for example: discussion of an element of the remedial program, opportunities for public involvement, availability of a report or other information, or announcement of a public meeting. The fact sheet will be mailed to all or part of the interested public, distributed at meetings and be available at sessions or sent on an "as requested" basis.

Groundwater: Water found beneath the earth's surface that fills pores between materials such as sand, soil, and gravel and also may fill cracks in bedrock. Groundwater is the source of drinking water on Long Island.

Order on Consent: A legal and enforceable negotiated agreement between the NYSDEC and responsible parties where responsible parties agree to undertake investigation and remediate or pay for the costs of investigation and remedial work at a site. The order includes a description of the remedial actions to be undertaken at the site and a schedule for implementation.

Potentially Responsible Parties: Individuals, companies (e.g. site owners, operators, transporters, or generators of hazardous waste) potentially responsible for or contributing to the contamination problems at a hazardous waste site.

Public Meeting: A scheduled gathering of the NYSDEC staff and the public to give and receive information, ask questions, and discuss concerns. A public meeting will take one of the following forms: large-group meeting called by the NYSDEC; participation by the NYSDEC at a meeting sponsored by another organization such as a town board or Department of Health; a working group or workshop; or, a tour of the hazardous waste site.

Public Notice: A written or verbal informational technique for telling people about an important part of a site's remedial program coming up soon (example: announcement that the report for the RI/FS is publicly available and a public meeting has been scheduled). The public notice may be formal and meet legal requirements (for example: what it must say, such as announcing beginning of a public comment period as well as where, when and, how is it published).

Site Classification: The NYSDEC assigns sites to classifications established by state law, as follows:

- Classification 1 - A site causing or presenting an imminent danger of causing irreversible or irreparable damage to the public health or environment - immediate action required.
- Classification 2 - A site posing a significant threat to the public health or environment - action required.

- Classification 2a - A temporary classification for a site known or suspected to contain hazardous waste. Most likely the site will require a Phase I and Phase II investigation to obtain more information. Based on the results, the site then would be reclassified or removed from the State Registry if found not to contain hazardous waste.
- Classification 3 - A site which has hazardous waste confirmed, but not a significant threat to the public health or environment - action may be deferred.
- Classification 5 - A site which has been properly closed, with no evidence of present or potential adverse impact - no further action required.

Upgradient: A term used to describe an area of relatively higher groundwater elevation. Groundwater flow from upgradient to downgradient areas.

SECTION 6.0
REFERENCES

Energy & Environmental Analysts, Inc., March 1987. *Engineering Investigation at Inactive Hazardous Site, Phase II Investigation.*

Fanning, Phillips and Molnar, May, 1999. *Site Assessment Update Report for Harder Tree Services, 63 Jerusalem Avenue, Hempstead, New York, NYSDEC Registry # 130035.*

Fanning, Phillips and Molnar, September, 1998. *Site Assessment Update Work Plan for Harder Tree Services, NYSDEC Site # 130035.*

Nassau County Department of Public Works, 1997. *March, 1997 Nassau County Water Table Elevation.*

New York State Department of Environmental Conservation, July 16, 1999 letter commenting on Site Assessment Update Report.

New York State Department of Environmental Conservation, June, 1998. *Citizen Participation in New York's Hazardous Waste Site Remediation Program: A Guidebook.*

New York State Department of Environmental Conservation, March 8, 1998. *Water Quality Regulations for Surface Waters and Groundwaters.*

New York State Department of Environmental Conservation, April, 1995. *Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels, TAGM HWR-94-4046.*

New York State Department of Health, August 6, 1999 letter commenting on Site Assessment Report.

Suffolk County Department of Health Services, June, 1999. *Water Quality Monitoring Program to Detect Pesticide Contamination in Groundwaters of Nassau and Suffolk Counties, NY.*

U.S. Geological Survey, 1979. *Freeport Quadrangle.*

U.S. Geological Survey, 1972. *Water Transmitting Properties of Aquifers on Long Island, New York.*

U.S. Geological Survey, 1963. *Water-Supply Paper 1613-A, "Geology and Ground-Water Conditions in Southern Nassau and Southeastern Queens Counties, Long Island, NY".*

U.S. Soil Conservation Service, 1987. *Soil Survey for Nassau County, New York.*

TABLE 1
PROPOSED SCHEDULE FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY
HARDER TREE SERVICES
63 JERUSALEM AVENUE, HEMPSTEAD, NEW YORK

Task		Months													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Execute Consent Order	*														
NYSDEC Perform Citizen Participation Activities (document repository, fact sheet)															
Perform Remedial Investigation															
Prepare RI Report															
NYSDEC Review and Approval															
Prepare Feasibility Study															
NYSDEC Review and Approval															

APPENDIX A

HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN
HARDER TREE SERVICES SITE
REMEDIAL INVESTIGATION

This Health and Safety Plan (HASP) will present health and safety procedures for the soil and groundwater sampling Remedial Investigation (RI) tasks. Subcontractors will be provided with a copy of the HASP, however, it is the responsibility of the subcontractor to implement the HASP or any other health and safety measures it deems appropriate. FPM will not assume responsibility for the health and safety of the subcontractors at the Harder Tree Services site (Site).

Soil Sampling

The soil sampling will be performed by FPM personnel. Near-surface soil samples (0 to three inches below grade) and subsurface soil samples (three to four feet below grade) will be obtained in unpaved areas using a decontaminated stainless steel hand auger. Geoprobe sampling to obtain near-surface and subsurface soil samples in paved areas will be performed by subcontractors. FPM personnel will be present to observe the Geoprobe operations and to transfer soil samples from the Geoprobe sampler to laboratory containers. In general, FPM will employ one to two persons at the Site. No sampling or other Site operations will be conducted by subcontractors without the presence of an FPM representative on Site. In the event that the Health and Safety Officer (HSO) is not present on the Site, the Assistant HSO will implement the HASP.

Based on the Site history and previous analyses of samples, it has been determined that the known chemical compounds of potential concern consist of pesticides in the soil and groundwater beneath the Site.

The reasonable pathway for workers at the Site to become exposed to pesticides is through inhalation of pesticide-containing dust particulates. To minimize the potential for dust inhalation

at the Site, the HSO will assess wind, vegetation, and soil moisture conditions and, if deemed necessary by the HSO, the affected area will be wetted with potable water. If this measure is determined to be ineffective, the HSO may decide to upgrade personal protection to Level C respiratory protection to include respirators with dust cartridges. If extremely windy and dusty conditions exist, the HSO may choose to postpone the sampling until such time as conditions improve.

Organic vapor concentrations will be monitored in the work zone by utilizing a Photovac MicroTIP Photoionization Detector (PID) or a Century 128 Organic Vapor Analyzer (OVA). The calibration of these instruments is described in later sections. Background organic vapor concentrations will then be established in the work zone prior to soil sampling and recorded in the HSO field book.

Upon commencement of sampling using the Geoprobe, PID (or OVA) readings will be obtained in the workers' breathing zone and in the vicinity of the sampling area. All readings and observations will be recorded in the HSO field book. Air monitoring will be conducted by FPM personnel.

Steady-state readings greater than five parts per million (ppm) in the worker's breathing zone will require upgrading to Level C personal protective equipment. Steady-state readings, for this purpose, will be defined as readings exceeding five ppm above background for a minimum of 10 seconds. If readings exceed five ppm in the sampling area, readings will then be obtained at points in the vicinity of each worker in the sampling area. These points will define each worker's breathing zone.

Upon encountering PID (or OVA) levels greater than five ppm above background in the worker's breathing zone, all personnel will be evacuated from the work zone in the upwind

direction. Specific evacuation routes will be discussed prior to commencement of work at each location based on work location and wind direction. In addition, an evacuation meeting place will be determined. Wind-direction telltales will be placed in the work zone to monitor wind direction. Level C personal protection will be implemented including full-face air-purifying respirators with dust and organic vapor cartridges (personal protective equipment will be described in greater detail in subsequent sections). All FPM personnel and subcontractors must be properly trained and fit tested prior to donning respirators. If, at any time, readings exceed steady-state levels greater than 50 ppm above background, or any conditions exist which the HSO determines will require Level B personal protective equipment, all work at the Site will cease immediately and all personnel will evacuate the work zone. Evacuation will occur in the upwind direction if discernable. Level B conditions are not anticipated to be encountered; however, if level B conditions arise, no Site work will be performed by FPM or contractors and a complete evaluation of the operation will be performed and this HASP will be modified.

All subcontractor and FPM personnel will be required to wear chemical-resistant gloves (such as butyl or nitrile) when the potential for dermal contact with soil or liquids is possible. This will include cleaning and handling of sampling equipment. Dermal contact with soil and liquids and equipment that has been in contact with the soil and liquids will be avoided.

Physical hazards related to powered equipment operations will be present during sampling. These hazards include potential injury or death due to inappropriate contact with powered equipment. Of particular concern are risks associated with equipment backing up, materials dropped from heights, and rotating or pivoting equipment. All Site workers will be briefed about these hazards prior to starting work and workers unfamiliar with powered equipment operations shall be paired with an experienced partner for at least one day to familiarize themselves with the

appropriate procedures. In addition, all Site workers shall be required to wear steel-toe boots for foot protection and hard hats for protection if overhead hazards are present.

Water Level Measurement and Groundwater Sampling Safety Analysis

Water level measurements and groundwater sampling will be performed by FPM personnel. In general, FPM will employ one to two persons at the Site. No water level measurements or groundwater sampling is anticipated to be done by contractors.

Based on the Site history and previous analysis of samples, it has been determined that the chemical compounds of potential concern consist of pesticides in the groundwater.

If warranted, organic vapor concentrations will be monitored in the work zone during water level monitoring and groundwater sampling by utilizing a PID. The PID will be "zeroed" by exposing the PID to a canister of hydrocarbon-free air (<0.1 parts per million (ppm) hydrocarbons). Background concentrations will then be established in the work zone prior to opening the wells and recorded in the HSO field book.

Upon opening the wells, PID reading will be obtained from the open casings, At the discretion of the HSO, PID readings may be obtained more frequently. All readings and observations will be recorded in the HSO field book. PID air monitoring will be conducted by FPM personnel.

Steady-state PID readings greater than five ppm in the worker's breathing zone will require upgrading to Level C personal protective equipment. Steady-state readings, for this purpose, will be defined as readings exceeding five ppm above background for a minimum of ten seconds. If readings exceed five ppm within the open well casing, readings will then be obtained at points approximately one foot above and then around the casing opening. These points will define the worker's breathing zone.

Upon encountering PID levels greater than five ppm above background in the worker's breathing zone, all personnel will be excavated from the work zone in the upwind direction. Specific evacuation routes will be discussed prior to commencement of work at each location based on work location and wind direction. In addition, an evacuation meeting place will be determined. Wind-direction telltales will be placed in the work zone to monitor wind direction. Level C personal protection may be implemented including full-face air-purifying respirators with dust and organic vapor cartridges (personal protective equipment will be described in greater detail in Subsection 7.7). All FPM personnel must be properly trained and fit tested prior to donning respirators. If, at any time, PID readings exceed steady-state levels greater than 50 ppm above background, or any conditions exist which the HSO determine will require Level B personal protective equipment, all work at the Site will cease immediately and all personnel will evacuate the work zone. Evacuation will occur in the upwind direction if discernable. Level B conditions are not anticipated to be encountered; however, if Level B conditions arise, no Site work will be performed by FPM or contractors and a complete evaluation of the operation will be performed and this HASP will be modified.

All personnel will be required to wear chemical-resistant gloves (such as butyl or nitrile) when the potential for dermal contact with the groundwater is possible. This will include cleaning and handling of retrieved water level indicators, bailers, and rope from the borehole. Dermal contact with groundwater and equipment that has been in contact with groundwater will be avoided. For handling sample containers, thin nitrile gloves may be used if dexterity is required. In addition, eye protection will be worn by samplers during periods when the potential for splashing of groundwater is present (such as during well bailing).

Other Safety Considerations

Noise

During soil sampling using a Geoprobe, operation of generators, or any other operation which may generate potentially harmful levels of noise, the HSO will monitor noise levels with a Realistic[tm] hand-held sound level meter. Noise levels will be monitored in decibels (dBs) in the A-weighted, slow-response mode. Noise level readings which exceed the 29 CFR 1910.95 permissible noise exposure limits will require hearing protection (see Table 1 for permissible noise exposures).

Hearing protection will be available to all Site workers and will be required for exceedance of noise exposure limits. The hearing protection will consist of foam, expansion-fit earplugs (or other approvable hearing protection) with an Environmental Protection Agency noise reduction rating of at least 29 dB. Hearing protection must alleviate worker exposure to noise to an eight-hour time-weighted average of 85 dB or below. In the event that the hearing protection is inadequate, work will cease until a higher level of hearing protection can be incorporated.

Slip/Trip/Fall Preventative Measures

To reduce the potential for slipping, tripping, or falling, the work zone will be kept clear of unnecessary equipment. In addition, all Site workers will be required to wear work boots with adequate tread to reduce the potential for slipping (work boots must be leather or chemical-resistant and contain steel toes and steel shanks).

Insects

Insect problems are expected to be minimal. Potential insect problems include, but are not limited to, bees, wasps, hornets, and ticks. Prior to commencement of work, each work area will be surveyed for nests and hives to reduce the possibility of disturbing these insects. In addition,

TABLE 1
PERMISSIBLE NOISE EXPOSURES*
HARDER TREE SERVICES SITE
63 JERUSALEM AVENUE
HEMPSTEAD, NEW YORK

Duration Per Day (Hours)	Sound Level Slow Response dBA
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
½	110
¼ or less	115

Notes:

- When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: $C_1/T_1+C_2/T_2$ C_n/T_n exceeds unity, then, the mixed exposure should be considered to exceed the limit value. Cn indicates the total time of exposure at a specified noise level, and Tn indicates the total time of exposure permitted at that level.

- Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

- *Standards derived from 29 CFR 1910.95

each Site worker will be asked to disclose any allergies related to insect stings or bites. The worker will be requested to keep his or her anti-allergy medicine on Site.

Tick species native to Long Island consist of the pinhead-sized deer tick and the much-larger dog tick. Ticks are unlikely to exist at the Site due to a paucity of suitable habitat. All Site workers will be advised to avoid walking through tall grassy areas where possible and will be advised to check for ticks on clothing periodically.

Heat/Cold Stress

Heat stress may become a concern especially if protective clothing is donned which will decrease natural ventilation. To assist in reducing heat stress the following measures will be taken:

- An adequate supply of water or other liquids will be brought on Site. To prevent dehydration, personnel will be encouraged to drink generous amounts of water even if not thirsty.
- A shady rest area will be designated (such as beneath the trees in the northeast corner of the property) to provide shelter during sunny days.
- In hot weather, workers wearing protective clothing may be rotated.

When the temperature is over 70 degrees Fahrenheit and personnel are wearing protective clothing, heat stress monitoring may be implemented as follows:

- Heart rate may be measured by counting the radial pulse for 30 seconds at the beginning of the rest period. The heart rate should not exceed 110 beats per minute. If the rate is higher, the next work period will be shortened by ten minutes (or 33%). If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle

will be shortened by 33%. The HSO will decide on the length of work periods and rest periods based on Site conditions.

- Body temperature may be measured, if deemed necessary, at the beginning of the rest period. Oral temperature should not exceed 99 degrees Fahrenheit. If it does, the next work period will be shortened by ten minutes (or 33%). However, if the oral temperature exceeds 99.7 degrees Fahrenheit at the beginning of the next period, the following work cycle will be further shortened by 33%. Work will not re-commence until by temperature has dropped below 99 degrees Fahrenheit.

Indications of heat stress range from mild (fatigue, irritability, anxiety, decreased concentration, dexterity or movement) to fatal. Medical help will be obtained for serious conditions.

Heat-related problems are:

- Heat rash: caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat as well as being a nuisance.
- Heat cramps: caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Signs: muscle spasm and pain in the extremities and abdomen.
- Heat exhaustion: caused by increased stress on various organs to meet increased demands to cool the body. Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.
- Heat stroke: the most severe form of heat stress. Can be fatal. Medical help must be obtained immediately. Body must be cooled immediately to prevent severe injury and/or

death. Signs: red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

Cold exposure is a concern if work is conducted during cold weather or marginally cold weather during precipitation periods or moderate to high wind velocity periods. To assist in reducing cold exposure the following measures will be taken:

- All personnel will be required to wear adequate and appropriate clothing. This will include head gear to prevent the high percentage loss of heat that occurs in this area (thermal liners for hard hats if hard hats are required).
- Provide a readily available warm shelter near each work zone.
- Carefully schedule work and rest periods to account for the current temperature and wind velocity conditions.
- Monitor work patterns and physical condition of workers and rotate personnel, as necessary.

Indications of cold exposure range from shivering, dizziness, numbness, confusion, weakness, impaired judgement, impaired vision to drowsiness. Medical help will be obtained for serious conditions if they occur.

Cold exposure related problems are:

- Frost bite: Ice crystal formation in body tissues. The restricted blood flow to the injured part results in local tissue destruction.
- Hypothermia: Severe exposure to cold temperature resulting in the body losing heat at a rate faster than the body can generate heat. The stages of hypothermia are shivering, apathy, loss of consciousness, decreasing pulse rate and breathing rate and death.

Potential Electrical Hazards

Potential electric hazards consist mainly of overhead and underground power lines. Prior to commencement of work at the Site, all work locations will be inspected with respect to overhead lines. Geoprobe masts will not be raised when the horizontal distance between the mast and overhead wires is less than 10 feet. Prior to Site mobilization, all work locations will be inspected for the presence of overhead wires.

Available as-built Site blueprints will be used to avoid contact with subsurface utility lines or structures. In addition, the Site owner shall be consulted regarding the potential presence of subsurface utilities at each sampling location.

The Buddy System

All activities in contaminated or potentially contaminated areas will be conducted by pairing off the Site workers in groups of two (or three if necessary). Each person (buddy) will be able to:

- Provide his or her partner with assistance.
- Observe his or her partner for signs of chemical or heat exposure.
- Periodically check the integrity of his or her partner's protective clothing.
- Notify the HSO or others if emergency help is needed.

The buddy system will be instituted at the beginning of each work day. If new workers arrive on Site, a buddy will be chosen prior to the new worker entering the work zone.

Site Communications

Two sets of communication systems will be established at the Site: internal communication among personnel on-Site, and external communication between on-Site and off-Site personnel.

Internal communication will be used to:

- Alert team members to emergencies.
- Pass along safety information such as heat stress check, protective clothing check, etc.
- Communicate changes in the work to be accomplished.
- Maintain Site control.

Due to ambient noise, verbal communications may be difficult at times. The HSO will carry a whistle (and compressed air horn if respirators are donned) to signal Site workers. A single whistle blast will be the signal to immediately evacuate the work zone through the access control point. This signal will be discussed with all Site workers prior to commencement of work.

An external communication system between on-Site and off-Site personnel will be established to:

- Coordinate emergency response
- Report to the Project Manager
- Maintain contact with essential off-Site personnel

A field telephone will be available at all times in the HSO's vehicle. In addition, the nearest stationary phone will be identified prior to the commencement of Site operations and this location will be relayed to all Site workers.

General Safe Work Practices

Standing orders which will be applicable during Site operations are as follows:

- No smoking, eating, drinking, or application of cosmetics in the work zone.
- No matches or lighters in the work zone.
- All Site workers will enter/exit work zone through the Site access point.

- Any signs of contamination, radioactivity, explosivity, or unusual conditions will require evacuating the Site immediately and reporting the information to the HSO.
- Loose fitting clothing or loose long hair will be prohibited in the work zone during powered equipment operations.
- A signal person will direct the backing of work vehicles.
- Equipment operators will be instructed to check equipment for abnormalities such as oozing liquids, frayed cables, unusual odors, etc.

Personnel Training Requirements

All FPM personnel and subcontractor personnel will receive adequate training prior to entering the Site. FPM and contractor's personnel will, at a minimum, have completed OSHA-approved, 40-hour hazardous materials Site safety training and OSHA-approved, eight-hour safety refresher course within one year prior to commencing field work. The HSO will have received the OSHA-approved, eight-hour course on managing hazardous waste operations. In addition, each worker must have a minimum of three days field experience under the direct supervision of a trained, experienced supervisor.

Prior to Site field work, the HSO will conduct an in-house review of the project with respect to health and safety with all FPM personnel who will be involved with field work at the Site. The review will include discussions of signs and symptoms of chemical exposure and heat stress that indicate potential medical emergencies presented in Table 2. In addition, review of personal protective equipment will be conducted to include the proper use of air-purifying respirators.

TABLE 2
SIGNS AND SYMPTOMS OF EXPOSURE TO CHEMICALS
DETECTED AT THE HARDER TREE SERVICES SITE
63 JERUSALEM AVENUE
HEMPSTEAD, NEW YORK

Type of Hazard	Signs and Symptoms
Chemical Hazard	Behavioral changes Breathing difficulties Changes in complexion of skin color Coordination difficulties Coughing Dizziness Drooling Diarrhea Fatigue and/or weakness Irritability Irritation of eyes, nose, respiratory tract, skin or throat Headache Light-headedness Nausea Sneezing Sweating Tearing Tightness in the chest
Heat Exhaustion	Clammy skin Confusion Dizziness Fainting Fatigue Heat rash Light-headedness Nausea Profuse sweating Slurred speech Weak pulse
Heat Stroke (may be fatal)	Confusion Convulsions Hot skin, high temperature (yet may feel chilled) Incoherent speech Staggering gait Sweating stops (yet residual sweat may be present) Unconsciousness

Medical Surveillance Program

All workers at the Site must participate in a medical surveillance program in accordance with 29 CFR 1910.120. A medical examination and consultation must have been performed within the last twelve months to be eligible for field work.

The content of the examination and consultation will include a medical and work history with special emphasis on symptoms related to the handling of hazardous substances, health hazards, and fitness for duty including the ability to wear required personal protective equipment under conditions (i.e., temperature extremes) that may be expected at the work Site.

All medical examinations and procedures shall be performed by, or under the supervision of, a licensed physician.

The Physician shall furnish a written opinion containing:

- The results of the medical examination and tests.
- The physician opinion as to whether the employee has any detected medical conditions which would place the worker at increased risk of material impairment of the employee's health from work in hazardous waste operations.
- The physician's recommended limitations upon the worker assigned to the work.
- A statement that the worker has been informed by the physician of the results of the medical examination and any further examination or treatment.

An accurate record of the medical surveillance will be retained. The record will consist of at least the following information:

- The name and social security number of the employee.
- Physician's written opinions, recommended limitations, and results of examinations and tests.

- Any worker medical complaints related to exposure to hazardous substances.

Personal Protective Equipment

General Considerations

The two basic objectives of the personal protective equipment (PPE) are to protect the wearer from safety and health hazards, and to prevent the wearer from incorrect use and/or malfunction of the PPE.

Potential Site hazards have been discussed previously. The duration of Site activities is estimated to be two to three days. All work is expected to be performed during daylight hours and workdays, in general, are expected to be eight to ten hours in duration. Any work performed beyond daylight hours will require the permission of the HSO. This decision will be based on the adequacy of artificial illumination and the type and necessity of the task being performed.

Personal protection levels for the Site activities, based on past investigations, are anticipated to be Level D with the possibility of upgrading to Level C. The equipment included for each level of protection is provided as follows:

Level C Protection

Personnel protective equipment

- Air-purifying respirator, full-face
- Chemical-resistant clothing includes: Tyvek™ (spunbonded olefin fibers) for particulate and limited splash protection or Saranex™ (plastic film-laminated Tyvek) for permeation resistance to solvents.
- Coveralls*, or
- Long cotton underwear*
- Gloves (outer), chemical-resistant

- Gloves (inner), chemical-resistant
- Boots (outer), leather or chemical-resistant, steel toe and shank.
- Boot covers (outer), chemical-resistant (disposable)*
- Hard hat (face shield)*
- Escape mask*
- 2-way radio communications (inherently safe)*

(*) optional

Criteria for Selection of Level C Protection

Meeting all of these criteria permits use of Level C Protection:

- Oxygen concentrations are not less than 19.5% by volume.
- Measured air concentrations of identified substances will be reduced by the respirator below the substance's threshold limit value (TLV).
- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any body area left unprotected by chemical-resistant clothing.
- Job functions do not require self-contained breathing apparatus.
- Direct readings are below 50 ppm on the OVA.

Level D Protection

Personnel protective equipment:

- Coveralls
- Gloves*
- Boots/shoes, leather or chemical-resistant, steel toe and shank.
- Safety glasses or chemical splash goggles*
- Hard hat (face shield*)

- Escape mask*

(*) optional

Criteria for Selection of Level D Protection

Meeting any of these criteria allows use of Level D Protection:

- No contaminant levels above 5 ppm organic vapors or dusty conditions are present.
- Work functions preclude splashes, immersion, or the reasonable potential for unexpected inhalation of any chemicals above the TLV.

Additional Considerations for Selecting Levels of Protection

Another factor which will be considered in selecting the appropriate level of protection is heat and physical stress. The use of protective clothing and respirators increases physical stress, in particular, heat stress on the wearer. Chemical protective clothing greatly reduces natural ventilation and diminishes the body's ability to regulate its temperature. Even in moderate ambient temperatures, the diminished capacity of the body to dissipate heat can result in one or more heat-related problems.

All chemical protective garments can be a contributing factor to heat stress. Greater susceptibility to heat stress occurs when protective clothing requires the use of a tightly fitted hood against the respirator face piece, or when gloves or boots are taped to the suit. As more body area is covered, less cooling takes place, increasing the probability of heat stress.

Wearing protective equipment also increases the risk of accidents. It is heavy, cumbersome, decreases dexterity, agility, interferes with vision, and is fatiguing to wear. These factors all increase physical stress and the potential for accidents. In particular, the necessity of

selecting a level of protection will be balanced against the increased probability of heat stress and accidents.

Donning and Doffing Ensembles

Donning an Ensemble

A routine will be established and practiced periodically for donning a Level C ensemble. Assistance may be provided for donning and doffing since these operations are difficult to perform alone.

Table 3 lists sample procedures for donning a Level C ensemble. These procedures should be modified depending on the particular type of suit and/or when extra gloves and/or boots are used.

Doffing an Ensemble

Exact procedures for removing Level C ensembles must be established and followed to prevent contaminant migration from the work area and transfer of contaminants to the wearer's body, the doffing assistant, and others.

Doffing procedures are provided in Table 4. These procedures should be performed only after decontamination of the suited worker. They require a suitably attired assistant. Throughout the procedures, both worker and assistant should avoid any direct contact with the outside surface of the suit.

Respirator Fit Testing

The fit or integrity of the facepiece-to-face seal of a respirator affects its performance. Most facepieces fit only a certain percentage of the population; thus each facepiece must be tested on the potential wearer in order to ensure a tight seal. Facial features such as scars, hollow temples, very prominent cheekbones, deep skin creases, dentures or missing teeth, and the

TABLE 3
SAMPLE DONNING PROCEDURES
HARDER TREE SERVICES SITE
63 JERUSALEM AVENUE
HEMPSTEAD, NEW YORK

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1. Inspect the clothing and respiratory equipment before donning (see Inspection in subsection 7.4).

2. Adjust hard hat or headpiece if worn, to fit user's head.

3. Standing or sitting, step into the legs of the suit; ensure proper placement of the feet within the suit; then gather the suit around the waist.

4. Put on chemical-resistant safety boots over the feet of the suit. Tape the leg cuff over the tops of the boots.

5. Don the respirator and adjust it to be secure, but comfortable.

6. Perform negative and positive respirator facepiece seal test procedures.

   - To conduct a negative-pressure test, close the inlet part with the palm of the hand or squeeze the breathing tube so it does not pass air, and gently inhale for about 10 seconds. Any inward rushing of air indicates a poor fit. Note that a leaking facepiece may be drawn tightly to the face to form a good seal, giving a false indication of adequate fit.

   - To conduct a positive-pressure test, gently exhale while covering the exhalation valve to ensure that a positive pressure can be built up. Failure to build a positive pressure indicates a poor fit.

7. Depending on type of suit:

   - Put on inner gloves (surgical gloves).

   - Additional overgloves, worn over attached suit gloves, may be donned later.

8. Put on hard hat

9. Have assistant observe the wearer for a period of time to ensure that the wearer is comfortable, psychologically stable, and that the equipment is functioning properly.

TABLE 4
DOFFING PROCEDURES
HARDER TREE SERVICES SITE
63 JERUSALEM AVENUE
HEMPSTEAD, NEW YORK

1. Remove any extraneous or disposable clothing, boot covers, outer gloves, and tape.

2. Remove respirator by loosening straps and pulling straps over the top of the head and move mask away from head. Do not pull mask over the top of the head.

3. Remove arms, one at a time, from suit, avoiding any contact between the outside surface of the suit and wearer's body and lay the suit out flat behind the wearer. Leave internal gloves on, if any.

4. Sitting, if possible, remove both legs from the suit.

5. After suit is removed, remove internal gloves by rolling them off the hand, inside out.

chewing of gum and tobacco may interfere with the respirator-to-face seal. A respirator shall not be worn when such conditions prevent a good seal. The worker's diligence in observing these factors shall be evaluated by periodic checks. Fit testing will comply with 29 CFR 1910.1025 regulations.

Inspection

The PPE inspection program will entail five different inspections:

- Inspection and operational testing of equipment received from the factory or distributor.
- Inspection of equipment as it is issued to workers.
- Inspection after use.
- Periodic inspection of stored equipment.
- Periodic inspection when a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arise.

The inspection checklist is provided in Table 5. Records will be kept of all inspection procedures. Individual identification numbers will be assigned to all reusable pieces of equipment and records should be maintained by that number. At a minimum, each inspection should record the ID number, date, inspector, and any unusual conditions or findings. Periodic review of these records may indicate an item or type of item with excessive maintenance costs or a particularly high level of down-time.

Storage

Clothing and respirators will be stored properly to prevent damage or malfunction due to exposure to dust, moisture, sunlight, damaging chemicals, extreme temperatures, and impact. Storage procedures are as follows:

TABLE 5
PPE INSPECTION CHECKLIST
HARDER TREE SERVICES SITE
63 JERUSALEM AVENUE
HEMPSTEAD, NEW YORK

CLOTHING

Before use:

- Determine that the clothing material is correct for the specified task at hand.
- Visually inspect for:
  - imperfect seams
  - non-uniform coatings
  - tears
  - malfunctioning closures
- Hold up to light and check for pinholes.
- Flex product:
  - Observe for cracks
  - Observe for other signs of shelf deterioration
- If the product has been used previously, inspect inside and out for signs of chemical attack:
  - discoloration
  - swelling
  - stiffness

During the work task, periodically inspect for:

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind, however, that chemical permeation can occur without any visible effects.
- Closure failure
- Tears
- Punctures
- Seam discontinuities

TABLE 5 (CONTINUED)
PPE INSPECTION CHECKLIST
HARDER TREE SERVICES SITE
63 JERUSALEM AVENUE
HEMPSTEAD, NEW YORK

GLOVES

Before use:

- Pressurize glove to check for pinholes. Either blow into glove, then roll gauntlet toward fingers or inflate glove and hold under water. In either case, no air should escape.

AIR-PURIFYING RESPIRATORS

- Inspect air-purifying respirators:
  - before each use to be sure they have been adequately cleaned
- Check material conditions for:
  - signs of pliability
  - signs of deterioration
  - signs of distortion
- Examine cartridges to ensure that:
  - they are the proper type for the intended use
  - the expiration date has not been passed
  - they have not been opened or used previously
- Check faceshields and lenses for:
  - cracks
  - crazing
  - fogginess
- Air purifying respirators will be stored individually in resealable plastic bags.

Clothing:

- Potentially contaminated clothing will be stored in an area separate from street clothing.
- Potentially contaminated clothing will be stored in a well-ventilated area, with good air flow around each item, if possible.
- Different types and material of clothing and gloves will be stored separately to prevent issuing the wrong material by mistake.
- Protective clothing will be folded or hung in accordance with manufacturer's recommendations.

Respirators:

- Air-purifying respirators should be dismantled, washed, and placed in sealed plastic bags.

Maintenance

Specialized maintenance will be performed only by the factory or an authorized repair person. Routine maintenance, such as cleaning, will be performed by the personnel to which the equipment is assigned. Respirators will be cleaned at the end of each day with alcohol pads or, preferably, by washing with warm soapy water.

Decontamination Methods

All personnel, clothing, equipment, and samples leaving the contaminated (work zone) area of the Site must be decontaminated to remove any harmful chemicals or infectious organisms that may have adhered to them. Decontamination methods either (1) physically remove contaminants (2) inactivate contaminants by chemical detoxification or disinfection/sterilization, or (3) remove contaminants by a combination of both physical and chemical means. In many cases, gross contamination can be removed by physical means involving dislodging/displacement, rinsing, wiping off, and evaporation. Contaminants that can be removed by physical means include dust,

vapors, and volatile liquids. All reusable equipment (e.g. respirators) will be decontaminated by rinsing in a bath of detergent and water. Monitoring equipment will be decontaminated as described below.

All used PPE to be discarded will be placed in a solid waste refuse container and properly disposed.

The effectiveness of the decontamination will be evaluated near the beginning of Site activities and will be modified if determined to be ineffective. Visual observation will be used for this purpose. The HSO will inspect decontaminated materials for discoloration, stains, corrosive effects, visible dirt, or other signs of possible residual contamination.

Decontamination Procedures for Sampling and Monitoring Equipment

All sampling and monitoring equipment shall be decontaminated prior to, and following, use at each well or monitoring location. Decontamination procedures shall consist of the following:

1. Scrub equipment in a bath of low-phosphate detergent and potable water.
2. Potable water rinse.
3. 1% nitric acid rinse.
4. Potable water rinse.
5. Methane followed by hexane rinse.
6. Distilled water rinse, air dry.
7. Aluminum foil wrap, shiny side out, for transport.

Personal protective equipment decontamination has been discussed previously.

Calibration Procedures, Frequencies, and Maintenance

This section will present the calibration procedures, frequencies, and maintenance for the health and safety field monitoring instruments.

The use of each instrument is presented as follows (the manufacturer's owner's manuals for all equipment used will be present at the Site):

1. Photovac MicroTIP - this instrument is a photoionization detector (PID) that measures the concentration of airborne ionizable gases and vapors. The MicroTIP does not distinguish between individual compounds and will not read methane. The calibration will be performed with a cylinder of "zero gas" (hydrocarbon free air) to "zero" the instrument and a 100 ppm cylinder of isobutylene to calibrate the span.

2. Century Model OVA - 128 Portable Organic Vapor Analyzer (OVA) - this instrument is a flame ionization detector (FID) that measures the concentration of airborne ionizable gases and vapors. The OVA does not distinguish between individual compounds in the survey mode and the OVA will detect methane. The calibration will be performed with "zero gas" to "zero" the instrument. The span gas will be a 50 ppm concentration of methane. Background atmospheric concentrations of methane are generally two to four ppm, therefore, background concentrations of organic vapors at the Site will generally be obtained with the MicroTIP (which does not detect methane).

The calibration procedures and frequencies for each instrument are presented as follows:

<u>Photovac MicroTIP (Photoionization Detector)</u>

Isobutylene at 100 ppm in air will be used as Span Gas. A commercial zero grade gas will be used as the zero gas. To calibrate the instrument, use the Calibration Kit (Photovac Part No. 390033) as follows:

1. Connect the supplied regulator to the Span Gas cylinder. Hand tighten the fittings.
2. Open the valve on the gas bag by turning the valve stem fully counter clockwise.
3. Attach the gas bag adapter nut to the regulator. Hand tighten the fittings.
4. Turn the regulator knob counter clockwise about half turn to start the flow of gas.
5. Fill the gas bag about half full and then close the regulator fully clockwise to turn off the flow of gas.
6. Disconnect the bag from the adapter and empty it. Flush the bag a few times with the Span Gas and then fill it.
7. Close the gas bag by turning the valve clockwise.
8. Press SETUP and select the desired Cal Memory with arrow keys and press ENTER. Press EXIT to leave Setup.
9. Press CAL and expose MicroTIP to Zero Gas. Press ENTER and MicroTIP sets its zero point.
10. MicroTIP then asks for the Span Gas concentration. Enter the Known Span Gas concentration and then connect the Span Gas bag adapter to the inlet.
11. Press ENTER and MicroTIP sets its sensitivity.
12. When MicroTIP's display reverts to normal, MicroTIP is calibrated and ready for use. Remove the Span Gas bag from the inlet.

The instrument will be calibrated prior to the commencement of each day's work. The instrument will be charged overnight prior to each day's work.

Century Model OVA-128 Portable Organic Vapor Analyzer (OVA)

Calibration will be accomplished using a sample of a known concentration of methane in air as follows:

1. Place instrument in normal operation with CALIBRATE Switch set to X10 and GAS SELECT dial set to 300, and allow 20 minutes for warm up and stabilization.
2. Use the CALIBRATE ADJUST (zero) knob to adjust the meter reading to zero.
3. Introduce a methane sample of a known concentration and adjust trimpot R32 so the meter reading corresponds to the know sample.
4. Extinguish the flame by blocking the exhaust ports.
5. Leave CALIBRATE Switch on X10 position and use CALIBRATE ADJUST (zero) knob to adjust Readout meter reading to 4 ppm.
6. Move the CALIBRATE Switch to the X1 position and using trimpot R31, adjust Readout meter reading to 4 ppm.
7. Move CALIBRATE Switch to X10 position again. Use CALIBRATE ADJUST (zero) knob to adjust Readout meter to 40 ppm.
8. Move CALIBRATE Switch to X100 position and use trimpot R33 to adjust Readout meter to 40 ppm.
9. Move CALIBRATE Switch back to X10 scale. Rezero Readout meter to 0 ppm; reignite instrument.
10. Unit is now balanced over the full range, calibrated to methane, and ready to be placed in normal service.

OVA calibration will be performed prior to entering the Site. On a daily basis, the calibration span will be checked by exposing the OVA to a known concentration of methane. If the reading deviates by greater than ten percent, the calibration procedure (shown above) will be performed. The OVA will be charged overnight prior to each day's work. Also, hydrogen refills will be performed as needed at the FPM office.

Emergency Response Plan

This section will present the Emergency Response Plan (ERP) for the Site. Pre-emergency planning will consist of reviewing the ERP with all workers at the Site prior to initiation of work.

Personnel Roles

It is anticipated that during the sampling activities at the Site, in general, two to six persons will be on the Site: The HSO, the assistant HSO, and subcontractor personnel. Should an emergency situation arise at the Site, the HSO will assume control and decision-making. The HSO will also resolve all dispute concerning health and safety requirements and precautions. The HSO will also:

- Be authorized to seek and purchase supplies as necessary.
- Have control over activities of everyone entering the Site.

In the event that the HSO is not present at the Site, the assistant HSO will assume the duties of the HSO.

The HSO will communicate, by field telephone or other, with off-Site personnel to include the Project Manager to evaluate data and assist in the decision-making process. Phone numbers for the fire department, police, ambulance, poison control center, Suffolk County Department of Health Services, NYS Department of Environmental Conservation Spill Response Department, are listed on Table 6. The hospital which will be utilized during an emergency will be Island Medical Center (Hempstead General Hospital). The directions to the hospital, along with the hospital's emergency room phone number are presented on Table 6.

Copies of Table 6 will be available at the Site and will be placed in all vehicles of personnel involved in activities at the Site.

TABLE 6

Emergency Telephone Numbers
(Area Code 516)

Nassau County Police	911
Ambulance	911
Poison Control Center	542-2323
N.Y.S. Department of Environmental Conservation	444-0320
(Chemical Spills)	or 1-800-457-7362
Island Medical Center (Hempstead General Hospital) Emergency Room	560-1305

FPM Contact Personnel (737-6200)

Dr. Kevin J. Phillips, P.E.
Peter Dermody, Project Manager
Stephanie Davis/Senior Hydrogeologist/Health & Safety Officer

Directions to Island Medical Center (Hempstead General Hospital) (560-1305)

When exiting the Site, make a left onto Jerusalem Avenue and follow it Rutland Road. Make a left turn on to Rutland Road. Follow Rutland Road to the end. The hospital is located at the end of Rutland Road. Its main entrance is located on Front Street at 800 Front Street.

Internal communications will consist of a single whistle (or compressed air horn if Level C is donned) blast. This blast will signal all workers to evacuate the work zone by the nearest exit.

Response Follow-Up

Following an emergency, or incident, a detailed report will be generated by the HSO. All equipment will be restored to pre-emergency conditions. The HASP will be reviewed following an emergency to determine if it provides adequate information to assist in dealing with the emergency. The HASP may be revised to incorporate additional information as needed.

Emergency Recognition and Prevention

Before daily work assignments begin, each day a brief on-Site meeting will be held by the HSO which will address health and safety issues related to the day's work. Prior to initiation of work, a detailed on-Site health and safety meeting will be held to review all potential hazards, contingencies, and safety measures.

Safe Distances and Places of Refuge

The main potential cause of work zone evacuation is a significant vapor release. Vapor release evacuation will be discussed prior to drilling at each Site and in general will be in the upwind direction. Wind direction will be monitored at each work location and all workers will be notified of the direction of evacuation prior to commencement of work. Safe distances will be discussed at each location and determined by the HSO. The OVA will be used to determine if workers have evacuated a sufficient distance.

At all times, vehicles which may be utilized in an emergency for transport to the hospital (or other destination) will have clear access to leave the Site. The HSO will assure that an emergency vehicle does not become blocked-in by other vehicles.

Site Security and Control

The HSO will control entry of personnel into the work zone. No unnecessary person shall be permitted in the work zone.

Decontamination Procedures During Emergencies

In the event of a medical emergency, decontamination will be performed if it does not interfere with essential treatment. Decontamination will be performed by washing, rinsing, and/or cutting off protective clothing and equipment.

If decontamination cannot be performed, the victim will be wrapped in plastic to reduce contamination to other personnel. Emergency and off-Site medical personnel will be alerted to the potential contamination.

Emergency Medical Treatment and First Aid

Medical emergencies will be treated, in general, by medical experts by transporting the victim to the nearby hospital.

A first aid kit will be present on Site for minor medical treatment.

APPENDIX B

ANALYTICAL DETECTION LIMITS

REPORTING LIMITS

Volatile Organic Compounds
CLP with ASP 95

All Analytes: 10 ug/l for aqueous samples, 10 ug/kg for solid samples.

clients/Harder\Analytes

Reporting Limits
SW846 - 8081A Analysis

Waters	Reporting Limits Water ug/L	Reporting Limits Soil ug/Kg
alpha-BHC	0.05	1.7
beta-BHC	0.05	7.5
delta-BHC	0.05	1.7
gamma-BHC	0.05	1.7
Heptachlor	0.05	1.7
Aldrin	0.05	1.7
Heptachlor Epoxide	0.05	1.7
Endosulfan I	0.05	1.7
Dieldrin	0.10	3.3
4,4'-DDE	0.10	3.3
Endrin	0.10	3.3
Endosulfan II	0.10	3.3
4,4'-DDD	0.15	3.3
Endosulfan Sulfate	0.10	3.3
4,4'-DDT	0.10	3.3
Methoxychlor	0.50	17
Endrin Aldehyde	0.10	3.9
Endrin Ketone	0.10	3.3
alpha-Chlordane	0.05	1.7
gamma-Chlordane	0.05	1.7
Toxaphene	2.50	110
Technical Chlordane	0.20	17

APPENDIX C

QUALITY ASSURANCE OFFICER RESUME

STEPHANIE O. DAVIS, C.P.G., R.G., P.G.
Senior Hydrogeologist

Experience Summary
Ms. Davis has diversified experience in geology and hydrogeology. Her professional experience includes groundwater and soil investigations, design and management of soil remediation projects, design and installation of groundwater containment and remediation systems, groundwater flow modeling, aquifer testing and interpretation, evaluation of site compliance with environmental regulations, environmental permitting, and personnel training. Ms. Davis is a Registered Geologist in the States of California and Pennsylvania and is also registered as a Certified Professional Geologist (CPG).

Education

M.S.	Geology / University of Southern California	1984
B.S.	Geology / Bucknell University	1981

Associations/Certifications
OSHA 40-hour and Current 8-hour Health and Safety Training and Current Annual Physical
Certified Professional Geologist #9487, 1995
Pennsylvania Registered Geologist #PG-000529-G, 1994
California Registered Geologist #5192, 1991
Geological Society of America
National Ground Water Association
Long Island Geologists
American Institute of Professional Geologists

Employment History

1993-Present	Fanning, Phillips and Molnar
1992-1993	Chevron Research and Technology Co.
1990-1992	Chevron Manufacturing Co.
1984-1990	Chevron Exploration, Land and Production Company

Continuing Education
* Dames & Moore Interpretation of Chemical Analytical Data
* Treatment of Contaminated Soil and Rock
* Groundwater Pollution and Hydrology
* Environmental Law and Regulation
* Remedial Engineering
* Soil and Foundation Engineering

Key Projects
Chemical Analytical Data Evaluations - Performed numerous evaluations of soil, groundwater, and air chemical analytical data. Familiar with federal, state, and local regulatory standards and application to chemical analytical results.

Participated in week-long chemical analytical data interpretation class focused on interpretation of data, evaluation of laboratories, and review of QA/QC results.

Performed in-house data validation for investigation and remediation projects at an oil refinery.

Hydrogeologic Evaluations - Participated in a multi-day, multi-well aquifer pumping test for New York City Transit (NYCT) Lennox Avenue site. Responsible for operating and maintaining data logging equipment, coordinating manual water level measurements, and analyzing resulting drawdown data.

Evaluated subsurface geologic conditions for NYCT Avenue T site utilizing boring logs, topographic, and historic map data.

Supervised drilling, installation and development of groundwater extraction, injection, and monitoring wells at a USEPA Superfund site in Deer Park, NY. Interpreted aquifer and well performance from development data and made recommendations for modification of drilling and development procedures.

Performed water level and water quality monitoring at an industrial site in Mattituck, NY. Constructed groundwater elevation contour maps and utilized chemical analytical data to predict contaminant plume migration.

Used the PC-based modeling program FLOW PATH to predict groundwater flow directions and evaluate extraction well locations and pumping rates for a groundwater containment and remediation system at a City of Richmond former municipal landfill.

Performed slug tests on monitoring wells at NYCT sites, and evaluated hydrologic properties using the HYDROLOGIC ISOAQX computer program.

Performed aquifer pumping and slug tests and evaluated hydrologic properties using the computer program AQTESOLV.

Site Investigations - Managed on-site and off-site soil and groundwater sampling program at a manufacturing facility in Bay Shore, New York. Compiled resulting data and prepared a comprehensive report of the investigation results for the Suffolk County Department of Health Services (SCDHS) and NYS Department of Environmental Conservation (NYSDEC). Proposed remediation technologies for on-site soil contamination and on-site and off-site groundwater contamination.

Managed and conducted a soil and groundwater sampling program using a Geoprobe sampler adjacent to the Newark Airport Runway 29 for the Federal Aviation Administration. Analyzed resulting chemical data and prepared a report.

Participated in soil and groundwater sampling using a Geoprobe sampler at a manufacturing facility in Suffolk County, New York. Compiled, reviewed, and presented the resulting chemical analytical data to the client.

Managed site investigation activities, including soil vapor sampling, soil sampling and analysis, groundwater sampling and analysis, and geotechnical evaluation for sites in Commack and Miller Place, NY. The resulting data were utilized by a major supermarket company in the negotiations for the purchase of the properties and in the property remediation prior to development.

Supervised drilling, installation, development, and sampling of monitoring wells at two commercial sites in Farmingdale, New York. Utilized resulting stratigraphic, hydrologic, and chemical analytical data to evaluate site conditions.

Supervised and conducted drilling, soil sampling, cone penetrometer testing, and well installation at Chevron Corp. refinery process water effluent treatment system and a City of Richmond former municipal landfill.

Remediation - Designed soil remediation plan and managed contractor support for a metal parts plating and manufacturing facility in Suffolk County, New York. Soil remediation was overseen and approved by the SCDHS.

Designed and performed indoor underground storage tank abandonment program, leaching pool remediation plan, and managed contractor support for a tape measure manufacturing facility in Suffolk County, New York. SCDHS provided oversight and approval.

Participated in the design process and coordinated technical aspects of a groundwater containment and remediation system for a City of Richmond former municipal landfill, including subsurface groundwater barrier walls and extraction wells.