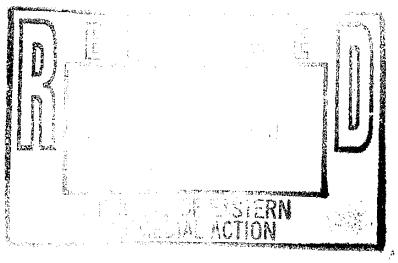
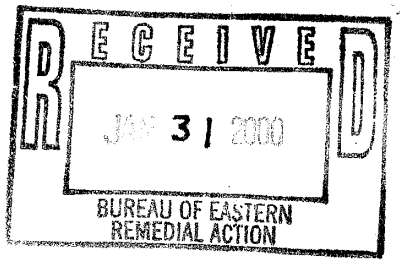
Fumex Sanitation Site

New Hyde Park, Nassau County, New York

North Hempstead (T)

Final Phase II Remedial Investigation Report





NYSDEC Site #1-30-041
Work Assignment #D002925-13

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Executive Summary

Camp Dresser & McKee (CDM) has been retained by the New York State Department of Environmental Conservation (NYSDEC) to prepare this Phase II Remedial Investigation (Phase II RI) Report for the Fumex Sanitation site under the New York State Superfund Contract (Work Assignment #D002925-22.) The Phase II RI was conducted between March and June 1998, in accordance with the NYSDEC Remedial Investigation/Feasibility Study (RI/FS) approved February 1998 work plan and Site Operations Plan. This RI Report discusses the findings of the RI and presents conclusions based on the results of the RI.

The primary objective of the Phase II RI for the Fumex Sanitation site was to define the nature and extent of pesticide contamination associated with the site and to provide necessary data to undertake a focused Feasibility Study. Completion of the Phase II RI met these objectives.

History and Physical Characteristics

The Fumex Sanitation site is located in a densely populated area at 131 Herricks Road in New Hyde Park, Nassau County, New York. The site encompasses approximately 1/3 acre of land and includes a one story masonry and metal frame building with no basement and a paved parking area. Fumex Sanitation, Inc. operated a commercial termite extermination business at this location from 1952 to 1992. The facility is currently unoccupied.

According to historical information, Fumex regularly sprayed its then unpaved parking lot with 1-2% chlordane for insect control from 1952 to 1978. In 1981, a drum of chlordane rinse water was spilled. Less than 30 gallons of the rinse water was spilled onto the asphalt parking lot behind the Fumex building. The rinse water entered two stormwater catch basins on the adjacent road (Bedford Avenue) and a dry well within the Fumex parking lot. Due to these activities, chlordane contaminated both the soil and groundwater beneath the site.

In 1986, NYSDEC entered into an Order on Consent with Fumex Sanitation, Inc. to determine the extent of chlordane in the soil and groundwater at the site and/or evaluate remedial alternatives. A limited site investigation was conducted in that same year. A second investigation was completed in 1989. In this same year, the Fumex site was included in the Registry of Inactive Hazardous Waste Disposal Sites in New York State.

In the spring of 1996, CDM was authorized by the New York State Department of Environmental Conservation (NYSDEC), under the State Superfund Standby Contract (SSSC), to conduct a limited Phase I investigation of the site in order to assess current chlordane concentrations within the onsite dry well sediments and in onsite groundwater. Based on the results of the Phase I RI, NYSDEC directed CDM in January of 1998 to develop a Phase II RI Scope of Work.

The Fumex site lies on a relatively flat and gentle topography at an elevation of approximately 95 feet above mean sea level (MSL). There is a slight increase in elevation to the east and west of the site. The site topography is primarily the result of drainage improvements both on-site and adjacent roadways.

There are three water-producing aquifers underlying the Fumex site: (1) the Upper Glacial aquifer, (2) the Magothy formation, and (3) the Lloyd sand of the Raritan formation (Smolensky, 1989). The Precambrian bedrock is considered the lower limit of the aquifer due to its relative impermeability.

Due to being in direct contact with site contamination, the most significant water bearing unit is the Upper Glacial aquifer which consists of highly permeable Pleistocene aged glacial outwash sands and gravels. The glacial outwash deposits are approximately 100 feet thick within the site area. Below the Upper Glacial aquifer exists the Magothy aquifer composed of Cretaceous sands, gravel and clay. The Magothy aquifer serves the primary source of drinking water for Nassau County.

Groundwater flow velocity within the Upper Glacial aquifer is estimated to be 2.25 feet per day. Depth to groundwater is approximately 45 feet below grade at the Fumex site; however, the water table may fluctuate by as much as seven feet due to seasonal changes in aquifer recharge.

There are a total of four public supply wells within a one-half mile radius of the Fumex site, all screened within the Magothy aquifer. There are no private supply wells within a 1,000 foot radius of the Fumex site.

Nature and Extent of Contamination

Soils

Soil contamination by pesticides is present within the Fumex site in excess of NYSDEC soil cleanup guidelines as defined in TAGM HWR-94-4046, dated January 24, 1998. The most significant soil contamination has been identified within soil located within the onsite drywell, as defined by the 1996 Phase I RI data, and within shallow surface soils, located immediately below the asphalt pavement to approximately two feet below grade, throughout the Fumex site parking lot. Sixteen out of the 21 listed TCL pesticides were detected within site soils. The six most frequently detected pesticides, in descending order of frequency, included:

- alpha-chlordane
- gamma-chlordane
- Heptachlor
- Dieldrin
- 4-4'-DDT
- 4-4'-DDE

The Phase I RI data indicated that shallow soil, from the bottom of the dry well to approximately three feet deep, were contaminated with a number of pesticides at concentrations well in excess of NYSDEC cleanup standards, including: delta BHC (5,400 ug/kg), heptachlor (1,700 ug/kg), Aldrin (1,100 ug/kg), alpha-chlordane (26,000 ug/kg) and gamma chlordane (30,000 ug/kg). Though pesticide concentrations generally decrease within soil samples collected at greater depths below the dry well, there is no consistent trend in decreasing concentrations with increasing soil depth. Pesticides were generally found to exceed NYSDEC soil cleanup standards in soil up to 15 feet below the dry well. Soil from 20 to 25 feet had detectable concentrations of pesticides but no one compound exceeded the soil cleanup guidelines. The sample collected from a depth of 45 to 50 feet

below the dry well exhibited delta-BHC (670 ug/kg), Heptachlor (320 ug/kg), alpha-chlordane (2,600 ug/kg) and gamma-chlordane (2,800 ug/kg), all in excess of the NYSDEC soil cleanup standard.

The Phase II RI data indicates relatively high pesticide concentrations (560 to 160,000 ug/kg) within shallow soil samples collected approximately one to two feet below the asphalt pavement of the Fumex site. Concentrations rapidly decrease with increasing depth, with several significant exceptions noted at MW-6. Based on the five Phase II RI sample points, shallow soil throughout the Fumex site parking lot exceed NYSDEC cleanup guidelines for up to nine different pesticide compounds, including:

Pesticide	Concentration Range for Shallow Soil (ug/kg)	NYSDEC std. (ug/kg)
■ Heptachlor	36,000 - 5,000	100
■ Aldrin	ND - 1,500	41
■ Dieldrin	2,700 - 16,000	44
■ 4-4'-DDE	90 - 14,000	2,100
■ Endrin	ND - 2,000	100
■ 4-4'-DDT	320 - 28,000	2,100
■ alpha-chlordane	10,000-120,000	540
■ gamma-chlordane	12,000 - 160,000	540
■ Endosulfan II	ND - 2,600	900

Pesticides exceeding NYSDEC cleanup guidelines are also present in deeper soils at several locations including: SB-11 (10 to 27 feet), SB-13 (50-55 feet), SB-14 (10-12 feet) and most significantly at MW-6 (5 to 17 feet). Additionally, most sample locations exhibit an increase in pesticide con-tamination at or below the water table with soil cleanup guidelines being exceeded for selected pesticides at : SB-11 (45-47 ft), SB-12 45-47 ft), SB-14 (55-57 ft) and at MW-6 (45-47 ft.).

Analysis of soil samples collected from MW-6 for TCL Volatile Organic Compounds and TCL semi-volatile organic compounds indicated only trace detections of 2-butanone (3 ug/kg) and tetra-chloroethene (3 ug/kg). The soil sample collected immediately below the asphalt pavement indicated trace levels of several semi-volatile compounds. All volatile and semi-volatile compounds were well below respective NYSDEC cleanup guidelines. Metals analysis indicates all 23 TAL metals to be well below respective NYSDEC soil cleanup guidelines.

The widespread nature of soil contamination identified within the Fumex site would not be indicative of a one-time release of contaminants, such as a spill. The data does suggest that surface soil contamination was the result of numerous releases of various pesticides within the parking lot, possibly occurring over a number of years prior to the area being paved. The presence of pesticides within dry well sediments may have occurred through direct discharge of rinse waters containing the pesticides or possibly runoff from the unpaved parking lot.

The variability of pesticide concentrations within site soil is likely a function of the relatively high soil/water partitioning coefficient of the pesticides and the non-uniform distribution of organic carbon in the glacial sands making up the site soil. TOC analysis of soil samples collected from MW-6 indicate TOC concentrations to be greatest in surface soils and then generally decrease with increasing depth, though TOC increases at 45-47 feet below grade. Due to a high soil/water partitioning coefficient, the pesticides will be relatively immobile in the soil environment and will tend to accumulate in areas of relatively higher TOC.

Groundwater

The Phase II RI groundwater data indicates groundwater contamination by numerous pesticides is present at the Fumex site within the upper zone of the Upper Glacial aquifer. However, offsite migration of this contamination does not appear to be significant, if occurring at all.

Nineteen (19) out of the twenty-one (21) listed TCL pesticides were detected in one or more samples collected from shallow onsite monitoring wells MW-1 through MW-5 during the four sample rounds (two Phase I and two Phase II RI sample rounds). The ten most frequently detected pesticides within shallow groundwater in descending order include:

Pesticide	Maximum Concentration (ug/l)	Well Location
■ gamma-chlordane	16.0	MW-1
■ alpha-chlordane	18.0	MW-1
■ 4-4' DDE	0.83	MW-1
■ Heptachlor Epoxide	0.61	MW-2
■ Dieldrin	4.30	MW-2
■ gamma-BHC (Lindane)	0.87	MW-3
■ Heptachlor	0.52	MW-5
■ 4-4'-DDT	1.3	MW-1
■ Aldrin	0.33	MW-1
■ Endrin	2.90	MW-2

Out of the 10 most frequently detected pesticides, MW-1 exhibited the highest recorded concentrations for six pesticide compounds, including alpha and gamma-chlordane, with MW-2 accounting for two and MW-3 and MW-5 each accounting for one. Monitoring well MW-1, MW-2 and MW-5 are located west to southwest (downgradient) of the drywell. Though MW-3 is located east of the drywell (upgradient) it is only 14 feet from the drywell manhole cover.

Virtually all positive detections of pesticides collected from onsite shallow well samples exceed the respective NYSDEC Class GA groundwater standard. In the case of the most commonly detected pesticides, such as Heptachlor Epoxide, gamma-chlordane and alpha-chlordane, concentrations exceed the GA standards of 0.04 to 0.05 ug/l by one to three orders of magnitude within onsite shallow groundwater.

Monitoring well MW-6 which is located downgradient of the drywell and screened within the upper zone of the Magothy aquifer exhibited trace concentrations of gamma-chlordane, 0.03 ug/l (qualified as estimated) in the first round and 0.057 ug/l in the second round groundwater sampling. It should be noted that the blind duplicate sample for the first round sample collected from MW-6 indicated all pesticides to be non-detectable.

Of the 11 offsite wells sampled during the Phase II RI, only one positive detection was observed over the two sample rounds. Dieldrin was detected at an estimated concentration of 0.03 ug/l within shallow upgradient monitoring well, MW-9S, in the first sample round but was not detected in the second round. The three Nassau County observation wells screened within the Upper Glacial aquifer, N-11738, N-11739, and N-12005 where found to be free of all TCL Pesticides. As discussed in Section 2.2, sampling conducted by the Nassau County Department of Public Works in November 1996 of N-12005 indicated the presence of chlordane at 1.0 ug/l and Heptachlor Epoxide at 0.2 ug/l. All offsite deep monitoring wells screened within the upper zone of the Magothy aquifer, including

all Nassau County observation wells N-11171 and N-11172, were found to be free of TCL Pesticides in both Phase II RI sample rounds.

Fate and Transport of Pesticides

Currently, the major contaminant transport mechanism at the site is the dispersion of pesticides absorbed to site soils through the infiltration of water either through cracks and porous areas within the asphalt pavement or direct discharge through the onsite dry well. Though in most cases, shallow soil contamination is greater than within the onsite drywell, the drywell is actually serving as the primary transport mechanism for pesticide contamination given onsite precipitation drains through the drywell and into contaminated soil, whereas, the shallow soil is relatively isolated from infiltrating water by the parking lot asphalt pavement. Based on estimated soil/water partitioning coefficients for the majority of pesticides detected in site soils, the pesticides are considered to be immobile or having low mobility within a soil/water environment. Therefore, though dispersion of pesticide contamination is occurring through the infiltration of water, it is occurring at a relatively slow rate.

Based on estimated contaminant velocities within the Upper Glacial aquifer and a highly conservative transport period of 46 years, the six most commonly detected pesticides within site soils would have traveled no further than 146 feet downgradient of the site. In the case of chlordane, the travel distance over this period would be no more than nine feet from the site. The contaminant velocities are very crude estimates and do not account for contaminant degradation through geochemical and biochemical reactions. Because these variable would tend to further limit advective transport of contaminants, the estimated retardation rates are likely to be conservatively high. The onsite and offsite groundwater data support the estimated contaminant velocities. Only onsite monitoring wells screened within the contaminant source area consistently exhibit pesticides.

The fate and transport model does not explain the presence of gamma-chlordane within deep monitoring well MW-6. This may have occurred during the drilling operation with some contamination carried from the shallow zone downward to the deeper zone.

Recommendations

Both the soil and groundwater at the Fumex site are contaminated with pesticides. The pesticide concentrations in the soil exceed NYSDEC TAGM criteria at the site, and the pesticide concentrations in the groundwater generally exceed NYSDEC TAGM criteria as measured in all five shallow monitoring wells. Recommendations are provided below for both the soil and groundwater contamination.

Soils

Soil data indicate that the soils beneath the parking lot and dry well are contaminated with pesticides. Due to the depth of the contamination within the unsaturated zone (the water table is about 50 feet below ground surface), the extent of the onsite contamination, and the fact that the entire area is paved, complete removal of the contaminated soils is neither feasible nor necessary. It appears that the drywell and soils adjacent to the drywell are clearly the major sources of continued groundwater contamination. Additionally, shallow soils immediately below the asphalt parking lot, although relatively isolated from infiltrating water, will also contribute to groundwater contamination.

Based on these findings, it is recommended that a select number of soil excavation and offsite disposal options be evaluated as part of focused Feasibility Study.

Groundwater

The pesticides found at this site generally exhibit very limited mobility in the groundwater, and tend to bind to the organic carbon within the soil matrix. For this reason, it is considered unlikely that groundwater contamination from the site will pose a serious, long term threat to downgradient wells.

- Based on the current extent of groundwater contamination and the nature of the contaminants, hydraulic containment and/or groundwater treatment at the site is not recommended at this time. Due to the depth and distance of the nearest public supply well, the potential health risks posed by the groundwater pathway from this site are minimal.

- It is recommended that a part of a long-term monitoring program, onsite and selected offsite monitoring wells be monitored periodically for TCL Pesticides in order to detect any potential offsite migration of pesticides. Given the low levels of pesticides detected in groundwater at the site, it is recommended that future analysis of groundwater samples be performed using analytical methods with lower method detection limits (MDLs) than the standard ASP TCL Pesticide analytical method, such as EPA Method 8080 or 8081.

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Section 1
Introduction and Scope

1.1 Project Background and Objectives

The Fumex Sanitation site is located at 131 Herricks Road in New Hyde Park, Nassau County, New York (see Figure 1-1, Location Map and Figure 1-2, Site Map). The site encompasses approximately one third acre of land and includes a one story masonry and metal frame building with no basement and a paved parking area. Fumex sanitation, Inc. operated a commercial termite extermination business at this location from 1952 to 1992. The site is currently unoccupied.

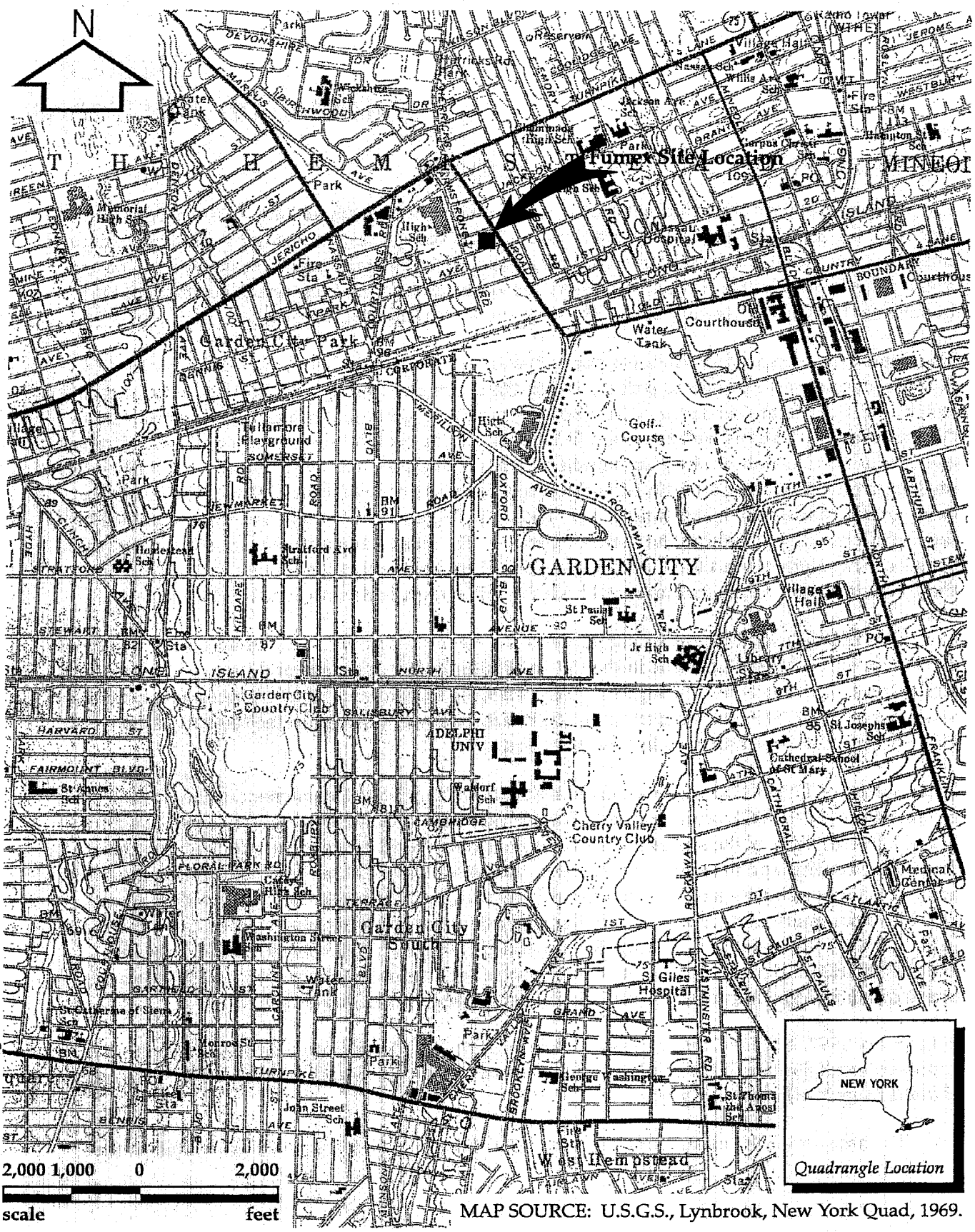
The Fumex site is located in a densely populated area. It is bounded on the north by Bedford Avenue, on the west by a paved parking lot, on the south and west by residential homes, and on the east by Herricks Road (see Figure 1-2). The area surrounding the site consists of industrialized/ commercial properties as well as residential properties south of the site. Fumex Sanitation had operated a commercial termite extermination facility at the site since 1952. Fumex regularly sprayed its then unpaved parking lot with 1-2% chlordane for insect control from 1952 to 1978. In 1981, a drum of chlordane rinse water was spilled. Less than 30 gallons of the rinse water was spilled onto the asphalt parking lot behind the Fumex building. The rinse water entered two stormwater catch basins on the adjacent road (Bedford Avenue) and a dry well within the Fumex parking lot. Due to these activities, chlordane contaminated both the soil and groundwater beneath the site.

In 1986, NYSDEC's Region 1 office entered into an Order-on-Consent with Fumex Sanitation, Inc. to determine the extent of chlordane in the soil and groundwater at the site and/or evaluate remedial alternatives. A limited site investigation was conducted in that same year. A second investigation was completed in 1989. In this same year, the Fumex site was included in the Registry of Inactive Hazardous Waste Disposal Sites in New York State.

In the spring of 1996, CDM was authorized by the New York State Department of Environmental Conservation (NYSDEC), under the State Superfund Standby Contract (SSSC), to conduct a limited Phase I Investigation of the site in order to assess current chlordane concentrations within the onsite dry well sediments and in onsite groundwater. Additionally, the Phase I RI included an inventory of nearby homes and businesses that may use private water supply wells. Section 2 of this report provides a summary of the Phase I RI findings. Further details of this investigation can be found in CDM's Phase I Remedial Investigation Report, dated December 1996. Based on the Phase I RI findings, NYSDEC determined that further investigation was necessary to fully assess the nature and extent of soil and groundwater contamination associated with the Fumex site.

In February 1997, NYSDEC authorized CDM to perform additional investigations of the site. An approved workplan for Phase II Investigations was completed in March 1998. The objectives of the Phase II RI for the Fumex site were:

- To characterize the existing concentration of chlordane and other pesticides in soils at the Fumex site



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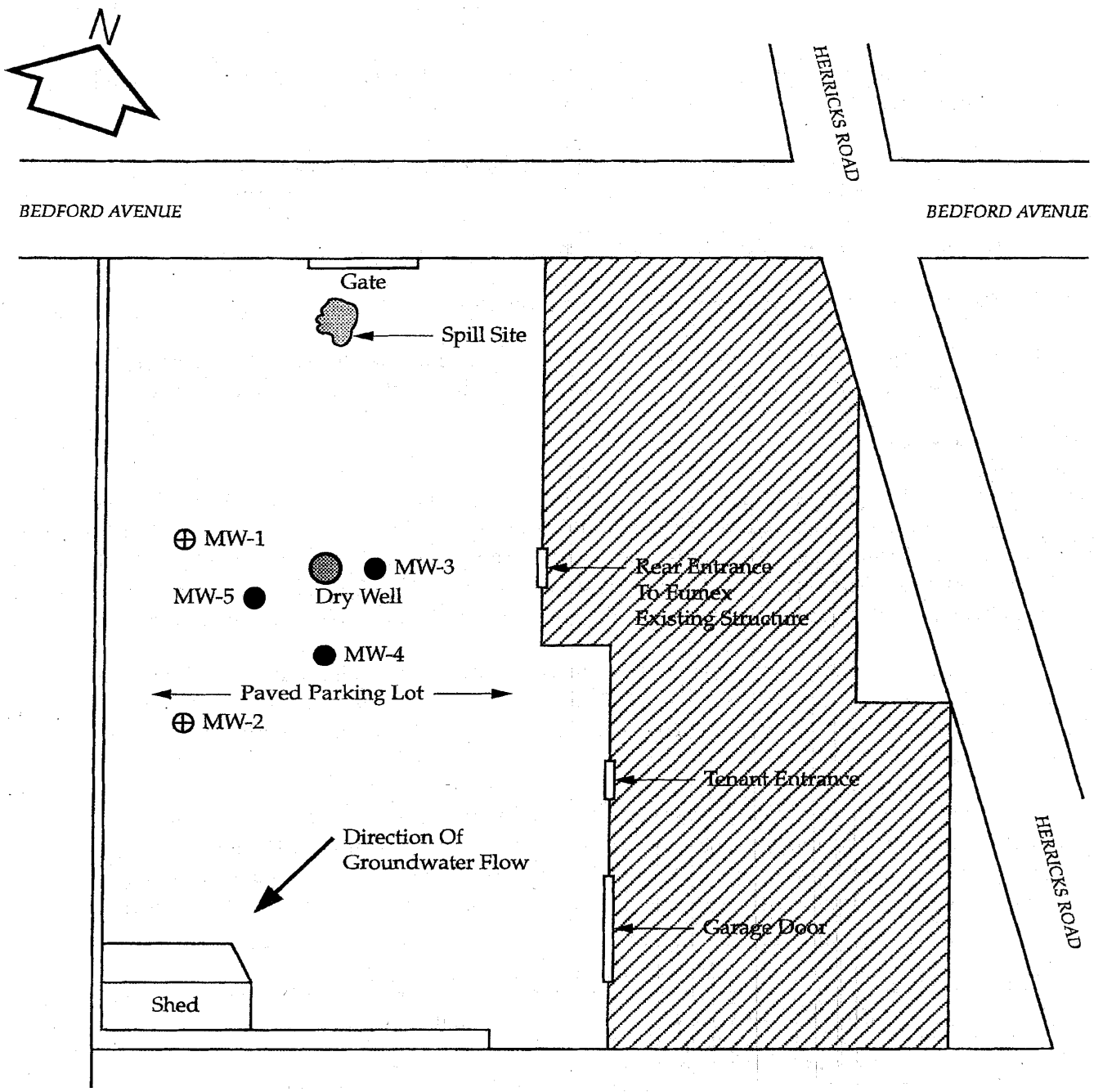
MAP SOURCE: U.S.G.S., Lynbrook, New York Quad, 1969.

Figure 1-1
Location Map
Phase II RI Report, Fumex Site - New Hyde Park, New York



LEGEND:

- Dry Well
- 4" Diameter Monitoring Well (MW)
- 2" Diameter Monitoring Well (MW)
- Fumex Building

Not To Scale

Fumex/Figure 1-2 [11/98]

Figure 1-2
Site Map
Phase II RI Report, Fumex Site - New Hyde Park, New York

- To characterize the hydrogeology of the Fumex site, including the general flow direction(s) of the aquifer, and the hydraulic relationship between the aquifers
- Develop a working Citizen Participation Plan that describes the site-specific citizen participation activities that will take place to compliment the remedial investigation
- Determine the distribution of pesticide contamination in groundwater both on-and off-site
- Determine the need for an Immediate Response Measure
- Obtain data needed to perform a focused Phase I and II FS which includes the screening of technologies and identification and development of remedial alternatives, if necessary

1.2 Site History

Fumex Sanitation Inc., is a New York Corporation originally formed on December 6, 1948. Fumex has operated a commercial termite extermination business at this site since 1952. In August 1981, a drum of chlordane rinse water stored at this site was knocked over, spilling approximately 30 gallons of the rinse water onto the asphalt parking lot behind the Fumex site. The material entered two stormwater catch basins on the adjacent road (Bedford Ave.) and a dry well on the Fumex property.

Reportedly, Fumex regularly sprayed their then unpaved parking lot with 1-2% chlordane for insect control from 1952 to 1978. In 1986, the NYSDEC's Region 1 office entered into an Order-on-Consent with Fumex to determine the extent of chlordane in the soil and groundwater at the site and evaluate remedial alternatives.

In 1992, Fumex Sanitation, Inc. changed its name to S.S. Sanitation, Inc. The sole officer and shareholder is Steven Schwimmer, who has filed for bankruptcy, pursuant to Chapter 7 of the bankruptcy code. S.S. Sanitation, Inc. no longer operates at this facility and the site is presently unoccupied. The following represents the results of a title search performed for the Fumex site.

Date of Deed	FROM	TO
07/17/27	Mineola West Corp.	Reginia Viente
12/14/44	Nassau Co Treasurers Office	Nassau County
12/31/46	Nassau County Executor	Max Magida
02/14/51	Max Magida	Margaret A. Sears
09/10/52	Margaret A. Sears	*Fumex Sanitation Inc.*
12/18/34	Mineola West Corp.	Matilda Fachus
04/01/40	Matilda Fachus	Stephen & Irene Izitar
04/13/49	Stephen Izitar, Irene Grieszler	Santa Carrillo
09/22/52	Santa Carrillo	*Fumex Sanitation Inc.*

1.3 Previous Investigations

In August 1981, a drum of chlordane rinse water stored at this site was knocked over, spilling approximately 30 gallons of the rinse water onto the asphalt parking lot behind Fumex. The material entered two stormwater catch basins on the adjacent road (Bedford Avenue) and a dry well in the parking lot on the Fumex property. Additionally, from 1952 to 1978, Fumex also regularly sprayed the then unpaved parking lot with commercial grade 1-2% chlordane for insect control.

In 1986, the NYSDEC's Region 1 office entered into an Order On Consent with Fumex to determine the extent of chlordane in the soil and groundwater at the site and evaluate remedial alternatives. A hydrogeological investigation was conducted in the same year by the consultant to Fumex, Roux Associates, to satisfy the requirements of the Order on Consent. Three monitoring wells were installed at the site, in addition to the two wells that had previously been installed. The five wells were sampled and the results are as follows:

Total Chlordane Concentrations in Groundwater (ppb)

Monitoring Well	July 1984	Dec. 4, 1986	Dec. 10, 1986
1	39	96	99.7
2	53	40	20.1
3	NS	NS	0.89
4	NS	55	3.6
5	NS	56	16.3

Note : NS = Not Sampled

Soil samples were collected during the installation of these monitoring wells. The chlordane concentrations reported in these samples show that the highest concentrations were found in MW-5 and that the concentrations in all wells generally decreased with depth. The results are as follows:

Chlordane Concentrations in Soil (ppb)

Monitoring Well	July 1984	Nov. 1986	Dec. 1986
1	1530 (25 - 27') 105 (35 - 37') 14 (40 - 42')	NS	NS
2	9 (30 - 32')	NS	NS

Monitoring Well	July 1984	Nov. 1986	Dec. 1986
3	NS	1492 (10 - 12') 96.9 (20 - 22') 308 (30 - 32') 90.3 (40 - 42') 59.4 (50 - 52')	480 (45 - 47')
4	NS	417 (10 - 12') 1344 (20 - 22') 700 (30 - 32')	670 (30 - 32')
5	NS	1500 (10 - 12') 1494 (20 - 22') 619 (30 - 32')	1500 (30 - 32') 1400 (45 - 47')

Note: NS = Not Sampled.

Based on the results of this investigation, a Phase I investigation was performed by Lawler, Matusky and Skelly, Engineers in 1989. This study presented an evaluation o f previously collected soil and groundwater sample results, as well as the results of an air monitoring survey. The results of the survey indicated the absence of any airborne pesticides. In 1989 Fumex was notified of the site's inclusion in the Registry of Inactive Hazardous Waste Disposal Sites in New York State. The owner of the property was notified of his status as a responsible party in 1994. He subsequently declined to enter into an Order-on-Consent with NYSDEC.

1.4 Environmental Setting

The following sections provide a description of the environmental setting at the Fumex site.

1.4.1 Site Topography

The Atlantic Coastal Plain physiographic province of North America is located along Long Island. Two lines of hills made of glacial debris exist along the northern and central part of Long Island. The northern moraine is the Harbor Hill moraine and the central moraine is the Ronkonkoma moraine. These moraines converge in western Long Island. The topography between these two moraines is relatively flat and gentle (Lawler, Matusky & Skelly, 1989).

The Fumex site lies on this relatively flat and gentle topography between the two moraines. The site is approximately 95 feet above mean sea level (msl). There is a slight increase in elevation to the east and west of the site. The site topography is primarily the result of drainage improvements both on-site and adjacent roadways. Figure 1-2 is a topographic map of the Fumex site area.

1.4.2 Geology

Figure 1-3 is a regional geologic cross section of western Nassau County. Sediments immediately underlying the site consist of Pleistocene aged glacial outwash sediments consisting of stratified sands and gravels which were deposited by the melting glaciers of the receding Harbor Hill

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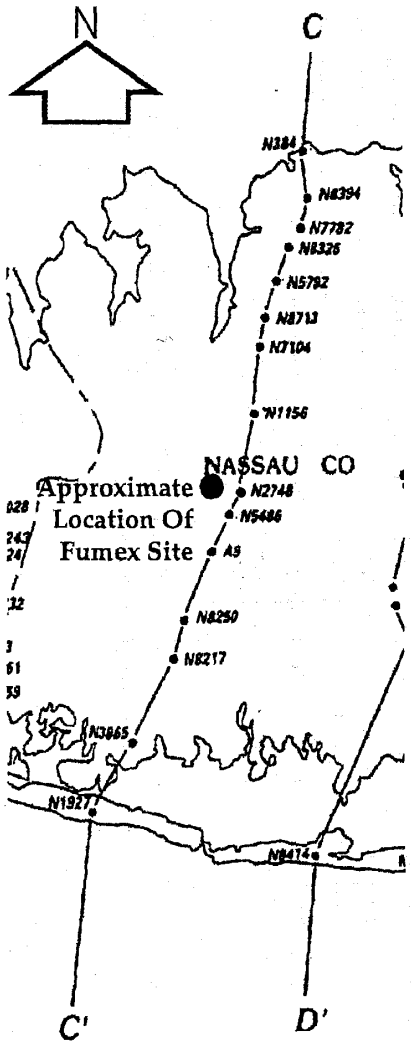
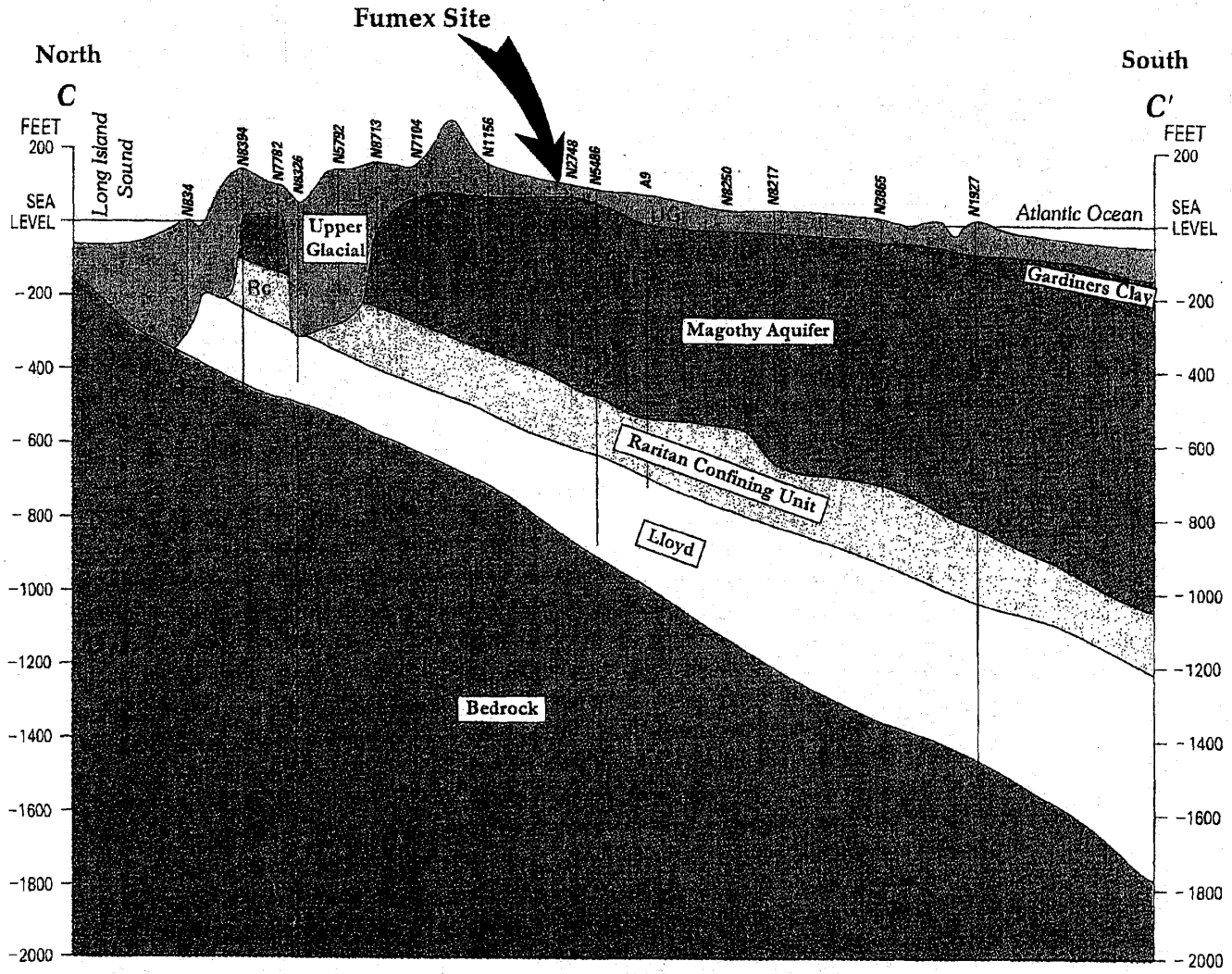


KEY:

UG - Upper Glacial
M - Magothy
Rc - Raritan Clay



SOURCE: Smolensky et al, 1989, Hydrologic Framework Of Long Island, New York.

Figure 1-3
Regional Geologic Cross Section, Western Nassau County
Phase II RI Report, Fumex Site - New Hyde Park, New York

CDM Camp Dresser & McKee

moraine. The glacial outwash sediments are approximately 100-150 feet thick within the site area and are very permeable.

As shown in Figure 1-3, Cretaceous sediments are located beneath the Pleistocene glacial outwash sediments. These cretaceous sediments consist of the younger Magothy formation and the older Raritan formation. The Magothy formation is composed of 300 to 400 feet thick, moderate to highly permeable, fine to medium sand. Coarse sand or sandy clay lenses are also found in the Magothy formation. The Raritan formation includes the Raritan clay and Lloyd sand formations. The Raritan clay is an impermeable clay layer with sand and gravel lenses. The Raritan clay is approximately 100 to 150 feet thick. The Lloyd sand underlies the other formations and consists of fine to coarse sand and gravel. The Lloyd sand has a moderate permeability and is nearly 150 feet thick (Smolensky, 1989).

The bedrock which underlines Long Island consists of precambrian crystalline rock, including mica schist, gneiss and granite. The bedrock has minor water-bearing fractures and is relatively impermeable. The bedrock depth is approximately 830 feet near the Fumex site (Lawler, Matusky & Skelly, 1989).

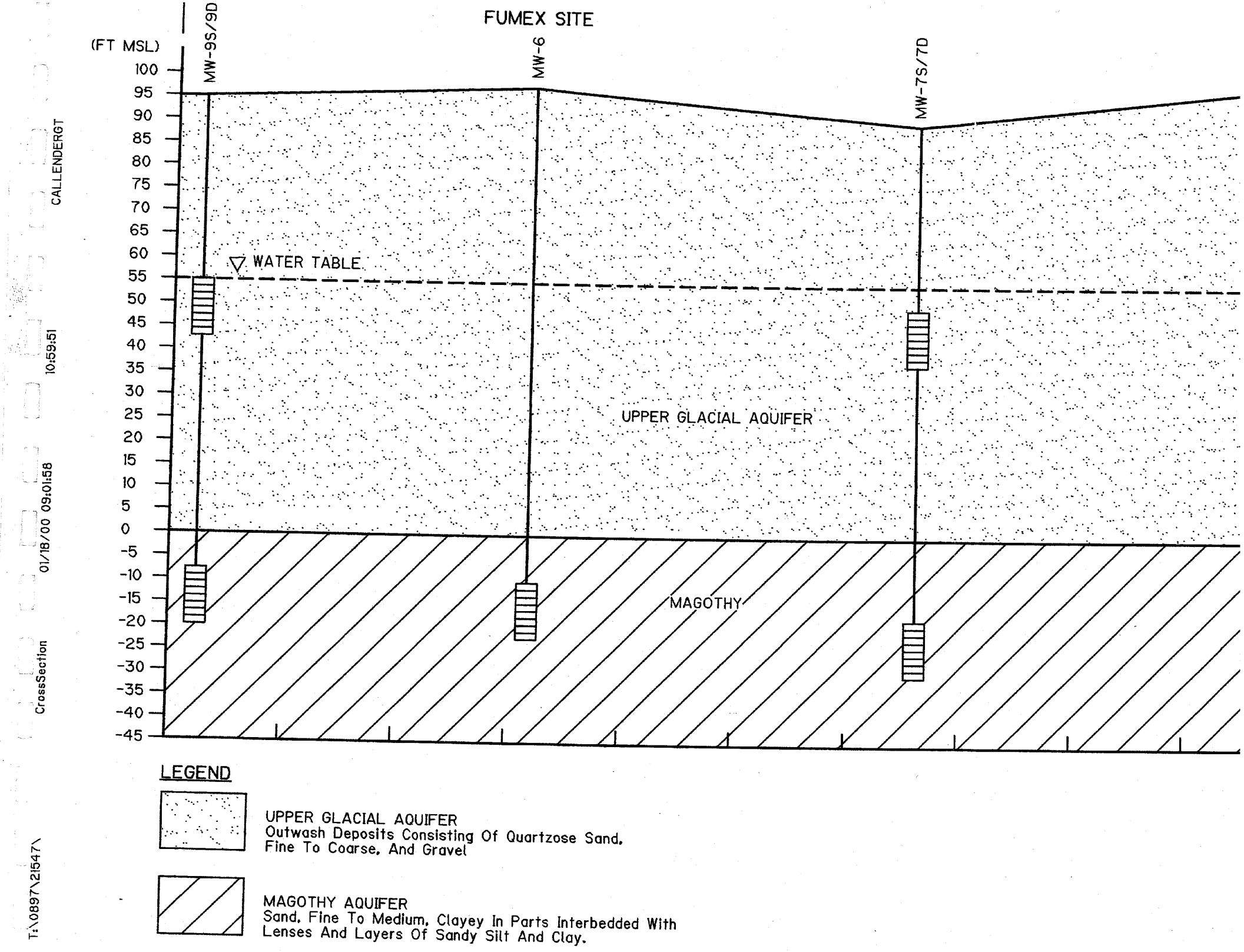
1.4.3 Regional and Site Hydrogeology

As shown in Figure 1-3, There are three water-producing aquifers: (1) the Upper Glacial aquifer, (2) the Magothy formation, and (3) the Lloyd sand of the Raritan formation (Smolensky, 1989). The Precambrian bedrock is considered the lower limit of the aquifer due to its relative impermeability.

The most significant water bearing unit at the Fumex site is the Upper Glacial aquifer which consists of Pleistocene age outwash sands and gravels. Boring logs from monitoring well and boring installations indicate that the sediments underlying the site are typically brown-tan-orange fine to coarse sands containing varying percentages of pebbles and gravel. This type of sediment is typical of the Upper Glacial aquifer. Approximately 100 feet below grade, multicolored fine to medium silty sand and sand alternate with beds comprised of silt and clay. These sediments are believed to represent the uppermost portions of the Magothy formation. Copies of the boring logs can be found in Appendix a. Information gathered during the hydrogeologic investigation has been compiled in the form of a north to south geologic cross section (provided as Figure 1-4). The water table and contact between the Upper Glacial aquifer and the Magothy formation are both shown on the cross section.

The Upper Glacial aquifer is an unconfined aquifer. Under natural conditions, virtually all groundwater recharge to this aquifer is the result of infiltration of precipitation into the vadose zone (unsaturated) and subsequent downward percolation through the water table into the saturated zone. The Upper Glacial aquifer is replenished directly by water from the surface at an average rate of 22 inches/year. Contamination at the Fumex site is found in the vadose zone of the Upper Glacial aquifer, providing a continuous source of contamination to this aquifer as precipitation infiltrates through the exposed sediment in the bottom of the dry well and any cracks or porous areas within the asphalt pavement.

The Upper Glacial aquifer is approximately 100 feet thick in the vicinity of the Fumex site. The depth to the water table is approximately 40-50 feet from below grade. Prior to the early 1990s the



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direction of groundwater flow in the Upper Glacial aquifer was influenced by heavy pumping along the Nassau/Queens border. The Jamaica Water Supply Company, typically pumped at rates exceeding 60 million gallons per day from the Upper Glacial aquifer. The direction of groundwater flow prior to the early 1990s was generally southwest but the pumping tended to skew the direction of flow in a more westerly direction. Since the early 1990s the amount of water pumped by the Jamaica Water Supply Co. has decreased to less than 30 million gallons per day. Typical groundwater table contours for the Upper Glacial aquifer for the mid 1980s are shown in Figure 1-5.

Based on the water table elevation measurements obtained from the Phase II RI monitoring wells (see section 3.2 for well construction details) and the existing onsite monitoring wells, CDM developed the water table contour map provided as Figure 1-6. Based on the contour map, groundwater within the Upper Glacial aquifer flows through the Fumex site and downgradient locations in a southwesterly direction.

The Magothy formation is composed of moderately to highly permeable sands with intermittent clay layers. The Magothy formation is used as the primary aquifer for public drinking water in Nassau County, with most wells screened more than 300-400 feet below the water table. Public supply wells are located within a few miles of the Fumex site (see Section 2, Figure 2-1). Magothy wells installed as part of the site investigation were typically screened 50 to 60 feet below the water table in the uppermost portion of the Magothy formation.

The Lloyd sand of the Raritan formation is located beneath the Magothy aquifer. An impermeable Raritan clay formation divides the Magothy aquifer and the Lloyd sand. The Lloyd aquifer is located between 650 to 700 ft. below the surface near the site and is considered a confined aquifer because its water is under artesian conditions. The Lloyd sand is also supplied by the slow, vertical migration of water through the Raritan clay.

Groundwater flow velocity or Darcian Velocity (ft/day) within the Upper Glacial aquifer at the Fumex site was calculated using the hydraulic gradient of 0.0018 ft/ft based on water table elevation measurements obtained for monitoring wells, the average horizontal hydraulic conductivity of the Upper Glacial aquifer of 250 ft/day, and an estimated sediment porosity of 20% typical for a mixture of sand and small gravels. The hydraulic gradient was determined to be 0.0018 ft/ft in the downgradient direction from MW-5 (onsite well) to MW-8S (offsite well).

The Darcian Velocity is derived using a modified form of Darcy's Law which governs flow through porous media. The modified form is:

$$V = \frac{K*I}{n}$$

where,
V=Darcian Velocity (Groundwater Velocity)
I= Hydraulic Gradient (0.0018 ft/ft)
K=Hydraulic Conductivity (Ave. 250 ft/day)
n= Porosity of Aquifer Sediments (20%)

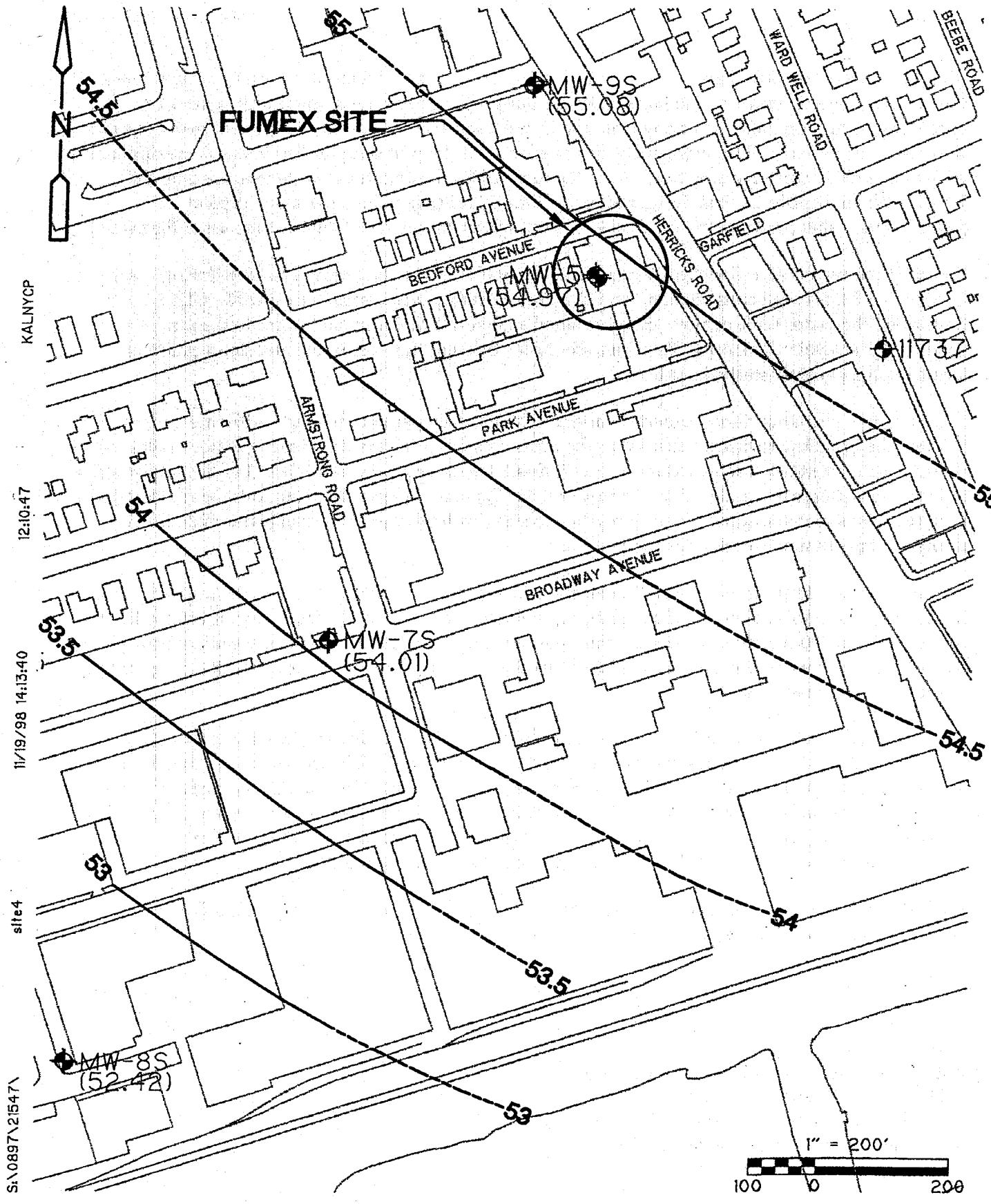
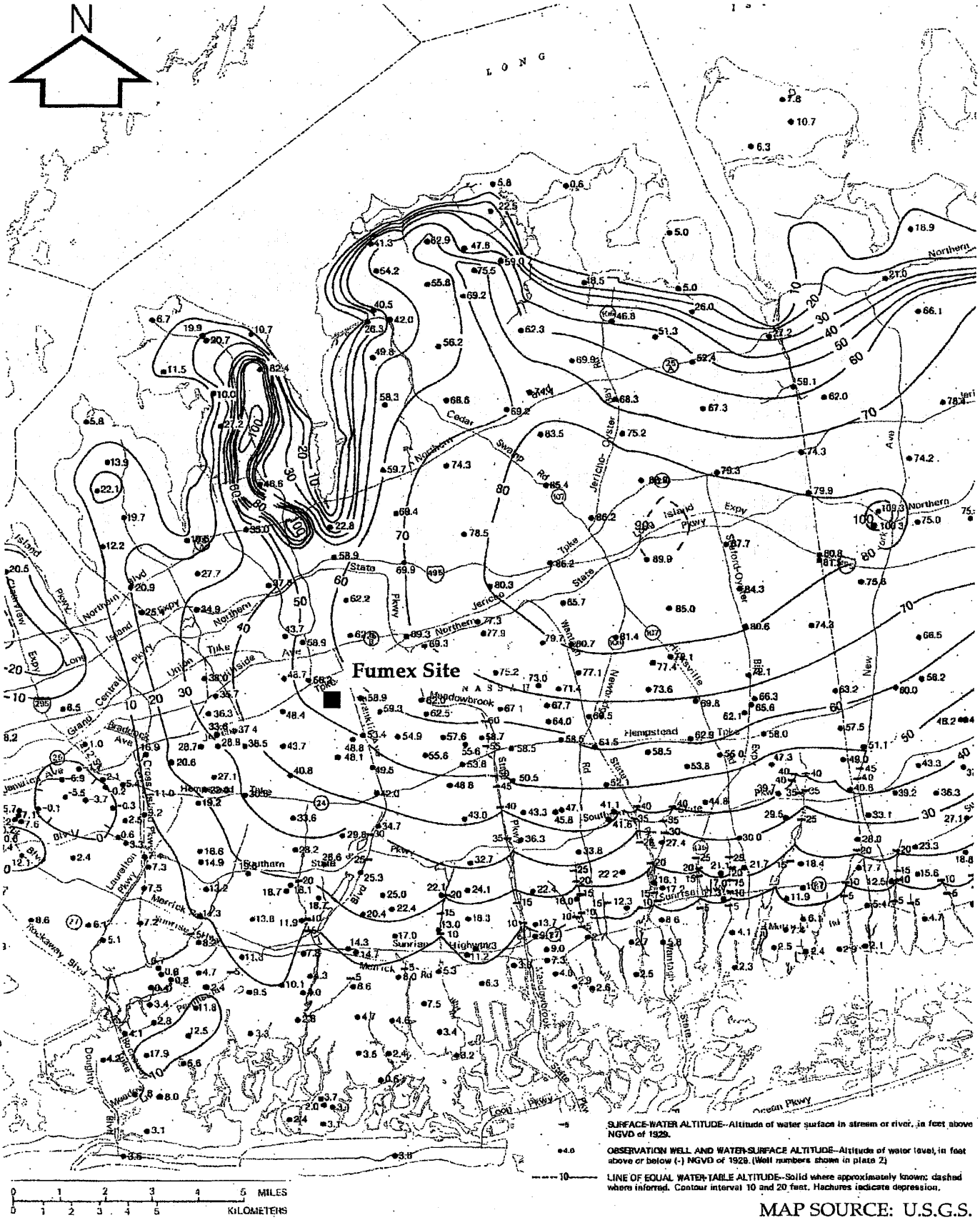


Figure 1-5
Study Area Water Table Contour Map
Phase II RI Report, Fumex Site - New Hyde Park, New York

CDM Camp Dresser & McKee



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MAP SOURCE: U.S.G.S.

Figure 1-6

Water Table Elevation On Long Island, New York

March-April 1984

Using this method, a horizontal groundwater velocity in the glacial outwash sediments was determined to be 2.25 ft/day. Note that the calculated Darcian velocity is a very rough estimate of actual groundwater flow within an aquifer. Due to the complex nature of site stratigraphy, groundwater velocities can vary greatly.

Based on static head measurements, a slight vertical gradient exist at the site between wells screened within the Upper Glacial aquifer and the deeper wells screened in the upper portion of the Magothy Aquifer. At wells clusters MW-7 and MW-8 (see Figure 1-4) installed as part of the Phase II Investigation, a downward vertical gradient of 0.02' and 0.03' exists. However at well cluster MW-9 an upward vertical gradient of 0.02' is observed.

1.4.4 Surface Water and Drainage

There are no surface water bodies within the Fumex site. Several intermittent ponds are located within 0.5 miles of the site. These ponds may be used as recharge basins. Hempstead Lake is located approximately 4 miles southeast of the site in Hempstead Lake State Park. Valley Stream is located approximately 5 miles southwest of the site. Valley Stream drains into Jamaica Bay. Site runoff is directed towards the onsite dry well which discharges directly to underlying soils. Runoff from outside the site is directed to the local stormwater collection system (Lawler, Matusky & Skelly, 1989) that discharges to a stormwater recharge basin located near the site.

Section 2
Phase I RI Findings

2.1 Phase I Remedial Investigation

This section summarizes the findings of the Phase I RI. The findings are discussed in greater detail in CDM's Phase I RI Report, dated December 1996. The Phase I Remedial Investigation of the Fumex site consisted of the following field activities:

- Characterize the existing concentrations of chlordane and other pesticides in the drywell by collecting sediment samples from the onsite drywell through the completion of one hollow stem auger boring;
- Characterize the hydrogeology of the site including the general flow direction(s) of the aquifer, and the hydraulic relationship between the five existing groundwater monitoring wells based on two rounds of synoptic water level measurements;
- Characterize the present concentration of chlordane in onsite groundwater through the sampling of the five existing monitoring wells; and
- Inventory the extent of potentially affected areas by identifying nearby homes or businesses that may use private water supply wells.

2.2 Well Survey

CDM contacted Garden City Park Water District, Mineola Water District and Village of Garden City Water District to obtain the locations of public supply wells in the vicinity of the site. In addition, Nassau County Department of Public Works, Bureau of Water Management (NCDPW) was contacted to acquire information about monitoring wells near the site. The locations of the public supply and monitoring wells nearest the site are shown on Figure 2-1. Table 2-1 provides information on each well.

The closest public supply well to the site is GCP #9 (Garden City Park Water District public supply well #9), located on Court House Road and Madison Avenue (approximately 1,300 feet west of the site). This well is used only in emergency situations.

Well M#7 (Mineola Water District public supply well #7) is located approximately 4,200 feet upgradient, or northeast, of the site. Wells M#4, VGC#12 (Village of Garden City Park Water District public supply well #12), VGC#8, VGC#15 and VGC#16 are located side-gradient (east to southeast) of the site. Public supply wells VGC#9, VGC#13 and VGC#14 are located downgradient (southwest or south-southwest) of the site. VGC#9, located on Wilson and Plaza Road, approximately 7,600 feet southwest of the site, is currently inactive. VGC#9 has the capacity to pump 1.58 mgd. VGC#13 (approximately 6,300 ft south-southwest of the site) and VGC#14 (approximately 7,400 ft south-southwest of the site) have the capacity to pump 2.02 mgd and 1.87 mgd, respectively. Both wells are located in the Garden City Country Club. Of the three public supply wells located

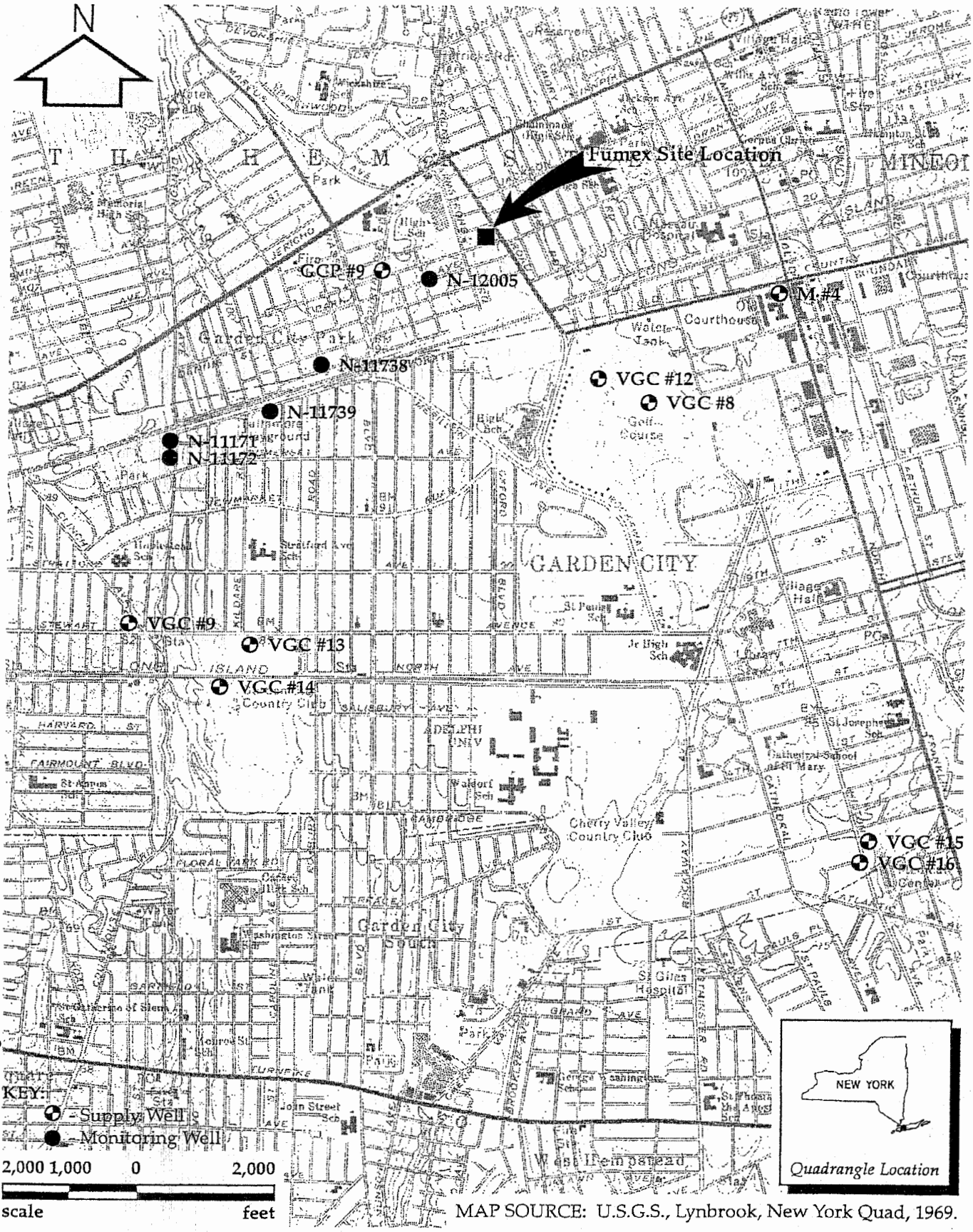

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Figure 2-1
Public Supply Wells And Nassau County Monitoring Wells
Phase II RI Report, Fumex Site - New Hyde Park, New York

CDM Camp Dresser & McKee

Table 2-1
Public Supply Wells and Monitoring Wells
Fumex Sanitation Site Phase II Remedial Investigation
NYSDEC Site #1-30-041

Well	Location	Approximate Distance from Fumex Sanitation	Depth of Well (ft)	Pumping Capacity (MGD)
Public Supply Wells:				
GCP#9*	Country Court House Rd. & Madison Ave.	1300 ft.W	405	1.73
M#4	Old Country Rd. and 8th Ave.	2600 ft. ESE	400	1.35
M#7	Jericho Tpke. And Mineola Blvd.	4200 ft. NE	400	1.35
VGC#8	Garden City Golf Club	3200 ft. SE	528	1.73
VGC#9	Wilson and Plaza Road	7600 ft. SW	470	1.58
VGC#12	Garden City Golf Club	2600 ft. SE	480	1.8
VGC#13	Garden City Country Club	6300 ft. SSW	445	2.02
VGC#14	Garden City Country Club	7400 ft. SSW	363	1.87
Monitoring Wells:				
NC-11737 (4")	Wardwell Road south of Garfield Ave.	500 ft. ESE	58	NA
NC-11738 (4")	Hilton Ave. and Fulton Ave.	2700 ft. SW	63	NA
NC-11739 (4")	Main Ave. and Meadowbrook Rd.	3500 ft. SW	62	NA
N-11171	RB 232 w/s Tanners Pond Road	5000 ft. SW	153	NA
N-11172	RB 232 w/s Tanners Pond Road	5100 ft. SW	378	NA
N-12005 (4")	Thorens and Broadway	800 ft. SW	63	NA

Notes:
* = Used as an emergency well
NA = Not applicable

downgradient of the site, VGC#14 is the most shallow, with a depth of 363 ft, and VGC #9 is the deepest, at 470 ft. All public supply wells in the vicinity of the site pump groundwater from the Magothy aquifer.

Private Supply Wells

In determining the existence of any private wells within a 1,000 feet radius downgradient of the Fumex site, CDM staff recorded the addresses of all homes and businesses in the area. These addresses were then compared against public water customer addresses obtained from Garden City Park Water District and Mineola Water District. It was found that 16 existing addresses were not listed as public water customers. On December 10, 1996, CDM staff visited these addresses to inquire as to whether or not a private well was in use. It was found that the unaccounted addresses, for the most part, were due to the fact that multiple businesses within a single building do not receive separate water bills. Therefore, several addresses often are serviced by one meter. Accordingly, the bill is forwarded to only one address. Based on the results of this survey, CDM concluded that no private wells were in use within a 1,000 foot radius of the Fumex site.

Area Monitoring Wells

Monitoring well N-11737 is located side-gradient (east) of the site, while N-12005, N-11738 and N-11739 are located downgradient (southwest). These wells range in depth from 58 to 63 ft, and are used to monitor water table elevations and sample groundwater in the Upper Glacial aquifer. Monitoring wells N-11171 and N-11172, located downgradient of the site, extend down to the Magothy aquifer. These two monitoring wells are approximately 153 and 378 feet deep, respectively. Monitoring well N-12005, located approximately 800 feet southwest of the site, (the closest monitoring well downgradient of the site), is a 4-inch diameter monitoring well located on the west side of Thorens Avenue between Park Avenue and Broadway. Its top of screen and bottom of screen elevations are 60.49 feet and 40.49 feet (msl), respectively, with a total depth of 63.65 feet, extending into the Upper Glacial aquifer. During a meeting with staff of Nassau County Department of Public Works (NCDPW), CDM requested the NCDPW to sample monitoring well N-12005 for pesticides as part of their routine County monitoring.

On November 26, 1996, NCDPW measured groundwater at an elevation of 45.45 feet msl in N-12005, and collected a groundwater sample which was analyzed by the Nassau County Department of Health Center for Laboratories and Research. The analysis found the presence of both chlordane (1.0 ppb) and Heptachlor Epoxide (0.2 ppb).

The NYSDEC groundwater criteria for gamma-chlordane and Heptachlor Epoxide is 0.01 ppb (ug/l). The NYSDOH drinking water criteria for Heptachlor Epoxide is 0.02 ppb (ug/l).

2.3 Dry Well Sediment Quality

As part of the Phase I RI, sediment samples were collected by hollow-steam auger drilling method on March 19, 1996 from the dry well located in the parking lot of the Fumex site. This drywell collects runoff from the paved parking area and recharges it back to the groundwater through the open

bottom of the well. Samples of sediment were collected at depths of 1-3 feet, 10-12 feet, 20-22 feet, and 45-47 feet below the bottom of the dry well, and were analyzed for TCL Pesticides.

Analytical results of these samples and the NYSDEC soil cleanup criteria are presented in Table 2-2. The compounds detected include:

- delta-BHC
- Heptachlor
- Aldrin
- Heptachlor Epoxide
- Endrin
- alpha - chlordane
- gamma - chlordane

Four pesticides were frequently detected in soil samples collected at various depths within the dry well at concentrations exceeding the NYSDEC soil cleanup criteria. These compounds included delta-BHC, Heptachlor, Aldrin, and gamma chlordane. With the exception of Heptachlor, the highest estimated concentrations of delta BHC (5400 ppb), Aldrin (1100 ppb), and gamma chlordane (30,000 pp), were detected in the first 1 to 3 feet of soil collected from the bottom of the dry well. The highest concentration of Heptachlor (6400 ppb), was detected from samples collected at 10 to 12 feet below the bottom of the dry well. While similar pesticides were detected at 20 to 22-feet in the dry well, none exceeded the NYSDEC soil cleanup criteria. In addition, both Heptachlor Epoxide (estimated at 6.5 ppb), and Endrin (estimated at 28 ppb) were detected in this sample at concentrations below the NYSDEC cleanup criteria. Alpha chlordane concentrations were also two orders of magnitude higher in the samples collected at the 1 to 3 feet (estimated at 26000 ppb) and 10 to 12-feet (estimated at 16000 ppb) depths than in the 20 to 22-feet interval (estimated at 530 ppb), with the concentration increasing to an estimated 2600 ppb in the 45 to 47-feet sample.

These results indicate that the highest concentration of pesticides are typically present in the sediment of the dry well to a depth of at least 12-feet, with similar pesticides present at elevated concentrations in the deeper soil samples collected at 45 to 45-feet below the bottom of the dry well.

No samples were collected from the two stormwater catch basins located on Bedford Avenue due to the lack of sediment present at the bottom of the basins.

2.4 Onsite Groundwater Quality

The onsite monitoring wells were sampled twice during the Phase I RI; on March 20, 1996 (Round 1) and on August 27, 1996 (Round 2). Analytical results, as well as NYSDEC groundwater criteria and NYSDEC Class - GA groundwater criteria, are presented in Table 2-3. The compounds detected in the sampling rounds include:

- delta-BHC
- gamma-BHC (Lindane)
- Heptachlor
- Aldrin

- Heptachlor Epoxide
- Endosulfan I
- Dieldrin
- 4,4'-DDE
- Endrin
- Endosulfan II
- 4,4'-DDD
- 4,4'-DDT
- Endrin Ketone
- Endrin Aldehyde
- alpha-chlordane
- gamma-chlordane

Round 1

Sampling round 1 was taken in March 1996, when the water table is usually at its seasonal high following the winter recharge. The greatest number of compounds (13 compounds total) were detected in monitoring well #1 (MW-1), which is located west and slightly north of the drywell. MW-1 contained the highest concentrations of Aldrin, Dieldrin, 4,4'-DDE, 4,4'-DDT, Endrin Ketone and Endrin Aldehyde. The concentrations of Endrin Ketone and Endrin Aldehyde were below respective GA standards. Ten of the thirteen compounds detected in MW-1 were measured at levels above the NYSDEC GA standards.

The fewest number of compounds were detected in MW-2 (6 compounds total). However, MW-2, which is directly downgradient of the dry well, contained the highest concentrations of these compounds.

Nine compounds were detected in MW-3. Although MW-3 contained the lowest concentration of the detected compounds, all concentrations were above the NYSDEC GA standards.

The same nine compounds detected in MW-3 were also present in MW-4. The concentrations in MW-4 were at consistently higher levels than those detected in MW-3.

In general, the pesticide concentrations measured in MW-5 were the next highest to those found in MW-2. MW-5 is west to south-west of the drywell. MW-5 is therefore downgradient of the dry well, but not directly downgradient as is MW-2.

Of the five samples collected in Round 1, only the concentrations of Endrin Ketone and Endrin Aldehyde in MW-1, were measured below the NYSDEC GA groundwater standards, for compounds that were detected.

Round 2

Sampling round 2 was taken in August, 1996. Usually the end of the summer represents the seasonal low water table following the summer when evapotranspiration is very high. In this case, however, the summer was unusually wet and cool, and the water table was actually higher than it was in the

spring. In this round of sampling, only two compounds were detected in MW-1. These included alpha-chlordane (estimated at 4.3 ppb) and gamma-chlordane (estimated at 6.5 ppb).

Four compounds were detected in MW-2. This well contained the highest concentrations of Heptachlor Epoxide (estimated at 0.61 ppb) and Dieldrin (estimated at 4.3 ppb) of all wells sampled in Round 2. An estimated concentration of 4.5 ppb of gamma-chlordane was also detected in MW-2.

Of the six compounds detected in MW-3, gamma-BHC (estimated at 0.87 ppb) was present at the highest concentration.

Of the ten compounds detected in MW-4, gamma-chlordane (estimated at 1.2 ppb) was present at the highest concentration.

Twelve pesticides were detected in a ground water sample collected from MW-5. Dieldrin (estimated at 0.81 ppb) was present at the highest concentration.

Comparison of Results

In comparing the results of the groundwater sampling, several observations can be made.

The compounds found in the greatest concentrations were gamma-chlordane (15 ppb in Round 1, and 6.5 ppb in Round 2) and alpha-chlordane (12 ppb in Round 1, and 4.3 ppb in Round 2).

The highest concentrations of gamma-chlordane and alpha-chlordane in Round 1 were measured in MW-2, while those in Round 2 were measured in MW-1.

The concentrations of total chlordane in the groundwater have decreased from the time of the initial sampling efforts performed in 1984 and in 1986. In the 1986 sampling effort the maximum total chlordane groundwater concentration detected was approximately 100 ppb. The maximum total chlordane groundwater concentration detected from the Round 1 sampling effort was approximately 27 ppb. During Round 2, the maximum chlordane concentration detected was approximately 10.8 ppb. A possible explanation of this downward trend in groundwater concentration is that the source of the chlordane in the groundwater, the dry well and surrounding soil, is being reduced by flushing and dilution with clean groundwater that flows through the soil from upgradient of the site. This will result in decreased chlordane concentrations in the soil and groundwater over time. However, as discussed in Section 4.4, due to the chemical nature of chlordane, this flushing of the soil is an extremely slow process. Though the nature and rates of geochemical and biochemical degradation of pesticides is not well understood, these processes may also contribute to the overall reduction in pesticide contamination.

The short-term variation in sample results (the differences between Rounds 1 and 2) did not indicate a particular trend in groundwater concentrations. The first round of sampling occurred in early spring. At that time, the groundwater table was measured at an elevation of 49 feet above mean sea level (msl). The second round of sampling occurred in late summer when the groundwater table was even higher, at 51 feet above msl. This 2-foot elevation difference may account for the concen-tration differences between the two sampling rounds. The higher water table in late summer may have

brought the groundwater in contact with contaminated soil located near the bottom of the unsaturated zone, thereby temporarily elevating the concentration of contaminants in the groundwater. In other areas, higher groundwater levels may simpy have caused greater dilution, thereby lowering the concentrations.

Table 2-2
Summary of Pesticides in Soil (from Phase I RI)
Fumex Sanitation Site Phase II Remedial Investigation
NYSDEC SIte #1-30-041

All results reported in ug/kg (ppb)

Sample Location:	NYSDEC Recommended	Dry Well 1-3 ft.		Dry Well 10-12 ft.		Dry Well 20-22 ft		Dry Well 45-47	
Parameters-Pesticides	**Soil Cleanup**	DW 1-3 DL	Q	DW 10-12 DL	Q	DW 20-22 DL	Q	DW 45-47 DL	Q
alpha-BHC	110	3200	UJ	1500	UJ	38	UJ	240	UJ
beta-BHC	200	3200	U	1500	U	38	U	240	U
delta-BHC	300	**5400**	DJN	**2800**		40	DJN	**670**	DJ
gamma-BHC(Lindane)	60	3200	UJ	1500	U	38	UJ	240	UJ
Heptachlor	100	**1700**	JD	**6400**		47	D	**320**	D
Aldrin	41	**1100**	DJN	**830**		38	U	240	U
Heptachlor Epoxide	20	3200	U	1500	U	6.5	DJN	240	U
Endosulfan I	900	3200	U	1500	U	38	U	240	U
Dieldrin	44	6300	U	3000	U	77	U	480	U
4,4'-DDE	2100	6300	U	3000	U	77	U	480	U
Endrin	100	6300	U	3000	U	28	DJN	480	U
Endosulfan II	900	6300	U	3000	U	77	U	480	U
4,4'-DDD	2900	6300	U	3000	U	77	U	480	U
Endosulfan Sulfate	1000	6300	U	3000	U	77	U	480	U
4,4'-DDT	2100	6300	U	3000	U	77	U	480	U
Methoxychlor	10000	32000	U	15000.00	U	380	U	2400	U
Endrin Ketone	NS	6300	U	3000	U	77	U	480	U
Endrin Aldehyde	NS	6300	U	3000	U	77	U	480	U
alpha-chlordane	540	**26000**	DJN	**16000**	DJN	530	DJ	**2600**	DJ
gamma-chlordane	540	**30000**	DJN	**14000**	DJN	510	DJ	**2800**	D
Toxaphene	NS	320000	U	150000	U	3800	UJ	24000	U

Notes:
Samples were collected on: 3/19/96.
BOLD: Exceeded the NYSDEC recommended soil cleanup standard, TAGM#4046
NS - No standard
Data Qualifiers:
D - Reported result taken from diluted sample analysis
JN - Presumptively present at an approximated quantity.
UJ - The compound was analyzed for, but not detected. The sample quantitation limit is an estimated quantity due to variance in quality control limits.
J - The associated numerical value is an estimated quantity.
U - The compound was analyzed for but not detected at or above the contract Required Quantitation Limit (CRQL), or the compound is not detected due to qualification through the method of field blank.

Table 2-3
Pesticides in Groundwater
Data Summary from Phase I RI
Fumex Sanitation Site Phase II Remedial Investigation
NYSDEC Site #1-30-041

All results reported in ug/L

Location: Monitoring Wells	NYSDEC Class GA Criteria														
Parameters-Pesticides/PCBs	**Groundwater Criteria**	**MW1**	**Q**	**MW2 DL**	**Q**	**MW3**	**Q**	**MW4**	**Q**	**MW5**	**Q**	**MW4 MS**	**Q**	**MW4 MSD**	**Q**
alpha-BHC	0.05	0.17	UJ	1.1	UJ	0.057	UJ	0.24	UJ	0.6	UJ		UJ		UJ
beta-BHC	0.05	0.17	U	1.1	U	0.057	U	0.24	U	0.6	U		U		U
delta-BHC	0.05	**0.36**		**2.2**	D	**0.14**	J	**0.57**	JN	0.6	U	**0.23**	JN	**0.28**	JN
gamma-BHC(Lindane)	0.05	**0.08**	J	1.1	UJ	**0.12**	J	**0.41**	J	**0.32**	J	**0.63**	J	**0.74**	J
Heptachlor	0.01	0.17	U	1.1	U	**0.029**	JN	**0.23**	J	**0.5**	J	**0.47**		**0.54**	
Aldrin	0.01	**0.29**	J	1.1	U	**0.039**	JN	**0.13**	JN	0.6	U	**0.42**	J	**0.46**	
Heptachlor Epoxide	0.01	**0.22**	J	**0.61**	JD	**0.11**		**0.28**	J	**0.39**	J	**0.14**	J	**0.18**	J
Endosulfan I	0.1	**0.35**	J	**0.93**	JD	0.057	U	0.24	U	**0.62**	J	**0.068**	JN		U
Dieldrin	0.01	**2.8**		2.2	U	**0.27**	J	**0.84**	J	**1**	J	**1.4**	J	**1.7**	J
4,4'-DDE	0.01	**0.14**	JN	2.2	U	0.11	U	0.48	U	1.2	U		U		U
Endrin	0.01	**0.4**	J	**2.9**	D	**0.085**	JN	**0.31**	JN	**0.9**	JN	**0.99**	J	**0.99**	JN
Endosulfan II	0.1	0.34	U	2.2	U	0.11	U	0.48	U	1.2	U		U		U
4,4'-DDD	0.01	0.34	U	2.2	U	0.11	U	0.48	U	1.2	U	**0.17**	JN	**0.14**	JN
Endosulfan Sulfate	0.1	0.34	U	2.2	U	0.11	U	0.48	U	1.2	U		U		
4,4'-DDT	0.01	**0.12**	JN	2.2	U	0.11	U	0.48	U	1.2	U	**0.85**		**1**	
Methoxychlor	35	1.7	U	11	U	0.57	U	2.4	U	6	U		U		U
Endrin Ketone	5	0.17	J	2.2	U	0.11	U	0.48	U	1.2	U		U		U
Endrin Aldehyde	5	0.57		2.2	U	0.11	U	0.48	U	1.2	U		U		U
alpha-chlordane	NS	1.3	J	12	DJ	0.45	J	2.1	J	4.8	J	1.3	E	2.1	E
gamma-chlordane	0.01	**1.5**		**15**	D	**0.35**	J	**1.9**	J	**5.2**		**1.5**	E	**2.2**	E
Toxaphene	NS	17	U	110	U	5.7	U	24	U	60	U		U		U

Notes:
Samples were collected during Phase I on 3/20/96.
BOLD: Exceeded the NYSDEC recommended soil cleanup standard, TAGM#4046
NS: No standard

Data Qualifiers:
D - Reported result taken from diluted sample analysis
JN - Presumptively present at an approximated quantity.
UJ - The compound was analyzed for, but not detected. The sample quantitation limit is an estimated quantity due to variance in quality control limits.
J - The associated numerical value is an estimated quantity.
R - The reported value is unusable and rejected data due to variance from quality control limits.
E - Reported value is estimated due to quantitation above the calibration range.

Section 3
Phase II Remedial Investigation Scope

The field activities for this Phase II investigation began on April 13, 1998 with an initial site visit and field activity planning review meeting. Present at the meeting were the NYSDEC, CDM and SJB Drilling Inc. The meeting included a HASP briefing wherein all field personnel reviewed and signed the site-specific Health and Safety Plan prior to initiating site tasks. The local police, hospital, and other local emergency services had been notified as to where, when, and what field activities were to be conducted.

3.1 Onsite Soil Borings

To evaluate the extent of vertical and horizontal distribution of contamination on the former Fumex property, surficial and subsurface soil sampling of on-site borings was performed. Soil boring locations are shown on Figure 3-1. Samples were collected from five soil borings, SB-10, SB-11, SB-12, SB-13, SB-14, and the monitoring well MW-6 boring. The five boring samples were analyzed for TCL Pesticide compounds. The samples from the MW-6 boring were analyzed for TCL Organics, including Pesticides, TAL Metals and Total Organic carbon analysis. Residual cuttings were placed back in the boreholes. Excess cutting material was stockpiled on the site property behind locked gates.

The borings were installed by SJB Drilling Inc., using the hollow-stem auger method. Prior to initiating drilling, all augers, split spoons, and non disposable sampling equipment were cleaned using a pressure washer. The auger flights and rig were pressure-washed between borings. The split-spoons and stainless-steel mixing bowls were further decontaminated prior to use with a liquinox wash, tap water rinse and distilled/deionized water rinse.

Concurrent with drilling operations, continuous monitoring with an explosimeter/L.E.L meter was performed. Standard penetration measurements or blow counts were recorded along with OVM readings, recovery percentage within the split-spoon and physical soil descriptions. The soil descriptions are provided in the soil boring logs, found in Appendix B.

A total of 48 soil boring samples were collected. These included six surficial soil samples that were collected upon clearance of asphalt prior to augering. Subsurface split-spoon samples were collected at five-foot intervals for the first 15 feet and at ten-foot intervals thereafter to the desired depths, resulting in seven split-spoon samples per boring.

The sample material was thoroughly mixed in a stainless-steel bowl using a precleaned, dedicated disposable spoon prior to placement in the appropriate sample containers. Each sample container was labeled with the date and time of collection and sample identification, then placed on ice in a cooler.

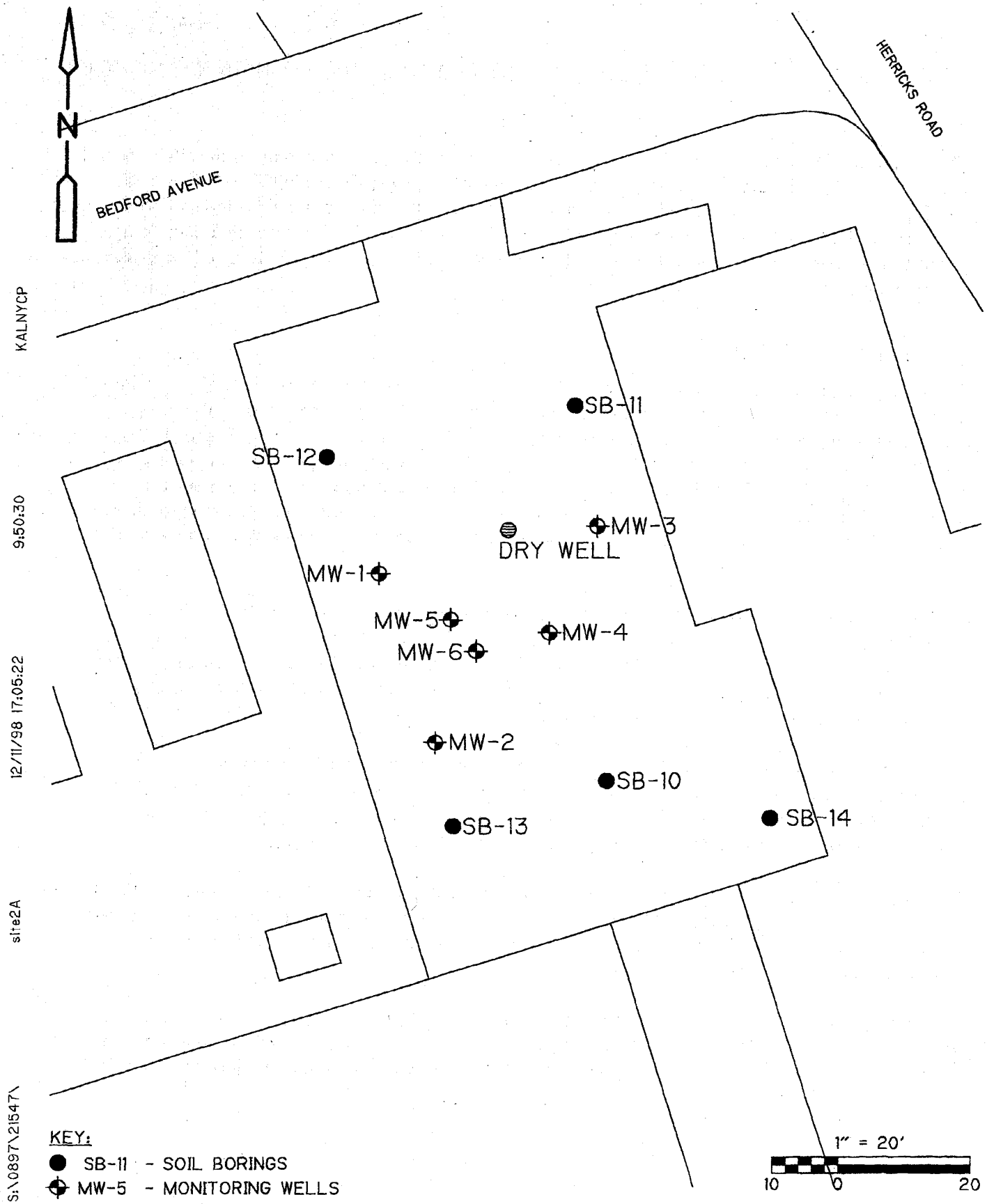

Figure 3-1
On-Site Monitoring Wells And Soil Boring Locations
Phase II RI Report, Fumex Site - New Hyde Park, New York

CDM Camp Dresser & McKee

Equipment field blanks were collected for analysis of the same parameters as the samples. This was performed by passing distilled/deionized water over a decontaminated split spoon and sampling spoon into the sample containers. Duplicate samples and matrix spike/matrix spike duplicate samples were collected for the assessment of the accuracy and precision of the laboratory. Chains of custody were completed for each sample cooler shipment. H2M Labs, Inc., provided sample shipment and analytical services.

3.2 Groundwater Monitoring Wells

CDM supervised the installation of seven monitoring wells which enabled a characterization of the site and surrounding hydrogeology. The installations - three shallow (approximately 50 foot depth) and four deep (approximately 125 foot depth) - included one onsite deep well (MW-6) and three offsite well clusters. Each cluster was composed of one shallow and one deep well. Table 3-1 summarizes well construction details. Well completion reports are provided in Appendix B.

One well cluster was located generally to the north and upstream of the site (MW-9S and MW-9D). The remaining two were located generally south and downgradient of the site. Well cluster (MW-8S and MW-8D) was situated approximately twice the distance from the site as the other well cluster (MW-7S and MW-7D). Offsite well locations are shown in Plate 1 provided in the back pocket of this report.

The three shallow water table wells were drilled using the hollow-stem auger method (using 6 1/4-inch I.D. augers). The four deep wells - screened in the Magothy Formation - were drilled using the hollow-stem auger method to 50 feet, then the flush-joint method (hammering 4-inch casing and flushing with water) to the desired depth.

3.2.1 Well Installation

Prior to initiating drilling activities, and between each well, all drilling equipment was pressure-washed on the site property. Based on direction from NYSDEC, rinsate from this decontamination process was directed to the onsite drywell.

Upon reaching the desired depths, 2-inch diameter schedule 40 polyvinylchloride (PVC) well casing and 10-foot long PVC well screens were installed. SJB suspended the casing one foot above the bottom of the hole for placement of a filter-pack.

For each of these wells, a continuous filter-pack in each borehole was installed consisting of Morie # zero sand around each well screen. The filter-pack was installed by pouring from grade along the outside of the riser pipe, while gradually backing-out the auger flights as the sand was emplaced. The filter packs extended from one-foot beneath the screen to two-feet above the top of the well screen. Above the filter pack, one foot of bentonite pellets was installed. The Portland/bentonite grout was then mixed and tremied to the surface.

A flush-mount valve box was installed at each monitoring well, and a concrete pad sloping away

Table 3-1
Well Construction Summary
Fumex Sanitation Site
Phase II Remedial Investigation
NYSDEC Site # 1-30-041

Well Id.	Location	Well Type	Borehole Diameter	Drilling Fluid	Bits / Depths	Total Depth	Casing Material	Casing Diameter	Screen Size	Slot Size	Screen Setting	Filter Material / Setting	Seals Material / Setting	Grout / Setting	Surface Casing Material
MW-6	Parking Lot	Monitor	4.25"auger 4" casing	water drive/ wash	4.25"/60' 4"/120'	121'	PVC	2"	10'	.10"	120'-110'	Morie #0 / 121'-108'	Bentonite slurry / 108'-104'	Portland/Bentonite / 104'-surface	Steel flush-mount
MW-7S	Armstrong and Broadway	Monitor	4.25" auger	water drive/ wash	4.25"/50'	50'	PVC	2"	10'	.10"	50'-40'	Morie #0 / 50'-37.5'	Bentonite slurry / 37.5'-35'	Portland/Bentonite / 35'-surface	Steel flush-mount
MW-7D	Armstrong and Broadway	Monitor	4.25" auger	water drive/ wash	4.25"/35' 4"/120'	120'	PVC	2"	10'	.10"	120'-110'	Morie #0 / 120'-108'	Bentonite slurry / 108'-104'	Portland/Bentonite / 104'-surface	Steel flush-mount
MW-8S	Thorens and Atlantic	Monitor	4.25" auger	water drive/ wash	4.25"/50'	60'	PVC	2"	10'	.10"	60'-50'	Morie #0 / 60'-48'	Bentonite slurry / 48'-46'	Portland/Bentonite / 46'-surface	Steel flush-mount
MW-8D	Thorens and Atlantic	Monitor	4.25" auger	water drive/ wash	4.25"/50' 4"/125'	125'	PVC	2"	10'	.10"	125'-115'	Morie #0 / 125'-112.5'	Bentonite slurry / 112.5'-108'	Portland/Bentonite / 108'-surface	Steel flush-mount
MW-9S	Madison and Herricks	Monitor	4.25" auger	water drive/ wash	4.25"/50'	50'	PVC	2"	10'	.10"	50'-40'	Morie #0 / 40'-37'	Bentonite slurry / 37'-35'	Portland/Bentonite / 35'-surface	Steel flush-mount
MW-9D	Madison and Herricks	Monitor	4.25" auger	water drive/ wash	4.25"/40' 4"/115'	115'	PVC	2"	10'	.10"	115'-105'	Morie #0 / 105'-113'	Bentonite slurry / 113'-109'	Portland/Bentonite / 109'-surface	Steel flush-mount

from the protective casing was completed around each well. Inner casing caps were locked and marked with an identification number and secured with keyed-alike padlocks. A set of keys was sent to the NYSDEC Project Manager.

3.2.2 Well Development

Each newly installed monitoring well was developed to provide representative groundwater samples with low turbidity (less than 50 NTU), to provide a reasonable estimate of the hydraulic conductivity of the monitoring interval, and to achieve responsiveness to water level changes within the formation by allowing for the free movement of groundwater between the monitoring well and the formation.

SJB performed well development for each of the seven newly-installed monitoring wells. The four deep wells were surged and purged using a decontaminated 2-inch Grundfos submersible pump. Reversals or surges in flow were accomplished by periodically shutting the pump off and allowing a backwashing to occur. Development water was measured into a 55-gallon drum.

The shallow wells were developed by bailing and surging with a hand bailer and surge block. The slow recovery rate of these wells precluded the use of the submersible pump. The development water for these wells was measured into 5-gallon buckets.

Turbidity of groundwater during well development was measured using a turbidimeter. Other parameters measured included specific conductance and pH. Development was completed upon the stabilization of pH and specific conductance and turbidity readings lower than 50 NTU. Development water was transferred to the site and deposited to the drywell.

3.3 Groundwater Sampling

Seventeen monitoring wells, including the seven new wells, the existing five on-site wells, and five Nassau County observation wells were sampled to determine groundwater quality at and in the vicinity of the site. Each sample was analyzed for TCL Pesticides. Two rounds of groundwater samples were collected, the first in early June 1998 and the second in late September, 1998. Onsite monitoring wells are shown on Figure 3-1 and offsite wells, including the Nassau County Observation Wells, are shown on Plate 1 provided in the back pocket of this report.

Prior to well evacuation, the water level and total depth of the well were measured to calculate the volume to be purged. In the deep wells, dedicated decontaminated 2-inch submersible Grundfos pumps and attached polyethylene hose sections were lowered to one-foot above the screen. Peristaltic pumps were used to purge the shallow wells. Pump flow rate and start/end times were recorded.

Temperature, pH, dissolved oxygen and conductivity equipment was calibrated twice daily during sampling activities. Measurements were recorded periodically during the purging process. Upon stabilization of these parameters and completion of required volumes, the pumps were removed and

the wells were allowed time to recharge.

Dedicated, disposable sampling bailers were used to collect the groundwater samples. Two unpreserved one-liter amber bottles were collected for each Pesticides analysis. A field blank, a duplicate and a matrix-spike/matrix-spike duplicate for Pesticides were collected to achieve sample Q/A requirements. Chains of custody were completed for each sample cooler shipment. H2M Labs, Inc. provided sample transport and analytical services.

3.4 Synoptic Groundwater Level Measurements

Following a two-week equilibration period after the installation of the new monitoring wells, CDM collected a round of synoptic water level measurements from the five existing on-site monitoring wells, the new shallow and deep wells and the Nassau County wells. A second round of water level measurements was made prior to the second round (Phase II RI) groundwater sampling conducted in September of 1998. Table 3-2 summarizes all water level data obtained from the Phase II RI as well as the Phase I RI.

Water level depths were measured with an electronic water level indicator. Decontamination of the indicator probe was performed between readings The measurements of the water levels (within an accuracy of " 0.01 feet) were completed prior to the groundwater sampling events.

3.5 Surveying of Sample Points

Horizontal and vertical control of all new and existing wells and borings, excluding the Nassau County wells, was performed by YEC, Inc. in July of 1998 in accordance with the Phase II RI Work Plan. Figure 3-1 provides the survey location of all onsite wells and borings. Plate 1 provides the survey location for all offsite monitoring wells as well as the Nassau County Wells. Table 3-1 provides elevation data for all Phase II RI wells installed by CDM.

3.6 Laboratory Analysis

H2M Laboratories Inc. completed all specified chemical analysis of samples collected as part of the Phase II RI. Analysis of samples was conducted in accordance with the NYSDEC Analytical Services Protocol (ASP) for the Contract Laboratory Program (CLP) issued in 1995.

3.7 Data Validation and Data Usability

Data validation was completed under subcontract by Chemworld Environmental Inc. (Chemworld) to determine and document analytical data quality in accordance with DEC CLP requirements. The analytical and validation processes were conducted in conformance with the CLP and are based on the United States Environmental Protection Agency's (EPA) Contract Laboratory Protocol "Statement of Work" documents and the associated "CLP Functional Guidelines for Data Validation" documents. Chemworld provided CDM with Data Validation Summary Reports explaining their

Table 3-2
Synoptic Water Level Measurements
Fumex Sanitation Site
Phase II Remedial Investigation
NYSDEC Site #1-30-041

Well ID No.	Top of PVC Casing Elevation (ft MSL)	March 20, 1996		August 27, 1996		June 2-3, 1998		September 23-24, 1998	
		Depth to Water from Top of PVC (ft)	Elevation of Water Surface (ft MSL)	Depth to Water from Top of PVC (ft)	Elevation of Water Surface (ft MSL)	Depth to Water from Top of PVC (ft)	Elevation of Water Surface (ft MSL)	Depth to Water from Top of PVC (ft)	Elevation of Water Surface (ft MSL)
MW-1	97.24	47.95	49.29	45.73	51.51	40.62	56.62	42.24	55.00
MW-2	97.54	48.25	49.29	46.08	51.46	40.93	56.61	42.55	54.99
MW-3	97.12	47.87	49.25	45.61	51.51	40.45	56.67	42.11	55.01
MW-4	97.22	48.00	49.22	45.77	51.45	40.62	56.60	42.26	54.96
MW-5	97.00	47.72	49.28	45.51	51.49	40.37	56.63	42.03	54.97
MW-6	96.94	No data	---	No data	---	40.25	56.69	41.91	55.03
MW-7D	89.18	No data	---	No data	---	33.55	55.63	35.18	54.00
MW-7S	89.03	No data	---	No data	---	33.42	55.61	35.02	54.01
MW-8D	99.03	No data	---	No data	---	44.95	54.08	46.69	52.34
MW-8S	99.34	No data	---	No data	---	45.23	54.11	46.92	52.42
MW-9D	94.78	No data	---	No data	---	38.08	56.70	39.71	55.07
MW-9S	95.07	No data	---	No data	---	38.35	56.72	39.99	55.08
NC-11171	77.00	No data	---	No data	---	28.38	48.62	29.64	47.36
NC-11172	77.30	No data	---	No data	---	28.98	48.32	30.31	46.99
NC-11738	96.00	No data	---	No data	---	43.83	52.17	46.62	49.38
NC-11739	94.83	No data	---	No data	---	41.40	53.43	45.52	49.31
NC-12005	99.14	No data	---	No data	---	46.38	52.76	48.10	51.04

findings provided as Appendix C.

Data validation was performed on all soil sample and the first round groundwater data for the Phase II RI. Due to the fact that CDM did not receive the second round groundwater data from the contract lab until November 19, 1998, third party data validation of this data was not completed in time for inclusion in this report. Therefore, the second round groundwater data presented in this report should be considered preliminary. CDM expects to receive the data validation report for the second round groundwater on December 18, 1998. CDM will incorporate any findings of this data validation in the final RI Report.

Based upon the intended use of the data, the following analytical data received independent validation by a third party:

- Groundwater samples (Round One only)
- Soil boring samples
- Associated quality control samples (ie. field blanks, method blanks)

The primary objective of the Phase II field investigation was to obtain reproducible, defensible data of sufficient quality and quantity to achieve the objectives of determining the extent and type of contaminants at the site. In order to do this, data quality objectives were incorporated in the planning of the investigation in accordance with regulatory guidelines.

Based on the third party validation, data were generally within acceptable quality control specifications. Both quantitative and qualitative analysis were acceptable. However, certain compounds , compound groups and/or a majority of compounds in one sample were additionally qualified or rejected after being reviewed by the data validator. A summary of the significant findings of the completed validation follows:

Volatile Organics by GC/MS

All initial and continuing calibration was performed within acceptable limits with the following exceptions: Acetone, Chloromethane, 2-Butanone, 2-Hexanone, Ethylbenzene, Xylene (total), 1,1,1-Trichloroethane, Carbon Tetrachloride. The groundwater samples associated with calibration exceedances for these compound were qualified as >J=, estimated, for the positive results, and >UJ=, estimated, for the non-detectable results for the compounds above.

One water method blank and two soil method blanks were analyzed for the sample delivery group CDMJ003, consisting of samples collected from MW-6 and SB-14. Volatile organics were detected in the soil method blanks as follows:

Sample Id.	Parameter	Concentration
VBLK 4/21/98	Methylene Chloride	2 ug/Kg, estimated
	Acetone	3 ug/Kg, estimated
VBLK 4/22/98	Methylene Chloride	2 ug/Kg, estimated
	Acetone	3 ug/Kg, estimated
	2-Hexanone	3 ug/Kg, estimated

Limits of ten times the highest respective results for methylene chloride and acetone, and five times the 2-Hexanone result, were used for review and qualification of the associated samples. Sample results that were found to be less than the blank limit but reported over the Contract Required Quantitation Limits were qualified as >U=, not detected.

Semi-Volatiles Compounds

Tentatively Identified Compounds (TICs) were qualified as >R=, unusable, due to their presence at less than five times the method blank result. In addition, TICs for heptachlor and chlordane isomers were qualified as >R=, unusable due to the fact that these compounds are detected through the pesticide analysis. The remaining data was considered to be valid and did not require the use of data qualifiers with the following exception. Calibrations for sample delivery group CDMJ003 exceeded the percent difference limit of 25% for Hexachlorocyclopentadiene and 2,4-Dinitrophenol. The samples associated with these calibrations were qualified as >UJ=, estimated for the non-detectable results. Positive results were not detected for the compounds affected.

Pesticides and PCBs

Pesticides were detected in the soil method blanks for sample delivery group CDMJ003 consisting of samples collected from MW-6 and SB-14 as follows:

Sample	Parameter	Concentration
PBLK03/PBLK02	alpha-Chlordane	0.83 ug/Kg, estimated
	gamma-Chlordane	1.20 ug/Kg, estimated

Sample results for this sample delivery group were qualified as >U=, not detected were found to be less than the blank limit.

When initial and continuing calibration standards were determined to be outside of acceptable limits the associated samples were qualified as >J=, estimated for the positive results and >UJ=, estimated for the non-detectable results for the compounds.

In accordance with GC qualitative analysis protocol, the lower of two values from the GC columns is reported. Numerous samples were noted where the percent difference between the GC columns was greater than 70%. These samples were qualified as, >JN= presumptively present at an approximate

quantity. Sample SB-11-6D2 was qualified as >R=, unusable , for endrin due to an extremely high percent difference generated for the results from the two GC columns. Similarly, samples SB-12-6 and SB-13-0DL1 were also qualified as >R=, unusable, for 4,4-DDD due to high percent differences on the two GC columns.

Inorganics

One field blank was analyzed for inorganics for the sample delivery group, CDMJ003 consisting of samples collected from MW-6 and SB-14. Positive results were detected as follows: aluminum(7.7 ug/l), calcium(60 ug/l), iron(14.2 ug/l), sodium(34.8 ug/l), and zinc(17.7 ug/l). Sample results that were found to be less than five times the respective inorganic field blank result were qualified as >U=, not detected.

Section 4
Nature and Extent of Contamination

This section discusses the nature and distribution of organic and inorganic constituents associated with the Fumex site. Both the Phase I and Phase II RI data sets are used in this evaluation. To aid risk management decisions regarding the need to remediate the site and to assist in developing presumptive remedies, this section of the report focuses on constituents identified as chemicals of concern (COCs) in soil and groundwater at the site.

Screening criteria for these various media were developed using the appropriate standards, criteria and guidance (SCGs) documents provided by NYSDEC as applicable SCGs for the Fumex site. Screening criteria are employed during site characterization because contaminants detected below regulatory standards are not likely to be targeted for remediation.

The following standards, criteria and guidance documents were used to screen the environmental samples collected at the site.

Soil

NYSDEC, Division of Hazardous Waste Management, Technical and Administrative Guidance Memorandum (TAGM)/Determination of Soil Cleanup Objectives and Cleanup Levels (HWR-94-4046), dated January 24, 1994;

Groundwater

NYSDEC, Division of Water, Technical and Operational Guidance Series (TOGS 1.1.1)/Ambient Water Quality Standards and Guidance Values, dated June 1998;

4.1 Onsite Soil Quality

As discussed in Section 3.1, a total of 50 soil samples were collected for laboratory analysis during the completion of five onsite soil borings and the installation of one onsite monitoring well (MW-6). Onsite soil borings were placed around the site dry well within the asphalt parking lot. All samples were analyzed for TCL pesticides. Additionally, seven soil samples collected from MW-6 were analyzed for TAL metals, TCL volatile organics and semi-volatile organics and Total Organic Carbon (TOC). Figure 4-1 provides the location of the onsite soil borings and MW-6.

4.1.1 TCL Pesticides

Sampling performed by CDM during the Phase I RI in 1996 revealed pesticide contamination present within sediments well in excess of NYSDEC cleanup standards within and below the onsite dry well. The most prevalent pesticide compounds detected within the drywell in descending order of frequency included:

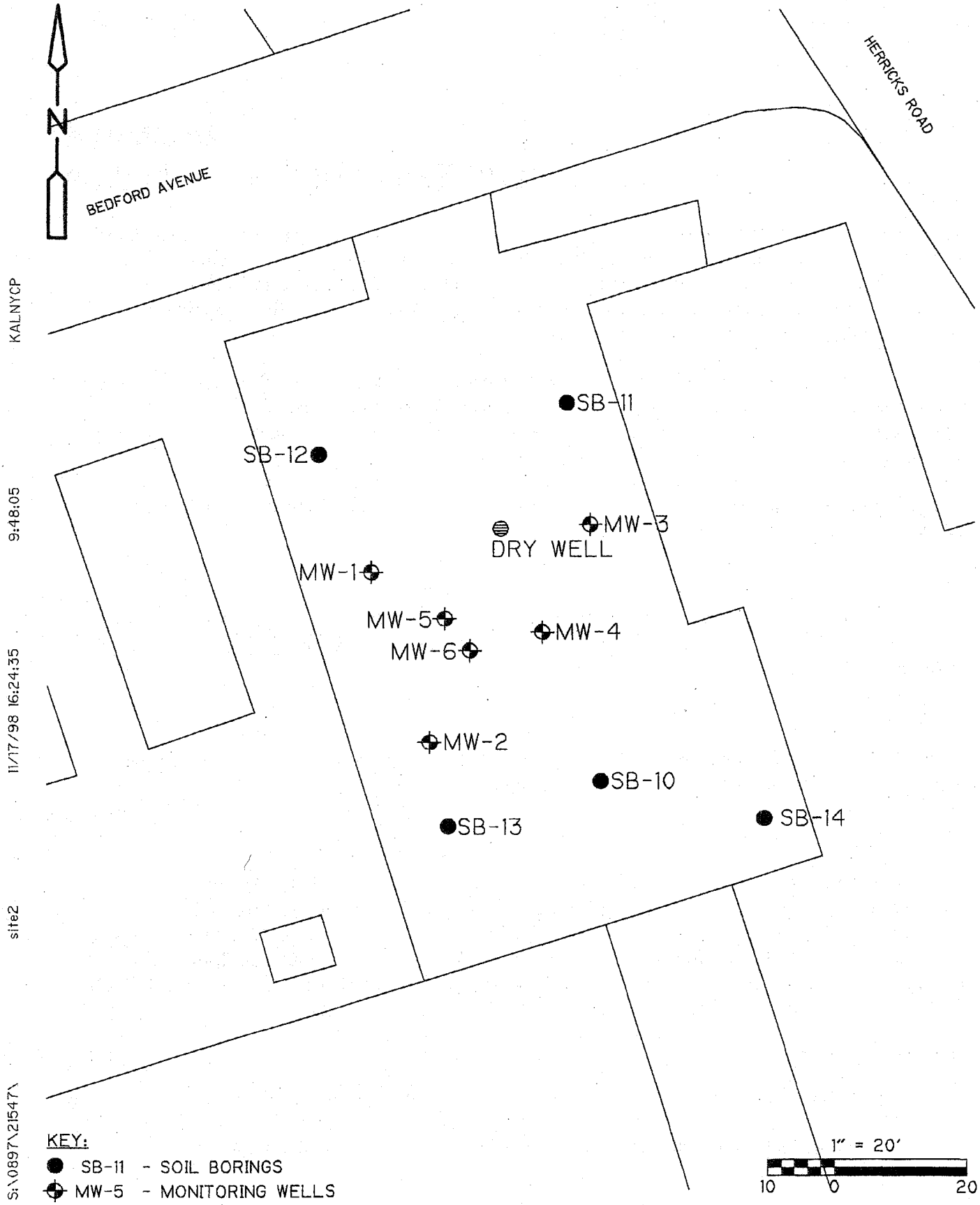

Figure 4-1
On-Site Monitoring Wells And Soil Boring Locations
Phase II RI Report, Fumex Site - New Hyde Park, New York

CDM Camp Dresser & McKee

T -1

Pesticides in Soil - Data Summary

Fumex Sanitation Site Phase II Remedial Investigation

NYSDEC Site #1-30-041

Pesticides (ug/Kg)	NYSDEC Recommended Soil Cleanup Standard	SB-10-0 DL1 04/14/98 0-1	SB-10-0 DL2 04/14/98 0-1	SB-10-1 04/14/98 5-7	SB-10-1 DL 04/14/98 5-7	SB-10-2 04/15/98 10-12	SB-10-3 04/14/98 15-17	SB-10-3 Duplicate 04/15/98 15-17	SB-10-4 04/14/98 25-27	SB-10-5 04/14/98 35-37	SB-10-6 04/14/98 45-47	SB-10-7 04/14/98 55-57	SB-10-7 DL 04/14/98 55-57
alpha-BHC	110	900.0 U	90.0 U	1.8 U	7.1 U	1.7 U	1.7 U	1.8 UJ	1.7 U	2.0 U	2.1 U	2.1 U	21.0 U
beta-BHC	200	900.0 U	90.0 U	1.8 U	7.1 U	1.7 U	1.7 U	1.8 U	1.7 U	2.0 U	2.1 U	2.1 U	21.0 U
delta-BHC	300	900.0 UJ	90.0 UJ	1.8 UJ	7.1 UJ	1.7 UJ	1.7 UJ	1.8 U	1.7 UJ	2.0 UJ	2.1 UJ	2.1 UJ	21.0 UJ
gamma-BHC (Lindane)	60	900.0 U	90.0 U	1.8 U	7.1 U	1.7 U	1.7 U	1.8 UJ	1.7 U	2.0 U	2.1 U	2.1 U	21.0 U
Heptachlor	100	**2400.0** D	**640.0** D	12.0	11.0 U	1.7 U	2.2	1.8 U	1.7 U	3.6	2.1 U	35.0 E	31.0 D
Aldrin	41	900.0 U	90.0 U	1.8 U	7.1 U	1.7 U	1.7 U	1.8 U	1.7 U	2.0 U	2.1 U	2.1 U	21.0 U
Heptachlor epoxide	20	900.0 U	90.0 U	1.8 U	7.1 U	1.7 U	1.7 U	1.8 U	1.7 U	2.0 U	2.1 U	2.1 U	21.0 U
Endosulfan I	900	900.0 U	90.0 U	1.8 U	7.1 U	1.7 U	1.7 U	1.8 U	1.7 U	2.0 U	2.1 U	2.1 U	21.0 U
Dieldrin	44	**2700.0** D	**720.0** D	16.0	13.0 JD	1.7 J	2.8 J	3.5 U	3.4 U	4.2	4.0 U	28.0	41.0 U
4,4'-DDE	2100	1700.0 U	96.0 DJN	2.4 JN	14.0 U	3.4 U	3.4 U	3.5 U	3.4 U	4.0 U	4.0 U	3.6 JN	41.0 U
Endrin	100	1700.0 U	170.0 U	3.4 U	14.0 U	3.4 U	3.4 U	3.5 UJ	3.4 U	4.0 U	4.0 U	4.1 U	41.0 U
Endosulfan II	900	1700.0 U	170.0 U	3.4 U	14.0 U	3.4 U	3.4 U	3.5 U	3.4 U	4.0 U	4.0 U	4.1 U	41.0 U
4,4'-DDD	2900	1700.0 UJ	170.0 UJ	3.4 UJ	14.0 UJ	3.4 UJ	3.4 UJ	3.5 U	3.4 UJ	4.0 UJ	4.0 UJ	4.1 UJ	41.0 UJ
Endosulfan sulfate	1000	1700.0 U	170.0 U	3.4 U	14.0 U	3.4 U	3.4 U	3.5 U	3.4 U	4.0 U	4.0 U	4.1 U	41.0 U
4,4'-DDT	2100	1300.0 JD	320.0 D	10.0	14.0 U	5.8	3.4 U	3.5 U	3.4 U	4.0 U	4.0 U	12.0	41.0 U
Methoxychlor	***	9000.0 U	900.0 U	18.0 U	71.0 U	17.0 U	17.0 U	18.0 U	17.0 U	20.0 U	21.0 U	21.0 U	210.0 U
Endrin ketone	NS	1700.0 U	170.0 U	2.2 J	14.0 U	3.4 U	3.4 U	3.5 U	3.4 U	4.0 U	4.0 U	3.6 J	41.0 U
Endrin aldehyde	NS	1700.0 U	170.0 U	3.4 U	14.0 U	3.4 U	3.4 U	3.5 U	3.4 U	4.0 U	4.0 U	4.1 U	41.0 U
alpha-chlordane	540	**10000.0** DJN	**2500.0** DE	57.0 E	60.0 DJN	9.2 JN	12.0 JN	3.8 JN	1.7 U	19.0 JN	3.5 JN	110.0 E	120.0 JN
gamma-chlordane	540	**12000.0** D	**3000.0** DE	69.0 E	73.0 D	11.0	14.0	4.7	1.7 U	22.0	4.2 J	140.0 E	150.0 D
Toxaphene	NS	90000.0 U	9000.0 U	180.0 U	710.0 U	170.0 U	170.0 U	180.0 U	170.0 U	200.0 U	210.0 U	210.0 U	2100.0 U

Notes:

BOLD: Exceeds NYSDEC recommended soil cleanup standard.

U- Indicates that the compound was analyzed for, but not detected at or above the Contract Required Quantitation Limit(CRQL), or the compound is not detected due to qualification through the method or field blank.

J- The associated numerical value is an estimated quantity.

JN- Tentatively identically identified with approximated concentrations (Volatile and Semi Volatile Organics). Presumptively present at an approximated quantity (Pesticides/PCB's)

UJ- This compound was analyzed for, but not detected. The sample quantitation limit is an estimated quantity due to variance from quality control limits.

C- Applies to pesticide results where the identification has been confirmed by GC/MS.

E- Reported value is estimated due to quantitation above the calibration range.

D- Reported result taken from diluted sample analysis.

A- Aldol condensation product

R- Reported value is unusable and rejected due to variance from quality control limits.

NA- Not analyzed

*** = Total pesticides <10,000 ug/kg

Table 4-1
Pesticides in Soil - Data Summary
Fumex Sanitation Site Phase II Remedial Investigation
NYSDEC Site #1-30-041

Pesticides (ug/Kg)	NYSDEC Recommended Soil Cleanup Standard	Sample ID: SB-11-0 DL1 / Date: 04/14/98 / Depth(feet): 0-1	SB-11-0 DL2 / 04/14/98 / 0-1	SB-11-1 / 04/14/98 / 5-7	SB-11-1 DL / 04/14/98 / 5-7	SB-11-2 / 04/14/98 / 10-12	SB-11-2 DL / 04/14/98 / 10-12	SB-11-3 DL1 / 04/14/98 / 15-17	SB-11-3 DL2 / 04/14/98 / 15-17	SB-11-4 / 04/14/98 / 25-27	SB-11-4 DL / 04/14/98 / 25-27	SB-11-5 / 04/14/98 / 35-37	SB-11-5 DL / 04/14/98 / 35-37
alpha-BHC	110	9800.0 U	980.0 U	1.7 U	7.0 U	1.7 U	44.0 U	89.0 U	8.9 U	1.8 U	8.8 U	1.7 U	8.6 U
beta-BHC	200	9800.0 U	980.0 U	1.7 U	7.0 U	1.7 U	44.0 U	89.0 U	8.9 U	1.8 U	8.8 U	1.7 U	8.6 U
delta-BHC	300	9800.0 UJ	980.0 UJ	1.7 UJ	7.0 UJ	1.7 UJ	44.0 UJ	89.0 UJ	8.9 UJ	1.8 UJ	8.8 UJ	1.7 UJ	8.6 UJ
gamma-BHC (Lindane)	60	9800.0 U	980.0 U	1.7 U	7.0 U	1.7 U	44.0 U	89.0 U	8.9 U	1.8 U	8.8 U	1.7 U	8.6 U
Heptachlor	100	**46000.0** D	**40000.0** DE	26.0	26.0 D	1.7 U	44.0 U	89.0 U	8.9 U	2.1 J	8.8 U	17.0	16.0 D
Aldrin	41	9800.0 U	**790.0** DJN	1.7 U	7.0 U	1.7 U	44.0 U	89.0 U	8.9 U	1.8 U	8.8 U	1.7 U	8.6 U
Heptachlor epoxide	20	9800.0 U	980.0 U	1.7 U	7.0 U	1.7 U	44.0 U	89.0 U	8.9 U	1.8 U	8.8 U	1.7 U	8.6 U
Endosulfan I	900	9800.0 U	980.0 U	1.7 U	7.0 U	10.0 JN	44.0 U	89.0 U	8.9 U	1.8 U	8.8 U	1.7 U	8.6 U
Dieldrin	44	19000.0 U	**10000.0** DJ	11.0	7.4 JD	**230.0** E	**260.0** D	**1200.0** D	**980.0** DE	**100.0** E	**110.0** D	37.0	33.0 D
4,4'-DDE	2100	**12000.0** DJN	**14000.0** DJ	24.0 J	22.0 D	20.0 J	85.0 U	170.0 U	17.0 U	1.9 J	17.0 U	7.1 J	17.0 U
Endrin	100	19000.0 U	**2200.0** DJN	3.4 U	14.0 U	7.5 JN	85.0 U	170.0 U	17.0 U	3.4 U	17.0 U	3.3 U	17.0 U
Endosulfan II	900	19000.0 U	1900.0 U	3.4 U	14.0 U	3.4 U	85.0 U	170.0 U	17.0 U	3.4 U	17.0 U	3.3 U	17.0 U
4,4'-DDD	2900	19000.0 UJ	1900.0 UJ	3.4 UJ	14.0 UJ	340.0 E	380.0 DJ	140.0 JD	140.0 DJ	25.0 J	16.0 JD	3.3 UJ	17.0 UJ
Endosulfan sulfate	1000	19000.0 U	1900.0 U	3.4 U	14.0 U	3.4 U	85.0 U	170.0 U	17.0 U	3.4 U	17.0 U	3.3 U	17.0 U
4,4'-DDT	2100	**28000.0** D	**24000.0** D	170.0 E	180.0 D	200.0 E	200.0 D	170.0 U	17.0 U	11.0 D	11.0 JD	54.0 E	55.0 D
Methoxychlor	***	19000.0 U	9800.0 U	17.0 U	70.0 U	17.0 U	440.0 U	890.0 U	89.0 U	18.0 U	88.0 U	17.0 U	86.0 U
Endrin ketone	NS	19000.0 U	1100.0 DJN	3.4 U	14.0 U	8.8	85.0 U	170.0 U	17.0 U	3.4 U	17.0 U	3.3 U	17.0 U
Endrin aldehyde	NS	19000.0 U	1900.0 U	3.4 U	14.0 U	3.4 U	85.0 U	170.0 U	17.0 U	3.4 U	17.0 U	3.3 U	17.0 U
alpha-chlordane	540	**120000.0** JN	**90000.0** DE	67.0 E	75.0 DJN	320.0 E	410.0 DJN	**660.0** DJN	530.0 DE	67.0 E	77.0 DJ	66.0 E	72.0 DJ
gamma-chlordane	540	**140000.0** D	**110000.0** DE	84.0 E	92.0 D	380.0 E	460.0 D	**700.0** D	**570.0** DE	110.0 E	120.0 D	84.0 E	89.0 D
Toxaphene	NS	980000.0 U	98000.0 U	170.0 U	700.0 U	170.0 U	4400.0 U	8900.0 U	890.0 U	180.0 U	880.0 U	170.0 U	860.0 U

Notes:
BOLD: Exceeds NYSDEC recommended soil cleanup standard.
U- Indicates that the compound was analyzed for, but not detected at or above the Contract Required Quantitation Limit(CRQL), or the compound is not detected due to qualification through the method or field blank.
J- The associated numerical value is an estimated quantity.
JN- Tentatively identically identified with approximated concentrations (Volatile and Semi Volatile Organics). Presumptively present at an approximated quantity (Pesticides/PCB's)
UJ- This compound was analyzed for, but not detected. The sample quantitation limit is an estimated quantity due to variance from quality control limits.
C- Applies to pesticide results where the identification has been confirmed by GC/MS.
E- Reported value is estimated due to quantitation above the calibration range.
D- Reported result taken from diluted sample analysis.
A- Aldol condensation product
R- Reported value is unusable and rejected due to variance from quality control limits.
NA- Not analyzed
*** = Total pesticides <10,000 ug/kg

T -1

Pesticides in Soil - Data Summary

Fumex Sanitation Site Phase II Remedial Investigation

NYSDEC Site #1-30-041

Pesticides (ug/Kg)	Sample ID Date Depth(feet) NYSDEC Recommended Soil Cleanup Standard	SB-11-6 DL1 04/14/98 45-47	SB-11-6 DL2 04/14/98 45-47	SB-11-7 04/14/98 53-55	SB-11-7 DL 04/14/98 53-55	SB-12-0 Duplicate-DL 04/15/98 0-1	SB-12-0 Duplicate 04/15/98 0-1	SB-12-0 DL1 04/14/98 0-1	SB-12-0 DL2 04/14/98 0-1	SB-12-1 04/14/98 5-7	SB-12-2 04/14/98 10-12	SB-12-3 04/14/98 15-17	SB-12-3 DL 04/14/98 15-17
alpha-BHC	110	200.0 U	20.0 U	2.0 U	10.0 U	920.0 U	18000.0 U	9200.0 U	920.0 U	1.8 U	1.8 U	1.8 U	18.0 U
beta-BHC	200	200.0 U	20.0 U	2.0 U	10.0 U	920.0 U	18000.0 U	9200.0 U	920.0 U	1.8 U	1.8 U	1.8 U	18.0 U
delta-BHC	300	200.0 UJ	20.0 UJ	2.0 UJ	10.0 UJ	920.0 U	18000.0 UJ	9200.0 UJ	920.0 UJ	1.8 UJ	1.8 UJ	1.8 UJ	18.0 UJ
gamma-BHC (Lindane)	60	200.0 U	20.0 U	2.0 U	10.0 U	920.0 U	18000.0 U	9200.0 U	920.0 U	1.8 U	1.8 U	1.8 U	18.0 U
Heptachlor	100	**660.0** D	**610.0** DE	24.0	24.0 D	**42000.0** DE	**51000.0** D	**36000.0** D	**32000.0** DE	3.7	1.1 J	63.0 E	60.0 D
Aldrin	41	200.0 U	13.0 DJN	2.0 U	10.0 U	**1500.0** DJN	18000.0 U	9200.0 U	**1100.0** DJN	1.8 U	1.8 U	1.8 JN	18.0 U
Heptachlor epoxide	20	200.0 U	20.0 U	2.0 U	10.0 U	920.0 U	18000.0 U	9200.0 U	920.0 U	1.8 U	1.8 U	1.8 U	18.0 U
Endosulfan I	900	200.0 U	20.0 U	2.0 U	10.0 U	920.0 U	18000.0 U	9200.0 U	**930.0** DJN	1.8 U	1.8 U	1.8 U	18.0 U
Dieldrin	44	380.0 U	**190.0** DJ	7.0 J	12.0 JD	**15000.0** D	36000.0 U	**11000.0** JD	**12000.0** D	3.5 U	1.9 J	26.0	19.0 JD
4,4'-DDE	2100	480.0 DJ	550.0 DJ	13.0 J	12.0 DJN	**2800.0** DJN	36000.0 U	18000.0 U	**2700.0** DJN	3.5 U	3.4 U	6.0 JN	34.0 U
Endrin	100	380.0 U	55.0 R	3.9 U	19.0 U	1800.0 U	36000.0 U	18000.0 U	1800.0 U	3.5 U	3.4 U	3.4 U	34.0 U
Endosulfan II	900	380.0 U	38.0 U	3.9 U	19.0 U	**2600.0** DJN	36000.0 U	18000.0 U	1800.0 U	3.5 U	3.4 U	3.4 U	34.0 U
4,4'-DDD	2900	380.0 UJ	38.0 UJ	3.9 UJ	19.0 UJ	1800.0 U	36000.0 UJ	18000.0 UJ	1800.0 UJ	3.5 UJ	3.4 UJ	3.4 UJ	34.0 UJ
Endosulfan sulfate	1000	380.0 U	38.0 U	3.9 U	19.0 U	1800.0 U	36000.0 U	18000.0 U	1800.0 U	3.5 U	3.4 U	3.4 U	34.0 U
4,4'-DDT	2100	**4500.0** D	**3900.0** DE	88.0 E	94.0 D	**6500.0** DJ	36000.0 U	18000.0 U	**5000.0** DJ	3.5 U	3.4 U	11.0 JN	34.0 U
Methoxychlor	***	2000.0 U	200.0 U	20.0 U	100.0 U	9200.0 U	180000.0 U	92000.0 U	9200.0 U	18.0 U	18.0 U	18.0 U	180.0 U
Endrin ketone	NS	380.0 U	22.0 DJN	3.9 U	19.0 U	1900.0 DJN	36000.0 U	18000.0 U	1800.0 U	3.5 U	3.4 U	3.4 J	34.0 U
Endrin aldehyde	NS	380.0 U	38.0 U	3.9 U	19.0 U	1800.0 U	36000.0 U	18000.0 U	1800.0 U	3.5 U	3.4 U	3.4 U	34.0 U
alpha-chlordane	540	**1900.0** DJN	**1600.0** DE	63.0 E	76.0 DJN	**100000.0** DE	**120000.0** DJN	**90000.0** DJN	**68000.0** DE	12.0 JN	5.7 JN	140.0 E	160.0 DJN
gamma-chlordane	540	**2200.0** D	**1900.0** DE	78.0 E	90.0 D	**120000.0** DE	**160000.0** D	**100000.0** D	**83000.0** DE	15.0	6.5 J	170.0 E	210.0 D
Toxaphene	NS	20000.0 U	2000.0 U	200.0 U	1000.0 U	92000.0 U	1800000.0 U	920000.0 U	92000.0 U	180.0 U	180.0 U	180.0 U	1800.0 U

Notes:

BOLD: Exceeds NYSDEC recommended soil cleanup standard.

U- Indicates that the compound was analyzed for, but not detected at or above the Contract Required Quantitation Limit(CRQL), or the compound is not detected due to qualification through the method or field blank.

J- The associated numerical value is an estimated quantity.

JN- Tentatively identically identified with approximated concentrations (Volatile and Semi Volatile Organics). Presumptively present at an approximated quantity (Pesticides/PCB's)

UJ- This compound was analyzed for, but not detected. The sample quantitation limit is an estimated quantity due to variance from quality control limits.

C- Applies to pesticide results where the identification has been confirmed by GC/MS.

E- Reported value is estimated due to quantitation above the calibration range.

D- Reported result taken from diluted sample analysis.

A- Aldol condensation product

R- Reported value is unusable and rejected due to variance from quality control limits.

NA- Not analyzed

*** = Total pesticides <10,000 ug/kg

Table 4-1
Pesticides in Soil - Interval Soil
Sampling of MW-6
Fumex Sanitation Site Phase II Remedial Investigation
NYSDEC Site #1-30-041

Pesticides (ug/Kg)	Sample ID / Date / Depth(feet) — NYSDEC Recommend Soil Cleanup Standard	MW-6-0 DL1 04/16/98 0-1	MW-6-0 DL2 04/16/98 0-1	MW-6-1 DL1 04/16/98 5-7	MW-6-1 DL2 04/16/98 5-7	MW-6-2 DL 04/16/98 10-12	MW-6-2 DL2 04/16/98 10-12	MW-6-3 DL1 04/16/98 15-17	MW-6-3 DL2 04/16/98 15-17	MW-6-4 04/16/98 25-27
alpha-BHC	110	900.0 U	360.0 U	180.0 U	18.0 U	8900.0 U	180.0 U	180.0 U	8.9 U	1.8 U
beta-BHC	200	900.0 U	360.0 U	180.0 U	18.0 U	8900.0 U	180.0 U	180.0 U	8.9 U	1.8 U
delta-BHC	300	900.0 UJ	360.0 UJ	180.0 UJ	18.0 UJ	8900.0 UJ	180.0 UJ	180.0 UJ	8.9 UJ	1.8 UJ
gamma-BHC (Lindane)	60	900.0 U	360.0 U	180.0 U	18.0 U	8900.0 U	180.0 U	180.0 U	8.9 U	1.8 U
Heptachlor	100	**5000.0** D	**4800.0** D	**310.0** D	**300.0** DE	**17000.0** D	**14000.0** DE	**170.0** JD	**210.0** DE	30.0 E
Aldrin	41	900.0 U	360.0 U	180.0 U	10.0 DJN	8900.0 U	**970.0** DJN	180.0 U	7.1 DJN	1.7 JN
Heptachlor epoxide	20	900.0 U	360.0 U	180.0 U	**85.0** DJN	8900.0 U	**1700.0** DJN	180.0 U	**45.0** DJN	1.8 U
Endosulfan I	900	900.0 U	360.0 U	180.0 U	19.0 DJN	8900.0 U	450.0 DJN	180.0 U	9.2 DJN	1.8 U
Dieldrin	44	**3500.0** D	**3500.0** D	**280.0** JD	**300.0** D	**17000.0** D	**16000.0** DE	340.0 U	**170.0** D	40.0
4,4'-DDE	2100	1700.0 U	560.0 DJN	350.0 U	53.0 DJN	17000.0 U	1700.0 DJN	340.0 U	39.0 DJN	9.9 JN
Endrin	100	1700.0 U	700.0 U	350.0 U	26.0 DJN	17000.0 U	**780.0** DJ	340.0 U	28.0 D	6.0 J
Endosulfan II	900	1700.0 U	700.0 U	350.0 U	21.0 DJN	17000.0 U	520.0 DJN	340.0 U	30.0 DJN	3.5 U
4,4'-DDD	2900	1700.0 UJ	700.0 UJ	350.0 UJ	35.0 UJ	17000.0 UJ	340.0 UJ	340.0 UJ	17.0 UJ	3.5 UJ
Endosulfan sulfate	1000	1700.0 U	700.0 U	350.0 U	35.0 U	17000.0 U	340.0 U	340.0 U	17.0 U	3.5 U
4,4'-DDT	2100	1600.0 JD	1700.0 D	350.0 U	140.0 DJN	17000.0 U	**4100.0** DJ	340.0 U	93.0 DJ	21.0 J
Methoxychlor	***	9000.0 U	3600.0 U	1800.0 U	180.0 U	89000.0 U	1800.0 U	1800.0 U	89.0 U	18.0 U
Endrin ketone	NS	1700.0 U	700.0 U	350.0 U	42.0 DJ	17000.0 U	1000.0 DJN	340.0 U	24.0 DJN	7.7 J
Endrin aldehyde	NS	1700.0 U	700.0 U	350.0 U	35.0 U	17000.0 U	390.0 DJ	340.0 U	17.0 U	1.8 JN
alpha-chlordane	540	**18000.0** DE	**16000.0** DE	**1700.0** DJN	**1400.0** DE	**59000.0** DJN	**41000.0** DE	**1200.0** DJN	**1000.0** DE	230.0 E
gamma-chlordane	540	**21000.0** DE	**19000.0** DE	**2000.0** D	**1700.0** DE	**69000.0** D	**48000.0** DE	**1500.0** D	**1200.0** DE	290.0 DE
Toxaphene	NS	90000.0 U	36000.0 U	18000.0 U	1800.0 U	890000.0 U	18000.0 U	18000.0 U	890.0 U	180.0 U

Notes:
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C- Applies to pesticide results where the identification has been confirmed by GC/MS.
E- Reported value is estimated due to quantitation above the calibration range.
D- Reported result taken from diluted sample analysis.
A- Aldol condensation product
R- Reported value is unusable and rejected due to variance from quality control limits.
NA- Not analyzed
*** = Total pesticides <10,000 ug/kg

4-1

Pesticides in Soil - Interval Soil

Sampling of MW-6

Fumex Sanitation Site Phase II Remedial Investigation

NYSDEC Site #1-30-041

Pesticides (ug/Kg)	***Sample ID*** ***Date*** ***Depth(feet)*** **NYSDEC Recommend Soil Cleanup Standard**	*MW-6-4 DL* *04/16/98* *25-27*	*MW-6-5* *04/16/98* **35-37**	*MW-6-5 DL* *04/16/98* **35-37**	*MW-6-6* *04/16/98* **45-47**	*MW-6-6 DL* *04/16/98* **45-47**	*MW-6-7* *04/16/98* **55-57**	*MW-6-7 DL* *04/16/98* **55-57**
alpha-BHC	110	36.0 U	1.8 U	18.0 U	2.1 U	84.0 U	2.2 U	22.0 U
beta-BHC	200	36.0 U	1.8 U	18.0 U	1.1 J	84.0 U	2.2 U	22.0 U
delta-BHC	300	36.0 UJ	1.8 UJ	18.0 UJ	2.1 UJ	84.0 UJ	2.2 UJ	22.0 UJ
gamma-BHC (Lindane)	60	36.0 U	1.8 U	18.0 U	2.1 U	84.0 U	2.2 U	22.0 U
Heptachlor	100	27.0 JD	18.0	15.0 DJ	**140.0** E	**170.0** D	25.0	23.0 D
Aldrin	41	36.0 U	1.8 U	18.0 U	5.0 JN	84.0 U	2.2 U	22.0 U
Heptachlor epoxide	20	36.0 U	1.8 U	18.0 U	2.1 U	84.0 U	2.2 U	22.0 U
Endosulfan I	900	36.0 U	1.8 U	18.0 U	2.1 U	84.0 U	2.2 U	22.0 U
Dieldrin	44	69.0 U	19.0	35.0 U	**150.0** E	**150.0** JD	27.0	23.0 JD
4,4'-DDE	2100	69.0 U	8.2 JN	35.0 U	27.0 JN	160.0 U	5.7 JN	43.0 U
Endrin	100	69.0 U	3.5 U	35.0 U	4.1 U	160.0 U	4.3 U	43.0 U
Endosulfan II	900	69.0 U	3.5 U	35.0 U	4.1 U	160.0 U	4.3 U	43.0 U
4,4'-DDD	2900	69.0 UJ	3.5 UJ	35.0 UJ	4.1 UJ	160.0 UJ	4.3 UJ	43.0 UJ
Endosulfan sulfate	1000	69.0 U	3.5 U	35.0 U	4.1 U	160.0 U	4.3 U	43.0 U
4,4'-DDT	2100	69.0 U	13.0 J	35.0 U	77.0 E	160.0 U	14.0 J	43.0 U
Methoxychlor	***	360.0 U	18.0 U	180.0 U	21.0 U	840.0 U	22.0 U	220.0 U
Endrin ketone	NS	69.0 U	3.5 U	35.0 U	22.0 JN	160.0 U	3.3 JN	43.0 U
Endrin aldehyde	NS	69.0 U	1.9 JN	35.0 U	4.3 JN	160.0 U	4.3 U	43.0 U
alpha-chlordane	540	270.0 DJN	150.0 E	170.0 DJN	**670.0** E	**1000.0** DJN	130.0 E	150.0 DJN
gamma-chlordane	540	320.0 D	160.0 E	180.0 D	**650.0** E	**1200.0** D	160.0 E	180.0 D
Toxaphene	NS	3600.0 U	180.0 U	1800.0 U	210.0 U	8400.0 U	220.0 U	2200.0 U

Notes:

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E- Reported value is estimated due to quantitation above the calibration range.

D- Reported result taken from diluted sample analysis.

A- Aldol condensation product

R- Reported value is unusable and rejected due to variance from quality control limits.

NA- Not analyzed

*** = Total pesticides <10,000 ug/kg

Table 4-2
Frequency of Pesticide Detections within Soil and Concentration Ranges
Fumex Sanitation Site Phase II Remedial Investigation
NYSDEC Site #1-30-041

Pesticides (ug/Kg)	NYSDEC Recommended Soil Cleanup Standard	Soil Concentration Range (ppb)	Location of Maximum Concentration	No. of Detections	Total No. of Samples	Percent Detections
alpha-BHC	110	ND	---	0	50	0
beta-BHC	200	ND - 1.1	MW-6-6	1	50	2
delta-BHC	300	ND	---	0	50	0
gamma-BHC (Lindane)	60	ND - 1.6	SB-12-5	1	50	2
Heptachlor	100	ND - 36,000	SB-12-0	39	50	78
Aldrin	41	ND - 1,500	SB-12-0	9	50	18
Heptachlor epoxide	20	ND - 8,200	SB-13-0	6	50	12
Endosulfan I	900	ND - 930	SB-12-0	6	50	12
Dieldrin	44	ND - 17,000	MW-6-2	32	50	64
4,4'-DDE	2100	ND - 14,000	SB-11-0	22	50	44
Endrin	100	ND - 2,200	SB-11-0	7	50	14
Endosulfan II	900	ND - 2600	SB-12-0	6	50	12
4,4'-DDD	2900	ND - 380	SB-11-2	4	50	8
Endosulfan sulfate	1000	ND	---	0	50	0
4,4'-DDT	2100	ND - 28,000	SB-11-0	26	50	52
Methoxychlor	***	ND	---	0	50	0
Endrin ketone	NS	ND - 1100	SB-11-0	14	50	28
Endrin aldehyde	NS	ND - 580	SB-14-0	7	50	14
alpha-chlordane	540	ND - 120,000	SB-11-0	48	50	96
gamma-chlordane	540	ND - 160,000	SB-12-0	47	50	94
Toxaphene	NS	ND	---	0	50	0

Notes:
*** = Total pesticides <10,000 ug/kg
NS = No standard

- Heptachlor
- Aldrin
- Dieldrin
- 4-4' DDE
- Endrin
- 4-4'-DDT
- alpha-chlordane
- gamma-chlordane
- Endosulfan II

As illustrated in Figures 4-3 through 4-5, surface soils located immediately below the asphalt pavement significantly exceed the NYSDEC recommended cleanup guidelines for the listed pesticides, in most cases by several orders of magnitude. However, pesticides exceeding NYSDEC cleanup guidelines are also present in deeper soils at several locations including: SB-11 (10 to 27 feet), SB-13 (50-55 feet), SB-14 (10-12 feet) and most significantly at MW-6 (5 to 17 feet). Additionally, most sample locations exhibit an increase in pesticide contamination at or below the water table with soil cleanup guidelines being exceeded for selected pesticides at: SB-11 (45-47 ft.), SB-12 (45-47 ft.), SB-14 (55-57 ft.) and at MW-6 (45-47 ft.).

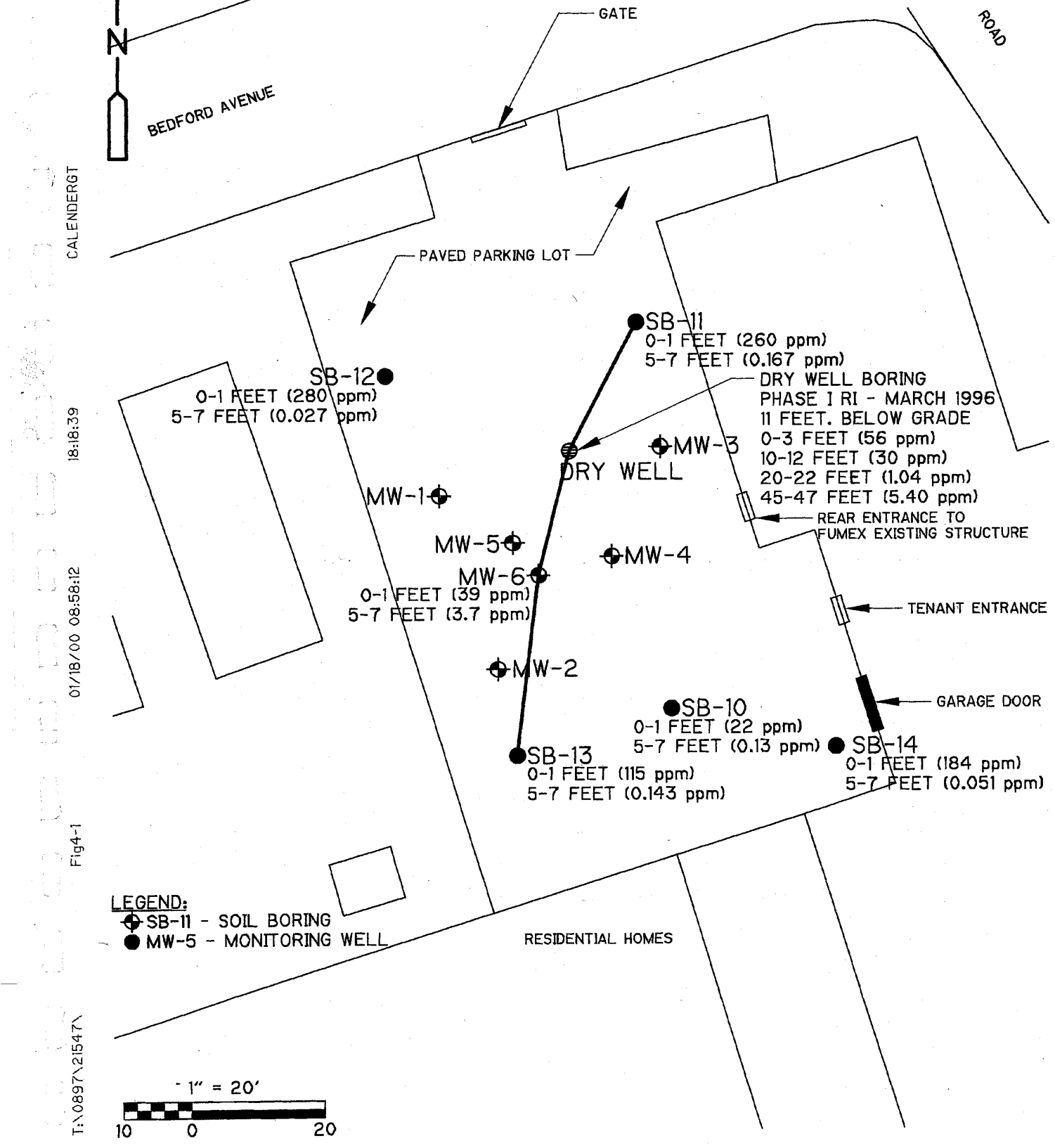
It should be noted that the NYSDEC soil cleanup guidelines as presented in TAGM HWR-94-4046 assumes a soil total organic carbon (TOC) concentration of 1 percent (0.01) using the following equation:

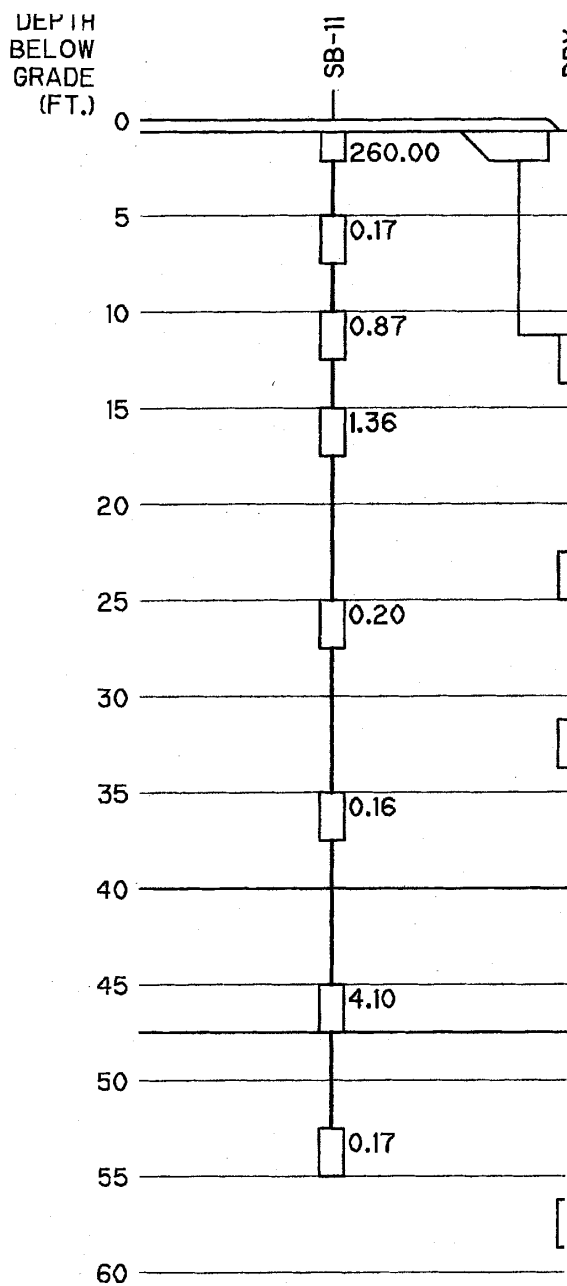
Allowable Soil Concentration $Cs = f \times koc \times Cw$

where: f = fraction of organic carbon of the natural soil medium
koc = organic carbon partition coefficient between water and soil media
Cw = appropriate water quality value (in this case NYSDEC class-GA standards)

TOC analysis of soil samples collected from MW-6, summarized in Table 4-5, indicate TOC concentrations range from 0.3 to 0.08 percent. Though the data indicates TOC varies considerably within site soils, it does indicate TOC within the glacially derived soils is considerably lower than the 1 percent used for the cleanup guidelines. Therefore, if site specific cleanup values were to be derived for the site, it is likely that the site specific values would be three to ten times lower than the currently used generic values.

The Phase II soil data indicates widespread pesticide contamination present throughout surface soils located immediately below the parking lot asphalt pavement. The widespread nature of the contamination would not be indicative of a one-time release of contaminants, such as a spill. The data does suggest that surface soil contamination was the result of numerous releases of various pesticides within the parking lot, possibly occurring over a number of years, prior to the area being paved. This could have occurred during routine cleaning of pesticide applicating equipment or storage containers. It may have also been the result of regular applications of the pesticides to the unpaved parking lot as reported by the site owners as occurring from 1952 to 1978. However,





NOTE:
CHLORDANE (TOTAL) IN PPM.
NYSDEC SOIL CLEANUP STANDAR
ALPHA-CHLORDANE = 0.54 PPM
GAMMA-CHLORDANE = 0.54 PP

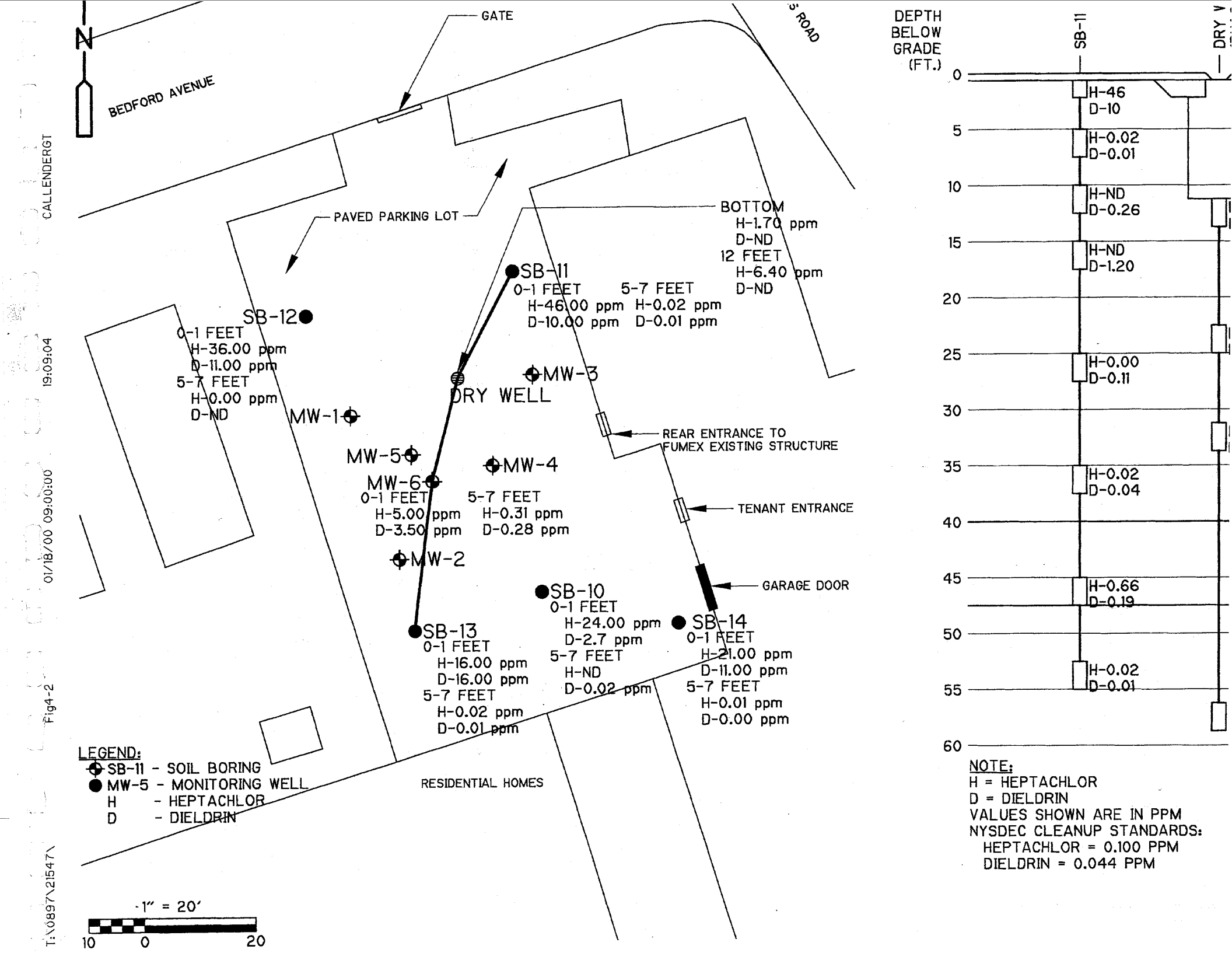

N
BEDFORD AVENUE
GATE
PAVED PARKING LOT
BOTTOM
H-1.70 ppm
D-ND
12 FEET
H-6.40 ppm
D-ND
SB-11
0-1 FEET
H-46.00 ppm
D-10.00 ppm
5-7 FEET
H-0.02 ppm
D-0.01 ppm
SB-12
0-1 FEET
H-36.00 ppm
D-11.00 ppm
5-7 FEET
H-0.00 ppm
D-ND
MW-3
DRY WELL
MW-1
REAR ENTRANCE TO
FUMEX EXISTING STRUCTURE
MW-5
MW-4
MW-6
0-1 FEET
H-5.00 ppm
D-3.50 ppm
5-7 FEET
H-0.31 ppm
D-0.28 ppm
TENANT ENTRANCE
MW-2
GARAGE DOOR
SB-10
0-1 FEET
H-24.00 ppm
D-2.7 ppm
5-7 FEET
H-ND
D-0.02 ppm
SB-13
0-1 FEET
H-16.00 ppm
D-16.00 ppm
5-7 FEET
H-0.02 ppm
D-0.01 ppm
SB-14
0-1 FEET
H-21.00 ppm
D-11.00 ppm
5-7 FEET
H-0.01 ppm
D-0.00 ppm
LEGEND:
SB-11 - SOIL BORING
MW-5 - MONITORING WELL
H - HEPTACHLOR
D - DIELDRIN
RESIDENTIAL HOMES
1" = 20'
10 0 20
DEPTH BELOW GRADE (FT.)
SB-11
DRY W
0
5
10
15
20
25
30
35
40
45
50
55
60
H-46
D-10
H-0.02
D-0.01
H-ND
D-0.26
H-ND
D-1.20
H-0.00
D-0.11
H-0.02
D-0.04
H-0.66
D-0.19
H-0.02
D-0.01
NOTE:
H = HEPTACHLOR
D = DIELDRIN
VALUES SHOWN ARE IN PPM
NYSDEC CLEANUP STANDARDS:
HEPTACHLOR = 0.100 PPM
DIELDRIN = 0.044 PPM
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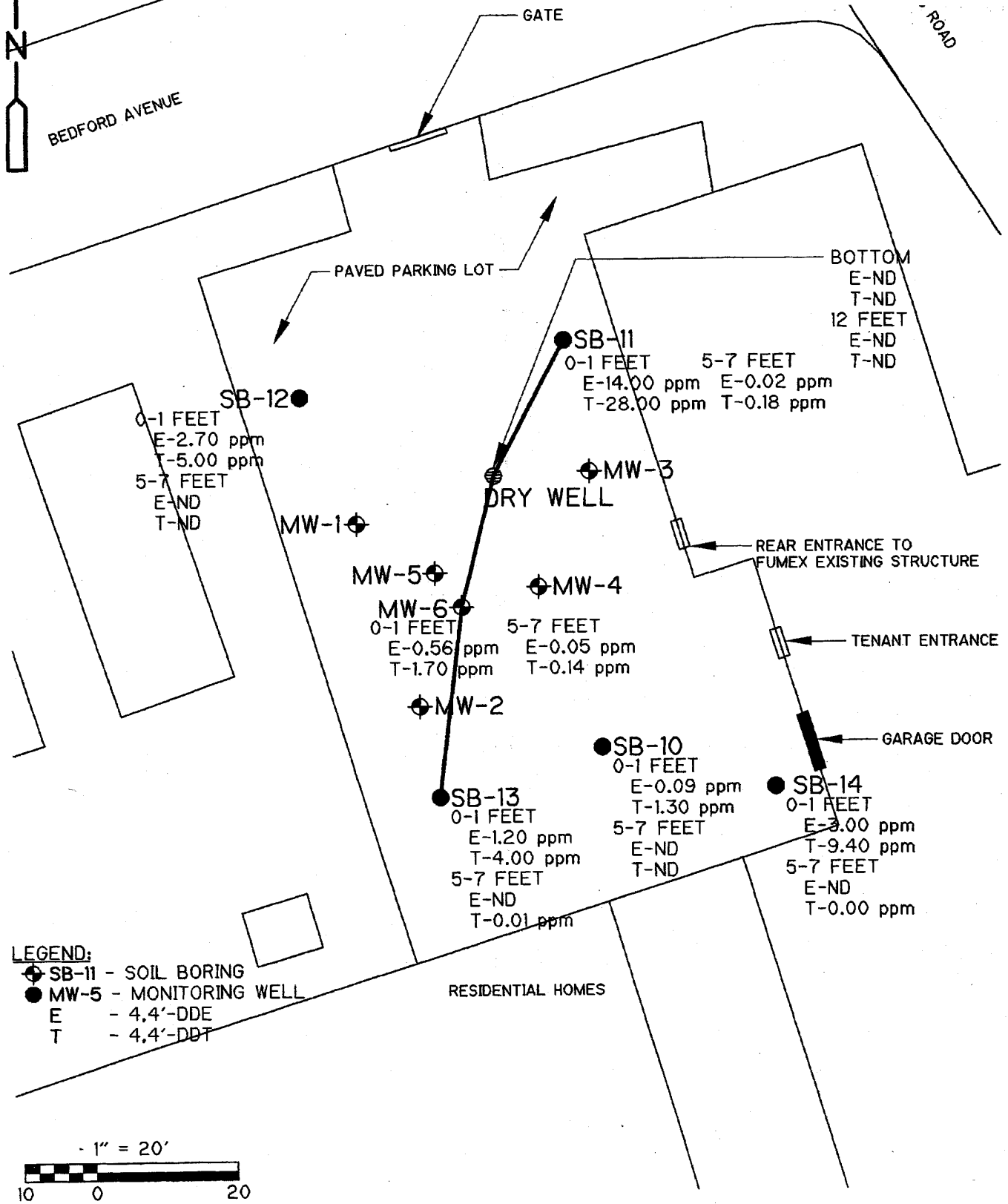
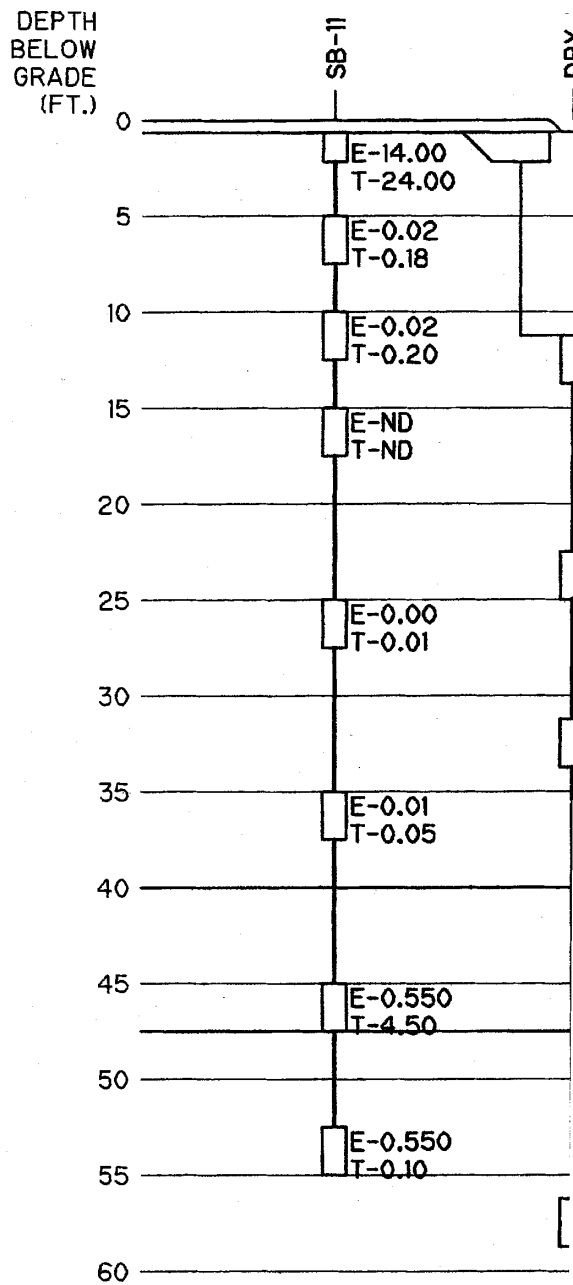
Fig4-2
T:\0897\21547\





NOTE:
E = 4-4'-DDE
T = 4-4'-DDT
VALUES SHOWN ARE IN PPM
NYSDEC CLEANUP STANDARDS:
4-4'-DDE = 2.1 PPM
4-4'-DDT = 2.1 PPM

CALLENDERGT 01/18/00 09:01:06 19:25:01 Fig4-3 T:\0897\21547\

chlordane was the only pesticide reportedly applied to this area, whereas numerous pesticides were detected within site soils.

The presence of pesticides within dry well sediments may have occurred through direct discharge of rinse waters containing the pesticides or possibly runoff from the unpaved parking lot. The presence of relatively high concentrations of pesticides within subsurface soils (5 to 17 feet below grade) collected from MW-6, which is located approximately 18 feet southwest of the dry well, may be attributed to pesticide contaminated water, either rinse waters or stormwater runoff, infiltrating soils surrounding the drywell. As discussed in Section 4.4, the majority of pesticides detected onsite have relatively high soil water partitioning coefficients (Kds) and tend to strongly adsorb onto organic carbon present in soil. Therefore, as water containing pesticides in solution infiltrate through the unsaturated soil surrounding the drywell, the pesticides would tend to adsorb onto the soils relatively close to the drywell.

The reason for the apparent increase the pesticide concentrations at and below the water table is not clear. However, total organic carbon (TOC) analysis of samples collected from MW-6 does show an increase in TOC at 45-47 feet compared to TOC from samples collected from depths ranging from 10 to 37 feet below grade. It is possible that the higher TOC results in a greater sorbative capacity within soils at or immediately below the water table with corresponding increases in pesticide concentrations.

4.1.2 TCL Organics

Soil samples collected during the installation of MW-6 were analyzed for TCL volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) in order to determine if these compounds are present within site soils. Tables 4-3 and 4-4 summarize the analytical results for VOCs and SVOCs, respectively.

The only VOCs detected included 2-butanone (1 to 3 ug/kg) and tetrachloroethene (3 ug/kg). The NYSDEC recommended soil cleanup standards for 2-butanone and tetrachloroethene are 300 and 1,400 ug/kg respectively. Both compounds are commonly used industrial solvents with a wide range of applications with 2-butanone primarily used as a paint solvent and tetrachloroethene primarily used as a metal degreasing agent and dry cleaning solvent. However, it is possible that both compounds were used as a solvent for pesticides or were used in the maintenance of pesticide applicating equipment. Based on available site history, the site was not used for any other industrial purposes prior to Fumex occupying the site.

All soil samples were free of SVOCs with the exception of the sample collected immediately below the asphalt pavement, MW-6 (0-1 ft.), which contained nine different targeted compounds, at estimated concentrations ranging from 54 to 270 ug/kg. All concentrations are well below the NYSDEC cleanup standard for each detected compound. The detected SVOCs are all common constituents in heavy petroleum and coal tar and may be associated with the petroleum-based asphalt parking lot given that the sample was collected immediately below the asphalt pavement.

Table 4-3
Volatile Organic Compounds in Soil - Data Summary
Fumex Sanitation Site Phase II Remedial Investigation
NYSDEC Site #1-30-041

	Sample ID	MW-6-0	MW-6-1	MW-6-2	MW-6-3	MW-6-4	MW-6-5	MW-6-6	MW-6-7	FB-0141698
	Date	04/16/98	04/16/98	04/16/98	04/16/98	04/16/98	04/16/98	04/16/98	04/16/98	04/16/98
	Depth(feet)	0-1	5-7	10-12	15-17	25-27	35-37	45-47	55-57	(in ug/l)
Volatiles - (ug/kg)	NYSDEC Recommended Soil Cleanup Standard									
Chloromethane	NS	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Bromomethane	NS	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Vinyl chloride	200	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Chloroethane	1900	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Methylene chloride	100	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Acetone	200	11 U	11 U	11 U	11 U	10 U	11 U	12 U	13 U	10 U
Carbon disulfide	2700	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
1,1-Dichloroethene	NS	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
1,1-Dichloroethane	200	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
1,2-Dichloroethene (Total)	NS	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
2-Butanone	300	1 J	1 J	1 J	10 U	3 J	11 U	12 U	2 J	10 U
Chloroform	300	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
1,2-Dichloroethane	100	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
1,1,1-Trichloroethane	800	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 UJ
Carbon tetrachloride	600	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 UJ
Bromodichloromethane	NS	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
1,2-Dichloropropane	NS	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
cis-1,3-Dichloropropene	NS	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Trichloroethene	700	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Benzene	60	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Dibromochloromethane	NS	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
trans-1,3-Dichloropropene	NS	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
1,1,2-Trichloroethane	NS	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Bromoform	NS	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
4-Methyl-2-pentanone	1000	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
2-Hexanone	NS	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Tetrachloroethene	1400	3 J	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
1,1,2,2-Tetrachloroethane	600	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Toluene	1500	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Chlorobenzene	1700	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Ethylbenzene	5500	11 UJ	11 UJ	11 UJ	10 UJ	10 UJ	11 UJ	12 UJ	13 UJ	10 U
Styrene	NS	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U
Xylenes (total)	1200	11 U	11 U	11 U	10 U	10 U	11 U	12 U	13 U	10 U

U- Indicates that the compound was analyzed for, but not detected at or above the Contract Required Quantitation Limit(CRQL), or the compound is not detected due to qualification through the method or field blank.
J- The associated numerical value is an estimated quantity.
JN- Tentatively identified with approximated concentrations (Volatile and Semi Volatile Organics).
Presumptively present at an approximated quantity (Pesticides/PCB's)
UJ- This compound was analyzed for, but not detected. The sample quantitation limit is an estimated quantity due to variance from quality control limits.
C- Applies to pesticide results where the identification has been confirmed by GC/MS.
E- Reported value is estimated due to quantitation above the calibration range.
D- Reported result taken from diluted sample analysis.
A- Aldol condensation product
R- Reported value is unusable and rejected due to variance from quality control limits.
NA- Not analyzed

Table 4

Semi-Volatile Organic Compounds in Soil - Data Summary

Fumex Sanitation Site Phase II Remedial Investigation

NYSDEC Site #1-30-041

Semi-Volatiles (ug/Kg)	Sample ID / Date / NYSDEC Recommended Soil Cleanup Standard	MW-6-0 04/16/98 0-1	MW-6-1 04/16/98 5-7	MW-6-2 04/16/98 10-12	MW-6-3 04/16/98 15-17	MW-6-4 04/16/98 25-27	MW-6-5 04/16/98 35-37	MW-6-6 04/16/98 45-47	MW-6-7 04/16/98 45-47	FB-0141698 04/16/98 (in ug/l)
1,2,4-Trichlorobenzene	3,400	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
1,2-Dichlorobenzene	7,900	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
1,3-Dichlorobenzene	1,600	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
1,4-Dichlorobenzene	8,500	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
2,2'-oxybis(1-Chloropropane)	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
2,4,5-Trichlorophenol	100	880.0 U	880.0 U	870.0 U	870.0 U	880.0 U	880.0 U	1000.0 U	1100.0 U	25.0 U
2,4,6-Trichlorophenol	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
2,4-Dichlorophenol	400	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
2,4-Dimethylphenol	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
2,4-Dinitrophenol	200 or MDL	880.0 UJ	880.0 UJ	870.0 UJ	870.0 UJ	880.0 UJ	880.0 UJ	1000.0 UJ	1100.0 UJ	25.0 UJ
2,4-Dinitrotoluene	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
2,6-Dinitrotoluene	1,000	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
2-Chloronaphthalene	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
2-Chlorophenol	800	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
2-Methylnaphthalene	36,400	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
2-Methylphenol	100 or MDL	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
2-Nitroaniline	430 or MDL	880.0 U	880.0 U	870.0 U	870.0 U	880.0 U	880.0 U	1000.0 U	1100.0 U	25.0 U
2-Nitrophenol	330 or MDL	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
3,3'-Dichlorobenzidine	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
3-Nitroaniline	500 or MDL	880.0 U	880.0 U	870.0 U	870.0 U	880.0 U	880.0 U	1000.0 U	1100.0 U	25.0 U
4,6-Dinitro-2-methylphenol	NS	880.0 U	880.0 U	870.0 U	870.0 U	880.0 U	880.0 U	1000.0 U	1100.0 U	25.0 U
4-Bromophenyl-phenylether	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
4-Chloro-3-methylphenol	240 or MDL	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
4-Chloroaniline	220 or MDL	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
4-Chlorophenyl-phenylether	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
4-Methylphenol	900	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
4-Nitroaniline	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
4-Nitrophenol	100 or MDL	880.0 U	880.0 U	870.0 U	870.0 U	880.0 U	880.0 U	1000.0 U	1100.0 U	25.0 U
Acenaphthene	50,000***	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Acenaphthylene	41,000	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Anthracene	50,000***	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Benzo[a]anthracene	224 or MDL	**71.0** J	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Benzo[a]purene	61 or MDL	80.0 J	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Benzo[b]fluoranthene	224 or MDL	**54.0** J	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U

Notes:

U- Indicates that the compound was analyzed for, but not detected at or above the Contract Required Quantitation Limit(CRQL), or the compound is not detected due to qualification through the method or field blank.

J- The associated numerical value is an estimated quantity.

JN- Tentatively identified with approximated concentrations (Volatile and Semi Volatile Organics).

UJ- This compound was analyzed for, but not detected.

The sample quantitation limit is an estimated quantity due to variance from quality control limits.

E- Reported value is estimated due to quantitation above the calibration range.

D- Reported result taken from diluted sample analysis.

R- Reported value is unusable and rejected due to variance from quality control limits.

*** = Total VOCs < 10 ppm,Total non-carcinogenic Semi-VOCs<500 ppm, Individual non-carcinogenic Semi-VOCs<50 ppm and Total carcinogenic Semi-VOCs<10 ppm.

BOLD: Exceeds NYSDEC recommended soil cleanup standard.

NS = No standard given in TAGM 4046

Table 4-4
Semi-Volatile Organic Compounds in Soil - Data Summary
Fumex Sanitation Site Phase II Remedial Investigation
NYSDEC Site #1-30-041

	Sample ID	*MW-6-0*	*MW-6-1*	*MW-6-2*	*MW-6-3*	*MW-6-4*	*MW-6-5*	*MW-6-6*	*MW-6-7*	*FB-0141698*
	Date	*04/16/98*	*04/16/98*	*04/16/98*	*04/16/98*	*04/16/98*	*04/16/98*	*04/16/98*	*04/16/98*	*04/16/98*
	NYSDEC	*0-1*	*5-7*	*10-12*	*15-17*	*25-27*	*35-37*	*45-47*	*45-47*	
Semi-Volatiles (ug/Kg)	**Recommended Soil Cleanup Standard**									*(in ug/l)*
Benzo[g,h,i]perylene	50,000***	93.0 J	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Benzo[k]fluoranthene	224 or MDL	**79.0** J	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
bis(2-Chloroethoxy)methane	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
bis(2-Chloroethyl)ether	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
bis(2-Ethylhexyl)phthalate	50,000***	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Butylbenzylphthalate	50,000***	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Carbazole	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Chrysene	400	81.0 J	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Dibenz[a,h]anthracene	14 or MDL	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Dibenzofuran	6,200	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Diethylphthalate	7,100	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Dimethylphthalate	2,000	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Di-n-butylphthalate	8,100	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Di-n-octylphthalate	50,000***	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Fluoranthene	50,000***	270.0 J	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Fluorene	50,000***	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Hexachlorobenzene	410	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Hexachlorobutadiene	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Hexachlorocyclopentadiene	NS	350.0 UJ	350.0 UJ	350.0 UJ	350.0 UJ	350.0 UJ	350.0 UJ	410.0 UJ	430.0 UJ	10.0 UJ
Hexachloroethane	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Indeno[1,2,3-cd]pyrene	3,200	73.0 J	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Isophorone	4,400	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Naphthalene	13,000	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Nitrobenzene	200	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
N-Nitroso-di-n-propylamine	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
N-Nitrosodiphenylamine	NS	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Pentachlorophenol	1,000	880.0 U	880.0 U	870.0 U	870.0 U	880.0 U	880.0 U	1000.0 U	1100.0 U	25.0 U
Phenanthrene	50,000***	87.0 J	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Phenol	30 or MDL	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U
Pyrene	50,000***	130.0 J	350.0 U	350.0 U	350.0 U	350.0 U	350.0 U	410.0 U	430.0 U	10.0 U

Notes:

BOLD: Exceeds NYSDEC recommended soil cleanup standard.

U- Indicates that the compound was analyzed for, but not detected at or above the Contract Required Quantitation Limit(CRQL), or the compound is not detected due to qualification through the method or field blank.

J- The associated numerical value is an estimated quantity.

JN- Tentatively identified with approximated concentrations (Volatile and Semi Volatile Organics).

UJ- This compound was analyzed for, but not detected.

The sample quantitation limit is an estimated quantity due to variance from quality control limits.

E- Reported value is estimated due to quantitation above the calibration range.

D- Reported result taken from diluted sample analysis.

R- Reported value is unusable and rejected due to variance from quality control limits.

***:Total VOCs < 10 ppm,Total non-carcinogenic Semi-VOCs<500 ppm, Individual non-carcinogenic Semi-VOCs<50 ppm and Total carcinogenic Semi-VOCs<10 ppm.

NS = No standard given in TAGM 4046

4.1.3 TAL Metals

Results of the TAL metals analysis of soil samples collect from MW-6 are presented in Table 4-5. Metals analysis indicates all 23 targeted metals are well below their respective NYSDEC recommended cleanup standards.

4.2 Onsite Groundwater

Onsite monitoring wells MW-1 through MW-5 were sampled by CDM twice during the Phase I RI and twice during the Phase II RI. Additionally, CDM installed deep monitoring well, MW-6 onsite and sampled it twice as part of the Phase II RI. All samples were analyzed for TCL Pesticides. Table 4-6 summarizes both the Phase I and Phase II RI onsite groundwater data and compares the data to NYSDEC class GA-type groundwater standards. Note that due to the fact that CDM received the second round groundwater data from H2M labs on November 19, 1998, data validation is currently not complete. Therefore, the Phase II RI second round groundwater results presented in this report are unvalidated and should be considered as such. Any significant changes in the second round data based on the data validation will be presented in the final RI report.

All onsite monitoring wells exhibited positive detections of at least one targeted pesticide com-pound in all Phase I and II sample rounds. In the case of MW-1, MW-2 and MW-5, as many as eight different pesticides were detected within collected groundwater samples. Nineteen (19) out of the twenty-one (21) listed TCL pesticides were detected in one or more samples during the four sample rounds. Table 4-7 summarizes the frequency of detections for each TCL pesticide over the four sample rounds for all onsite shallow wells, MW-1 through MW-5. As illustrated by Table 4-7, the six most frequently detected pesticides within shallow groundwater in descending order include:

- gamma-chlordane
- alpha-chlordane
- 4-4'-DDE
- Heptachlor Epoxide
- Dieldrin
- gamma-BHC (Lindane)

Consistent with pesticide distribution in site soils, gamma and alpha chlordane were the most frequently detected pesticides within onsite shallow groundwater. Dieldrin and to a lesser extent 4-4'-DDE were also commonly detected in site soils. Heptachlor epoxide was only sporadically detected in site soils. Research of the literature indicates Heptachlor degrades in the environment to Heptachlor epoxide. Additionally, 4-4' DDE is a degradation compound of 4-4' DDT and Aldrin which was only detected sporadically in site soils, primarily within the onsite dry well, degrades to Dieldrin, commonly detected within both soil and groundwater. This information suggests that the pesticides are undergoing natural degradation with onsite groundwater containing a greater proportion of the degradation compounds.

The most significant discrepancy between the soil and groundwater data is that gamma-BHC (Lindane) was detected in only one out of 50 soil samples, whereas the compound was the sixth

Table 4-5
TAL Metals in Soil - Data Summary
Fumex Sanitation Site Phase II Remedial Investigation
NYSDEC Site #1-30-041

	Sample ID	MW-6-0	MW-6-1	MW-6-2	MW-6-3	MW-6-4	MW-6-5	MW-6-6	MW-6-7	FB-0141698
	Date	04/16/98	04/16/98	04/16/98	04/16/98	04/16/98	04/16/98	04/16/98	04/16/98	04/16/98
	Depth(feet)	0-1	5-7	10-12	15-17	25-27	35-37	45-47	55-57	NA (in ug/l)
Metals - (ug/kg)	NYSDEC Recommended Soil Cleanup Standard									
Aluminum	33,000,000**	5150.0	4640.0	2560.0	2110.0	1520.0	2140.0	2230.0	1760.0	7.7 B
Antimony	NA	0.9 J	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.6 UJ	0.7 UJ	2.5 U
Arsenic	7500.0	33.1	56.4	18.6	4.8	2.0 B	3.6	10.0	2.1 B	1.1 U
Barium	300,000	38.8 B	19.9 B	17.9 B	25.0 B	13.8 B	18.9 B	15.1 B	14.5 B	0.6 U
Beryllium	160	0.3 B	0.2 B	0.2 B	0.1 B	0.1 B	0.2 B	0.1 B	0.1 B	0.1 U
Cadmium	10,000	0.2 B	0.0 B	0.0 U	0.0 U	0.0 U	0.0 U	0.1 B	0.1 U	0.2 U
Calcium	130,000 - 35,000,000**	4230.0	736.0 B	1240.0	268.0 B	192.0 B	182.0 B	407.0 B	749.0 B	60.0 B
Chromium	50,000	11.2	8.4	7.5	7.5	4.6	9.9	5.6	6.6	0.7 U
Cobalt	30,000	4.2 B	3.4 B	3.3 B	5.1 B	1.2 B	2.4 B	1.7 B	2.6 B	1.3 U
Copper	25,000	14.1	7.1	6.1	6.3	4.6 B	7.3	4.9 B	4.4 B	0.9 U
Iron	2,000,000	10300.0	10500.0	7770.0	7770.0	4680.0	10900.0	5800.0	6240.0	14.2 B
Lead	400,000***	69.6	10.0	5.6	4.3	2.2	2.3	5.3	2.3	0.7 U
Magnesium	100,000 - 5,000,000**	1440.0	1070.0	753.0 B	684.0 B	416.0 B	774.0 B	593.0 B	941.0 B	7.7 U
Manganese	50,000 - 5,000,000**	190.0	167.0	135.0	297.0	85.1	101.0	78.5	99.6	0.4 U
Mercury	100	0.1 U	0.0 U	0.0 U	0.0 U	0.0 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	13,000	12.0	9.5	6.8 B	7.5 B	3.5 B	4.3 B	4.7 B	8.5 B	1.6 U
Potassium	8,500,000 - 43,000,000**	603.0 B	414.0 B	342.0 B	414.0 B	245.0 B	578.0 B	376.0 B	336.0 B	14.0 U
Selenium	2,000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.6 U	0.6 U	2.4 U
Silver	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.8 U
Sodium	6,000,000 - 8,000,000	64.7 B	44.3 B	36.7 B	48.5 B	40.2 B	40.9 B	59.1 B	43.5 B	34.8 B
Thallium	NA	0.7 J	0.6 J	0.7 J	0.4 U	0.4 U	0.6 J	0.9 J	0.8 J	1.9 U
Vanadium	150,000	15.0	11.6	9.0 B	7.1 B	4.3 B	7.8 B	6.4 B	6.2 B	1.0 U
Zinc	20,000	42.8	20.2	13.2 U	11.2 U	6.8 U	12.4 U	12.0 U	10.7 U	17.7 B
Total Organic Carbon, in mg/kg	NA	3,040	1830.0	928.0	998.0	792.0	848.0	1490.0	948.0	1.0 U

Notes:

U- Indicates analyte not detected at or above the Contract Required Quantitation Limit(CRQL), or the compound is not detected due to qualification through the method or field blank.

B- indicates analyte result is between Instrument Detection Level (IDL), CRDL.

J- The reported value is estimated due to variance to quality control limits.

UJ- The element was analyzed for, but not detected. The sample quantitation limit is an estimate due to variance from quality control limits.

E- Reported value is estimated because of the presence of interference.

R- Reported value is unusable and rejected due to variance from quality control limits.

NA- Not analyzed NS- No standard given in TAGM 4046

*NYSDEC, TAGM #4046, "Determination of Soil Cleanup Objectives and Cleanup Levels", Jan. 24, 1994

**Natural range of soils for eastern United States, McGovern, NYSDEC, 1984 as given in TAGM #4046.

***USEPA's Interim Lead Hazard Guidance for residential screening levels.

Table 4-6
Pesticides in Onsite Groundwater - Data Summary
Furnex Sanitation Site Phase II Remedial Investigation
NYSDEC Site #1-30-041

		MW-1				MW-2				MW-3			
		Phase I RI		Phase II RI		Phase I RI		Phase II RI		Phase I RI		Phase II RI	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
	Sample ID	*MW1*	*MW1DL*	*MW-1*	*MW-1/DL*	*MW2DL*	*MW2DL*	*MW-2*	*MW-2/DL*	*MW3*	*MW3DL*	*MW-3*	*MW-3*
	Date	*03/20/96*	*08/27/96*	*06/02/98*	*09/24/98*	*03/20/96*	*08/27/96*	*06/02/98*	*09/24/98*	*03/20/96*	*08/27/96*	*06/03/98*	*09/24/98*
Pesticides/PCB's (ug/L)	**NYSDEC Standard for Class GA Water**												
alpha-BHC	0.01	0.17 UJ	1.00 UJ	0.05 U	1.00 U	1.10 UJ	1.00 UJ	0.05 U	0.25 U	0.06 UJ	0.10 UJ	0.05 U	0.050 U
beta-BHC	0.04	0.17 U	1.00 UJ	**0.12**	1.00 U	1.10 U	1.00 UJ	0.05 U	0.25 U	0.06 U	0.10 UJ	0.05 U	0.050 U
delta-BHC	0.04	**0.36**	1.00 UJ	0.05 U	1.00 U	**2.20** D	1.00 UJ	0.05 U	0.25 U	**0.14** J	0.10 UJ	0.05 U	0.050 U
gamma-BHC (Lindane)	0.05	**0.08** J	1.00 UJ	**0.48**	1.00 U	1.10 UJ	1.00 UJ	0.03 J	0.25 U	**0.12** J	**0.87** JD	0.05 U	0.050 U
Heptachlor	0.04	0.17 U	1.00 UJ	**0.34** JN	1.00 U	1.10 U	1.00 UJ	0.05 U	0.25 U	0.03 JN	0.10 UJ	**0.05** D	0.050 U
Aldrin	ND	**0.29** J	1.00 UJ	**0.33** JN	1.00 U	1.10 U	1.00 UJ	**0.15** JN	0.25 U	**0.04** JN	0.10 UJ	0.05 U	0.050 U
Heptachlor epoxide	0.03	**0.22** J	1.00 UJ	0.05 U	1.00 U	**0.61** JD	0.61 JD	0.05 U	0.25 U	**0.11**	**0.19** JD	0.05 U	0.050 U
Endosulfan I	No standard	0.35 J	1.00 UJ	0.05 U	1.00 U	0.93 JD	1.00 UJ	0.05 U	0.25 U	0.06 U	0.09 JND	0.05 U	0.050 U
Dieldrin	0.00	**2.80**	2.00 UJ	10.00 U	**5.20** D	2.20 U	**4.30** JD	5.00 U	0.50 U	**0.27** J	**0.86** JD	**0.26**	**0.087** J
4,4'-DDE	0.20	0.14 JN	2.00 UJ	**0.83** JN	2.00 U	2.20 U	2.00 UJ	**0.56** JN	0.50 U	0.11 U	0.20 UJ	0.07 JN	0.10 U
Endrin	ND	**0.40** J	2.00 UJ	0.10 U	2.00 U	**2.90** D	2.00 UJ	0.10 U	0.50 U	**0.09** JN	0.20 UJ	0.10 U	0.10 U
Endosulfan II	No standard	0.34 U	2.00 UJ	1.40 J	**1.1** JND	2.20 U	2.00 UJ	**0.48** JN	0.50 U	0.11 U	0.20 UJ	0.10 U	0.10 U
4,4'-DDD	0.30	0.34 U	2.00 UJ	0.10 U	2.00 U	2.20 U	2.00 UJ	0.10 U	0.50 U	0.11 U	0.20 UJ	0.10 U	0.10 U
Endosulfan sulfate	No standard	0.34 U	2.00 UJ	0.10 U	2.00 J	2.20 U	2.00 UJ	0.10 U	0.50 U	0.11 U	0.20 UJ	0.10 U	0.10 U
4,4'-DDT	0.20	0.12 JN	2.00 UJ	**1.30** JN	2.00 U	2.20 U	2.00 UJ	**0.46** JN	0.50 U	0.11 U	0.20 UJ	0.08 J	0.10 U
Methoxychlor	35.0	1.70 U	10.00 UJ	0.50 U	10.00 UJ	11.00 U	10.00 UJ	0.50 U	2.5 UJ	0.57 U	1.00 UJ	0.50 U	0.50 U
Endrin ketone	5.0	0.17 J	2.00 UJ	0.74 J	2.00 U	2.20 U	2.00 UJ	0.26 JN	0.5 U	0.11 U	0.20 UJ	0.10 U	0.10 U
Endrin aldehyde	5.0	0.57	2.00 UJ	0.10 U	2.00 U	2.20 U	2.00 UJ	0.10 U	0.5 U	0.11 U	0.20 UJ	0.10 U	0.10 U
alpha-chlordane	0.05	**1.30** J	**4.30** JD	**18.00** DJN	**20** JD	**12.00** DJ	**2.90** JD	**13.00** DJN	**5.10** JD	**0.45** J	**0.64** JD	**0.94** DJ	**0.40** JN
gamma-chlordane	0.05	**1.50**	**6.50** JD	**16.00** D	**17** D	**15.00** D	**4.50** JD	**15.00** D	**5.10** D	**0.35** J	**0.63** JD	**1.50** D	**0.92**
Toxaphene	0.06	17.00 U	100.00 UJ	5.00 U	100.00 U	110.00 U	100.00 UJ	5.00 U	25 U	5.70 U	10.00 UJ	5.00 U	5.0 U

Notes:
U- Indicates that the compound was analyzed for, but not detected at or above the Contract Required Quantitation Limit(CRQL), or the compound is not detected due to qualification through the method or field blank.
J- The associated numerical value is an estimated quantity.
JN- Tentatively identified with approximated concentrations (Volatile and Semi Volatile Organics). Presumptively present at an approximated quantity (Pesticides/PCB's)
UJ- This compound was analyzed for, but not detected. The sample quantitation limit is an estimated quantity due to variance from quality control limits.
C- Applies to pesticide results where the identification has been confirmed by GC/MS.
E- Reported value is estimated due to quantitation above the calibration range.
D- Reported result taken from diluted sample analysis.
A- Aldol condensation product
R- Reported value is unusable and rejected due to variance from quality control limits.
P - Target analyte is greater than 25% difference for detected concentrations between the two GC columns. The lower of the two values is reported on Form I and flagged with a P.
ND = Non detect
NA = Not analyzed

Table 4-6
Pesticides in Onsite Groundwater - Data Summary
Fumex Sanitation Site Phase II Remedial Investigation
NYSDEC Site #1-30-041

		MW-4				MW-5				MW-6		
		Phase I RI		Phase II RI		Phase I RI		Phase II RI		Phase II RI		
	Sample ID	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 1	Round 2
		MW4	*MW4DL*	*MW-4*	*MW-4DL*	*MW5*	*MW5*	*MW-5*	*MW-5DL*	*MW-6*	*MW-6*	*MW-6*
	Date	*03/20/96*	*08/27/96*	*06/03/98*	*09/24/98*	*03/20/96*	*08/27/96*	*06/02/98*	*09/24/98*	*06/02/98*	*06/02/98 Duplicate*	*09/24/98*
Pesticides/PCB's (ug/L)	NYSDEC Standard for Class GA Water											
alpha-BHC	0.01	0.24 UJ	0.10 UJ	0.05 U	0.10 U	0.60 UJ	0.05 UJ	0.05 U	0.50 U	0.05 U	0.05 U	0.050 U
beta-BHC	0.04	0.24 U	0.10 UJ	0.05 U	0.10 U	0.60 U	0.05 UJ	0.05 U	0.50 U	0.05 U	0.05 U	0.050 U
delta-BHC	0.04	**0.57** JN	0.10 UJ	0.05 U	0.10 U	0.60 U	0.05 UJ	0.05 U	0.50 U	0.05 U	0.05 U	0.050 U
gamma-BHC (Lindane)	0.05	**0.41** J	**0.80** JD	0.05 U	0.10 U	**0.32** J	**0.30** J	**0.11** J	0.50 U	0.05 U	0.05 U	0.050 U
Heptachlor	0.04	**0.23** J	**0.07** JD	0.03 J	0.10 U	**0.50** J	**0.05** J	0.05 U	0.50 U	0.05 U	0.05 U	0.050 U
Aldrin	ND	**0.13** JN	**0.08** JND	0.05 U	0.10 U	0.60 U	0.05 UJ	**0.11** J	0.50 U	0.05 U	0.05 U	0.050 U
Heptachlor epoxide	0.03	**0.28** J	**0.25** JD	0.05 U	0.10 U	**0.39** J	**0.17** J	0.05 U	0.50 U	0.05 U	0.05 U	0.050 U
Endosulfan I	No standard	0.24 U	0.10 R	0.05 U	0.10 U	0.62 J	0.05 R	0.05 U	0.50 U	0.05 U	0.05 U	0.050 U
Dieldrin	0.00	**0.84** J	**1.30** JD	**0.20** J	**0.18** JD	**1.00** J	**0.81** J	**1.40** J	**1.2** JD	0.10 U	0.10 U	0.10 U
4,4'-DDE	0.20	0.48 U	**0.21** JND	0.06 JN	0.20 U	1.20 U	0.11 JN	0.19 JN	1.00 U	0.10 U	0.10 U	0.10 U
Endrin	ND	**0.31** JN	0.20 UJ	0.05 U	0.20 U	**0.90** JN	0.10 UJ	**0.19** J	1.00 U	0.10 U	0.10 U	0.10 U
Endosulfan II	No standard	0.48 U	0.20 UJ	0.10 U	**0.18** JND	1.20 U	**0.06** JN	0.10 U	**0.92** JND	0.10 U	0.10 U	0.10 U
4,4'-DDD	0.30	0.48 U	0.20 UJ	0.10 U	0.20 U	1.20 U	0.05 J	0.10 U	1.00 U	0.10 U	0.10 U	0.10 U
Endosulfan sulfate	No standard	0.48 U	0.20 UJ	0.10 U	0.20 U	1.20 U	0.10 UJ	0.10 U	1.00 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	0.20	0.48 U	0.17 JD	0.15	0.20 U	1.20 U	0.09 JN	0.41 J	1.00 U	0.10 U	0.10 U	0.10 U
Methoxychlor	35.0	2.40 U	1.00 UJ	0.50 U	1.00 UJ	6.00 U	0.50 UJ	0.50 U	5.00 UJ	0.50 U	0.50 U	0.50 U
Endrin ketone	5.0	0.48 U	0.20 UJ	0.10 U	0.20 U	1.20 U	0.06 JN	0.17 J	1.0 U	0.10 U	0.10 U	0.10 U
Endrin aldehyde	5.0	0.48 U	0.20 UJ	0.10 U	0.20 U	1.20 U	0.10 UJ	0.10 U	1.0 U	0.10 U	0.10 U	0.10 U
alpha-chlordane	0.05	**2.10** J	**0.83** JD	**1.40** DJN	**1.80** JD	**4.80** J	**0.46** J	**3.70** DJN	**7.6** JD	0.05 U	0.05 U	0.047 J
gamma-chlordane	0.05	**1.90** J	**1.20** JD	**2.20** D	**2.10** D	**5.20**	**0.43** J	**3.40** D	**5.0** D	**0.03** J	0.05 U	**0.057**
Toxaphene	0.06	24.00 U	10.00 UJ	5.00 U	10 U	60.00 U	5.00 UJ	5.00 U	50 U	5.00 U	5.00 U	5.0 U

Notes:
U- Indicates that the compound was analyzed for, but not detected at or above the Contract Required Quantitation Limit(CRQL), or the compound is not detected due to qualification through the method or field blank.
J- The associated numerical value is an estimated quantity.
JN- Tentatively identified with approximated concentrations (Volatile and Semi Volatile Organics). Presumptively present at an approximated quantity (Pesticides/PCB's)
UJ- This compound was analyzed for, but not detected. The sample quantitation limit is an estimated quantity due to variance from quality control limits.
C- Applies to pesticide results where the identification has been confirmed by GC/MS.
E- Reported value is estimated due to quantitation above the calibration range.
D- Reported result taken from diluted sample analysis.
A- Aldol condensation product
R- Reported value is unusable and rejected due to variance from quality control limits.
ND = Non detect
NA = Not analyzed

Table 4-7
Frequency of Pesticide Detections and Concentration Ranges within Onsite Groundwater Samples
Fumex Sanitation Site Phase I and II Remedial Investigation
NYSDEC Site #1-30-041

Pesticides	NYSDEC Standard for Class GA Water	Observed Concentration Range (ug/L) Min.	Max.	Well with Max. Concentration	No. of Detections	Total No. of Samples	Percent Detections
alpha-BHC	0.01	0.05 U	0.05 U	---	0	23	0
beta-BHC	0.04	0.05 U	0.12	MW-1	1	23	4.3
delta-BHC	0.04	0.05 U	2.20	MW-2	4	23	17.4
gamma-BHC(Lindane)	0.05	0.05 U	0.87	MW-3	11	23	47.8
Heptachlor	0.04	0.05 U	0.52	MW-5	10	23	43.5
Aldrin	ND	0.05 U	0.33	MW-1	9	23	39.1
Heptachlor Epoxide	0.03	0.05 U	0.61	MW-2	12	23	52.2
Endosulfan I	No standard	0.05 U	1.0	MW-1	5	23	21.7
Dieldrin	0.004	0.10 U	4.3	MW-2	16	23	69.6
4,4'-DDE	0.20	0.10 U	0.83	MW-1	12	23	52.2
Endrin	ND	0.10 U	2.9	MW-2	7	23	30.4
Endosulfan II	No standard	0.10 U	1.4	MW-1	7	23	30.4
4,4'-DDD	0.30	0.10 U	0.05	MW-5	1	23	4.3
Endosulfan Sulfate	No standard	0.10 U	0.068	MW-1	1	23	4.3
4,4'-DDT	0.20	0.10 U	1.3	MW-1	10	23	43.5
Methoxychlor	35	0.50 U	0.25	MW-1	1	23	4.3
Endrin Ketone	5	0.10 U	0.74	MW-1	6	23	26.1
Endrin Aldehyde	5	0.10 U	0.57	MW-1	2	23	8.7
alpha-chlordane	0.05	0.05 U	18.0	MW-1	21	23	91.3
gamma-chlordane	0.05	0.05 U	16.0	MW-1	22	23	95.7
Toxaphene	0.06	5.00 U	5.00 U	---	0	23	0.0

Notes:
U - Non detect
ND - Non detect

most frequently detected pesticide within shallow groundwater. This discrepancy is likely due to the fact that gamma-BHC (Lindane) has a relatively low soil/water partitioning coefficient (Kd) compared to the other commonly detected pesticides; and, therefore, is one of the most mobile pesticides in groundwater.

As summarized in Table 4-7, out of the 10 most frequently detected pesticides, MW-1 exhibited the highest recorded concentrations for six pesticide compounds, including alpha and gamma-chlordane, with MW-2 accounting for two and MW-3 and MW-5 each accounting for one. Monitoring well MW-1, MW-2 and MW-5 are located west to southwest of the drywell. Though MW-3 is located east of the drywell (upgradient) it is only 14 feet from the drywell manhole cover.

A total of 12 pesticides were found to exceed respective GA standards. Though Endosulfan I, Endosulfan II and Endosulfan Sulfate were detected within shallow groundwater, these compounds currently do not have a GA groundwater standard. Virtually all positive detections of pesticides collected from onsite well samples exceed the respective NYSDEC Class GA groundwater standard. In the case of the most commonly detected pesticides, such as Heptachlor Epoxide, gamma-chlordane and alpha-chlordane, concentrations exceed the GA standards of 0.04 to 0.05 ug/l by one to three orders of magnitude within onsite shallow groundwater.

Monitoring well MW-6 which is located downgradient of the drywell and screened within the upper zone of the Magothy aquifer exhibited trace concentrations of gamma-chlordane, with 0.03 ug/l (qualified as estimated) in the first round and 0.057 ug/l in the second round groundwater sampling. It should be noted that the blind duplicate sample for the first round sample collected from MW-6 indicated all pesticides to be non-detectable.

Comparing all four sample rounds does not indicate any clear trends in contaminant concentrations over the 18 month sampling period. With the exception of gamma-chlordane and alpha-chlordane, the pesticide detected within onsite groundwater are at or below the contract required quantitation limit (CRQL) at most locations. As a result, positive detections are sporadic in nature from one sample round to the next making it difficult to identify any clean trend.

4.3 Offsite Groundwater Quality

As part of the Phase II RI, CDM installed and sampled six offsite groundwater monitoring wells to assess upgradient groundwater quality and the potential downgradient migration of pesticides from the Fumex site. Additionally, CDM sampled five Nassau County Department of Health observation wells located downgradient of the site to further define any potential offsite migration. Table 4-8 summarizes the offsite well sample data. Sampling was completed concurrent with onsite well sampling with the first round collected in June and the second collected in September 1998. Figure 4-2 provides the location of the Phase II RI offsite wells. The location of the Nassau County wells sampled as part of the Phase II RI are shown in Plate 1 located in the back pocket of the report.

Of the 11 offsite wells sampled during the Phase II RI, only one positive detection was observed over the two sample rounds. Dieldrin was detected at an estimated concentration of 0.03 ug/l within shallow upgradient monitoring well, MW-9S, in the first sample round but was not detected

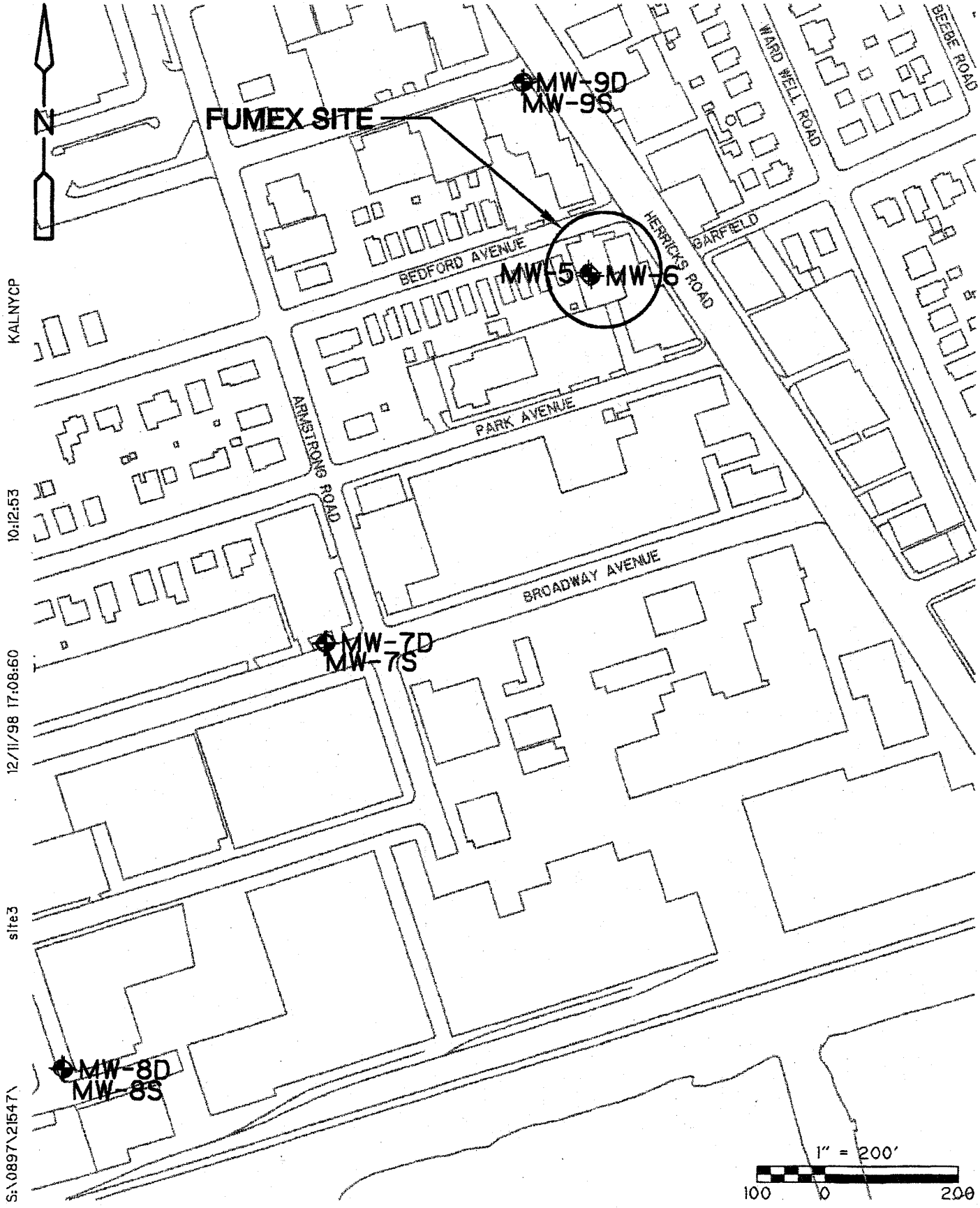


Figure 4-2
Off-Site Monitoring Wells Locations
Phase II RI Report, Fumex Site - New Hyde Park, New York

Table 4-8
Pesticides in Offsite Groundwater - Data Summary Tables
Fumex Sanitation Site Phase II Remedial Investigation
NYSDEC Site #1-30-041

		MW-7-D		MW-7S		MW-8D		MW-8S		MW-9D		MW-9S	
		Phase II		Phase II		Phase II		Phase II		Phase II		Phase II	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
	Sample ID	*MW-7-D*	*MW-7-D*	*MW-7S*	*MW-7S*	*MW-8D*	*MW-8D*	*MW-8S*	*MW-8S*	*MW-9D*	*MW-9D*	*MW-9S*	*MW-9S*
	Date	*06/02/98*	*09/24/98*	*06/02/98*	*09/23/98*	*06/02/98*	*09/23/98*	*06/02/98*	*09/24/98*	*06/01/98*	*09/24/98*	*06/01/98*	*09/24/98*
Pesticides/PCB's-(ug/L)	NYSDEC Standard for Class GA Water												
alpha-BHC	0.01	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
beta-BHC	0.04	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
delta-BHC	0.04	0.05 U	0.050 U	0.05 U	0.050 U	0.03 J	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
gamma-BHC (Lindane)	0.05	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
Heptachlor	0.04	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
Aldrin	ND	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
Heptachlor epoxide	0.03	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
Endosulfan I	No standard	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
Dieldrin	0.00	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	**0.03 J**	0.10 U
4,4'-DDE	0.20	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin	ND	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan II	No standard	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	0.30	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan sulfate	No standard	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	0.20	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Methoxychlor	35.0	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Endrin ketone	5.00	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin aldehyde	5.00	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
alpha-chlordane	0.05	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
gamma-chlordane	0.05	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
Toxaphene	0.06	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.00 U	5.0 U	5.0 U	5.0 U

Notes:
U- Indicates that the compound was analyzed for, but not detected at or above the Contract Required Quantitation Limit(CRQL), or the compound is not detected due to qualification through the method or field blank.
J- The associated numerical value is an estimated quantity.
JN- Tentatively identified with approximated concentrations (Volatile and Semi Volatile Organics). Presumptively present at an approximated quantity (Pesticides/PCB's)
UJ- This compound was analyzed for, but not detected. The sample quantitation limit is an estimated quantity due to variance from quality control limits.
C- Applies to pesticide results where the identification has been confirmed by GC/MS.
E- Reported value is estimated due to quantitation above the calibration range.
D- Reported result taken from diluted sample analysis.
A- Aldol condensation product
R- Reported value is unusable and rejected due to variance from quality control limits.
ND = Non detect
NA = Not analyzed

Table 4-8
Pesticides in Offsite Groundwater - Data Summary Tables
Fumex Sanitation Site Phase II Remedial Investigation
NYSDEC Site #1-30-041

		N-11171		N-11172		N-11738		N-11739		N-12005		FB-1	
		Phase II		Phase II		Phase II		Phase II		Phase II		Phase II	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
	Sample ID	*N-11171*	*N-11171*	*N-11172*	*N-11172*	*N-11738*	*N-11738*	*N-11739*	*N-11739*	*N-12005*	*N-12005*	*FB-1*	*FB-1*
	Date	*06/03/98*	*09/24/98*	*06/06/98*	*09/24/98*	*06/03/98*	*09/24/98*	*06/03/98*	*09/24/98*	*06/03/98*	*09/24/98*	*06/03/98*	*09/24/98*
Pesticides/PCB's-(ug/L)	NYSDEC Standard for Class GA Water												
alpha-BHC	0.01	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
beta-BHC	0.04	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
delta-BHC	0.04	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
gamma-BHC (Lindane)	0.05	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
Heptachlor	0.04	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
Aldrin	ND	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
Heptachlor epoxide	0.03	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
Endosulfan I	No standard	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
Dieldrin	0.00	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDE	0.20	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin	ND	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan II	No standard	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	0.30	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan sulfate	No standard	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	0.20	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Methoxychlor	35.0	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Endrin ketone	5.00	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin aldehyde	5.00	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
alpha-chlordane	0.05	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
gamma-chlordane	0.05	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U	0.05 U	0.050 U
Toxaphene	0.06	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.00 U	5.0 U	5.0 U	5.0 U

Notes:
U- Indicates that the compound was analyzed for, but not detected at or above the Contract Required Quantitation Limit(CRQL), or the compound is not detected due to qualification through the method or field blank.
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UJ- This compound was analyzed for, but not detected. The sample quantitation limit is an estimated quantity due to variance from quality control limits.
C- Applies to pesticide results where the identification has been confirmed by GC/MS.
E- Reported value is estimated due to quantitation above the calibration range.
D- Reported result taken from diluted sample analysis.
A- Aldol condensation product
R- Reported value is unusable and rejected due to variance from quality control limits.
ND = Non detect
NA = Not analyzed

in the second round. The three Nassau County observation wells screened within the Upper Glacial aquifer, N-11738, N-11739 and N-12005 where found to be free of all TCL Pesticides. As discussed in Section 2.2., sampling conducted by the Nassau County Department of Public Works in November 1996 of N-12005 indicated the presence of chlordane at 1.0 ug/l and Heptachlor Epoxide at 0.2 ug/l.

All offsite deep monitoring wells screened within the upper zone of the Magothy aquifer, including all Nassau County observation wells N-11171 and N-11172, were found to be free of TCL Pesticides in both sample rounds.

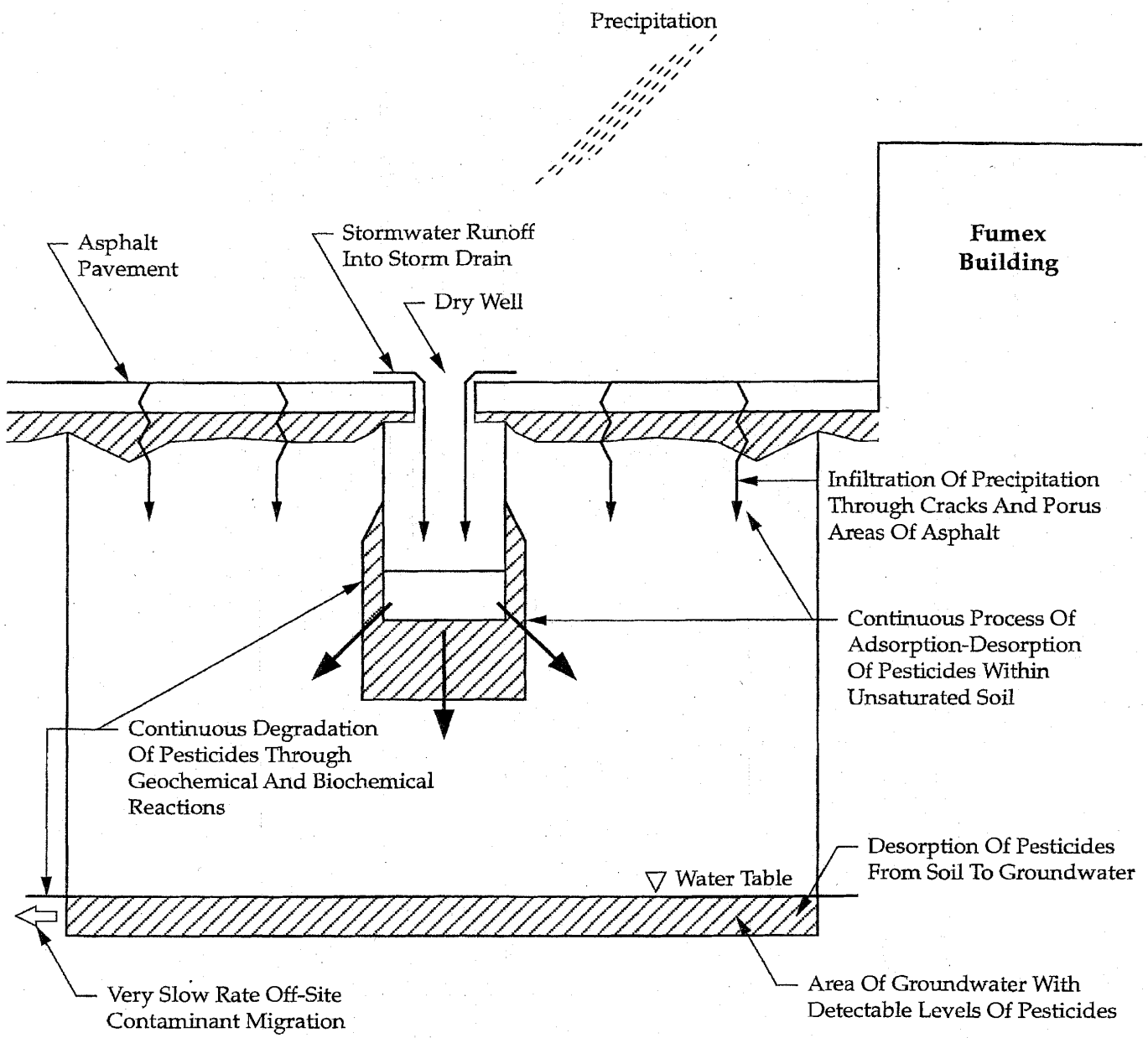
4.4 Contaminant Fate and Transport

The fate and transport of contaminants within soil and groundwater is a highly complex process governed by many reactions including hydrolysis, oxidation, reduction, volatilization, adsorption, and biodegradation. However, the major reactions effecting contaminant transport in groundwater are adsorption and biodegradation. (Olsen & Davis, 1990).

Based on existing conditions at the Fumex site, the conceptual model for pesticide transport within the subsurface environment is illustrated in Figure 4-6. Currently, the major contaminant transport mechanism at the site is the dispersion of pesticides adsorbed to organic carbon in site soils through the infiltration of water either through cracks and porous areas within the asphalt pavement or direct discharge through the onsite dry well. As the infiltrating water comes in contact with the contaminant soil, a small fraction of the pesticides adsorbed onto site soils will desorb, or partition, into the water. The infiltrating water will continue moving vertically under the force of gravity transporting the pesticides a short distance before being readsorbed to site soils. This process will continue dispersing pesticides within soils from areas of high concentration to areas of low concentration. Upon reaching the water table, the pesticides will be further dispersed through the natural movement of groundwater. Based on the understanding that shallow groundwater at the site flows predominantly in a horizontal direction, dispersion within the Upper Glacial aquifer will be predominantly horizontal in the direction of groundwater flow.

Based on a review of technical literature, geochemical and biochemical degradation of selected pesticides is known to occur within a soil and groundwater environment, however, the factors effecting the rate of degradation for most pesticide compounds is not well understood. As discussed in section 4.2, the presence of several compounds known to be breakdown products of pesticides, or daughter products, within site soil and groundwater indicates that natural degradation of the pesticide contamination is occurring onsite. In general, pesticides have relatively low Henry's Law Constants; therefore, volatilization is not considered a significant transport mechanism.

Table 4-9 summarizes the organic carbon partition coefficient (Koc) for each TCL pesticide. Koc reflects the propensity of an organic compounds to sorb to the organic matter found in soil and therefore, governs the degree of dissolution and mobility for the compound in the groundwater. Chemicals that sorb into organic materials in an aquifer (i.e. organic carbon) are retarded in their movement in groundwater. Therefore, the greater the organic carbon partition coefficient, the



Fumex/Figure 4-6 [11/98]

LEGEND:

- Areas Of Higher Pesticide Soil Contamination (Source Areas)

Not To Scale

Figure 4-6
Conceptual Model Of Contaminant Fate And Transport Processes
Phase II RI Report, Fumex Site - New Hyde Park, New York

Table 4-9
Soil Water Partition Coefficients, Retardation Rates, and Uses of Pesticides
Fumex Sanitation Site
Phase II Remedial Investigation
NYSDEC Site #1-30-041

Compound	Organic Carbon Partition Coefficient (Koc)	Soil-Water Partition Coefficient (Kd)	Calculated Retardation Factor (Rd)	Estimated Contaminant Velocity (ft./day)	Uses
alpha-BHC	1,901	2.7	27	0.0835	Not produced commercially in the US.
beta-BHC	3,548	5.0	46	0.0489	Insecticide
delta-BHC	1,902	2.7	27	0.0834	Insecticide
gamma-BHC(Lindane)	3,311	4.6	43	0.0520	Pesticide and Insecticide
Heptachlor	21,878	30.6	258	0.0087	Insecticide for termite, fire ant and boll weevil control.
Aldrin	407	0.6	10	0.2319	Primarily used to control termites.
Heptachlor Epoxide	20,893	29.3	246	0.0091	Derived from the degradation of Heptachlor
Endosulfan I	2,042	2.9	29	0.0787	Insecticide for vegetable crops
Dieldrin	35,481	49.7	415	0.0054	Insecticide; wool processing industry
4,4'-DDE	1,000,000	1,400	11,555	0.0002	Military product; chemical research
Endrin	8,318	11.6	101	0.0223	Insecticide
Endosulfan II	2,344	3.3	32	0.0702	Insecticide for vegetable crops
4,4'-DDD	43,651	61.1	509	0.0044	Dusts, emulsions and wettable powders for contact
Endosulfan Sulfate	2,344	3.3	32	0.0702	NDF
4,4'-DDT	1,659,587	2,323	19,173	0.0001	Use as an insecticide is prohibited.
Methoxychlor	89,125	124.8	1,034	0.0022	Insecticide to control mosquito larvae and house flies
Endrin Ketone	NDF	NA	NA	NA	NDF
Endrin Aldehyde	26,915	37.7	316	0.0071	NDF
alpha-chlordane	371,535	520	4,296	0.0005	Insecticide used to control insects around the home.
gamma-chlordane	1,000,000	1,400	11,555	0.0002	Insecticide used to control insects around the home.
Toxaphene	1,513	2.1	22	0.1001	Pesticide used primarly on vegetables.

Notes:
NDF: No data found

Source: Montgomery, J.H., Welkon, L.M., Groundwater Chemicals Desk Reference, Lewis Publishers Inc. Chelsea, Michigan, 1990

greater the reduction in the mobility of the compound. The normal range of Koc values extends from $1x10^{-7}$ to $1x10^{7}$ with higher values indicating greater sorption potential.

The distribution of contaminants between water and the adjoining soil matrix is often described by the soil-water distribution coefficient (Kd).

The Kd has been calculated by normalizing the Koc against the organic carbon content (foc) of the soil or aquifer material, as follows (Lyman, 1983).

$$Kd = Koc*foc$$

where,

Kd = soil water partition coefficient
Koc - carbon solution distribution
foc = fraction of organic carbon

Using a Total Organic Carbon (TOC) for the site of 0.14 percent (0.0014) which is the average of all TOC values of soil samples collected from MW-6, the Kd for each TCL pesticide has been calculated and summarized in Table 4-9.

Olsen and Davis (1990) categorize contaminants with Kds ranging from 2-10 as having low mobility and with Kds over 10 as being immobile within a soil/water environment. Based on the Kd values for each pesticide, all would be considered as having low mobility or immobile with the exception of Aldrin with a Kd of only 0.6. The six most frequently detected pesticides within site soils, including: Heptachlor, Dieldrin, 4-4'-DDE, 4-4'-DDT, alpha-chlordane and gamma-chlordane have Kds well in excess of 10, and, therefore, would be considered highly immobile.

The soil/water partition of coefficient is a constant relating the thermodynamic activities of the two phases:

$$K_d = \frac{a_s}{a_w}$$

where a_s is the activity of the chemical in the soil (or solid matrix) and a_w is the activity of the chemical in the water (aqueous phase) (Mackay and Shui, 1981).

Because the activities are equal to the activity coefficients multiplied by the chemical concentrations and the activity coefficients approach unity for environmental concentrations, the Kd is usually defined as the ratio of concentrations in the solid and water phase.

$$K_d = \frac{C_s}{C_w} = \frac{\text{Mass of solute on the solid phase per unit mass of solid phase}}{\text{Concentration of solute in solution}}$$

C_s is usually expressed in terms of mg/kg (ppm in the solid) and C_w is expressed in terms of mg/L (or ppm in the water, if the density equals one). Therefore, the units on K_d are L/kg or mL/g. (Freese and Cherry, 1979).

Using Kd as a ratio of mass of pesticide in the solid phase (solid matrix) versus the mass in solution, it can be shown that the fraction of pesticide mass in infiltrating water, as depicted in Figure 4-6, compared to the soil matrix mass is very small and, as a result, the dispersion of pesticide contamination by the infiltrating water is a relatively slow process. For alpha-chlordane, the fraction would be 1 ppm dissolved in water to 520 ppm, adsorbed to soil, for gamma-chlordane, it would be 1 ppm in water for 1,400 ppm adsorbed to soil.

Using Kd in conjunction with other aquifer properties, the retardation of a compound relative to the velocity of groundwater can be estimated by the following equation (Freeze and Cherry, 1979):

$$Rd = V/VC = \frac{1 + B * Kd}{n}$$

where

Rd = Retardation factor
Vc = Velocity of retarded contaminant
V = Average Darcian velocity of groundwater (2.25 ft/day)
B = Bulk density of aquifer material (1.65 gm/cm^3)
Kd = Calculated soil-water partition coefficient
n = porosity (20%)

Using the estimated Kd for each pesticide and a bulk density of 1.65 gm/cm^3 as a reasonable estimate for glacial sands, the retardation factor (Kd) is calculated and summarized in Table 4-9. Using the estimated groundwater velocity of 2.25 ft/day for the Upper Glacial aquifer, as discussed in section 1.4.3, and the Kd for each pesticide, the estimated contaminant velocity for each pesticide is estimated and summarized in Table 4-9. As with the estimated groundwater velocity, the contaminant velocities are only a crude approximation of the actual migration rates of contaminants within the groundwater environment. The contaminant velocity assumes homogeneous aquifer properties and only accounts for adsorption. It does not account for contaminant dispersion or degradation through geochemical and biochemical reactions. Degradation would tend to further limit advective transport of contaminants, the estimated retardation rates are likely to be conservatively high.

Based on a highly conservative assumption that pesticides entered the Upper Glacial aquifer in 1952, the year when Fumex started operations at the site, the pesticides would have had 46 years to travel within the aquifer. Based on the contaminant velocities and the 46 year period, the six most commonly detected pesticides within site soils would have traveled the following distances downgradient of the site:

- alpha-chlordane 8.2 feet
- gamma-chlordane 3.3 feet
- Heptachlor 142 feet
- Dieldrin 88 feet
- 4,4'-DDT 1.7 feet
- 4,4-DDE 3.3 feet

Even pesticides with relatively higher mobilities such as gamma-BHC (Lindane) which was one of the six most frequently detected pesticides within groundwater would have traveled only 851 feet over this 46 year period. Aldrin, which is the most mobile listed pesticide would have traveled 3,800 feet over this period. However, soil and data suggests that Aldrin is only sporadically detected in onsite soil and groundwater and is likely degrading to Dieldrin which has a significantly greater retardation factor.

The onsite and offsite groundwater data supports the estimated contaminant velocities. Only onsite monitoring wells screened immediately within the contaminant source area consistently indicate the presence of pesticides within groundwater. All offsite monitoring wells including the nearest well MW-7S, located approximately 700 feet southwest of the Fumex site, were found to be free of any detectable levels of pesticides during both Phase II RI sample rounds. Though Nassau County Department of Public Works identified the presence of chlordane (1.0 ug/l) and Heptachlor Epoxide (0.2 ug/l) within Nassau County well N-12005 in November 1996, the Phase II RI sample rounds found the well to be free of all pesticides. Given the RI laboratory data undergoes strict QA/QC under the NYSDEC ASP program and is further qualified through third party data validation, the RI data is considered more reliable than the Nassau County data.

Sampling of MW-6 which is screened within the upper zone of the Magothy aquifer, approximately 120 feet below grade at the site, does indicate detectable levels of gamma chlordane at this location, 0.03 ug/l in Round 1 and 0.057 in Round 2 of the Phase II RI. Static head measurements within onsite wells do suggest a subtle downward vertical gradient at the Fumex site. As a result, there exists a potential for downward migration of pesticides within the Upper Glacial aquifer. However, gamma chlordane is the one of the least mobile pesticides detected within the site, traveling only 3.3 feet in a horizontal direction over a 46 year period.

Section 5
Conclusions and Recommendations

5.1 Conclusions

The primary objective of the Phase II RI for the Fumex Sanitation site was to define the nature and extent of pesticide contamination associated with the site and to provide necessary data to undertake a focused Feasibility Study. Completion of the Phase II RI met these objectives. The major conclusions based on the Phase II RI data are as follows:

Soils

Soil contamination by pesticides is present within the Fumex site in excess of NYSDEC soil cleanup guidelines as defined in TAGM HWR-94-4046, dated January 24, 1998. The most significant soil contamination has been identified within soil located within the onsite drywell, as defined by the 1996 Phase I RI data, and within shallow surface soils, located immediately below the asphalt pavement to approximately two feet below grade, throughout the Fumex site parking lot. Sixteen out of the 21 listed TCL pesticides were detected within site soils. The six most frequently detected pesticides, in descending order of frequency, included:

- alpha-chlordane
- gamma-chlordane
- Heptachlor
- Dieldrin
- 4-4'-DDT
- 4-4'-DDE

The Phase I RI data indicated that shallow soil, from the bottom of the dry well to approximately three feet deep, were contaminated with a number of pesticides at concentrations well in excess of NYSDEC cleanup standards, including: delta BHC (5,400 ug/kg), heptachlor (1,700 ug/kg), Aldrin (1,100 ug/kg), alpha-chlordane (26,000 ug/kg) and gamma chlordane (30,000 ug/kg). Though pesticide concentrations generally decrease within soil samples collected at greater depths below the dry well, there is no consistent trend in decreasing concentrations with increasing soil depth. Pesticides were generally found to exceed NYSDEC soil cleanup standards in soil up to 15 feet below the dry well. Soil from 20 to 25 feet had detectable concentrations of pesticides but no one compound exceeded the soil cleanup guidelines. The sample collected from a depth of 45 to 50 feet below the dry well exhibited delta-13HC (670 ug/kg), Heptachlor (320 ug/kg), alpha-chlordane (2,600 ug/kg) and gamma-chlordane (2,800 ug/kg), all in excess of the NYSDEC soil cleanup standard.

The Phase II RI data indicates relatively high pesticide concentrations (560 to 160,000 ug/kg) within shallow soil samples collected approximately one to two feet below the asphalt pavement of the Fumex site. Concentrations rapidly decrease with increasing depth, with several significant exceptions noted at MW-6. Based on the five Phase II RI sample points, shallow soil throughout the Fumex site parking lot exceed NYSDEC cleanup guidelines for up to nine different pesticide compounds, including:

Pesticide	Concentration Range for Shallow Soil (ug/kg)
■ Heptachlor	36,000 - 5,000
■ Aldrin	ND - 1,500
■ Dieldrin	2,700 - 16,000
■ 4-4'-DDE	90 - 14,000
■ Endrin	ND - 2,000
■ 4-4'-DDT	320 - 28,000
■ alpha-chlordane	10,000-120,000
■ gamma-chlordane	12,000 - 160,000
■ Endosulfan II	ND - 2,600

Pesticides exceeding NYSDEC cleanup guidelines are also present in deeper soils at several locations including: SB-11 (10 to 27 feet), SB-13 (50-55 feet), SB-14 (10-12 feet) and most significantly at MW-6 (5 to 17 feet). Additionally, most sample locations exhibit an increase in pesticide contamination at or below the water table with soil cleanup guidelines being exceeded for selected pesticides at : SB-11 (45-47 ft), SB-12 45-47 ft), SB-14 (55-57 ft) and at MW-6 (45-47 ft.).

Analysis of soil samples collected from MW-6 for TCL Volatile Organic Compounds and TCL semi-volatile organic compounds indicated only trace detections of 2-butanone (3 ug/kg) and tetrachloroethene (3 ug/kg). The soil sample collected immediately below the asphalt pavement indicated trace levels of several semi-volatile compounds. All volatile and semi-volatile compounds were well below respective NYSDEC cleanup guidelines. Metals analysis indicates all 23 TAL metals to be well below respective NYSDEC soil cleanup guidelines.

Groundwater

The Phase II RI groundwater data indicates groundwater contamination by numerous pesticides is present at the Fumex site within the upper zone of the Upper Glacial aquifer. However, offsite migration of this contamination does not appear to be significant, if occurring at all.

Nineteen (19) out of the twenty-one (21) listed TCL pesticides were detected in one or more samples collected from shallow onsite monitoring wells MW-1 through MW-5 during the four sample rounds (two Phase I and two Phase II RI sample rounds). The ten most frequently detected pesticides within shallow groundwater in descending order include:

Pesticide	Maximum Concentration (ug/l)	Well Location
■ gamma-chlordane	16.0	MW-1
■ alpha-chlordane	18.0	MW-1
■ 4-4' DDE	0.83	MW-1
■ Heptachlor Epoxide	0.61	MW-2
■ Dieldrin	4.30	MW-2
■ gamma-BHC-Lindane	0.87	MW-3
■ Heptachlor	0.52	MW-5
■ 4-4'-DDT	1.3	MW-1
■ Aldrin	0.33	MW-1
■ Endrin	2.90	MW-2

Out of the 10 most frequently detected pesticides, MW-1 exhibited the highest recorded concentrations for six pesticide compounds, including alpha and gamma-chlordane, with MW-2 accounting for two and MW-3 and MW-5 each accounting for one. Monitoring well MW-1, MW-2 and MW-5 are located west to southwest (downgradient) of the drywell. Though MW-3 is located east of the drywell (upgradient) it is only 14 feet from the drywell manhole cover.

Virtually all positive detections of pesticides collected from onsite shallow well samples exceed the respective NYSDEC Class GA groundwater standard. In the case of the most commonly detected pesticides, such as Heptachlor Epoxide, gamma-chlordane and alpha-chlordane, concentrations exceed the GA standards of 0.04 to 0.05 ug/l by one to three orders of magnitude within onsite shallow groundwater.

Monitoring well MW-6 which is located downgradient of the drywell and screened within the upper zone of the Magothy aquifer exhibited trace concentrations of gamma-chlordane, 0.03 ug/l (qualified as estimated) in the first round and 0.057 ug/l in the second round groundwater sampling. It should be noted that the blind duplicate sample for the first round sample collected from MW-6 indicated all pesticides to be non-detectable.

Of the 11 offsite wells sampled during the Phase II RI, only one positive detection was observed over the two sample rounds. Dieldrin was detected at an estimated concentration of 0.03 ug/l within shallow upgradient monitoring well, MW-9S, in the first sample round but was not detected in the second round. The three Nassau County observation wells screened within the Upper Glacial aquifer, N-11738, N-11739, and N-12005 where found to be free of all TCL Pesticides. As discussed in Section 2.2, sampling conducted by the Nassau County Department of Public Works in November 1996 of N-12005 indicated the presence of chlordane at 1.0 ug/l and Heptachlor Epoxide at 0.2 ug/l. All offsite deep monitoring wells screened within the upper zone of the Magothy aquifer, including all Nassau County observation wells N-11171 and N-11172, were found to be free of TCL Pesticides in both Phase II RI sample rounds.

Fate and Transport of Pesticides

Currently, the major contaminant transport mechanism at the site is the dispersion of pesticides absorbed to site soils through the infiltration of water either through cracks and porous areas within the asphalt pavement or direct discharge through the onsite dry well. Though in most cases, shallow soil contamination is greater than within the onsite drywell, the drywell is actually serving as the primary transport mechanism for pesticide contamination given onsite precipitation drains through the drywell and into contaminated soil, whereas, the shallow soil is relatively isolated from infiltrating water by the parking lot asphalt pavement. Based on estimated soil/water partitioning coefficients for the majority of pesticides detected in site soils, the pesticides are considered to be immobile or having low mobility within a soil/water environment. Therefore, though dispersion of pesticide contamination is occurring through the infiltration of water, it is occurring at a relatively slow rate.

Based on estimated contaminant velocities within the Upper Glacial aquifer and a highly conservative transport period of 46 years, the six most commonly detected pesticides within site soils would have traveled no further than 146 feet downgradient of the site. In the case of chlordane, the travel distance over this period would be no more than nine feet from the site.

The contaminant velocities are very crude estimates and do not account for contaminant degradation through geochemical and biochemical reactions. Because these variable would tend to further limit advective transport of contaminants, the estimated retardation rates are likely to be conservatively high. The onsite and offsite groundwater data support the estimated contaminant velocities. Only onsite monitoring wells screened immediately within the contaminant source area consistently exhibit pesticides.

The fate and transport model does not explain the presence of gamma-chlordane within deep monitoring well MW-6. This may have occurred during the drilling operation with some contamination carried from the shallow zone downward to the deeper zone.

5.2 Recommendations

Both the soil and groundwater at the Fumex site are contaminated with pesticides. The pesticide concentrations in the soil exceed NYSDEC TAGM criteria at the site, and the pesticide concentrations in the groundwater generally exceed NYSDEC TAGM criteria as measured in all five shallow monitoring wells. Recommendations are provided below for both the soil and groundwater contamination.

Soils

Soil data indicate that the soils beneath the parking lot and dry well are contaminated with pesticides. Due to the depth of the contamination within the unsaturated zone (the water table is about 50 feet below ground surface), the extent of the onsite contamination, and the fact that the entire area is paved, complete removal of the contaminated soils is neither feasible nor necessary. It appears that the drywell and soils adjacent to the drywell are clearly the major sources of continued groundwater contamination. Additionally, shallow soils immediately below the asphalt parking lot, although relatively isolated from infiltrating water, will also contribute to groundwater contamination.

Based on these findings, it is recommended that a select number of soil excavation and offsite disposal options be evaluated as part of focused Feasibility Study.

Groundwater

The pesticides found at this site generally exhibit very limited mobility in the groundwater, and tend to bind to the organic carbon within the soil matrix. For this reason, it is considered unlikely that groundwater contamination from the site will pose a serious, long term threat to downgradient wells.

- Based on the current extent of groundwater contamination and the nature of the contaminants, hydraulic containment and/or groundwater treatment at the site is not recommended at this time. Due to the depth and distance of the nearest public supply well, the potential health risks posed by the groundwater pathway from this site are minimal.

- It is recommended that a part of a long-term monitoring program, onsite and selected offsite monitoring wells be monitored periodically for TCL Pesticides in order to detect any potential offsite migration of pesticides. Given the low levels of pesticides detected in groundwater at the site, it is recommended that future analysis of groundwater samples be performed using

analytical methods with lower method detection limits (MDLs) than the standard ASP TCL Pesticide analytical method, such as EPA Method 8080 or 8081.

Section 6
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Appendix A

Boring Logs And Well Completion Report

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LOG OF BORING

BORING #: SB-10
Page 1 of 1
Permit #:
Job #:

Project FUMEX — Location Parking lot
Date Drilled 4/14/98 — Drilling Co.: SJB
Total Depth 57' — Method Used: HOLLOW STEM AUGER
Inspector T. HORN — Organic Vapor Inst: OVM — Water elv:

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks/ Sample time
	SB-10-0	-	0-1'	-	0.0	Dark-brown fine to medium sand, trace silt, trace small rounded pebbles, moist.		0700
5								
	SB-10-1	4-11-17-17	5-7'	70%	0.0	Orange-tan medium to very coarse sand, with small subangular pebbles, damp.		0720
10								
	SB-10-2	8-15-15-17	10-12'	50%	0.0	Orange-tan medium to coarse sand, with small subrounded pebbles, damp.		0740
15								
	SB-10-3	4-8-7-7	15-17'	75%	0.0	Tan-light-brown fine to coarse sand, trace small subrounded pebbles, damp		0800 Duplicate
20								
25								
	SB-10-4	10-12-12-11	25-27'	50%	0.0	Yellow-orange fine to medium sand, some coarse sand, trace small rounded pebbles, damp.		0815
30								
35								
	SB-10-5	11-11-12-12	35-37'	80%	0.0	Orange-tan medium sand, trace coarse sand, trace micaceous silt, moist.		0835
40								
45								
	SB-10-6	12-6-8-8	45-47'	50%	0.0	Reddish-tan fine to medium sand, trace coarse sand, wet.		0900
50								
55								
	SB-10-7	5-7-7-11	55-57'	75%	0.0	Tan-orange fine to medium sand, wet.		0920
60								

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LOG OF BORING

BORING # SB-11
Page 1 of 1
Permit #:
Job #:

Project FUMEX | Location Parking lot
Date Drilled 4/14/98 | Drilling Co.: SJB
Total Depth 57' | Method Used: HOLLOW STEM AUGER
Inspector T. HORN | Organic Vapor Inst: OVM | Water elv:

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks/ Sample time
	SB-11-0	-	0-1'	-	0.0	Dark-brown silty sand, trace clay, damp.		1125
5	SB-11-1	3-3-6-8	5-7'	50%	0.0	Upper 6" - dark-brown silty sand, trace clay, damp. Lower 6" - orange-tan medium to coarse sand, some small to medium rounded pebbles, damp.		1135
10	SB-11-2	9-12-9-11	10-12'	60%	0.0	Orange-tan coarse sand, trace small rounded pebbles, damp.		1150
15	SB-11-3	5-9-10-11	15-17'	50%	0.0	Reddish-orange-tan medium to coarse sand, trace small rounded pebbles, damp.		1200
20								
25	SB-11-4	6-12-11-12	25-27'	70%	0.0	Orange-tan fine to coarse sand, trace small subrounded pebbles, damp.		1220
30								
35	SB-11-5	9-11-12-11	35-37'	50%	0.0	Orange-tan medium to coarse sand, with small subrounded pebbles, damp.		1330
40								
45	SB-11-6	4-4-6-10	45-47'	60%	0.0	Light-brown fine to medium sand, little small subrounded pebbles, trace micaceous silt, wet.		1350
50								
55	SB-11-7	3-5-5-2	53-55'	40%	0.0	Orange-tan fine to medium sand, trace small rounded pebbles, wet.		1415
60								

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LOG OF BORING

BORING # SB-12
Page 1 of 1
Permit #:
Job #:

Project FUMEX — Location Parking lot
Date Drilled 4/15/98 — Drilling Co.: SJB
Total Depth 55' — Method Used: HOLLOW STEM AUGER
Inspector T. HORN — Organic Vapor Inst: OVM — Water elv:

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks/ Sample time
	SB-12-0	-	0-1'	-	0.0	Dark-brown silty sand, trace clay, trace organics, trace small to medium rounded pebbles, moist.		0830
5								
	SB-12-1	15-11-19-19	5-7'	40%	0.0	Orange-tan fine to coarse sand, some small to medium subrounded pebbles, trace micaceous silt, damp.		0845
10								
	SB-12-2	9-16-25-23	10-12'	50%	0.0	Light-orange-tan small to medium angular pebbles with coarse sand, some medium sand, damp.		0900
15								
	SB-12-3	7-10-14-15	15-17'	60%	0.0	Orange-tan medium to coarse sand with small to medium subangular pebbles, damp.		0915
20								
25								
	SB-12-4	11-9-9-10	25-27'	50%	0.0	Orange-tan fine to coarse sand, some small subangular pebbles, damp.		0930
30								
35								
	SB-12-5	9-11-11-12	35-37'	50%	0.0	Reddish-orange-tan coarse sand with medium sand, some small to medium subangular pebbles, damp.		0945
40								
45								
	SB-12-6	4-3-4-4	45-47'	60%	0.0	Orange-tan medium to coarse sand little small subrounded pebbles, wet.		1000
50								
55	SB-12-7	5-6-6-7	53-55'	70%	0.0	Orange-tan medium to coarse sand, some small subrounded pebbles, wet.		1015
60								

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LOG OF BORING

BORING # SB-13
Page 1 of 1
Permit #:
Job #:

Project FUMEX
Location Parking lot
Date Drilled 4/15/98
Drilling Co.: SJB
Total Depth 55'
Method Used: HOLLOW STEM AUGER
Inspector T. HORN
Organic Vapor Inst: OVM
Water elv:

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks/ Sample time
	SB-13-0	-	0-1'	-	0.0	Brown fine to medium sand, trace silt, trace very small subangular pebbles, damp.		1140
5								
	SB-13-1	10-12-15-19	5-7'	40%	0.0	Light-orange-tan coarse sand with medium sand, trace semi-rounded small gravel, moist.		1200
10								
	SB-13-2	8-12-15-19	10-12'	50%	0.0	Light-orange-tan medium to coarse sand with small subrounded pebbles, damp.		1215
15								
	SB-13-3	7-10-14-15	15-17'	50%	0.0	Light-orange-tan medium to coarse sand with small subrounded pebbles, damp.		1230
20								
25								
	SB-13-4	9-9-11-12	25-27'	40%	0.0	Orange-tan medium to coarse sand, trace small subrounded pebbles, damp.		1245
30								
35								
	SB-13-5	6-11-14-14	35-37'	50%	0.0	Reddish-orange-tan medium to coarse sand, trace small rounded pebbles, wet.		1315
40								
45								
	SB-13-6	5-4-6-6	45-47'	60%	0.0	Light-orange-brown medium to coarse sand, trace small rounded pebbles,wet.		1330
50								
55	SB-13-7	5-6-6-9	53-55'	70%	0.0	Light-orange-brown medium to coarse sand, trace small to medium semi-rounded pebbles, wet.		1345
60								

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LOG OF BORING

BORING # SB-14
Page 1 of 1
Permit #:
Job #:

Project FUMEX — Location Parking lot
Date Drilled 4/17/98 — Drilling Co.: SJB
Total Depth 57' — Method Used: HOLLOW STEM AUGER
Inspector T. HORN — Organic Vapor Inst: OVM — Water elv:

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks/ Sample time
	SB-14-0	-	0-1'	-	0.0	Dark-brown fine to medium sand, trace silt, trace organics, damp.		0800
5								
	SB-14-1	5-10-14-20	5-7'	80%	0.0	Orange-tan medium to coarse sand with small to medium subrounded pebbles, damp.		0815
10								
	SB-14-2	5-10-11-12	10-12'	80%	0.0	Tan-orange fine to coarse sand, some small subrounded pebbles, damp.		0830
15								
	SB-14-3	6-9-9-9	15-17'	70%	0.0	Orange-tan fine to medium sand, trace coarse sand, trace small pebbles, damp.		0845
20								
25								
	SB-14-4	9-10-14-14	25-27'	60%	0.0	Reddish-orange-tan fine to very coarse sand and small to medium pebbles, damp.		0900
30								
35								
	SB-14-5	7-7-8-7	35-37'	50%	0.0	Orange-tan medium to coarse sand, little medium pebbles, trace small pebbles, wet.		0915
40								
45								
	SB-14-6	4-4-5-9	45-47'	75%	0.0	Orange-tan fine to coarse sand, with small to medium pebbles, wet.		0930
50								
55								
	SB-14-7	4-4-9-11	55-57'	60%	0.0	Orange-tan fine to coarse sand, some small to medium pebbles, wet.		0945
60								

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LOG OF BORING

BORING # MW-6
Page 1 of 2

Project FUMEX — Location Parking lot — Permit #:
Date Drilled 4/16-23/1998 — Drilling Co.: SJB — Job #:
Total Depth 120' — Method Used: HOLLOW STEM AUGER
Inspector T. HORN — Organic Vapor Inst: OVM — Water elv:

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks/ Sample time
	MW-6-0	-	0-1'	-	0.0	Dark-brown fine to medium sand, little silt, trace organics, moist.		0700
5								
	MW-6-1	5-7-10-10	5-7'	60%	0.0	Orange-tan fine to coarse sand, trace small subrounded gravel, trace small to medium pebbles, damp.		0745
10								
	MW-6-2	5-9-15-18	10-12'	60%	0.0	Orange-tan fine to coarse sand little subrounded small to medium pebbles, damp.		0800
15								
	MW-6-3	7-11-7-7	15-17'	70%	0.0	Tan-brown fine to coarse sand, little small pebbles, damp.		0830
20								
25								
	MW-6-4	11-8-9-9	25-27'	70%	0.0	Light-orange-brown fine to coarse sand, some small to medium pebbles, damp.		0900
30								
35								
	MW-6-5	5-7-9-9	35-37'	75%	0.0	Brown-orange medium to coarse sand, some small to medium subrounded pebbles,damp.		0915
40								
45								
	MW-6-6	3-3-4-5	45-47'	75%	0.0	Brown-reddish-orange medium to coarse sand, little small to medium pebbles, wet.		0930
50								
55								
	MW-6-7	3-3-9-5	55-57'	60%	0.0	Tan-brown fine to medium sand, trace small rounded pebbles, wet.		0945
60								

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BORING # MW-6
Page 2 of 2
Permit #:

LOG OF BORING

Project FUMEX Location Parking lot

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec (feet)	Org. Vap (ppm)	Sample Description	Strata Change	Remarks/ Sample time
65								
70								
75								
80								
85								
90								
95								
100								
105								
110								Top of screen
115								
120								Total depth

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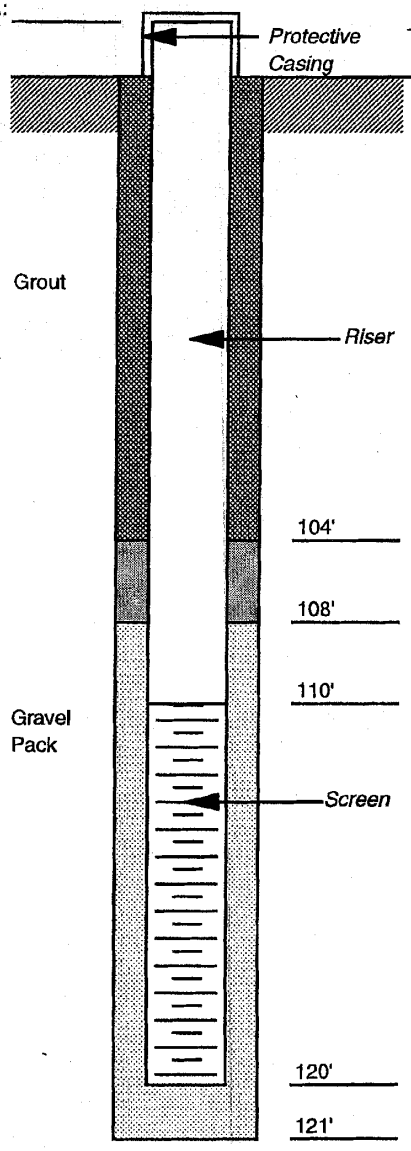
WELL CONSTRUCTION SUMMARY

Project: FUMEX Location: Parking lot Well No.: MW-6
Permit No.:

TOC elev.:



Type: Monitor

DRILLING SUMMARY

Drilling Company: SJB Drillers: Mike/assistant
Drill Rig/Model: CME-75
Borehole Diameters: 4.25" auger/4" casing Drilling Fluid: water (drive and wash)
Bits/Depths: 4.25"/60',4"/120'
Total Depth: 121' Depth To Water: 40'
Supervisor Geologist: T. HORN

WELL DESIGN

Casing Material:	PVC	Diameter:	2"
Screen Size:	10'	Diameter:	2"
Slot Size:	.10"	Setting:	120'-110'
Filter Material:	Morie #0 sand	Setting:	121'-108'
Seals Material:	Bentonite slurry	Setting:	108'-104'
Grout:	Potland/Bentonite	Setting:	104'-surface
Surface Casing Material:	Steel flush-mount	Setting:	surface

TIME LOG

	Started	Completed
Drilling:	4/16/98	4/23/98
Installation:	4/23/98	4/24/98
Development:	5/6/98	5/7/98

WELL DEVELOPMENT

Method: Surge/purge via Grundfos submersible pump
Static Depth to Water:
Pumping Depth To Water:
Pumping Rate: Spec. Capacity:
Volume Pumped:

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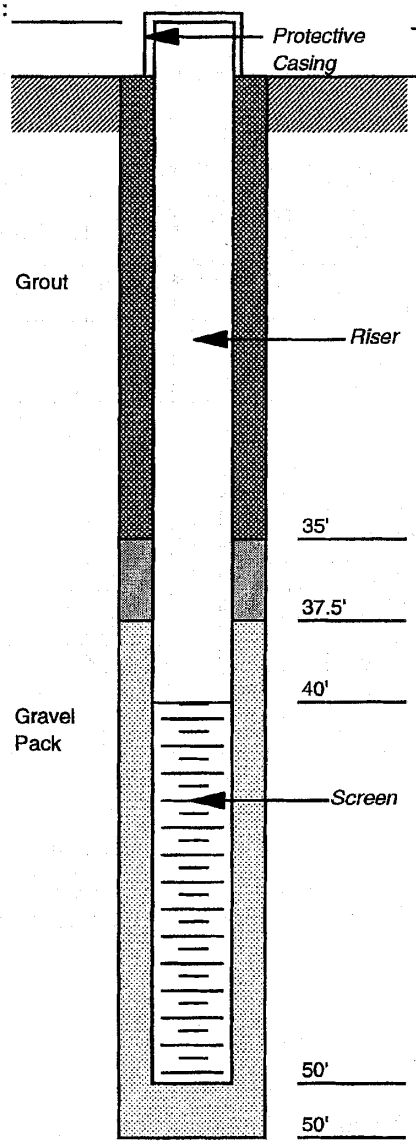
WELL CONSTRUCTION SUMMARY

Project: FUMEX Location: Armstrong and Broadway Well No.: MW-7S
Permit No.:

TOC elev.:



Type: Monitor

DRILLING SUMMARY

Drilling Company:	SJB	Drillers:	Mike/assistant
Drill Rig/Model:	CME-75		
Borehole Diameters:	4.25" auger	Drilling Fluid:	
Bits/Depths:	4.25"/50'		
Total Depth:	50'	Depth To Water:	40'
Supervisor Geologist:	T. HORN		

WELL DESIGN

Casing Material:	PVC	Diameter:	2"
Screen Size:	10'	Diameter:	2"
Slot Size:	.10"	Setting:	50'-40'
Filter Material:	Morie #0 sand	Setting:	50'-37.5'
Seals Material:	Bentonite chips	Setting:	37.5'-35'
Grout:	Potland/Bentonite	Setting:	35'-surface
Surface Casing Material:	Steel flush-mount	Setting:	surface

TIME LOG

	Started	Completed
Drilling:	4/20/98	4/20/98
Installation:	4/20/98	4/20/98
Development:	5/8/98	5/8/98

WELL DEVELOPMENT

Method:	Surge/purge via Grundfos submersible pump		
Static Depth to Water:			
Pumping Depth To Water:			
Pumping Rate:		Spec. Capacity:	
Volume Pumped:			

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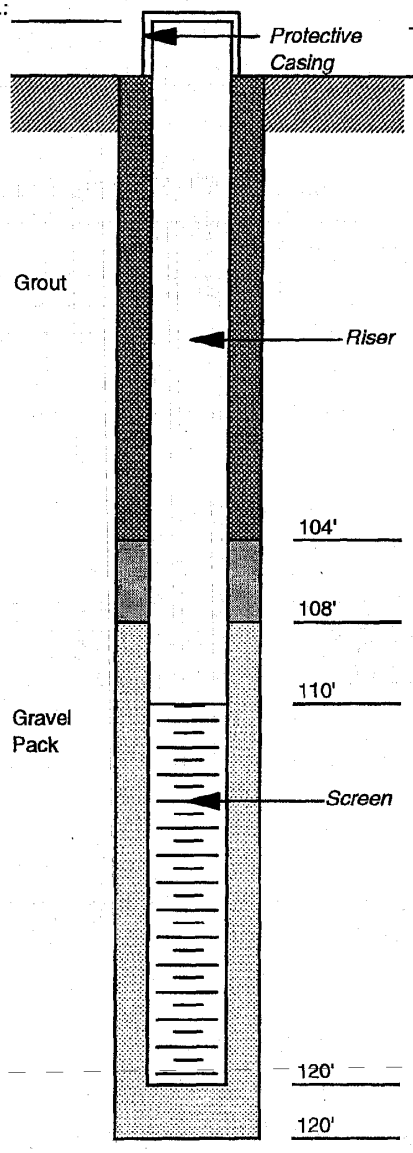
WELL CONSTRUCTION SUMMARY

Project: FUMEX Location: Armstrong and Broadway Well No.: MW-7D
Permit No.:

TOC elev.:



Type: Monitor

DRILLING SUMMARY

Drilling Company: SJB Drillers: Mike/assistant
Drill Rig/Model: CME-75
Borehole Diameters: 4.25" auger/4" casing Drilling Fluid: water (drive and wash)
Bits/Depths: 4.25"/35',4"/120'
Total Depth: 120' Depth To Water: 40'
Supervisor Geologist: T. HORN

WELL DESIGN

Casing Material:	PVC	Diameter:	2"
Screen Size:	10'	Diameter:	2"
Slot Size:	.10"	Setting:	120'-110'
Filter Material:	Morie #0 sand	Setting:	120'-108'
Seals Material:	Bentonite slurry	Setting:	108'-104'
Grout:	Potland/Bentonite	Setting:	104'-surface
Surface Casing Material:	Steel flush-mount	Setting:	surface

TIME LOG

	Started	Completed
Drilling:	4/30/98	5/13/98
Installation:	5/13/98	5/14/98
Development:	5/14/98	5/14/98

WELL DEVELOPMENT

Method: Surge/purge via Grundfos submersible pump
Static Depth to Water:
Pumping Depth To Water:
Pumping Rate: Spec. Capacity:
Volume Pumped:

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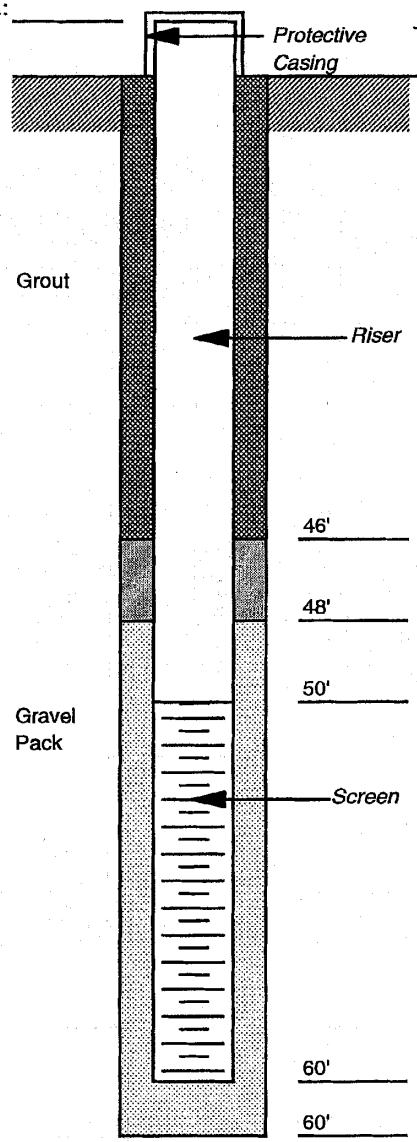
WELL CONSTRUCTION SUMMARY

Project: FUMEX Location: Thorens and Atlantic Well No.: MW-8S
Permit No.:

TOC elev.:



DRILLING SUMMARY

Drilling Company:	SJB	Drillers:	Mike/assistant
Drill Rig/Model:	CME-75		
Borehole Diameters:	4.25" auger	Drilling Fluid:	
Bits/Depths:	4.25"/50'		
Total Depth:	60'	Depth To Water:	40'
Supervisor Geologist:	T. HORN		

WELL DESIGN

Casing Material:	PVC	Diameter:	2"
Screen Size:	10'	Diameter:	2"
Slot Size:	.10"	Setting:	60'-50'
Filter Material:	Morie #0 sand	Setting:	60'-48'
Seals Material:	Bentonite chips	Setting:	48'-46'
Grout:	Potland/Bentonite	Setting:	46'-surface
Surface Casing Material:	Steel flush-mount	Setting:	surface

TIME LOG

	Started	Completed
Drilling:	4/21/98	4/21/98
Installation:	4/21/98	4/21/98
Development:	5/5/98	5/6/98

WELL DEVELOPMENT

Method:	Surge/purge via Grundfos submersible pump		
Static Depth to Water:			
Pumping Depth To Water:			
Pumping Rate:		Spec. Capacity:	
Volume Pumped:			

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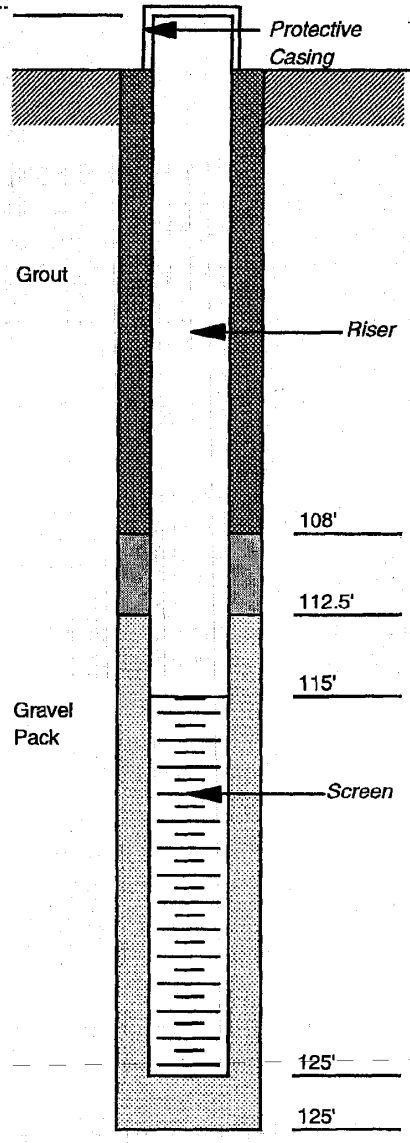
WELL CONSTRUCTION SUMMARY

Project: FUMEX Location: Thorens and Atlantic Well No.: MW-8D
Permit No.:

TOC elev.:



Type: Monitor

DRILLING SUMMARY

Drilling Company: SJB Drillers: Mike/assistant
Drill Rig/Model: CME-75
Borehole Diameters: 4.25" auger/4" casing Drilling Fluid: water (drive and wash)
Bits/Depths: 4.25"/50',4"/125'
Total Depth: 125' Depth To Water: 40'
Supervisor Geologist: T. HORN

WELL DESIGN

Casing Material:	PVC	Diameter:	2"
Screen Size:	10'	Diameter:	2"
Slot Size:	.10"	Setting:	125'-115'
Filter Material:	Morie #0 sand	Setting:	125'-112.5'
Seals Material:	Bentonite slurry	Setting:	112.5'-108'
Grout:	Potland/Bentonite	Setting:	108'-surface
Surface Casing Material:	Steel flush-mount	Setting:	surface

TIME LOG

	Started	Completed
Drilling:	4/24/98	4/29/98
Installation:	4/29/98	4/29/98
Development:	5/4/98	5/5/98

WELL DEVELOPMENT

Method: Surge/purge via Grundfos submersible pump
Static Depth to Water:
Pumping Depth To Water:
Pumping Rate: Spec. Capacity:
Volume Pumped:

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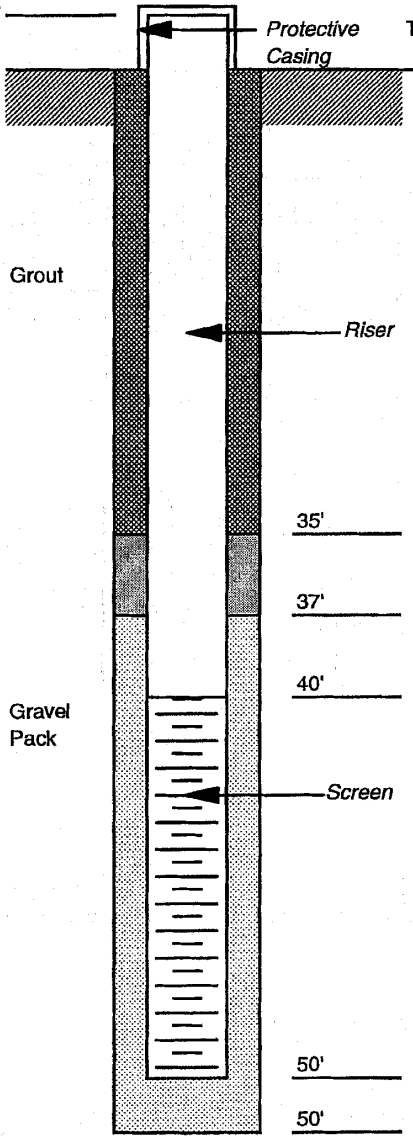
WELL CONSTRUCTION SUMMARY

Project: FUMEX Location: Madison and Herricks Well No.: MW-9S
Permit No.:

TOC elev.:



Type: Monitor

DRILLING SUMMARY

Drilling Company: SJB Drillers: Mike/assistant
Drill Rig/Model: CME-75
Borehole Diameters: 4.25" auger Drilling Fluid:
Bits/Depths: 4.25"/50'
Total Depth: 50' Depth To Water: 40'
Supervisor Geologist: T. HORN

WELL DESIGN

Casing Material:	PVC	Diameter:	2"
Screen Size:	10'	Diameter:	2"
Slot Size:	.10"	Setting:	50'-40'
Filter Material:	Morie #0 sand	Setting:	40'-37'
Seals Material:	Bentonite chips	Setting:	37'-35'
Grout:	Potland/Bentonite	Setting:	35'-surface
Surface Casing Material:	Steel flush-mount	Setting:	surface

TIME LOG

	Started	Completed
Drilling:	5/7/98	5/7/98
Installation:	5/7/98	5/7/98
Development:	5/8/98	5/8/98

WELL DEVELOPMENT

Method: Surge/purge via Grundfos submersible pump
Static Depth to Water:
Pumping Depth To Water:
Pumping Rate: Spec. Capacity:
Volume Pumped:

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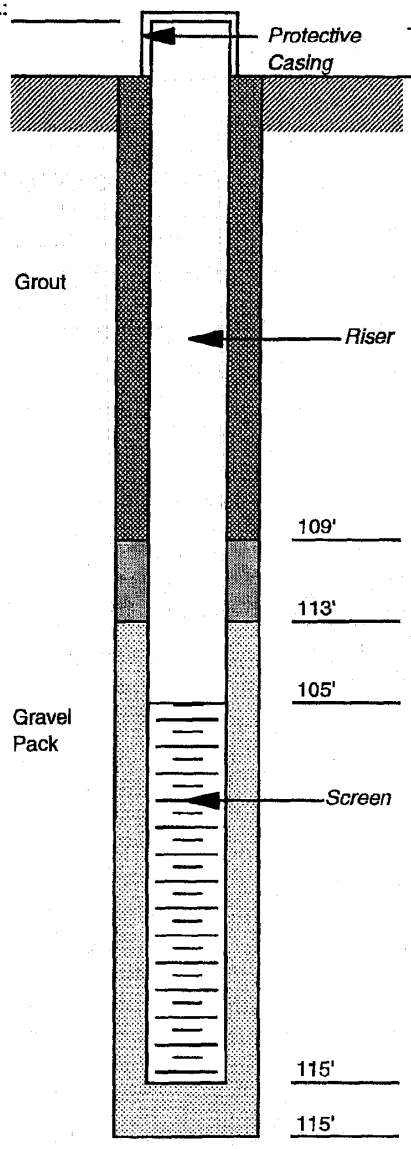
WELL CONSTRUCTION SUMMARY

Project: FUMEX Location: Madison and Herricks Well No.: MW-9D
Permit No.:

TOC elev.:



Type: Monitor

DRILLING SUMMARY

Drilling Company: SJB Drillers: Mike/assistant
Drill Rig/Model: CME-75
Borehole Diameters: 4.25" auger/4" casing Drilling Fluid: water (drive and wash)
Bits/Depths: 4.25"/40',4"/115'
Total Depth: 115' Depth To Water: 40'
Supervisor Geologist: T. HORN

WELL DESIGN

Casing Material:	PVC	Diameter:	2"
Screen Size:	10'	Diameter:	2"
Slot Size:	.10"	Setting:	115'-105'
Filter Material:	Morie #0 sand	Setting:	105'-113'
Seals Material:	Bentonite slurry	Setting:	113'-109'
Grout:	Potland/Bentonite	Setting:	109'-surface
Surface Casing Material:	Steel flush-mount	Setting:	surface

TIME LOG

	Started	Completed
Drilling:	5/7/98	5/11/98
Installation:	5/11/98	5/12/98
Development:	5/14/98	5/14/98

WELL DEVELOPMENT

Method: Surge/purge via Grundfos submersible pump
Static Depth to Water:
Pumping Depth To Water:
Pumping Rate: Spec. Capacity:
Volume Pumped: