Lawrence Aviation Industries

Port Jefferson Station, New York

Preliminary Remedial Investigation Report

NYSDEC Site #1-52-016
Work Assignment #D002925-20.1

Prepared For:

New York State
Department Of Environmental Conservation

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Section 1
Purpose of Study and Report

1.1 Introduction

Camp Dresser & McKee (CDM) has been retained by the New York State Department of Environmental Conservation to prepare this Remedial Investigation (RI) Report for the Lawrence Aviation Industries Site under the New York State Superfund Standby Contract (Work Assignment #D002925-20.1). This abbreviated RI Report discusses the findings and presents conclusions based on the results of the RI conducted between November 1997 and April 2000, in accordance with the NYSDEC Remedial Investigation approved August 1997 and February 2000 Work Plans and Site Operations Plan (SOP) (CDM 1997).

The original purpose of the Remedial Investigation process was to define the nature and extent of the contamination resulting from manufacturing practices at the Lawrence Aviation Industries Site. Since site access could not be acquired at the time of the preliminary remedial investigation, the specific objectives of this Remedial Investigation have been changed to meet the reduced field activities as a preliminary remedial investigation.

The specific objectives of the Preliminary Remedial Investigation are:

- Determine the nature of the contamination in the installed off-site wells
- Determine the most probable source of the off-site contamination

Section 1 of this report begins with a summary of the background and history of the site. Existing physical conditions and environmental setting are discussed in Section 2. A summary of the field investigations and findings are presented in Section 3, followed by a discussion of the nature and extent of off-site contamination in Section 4. A conceptual groundwater model of contaminant transport at and downgradient of the site is also discussed in this section. Conclusions are presented in Section 5 and references are presented in Section 6.

1.2 Site Location

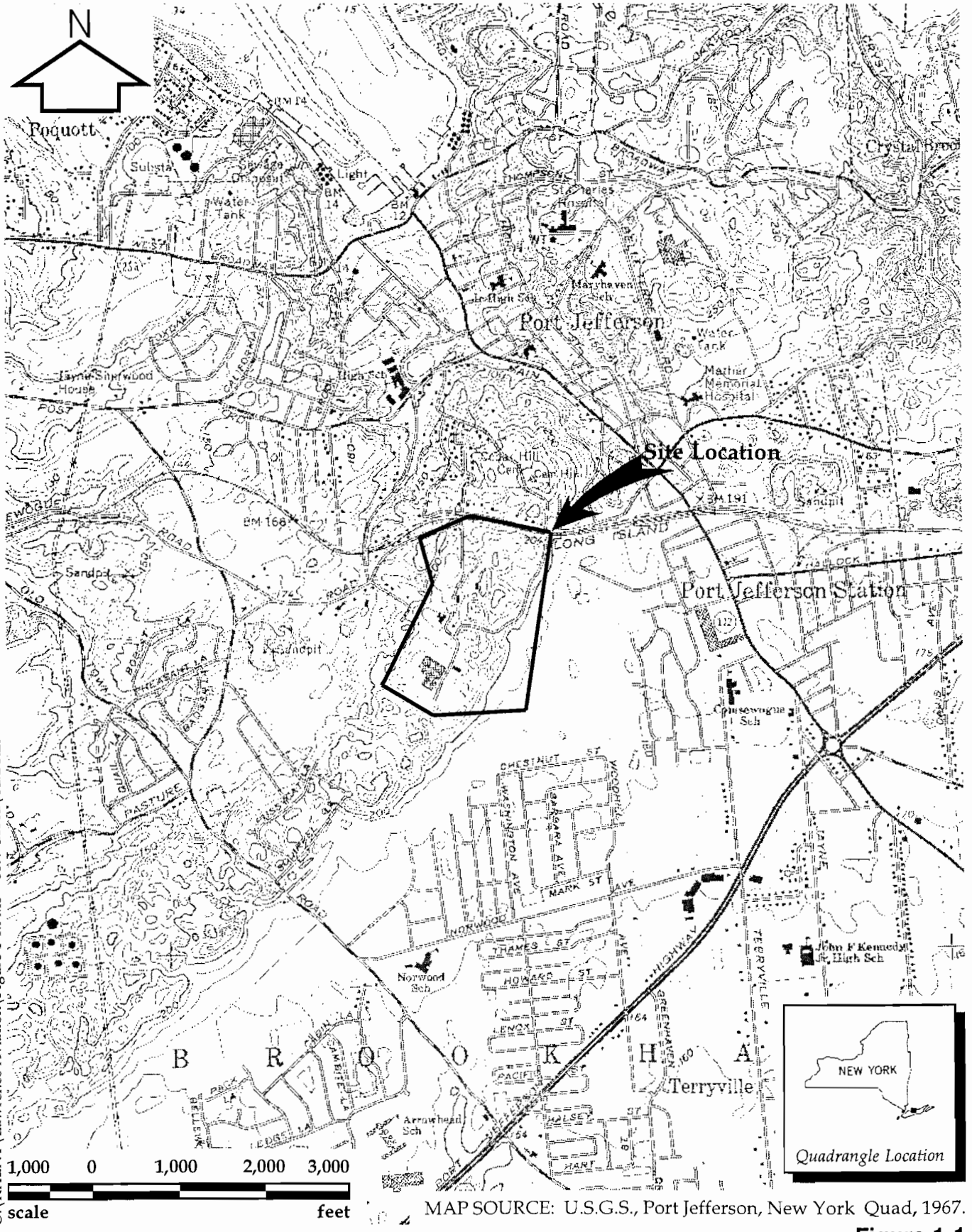
The Lawrence Aviation Industries site is located in the Village of Port Jefferson Station in the Town of Brookhaven, Suffolk County, New York, shown in Figure 1-1, and is approximately 126 acres in size. The Long Island Railroad (LIRR) and Sheep Pasture Road form the northern border of the site, to the east and west are various residential single family houses and to the south is a wooded area beyond which is an apartment complex. The Port Jefferson Harbor, an outlet to the Long Island Sound lies approximately one mile to the north. The site is located on the Harbor Hill terminal moraine, a topographical high point within the study area, at an elevation between 200 and 220 feet above mean sea level. The local terrain is hilly and slopes towards the north in the direction of Long Island Sound.

1.3 Site Background

Lawrence Aviation Industries is an industrial manufacturing facility. The company was originally located in Brooklyn, New York and conducted business as Leadkote Products. Products produced by Lead Kote Products included lead gutters and spouts for roof drains. When the company moved to Port Jefferson Station in 1951, all the existing material from the original manufacturing processes were transferred to the new location. In 1959, Leadkote Products changed names to Lawrence Aviation Industries, Inc.

Based on review of available drawings, the Lawrence Aviation manufacturing facility is comprised of ten major buildings which are located on approximately 34 acres of the 126 acre site, as shown in Figure 1-2. According to current SCDHS storage tank registration records, there are ten above ground and 21 below ground process tanks containing various acids, caustic compounds and rinse waters currently in service. There are also three active above ground and one underground storage tank containing No. 2 fuel oil. Between 1992 and 1995, Lawrence Aviation removed a total of 18 tanks from the site, including industrial waste, waste oil, gasoline, diesel and fuel oil storage tanks.

Lawrence Aviation's main product currently is titanium sheet metal. These titanium sheets and other manufactured products are used in the aviation industry. The wastes generated from

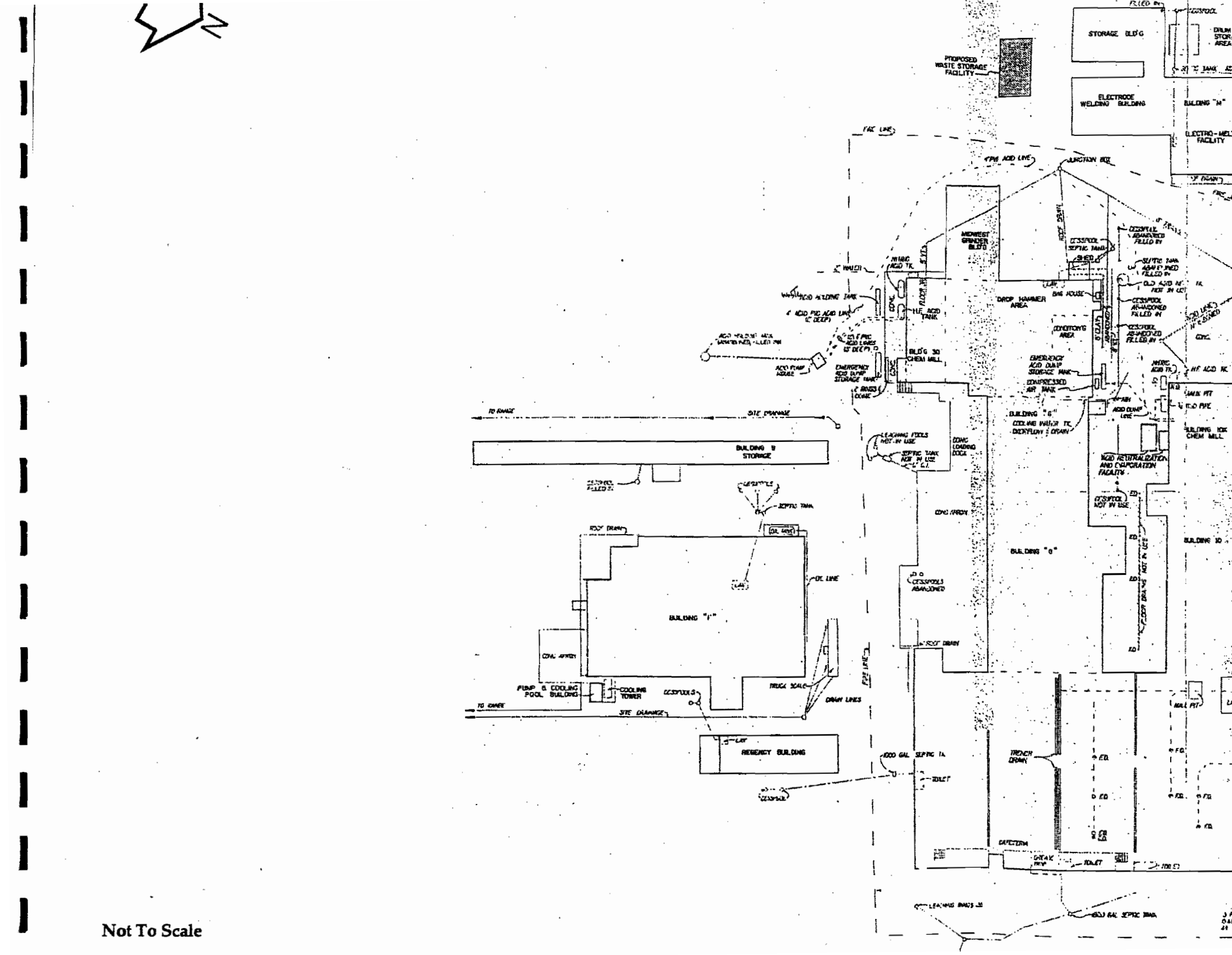


O:\KALNY\Lawrence Aviation\Figure 1-1.PM6 0897-21362\T2.DREP

MAP SOURCE: U.S.G.S., Port Jefferson, New York Quad, 1967.

Figure 1-1
Location Map
Remedial Investigation, Lawrence Aviation Site
- Port Jefferson Station, New York

CDM Camp Dresser & McKee


STORAGE BLD'G
PROPOSED WASTE STORAGE FACILITY
ELECTRODE WELDING BUILDING
BUILDING "M"
ELECTRO-MELT FACILITY
FAC LINE
4"W ACID LINE
JUNCTION BOX
MIDWEST GRINDER BLD'G
CESSPOOL SEPTIC TANK SHED
CESSPOOL ABANDONED FILLED IN
SEPTIC TANK ABANDONED FILLED IN
OLD ACID NEUT. TK.
NITRIC ACID TK.
HF ACID TK.
DROP HAMMER AREA
BAG HOUSE
CONDITION'G AREA
EMERGENCY ACID DUMP STORAGE TANK
COMPRESSED AIR TANK
BUILDING "G" COOLING WATER TK. OVERFLOW DRAIN
ACID DUMP LINE
BUILDING 10K CHEM MILL
ACID NEUTRALIZATION AND EVAPORATION FACILITY
CESSPOOL NOT IN USE
BUILDING 10
BUILDING "B" STORAGE
LEACHING TOOLS NOT IN USE
SEPTIC TANK NOT IN USE
CONC LOADING DOCK
BUILDING "F"
BUILDING "G"
CESSPOOLS ABANDONED
ROOF DRAIN
OIL LINE
PUMP & COOLING POOL BUILDING
COOLING TOWER
TRUCK SCALE
DRAIN LINES
SITE DRAINAGE
REGENCY BUILDING
1000 GAL SEPTIC TK.
TRENCH DRAIN
CAFETERIA
TOILET
MAN PIT
6000 GAL SEPTIC TANK

Not To Scale

current and past operations include fluoride compounds, sludges, caustic acids, halogenated solvents and spent lubricating oils. Past site inspections also identified leaking transformer carcasses.

The following is a summary of significant issues and identification of areas of environmental concern based on a review of available Suffolk County Department of Health Services (SCDHS) and NYSDEC records:

Investigations of the site began in 1970 when a complaint from a residential property owner was received by the Suffolk County Department of Health Services (SCDHS). The owner indicated that his property was being affected by occasional Lawrence Aviation sump overflows. The overflow liquid did not freeze in the winter months, and was harming existing plant vegetation. SCDHS proceeded to sample the Lawrence Aviation sump and determined that the contents exceeded permissible discharge limits for pH, hexavalent chromium (Cr^{+6}) and nitrates. A full inspection of site premises and processes was requested by the SCDHS at this time.

During the remainder of the 1970s, inspections performed by SCDHS and the Brookhaven Department of Environmental Protection (BDEP) of surrounding areas identified that adjacent residential wells were contaminated with fluoride, nitrates, trichloroethylene, 1,1-dichloroethylene, cis-1,2-dichloroethylene, tetrachloroethylene, and heavy metals.

On May 13, 1980, the SCDHS performed an investigation of the Lawrence Aviation site. The initial investigation was followed by aerial photography taken on May 22, 1980. Subsequent investigations were performed on June 25 and July 30, 1980 by SCDHS. SCDHS documented the results of these investigations in a memorandum which in an official affidavit. The following areas of environmental concern were identified within the affidavit:

- Various areas of the site contained an accumulation of drums. The drums were improperly stored on the ground surface. Drums in general were uncovered and damaged with liquid contents leaking onto the ground surface. Stained ground surfaces and potential burial of drums were also identified in these areas. Drums reportedly contained acid sump sludges, salt waste, perchloroethylene

(tetrachloroethylene), hydraulic oil, zyglo penetrant, solvents, whitish rectangular crystals, hydrofluoric acid, and trichloroethylene.

- Manual drum pump out operations were witnessed where drum contents were discharged directly to the ground surface.

- An evaporatory system was surrounded by a lake of liquid waste caused from an overflowing holding tank.

- Various process related effluents including quench water from titanium cutting operations, flush water from a smelter cooling system, and oily water from rolling mills, presses and fork lift maintenance areas, were discharged directly to the ground surface.

- Earthen lagoons were used to store liquid waste.

- A pile of old transformers was identified onsite. Oily liquid was visible leaking from some of the transformers.

- A leaking underground acid rinse waste tank was identified. Discarded tanks were noted to have bluish-green liquids leaking from them. Liquids had a measured pH of 1.

Related to the above environmental concerns, in the months of September, October and November 1980, SCDHS witnessed various "clean-up" activities at the site. Drums were roughly gathered with heavy machinery into piles positioned on a built up earthen area, causing liquid contents to leak onto the ground surface. Combined drum discharges caused spontaneous chemical reactions. Once piled, the drums were crushed and their liquid contents allowed to runoff the built up earthen area. The resulting drums and remaining sludges were disposed of in an out of state landfill. It was reported that 7,500 gallons of waste oils, 1,000 tons of sludges and some contaminated soil were removed from the site.

In conjunction with the SCDHS, the New York State Department of Environmental Conservation (NYSDEC), also investigated the site during the 1980s. Investigations included the preparation of a Phase I Environmental Assessment in January 1986. As documented from the SCDHS findings, the NYSDEC also identified numerous unpermitted discharges at the site, including carbon disulfide, phenols, fluoride, iron, 1,1,1 trichloroethane, toluene, and sludges. A work plan was developed as part of the Phase I investigations to collect additional field information and develop conceptual remedial design and cost estimates. Plans for field investigations included geophysical studies, monitoring well installation, and soil and aquifer sampling. However, this investigation apparently was never performed.

In February, 1987 SCDHS requested that Federal Superfund emergency provisions be made to supply the residences with safe drinking water located north (downgradient) of the site, due to the presence of trichloroethylene, tetrachloroethylene, and cis-dichloroethylene within their private well water. The plan included temporary bottled water provisions and the extension of a nearby water main. The plan was granted and implemented.

Other SCDHS and NYSDEC documentation from 1986 to present identified additional potential environmental concerns including the identification of a battery storage pile and a construction and demolition debris landfill. Two former employees of Lawrence Aviation indicated that pits existed at the site for regular disposal of degreasing solvents, lube oils and heavy equipment insulating oils. The pits were 6 to 8 feet deep and were often covered with soil to hide the contents of the pits. It was also identified that approximately 100 drums were buried about 15 feet deep at the northeast section of the plant. Another dump apparently exists on the east side of the facility buildings.

The NYSDEC Region 1 Resource Conservation and Recovery Act (RCRA) Hazardous Substance Group oversaw a major drum removal action in 1991. Between July 1991 and March 1992, 14 test wells were installed downgradient of the site by the SCDHS. The wells and nearby stream were sampled and found to be contaminated with trichloroethylene and tetrachloroethylene. NYSDEC reclassified the site in 1991 as a significant threat to the public due to the contamination of downgradient wells, a pond, and associated tidal creek.

In 1992, Lawrence Aviation filed a delisting petition which was denied for the following reasons:

- Disposal of hazardous waste had been documented by the SCDHS.
- Private water supply wells downgradient had been contaminated. The USEPA was implementing the private well Emergency Removal Action at that time.
- A pond and stream downgradient had been contaminated as confirmed by sampling done by the SCDHS.
- Monitoring wells installed downgradient of the site and sampled by the SCDHS exhibited contamination.

Additional sampling performed by SCDHS confirmed the presence of chlorinated solvents and fluoride within a downgradient pond and stream. The highest level of trichloroethane found in the pond and stream was 1,700 ppb with a guidance value of 11 ppb. The fluoride levels found in the pond and stream were not high enough to be violations, but they serve as a fingerprint for the source as no other industries in the area are known to use hydrofluoric acid. Subsequently, NYSDOH posted an advisory to alert the community of the contamination present in the surface waters and to avoid prolonged contact with these surface waters.

In January 1993, a NYSDEC memorandum requested that a State funded Interim Remedial Measure (IRM) be performed to further assess the contamination within the pond, stream and harbor. Due to shellfish harvesting within the Harbor, and human exposure to the pond, public health is a concern in these areas.

In October 1997, SCDHS identified ten additional residences with private wells downgradient of the site that were found to be impacted or potentially impacted. Tetrachloroethylene, trichloroethylene, and cis-dichloroethylene were detected in the groundwater and in some of

the private wells. These ten homes were all subsequently connected to the Suffolk County Water Authority (SCWA) distribution system between 1997 and 1999.

Due to the long history of environmental concerns associated with the site, the multiple areas of environmental concerns present and the relatively large size of the site (126 acres); a thorough - phased investigation approach was proposed, in order to obtain sufficient data to characterize the nature and extent of site contamination and to identify appropriate Interim Remedial Measures (IRMs). Additionally, data from a comprehensive RI will be needed to develop and prepare an FS for the site.

Review of NYSDEC and SCDHS records concerning the site indicates:

- A potential for buried debris including chemical drums;
- Numerous locations of outside drum storage;
- Multiple documented cases of drummed wastes (including halogenated VOCs) being discharged to the ground;
- Documented organic and inorganic contamination present within onsite leaching pools and lagoon;
- Documented contamination of private wells by halogenated VOCs located less than one mile downgradient of the site; and
- Documented surface water and groundwater contamination by halogenated VOCs up to one mile from the site.

Given the documented cases of halogenated VOCs discharges at the site, there exists a significant potential for a pure VOC release or dense non-aqueous phase liquid (DNAPL) slug migrating through the unsaturated soil and reaching the water table. Having a greater density than water, the DNAPL slug would continue moving vertically through the Upper Glacial aquifer until reaching the Smithtown Clay unit, discussed further in Section 2.5, where it may remain as a DNAPL pool on top and within the clay unit. This DNAPL pool along with any residual VOCs within the unsaturated and saturated zones will continue to be a source of significant groundwater contamination.

The Pre-Field Investigation Subtasks included a thorough literature review of documents in order to identify all known and suspected areas of contamination. A review of aerial photographs was conducted to locate drum storage areas, areas of possible filling and other potential concerns. Additionally, a site map was developed so that areas of concern and sample points could be accurately located within the site. A groundwater model was developed in order to determine groundwater flow patterns through out the 126 acre site and surrounding areas. Through particle tracking analysis, the model was used to identify potential contaminant plume migration pathways within the site which will aid in the selection of future sample locations.

The results of the literature review to identify all known and suspected areas of contamination in addition to the aerial photograph review are summarized in Table 1-1.

Based on the findings of the Pre-Field Investigation and discussions with NYSDEC, soil boring, push probe and monitoring well locations will be selected. The planned Field Investigation Subtasks and data objectives of each subtask are as follows:

- Geophysical Investigation: To locate buried objects that may be a source of soil and groundwater contamination.
- Abandoned Discharge Lagoon Investigation: To assess the nature of material used to fill site discharge lagoons and determine if soil contaminants are present.
- Push Probe Investigation: To identify soil contaminant "hot spots" within the site. Note that soil borings and monitoring well locations will be modified based on the results of the push probe investigation.
- Soil Borings and Monitoring Well Installation: To further assess soil contamination identified by the push probe investigation (at greater depths); to assess soil and groundwater quality downgradient of identified hot spots and other potential areas of concern; obtain information on site hydrogeology and; identify possible DNAPL pools within the Smithtown Clay Unit.
- Groundwater and Surface Water Sampling: Assess the extent of groundwater contamination within and downgradient of the site and the extent of surface water contamination within a potentially impacted tidal creek and pond located less than one mile downgradient of the site.

- Dry Well Investigation: Assess if onsite drywells, leaching pools and septic systems are sources of soil and groundwater contamination.

Table 1-1
Potential Sources of Contamination on Lawrence Aviation Industries Site

Lawrence Aviation Industries Remedial Investigation
NYSDEC Site #1-52-016

Potential Contaminant Source	Regulatory Records NYSDEC/SCDHS	Documents Regarding Ex-Employee Statements	Aerial Photographs	Interview of Ex-SCDHS Officials and Local Residents
1) 1980 Drum Processing Areas	Over 10,000 drums containing various waste oils, sludges, and solvents crushed onsite to remove liquids. Drum liquids allowed to drain onto soil, sampling identified liquids with pHs ranging from 1 to 12. Possibly as many as 35 solvent drums crushed.	Confirmed drum disposal operations. Possibly buried drums.	1976, 1978 and 1980 Aerials show increase in outside drum storage. Areas of actual drum crushing identified in 1980 photo. Aerials show extensive staining of surface soils within area.	Eyewitness of drum crushing identified locations (two). Suspects solvent drums crushed at western location.
2) Southwest Melt Shop, Building M	Identified two hose discharges from back of building - 9/23/80 Sampled Discharge - PCE = 96,000 ppb; TCE = 22,000 ppb. Septic System sampled - 10/3/80 PCE=4,300ppb; TCE = 350 ppb Contaminant Soil Removed from Site on 10/29/84	Disposal Pit located in SW corner of site used to dump waste oils and solvents, possibly PCBs.	Photos show extensive drum storage and soil staining behind building. 1976/78 photos show trench with drainage channels behind SW building. Photos show extensive staining and spillage around front and back entrances.	Eyewitness - sampled 6" hose by door, 2 discharge hoses; one from back door, 2nd off of cooling tower. Resident confirms witnessing disposal of drums within the area.
3) Drum Spearing Operations - South end of Building 10X	Sampled liquid from back of building 10X - 2 layers - Top Layer - TCE = 1.6x10^6 ppb, Bottom Layer = TCE = 1.3x10^9ppb. Eyewitness spearing of TCE drums with forklift.	None.	Oblique aerial from 1981? Shows a shallow pit with drums and staining within bottom, located approx. 160-ft south of Bldg. 10X. Photos show extensive staining and spillage around entrance of building.	SCDHS observed drum spearing of TCE drums within shallow pit. Stated fork-lift operator informed him that on average 15 drums of solvent were "disposed" of in this manner every week.
4) Discharge Lagoons - North and South Lagoons	Lagoons periodically overflowed onto adjoining property (west). 1972 -1978 Sampled periodically by SCDHS during this time frame. Elevated levels of pH, nitrates, fluoride, hexavalent chromium, Trace VOCs. Hose discharges oily water to North Lagoon.	None.	North Lagoon present in 1962 aerial photo, no south lagoon. One large lagoon shown in 1973 photo. North /South Lagoons separated by berm in 1976 photo. 1978 photo breached north lagoon draining west into adjacent property. 1988 - lagoons are not present. Oblique aerials (1981) show a milky white substance, low level drum within north lagoon.	SCDHS observed hose discharges to North Lagoon consisting of oily water.

Table 1-1
Potential Sources of Contamination on Lawrence Aviation Industries Site

Lawrence Aviation Industries Remedial Investigation
NYSDEC Site #1-52-016

Potential Contaminant Source	Regulatory Records NYSDEC/SCDHS	Documents Regarding Ex-Employee Statements	Aerial Photographs	Interview of Ex-SCDHS Officials and Local Residents
5) Fill Areas: No. 1 - SW Corner of Site Near Melt Shop. No. 2 - SE Area, Adjacent to Turkey Coop. No. 3-Eastern Edge of Woodland. No.4 -Northern Border of Site	None.	Two ex-employees confirmed presence of disposal pits in No.1 and No. 3. One ex-employees witnessed in excess of 100 drums buried in eastern portion of No. 3. One ex-employee noted dump in No.4.	Aerial photos (1973-80) clearly show cutting and filling operations within areas No. 1, 3 and 4.	Eyewitness observed buried drums along southern edge of Turkey Coop, also stated that leaching pools for acid waste were located east of Bldg. 30, all located in Area No. 2.
6) Acid Wastes from Building 40 - Chemical Mill Operations	Records document chronic overflowing and spillage of waste acids. 1975 inspection notes open trench east of Bldg. 30 where "extremely toxic wastes" were discharged. Samples identified low pH, nitrogen, Fluoride, COD but no VOCs.	None.	Documents chronic spillage and staining on ground east of Bldg. 30.	None.
7) Waste Storage Building	Constructed in early 1980s.	None.	Documents area as being a long-term, outside drum storage area.	None.
8) Acid Holding Tanks. Evaporator - Building 10X	Records document chronic overflowing of waste water evaporator onto ground. Clean soil periodically spread over area.	None.	Documents spillage and staining within area.	None.
9) Outside Drum Storage Areas	Numerous outside drum storage areas with leaking drums and stained soil.	Indicates some drums were buried onsite	Documents drum storage areas	None.
10) Old Laboratory Cesspool	Sample records identified MIBK = 140 ppb (06/08/83). Carbon Tet. 4,500 ppb (6/18/83).	None.	None.	None.
11) Old Motor Pool	Sampled Machine shop septic (05/22/88): toluene = 53 ppb; p. ethyl = 130 ppb, Trimeth benzene = 470 ppb	None.	None.	Noted Building full of drums in 1980, had floor drain, drain smelled of solvents. Suspected that floor drain discharged to North Lagoon.
12) Transformers	July 13, 1990 NYSDEC memo notes six leaking transformers on loading dock.	None.	Identifies four areas of transformers.	None.
13) Other Septic Systems	SCDHS Sampling identified low level contamination within septic systems for Regency Bldg. And "Bldg. F".	None.	None.	None.
14) Fuel Oil Storage	None.	None.	Heavy Staining noted around fuel oil AST located west of Bldg. 10X.	None.

Section 2
Existing Conditions

Existing physical conditions and environmental setting at the Lawrence Aviation Industries site are discussed in Section 2. The surrounding demographics are presented as well as the local meteorology, topography, geology and hydrogeology.

2.1 Surrounding Demographics

The Lawrence Aviation Industries site is located in the Village of Port Jefferson Station in the Town of Brookhaven, Suffolk County, New York.

According to the Census of Population and Housing (1990), the population in the Village of Port Jefferson Station was 7,232. In the last ten years the area has undergone significant growth.

The population of the Village of Port Jefferson was approximately 7,471 in 1990. Overall the area has experienced significant expansion in the last 10 years as the population sprawl continues eastward through Long Island from Nassau County and New York City.

2.2 Meteorology

The climate of New York State is the humid continental type with cold winters and warm summers. In the eastern region of Long Island where the Lawrence Aviation Industries Site is located, the periods of snow during the winter months is moderate.

The average annual temperature for the study area between 1949 through 1999 was approximately 50 degrees Fahrenheit (source : Brookhaven National Labs). The warmest month of the year is July, with an average daily temperature of 72 degrees F. January is typically the coldest month, averaging a daily temperature of 29 degrees F.

The reported average annual total precipitation is approximately 48 inches, with average monthly rainfall ranging from a minimum of 3.2 inches in July, to a maximum 4.8 inches in March. Precipitation throughout the year is therefore, fairly consistent.

Average annual snowfall is approximately 30-inches. Almost ninety-five percent of the snowfall occurs in the months December through March.

2.3 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.

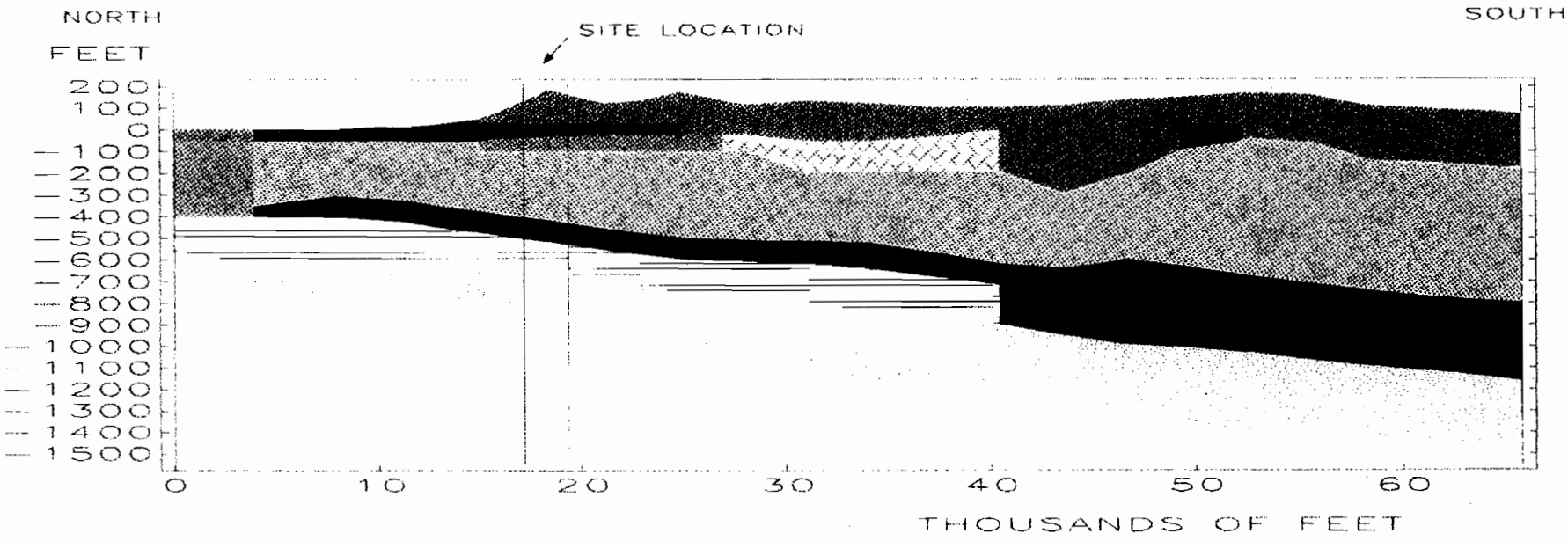
The Lawrence Aviation site lies just south of the Harbor Hill moraine, on a local plateau. Immediately north of the site is a high point, reaching an elevation of 271 feet msl. From this location north, topography drops over 200 within 1,000 horizontal feet, then gradually transitions to sea level (Port Jefferson Harbor).

The site is relatively hilly, with rolling hills and valleys, compared to the topography to the west and south, which is predominately flat. Ground surface elevations on-site range from approximately 190 feet above mean sea level (msl) to 250 feet msl.

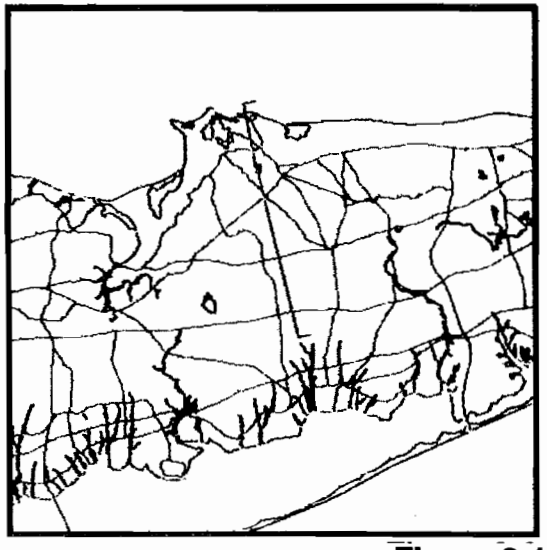
2.4 Geology and Hydrogeology

2.4.1 Geology

Figure 2-1 is a regional cross section through the central portion of Suffolk County. Sediments immediately underlying the site are Pleistocene aged glacial outwash



CROSS SECTION EE



MATERIALS CROSS-SECTION EE

- RON TRM MORAINE
- RARITAN CLAY
- REW MAGOTHY 60
- UPPER GLACIAL 185
- SMITHTOWN CLAY
- HH GRD MORAINE
- UPPER MAGOTHY 65
- MIDDLE MAGOTHY 65
- BASAL MAGOTHY 125
- UPPER GLACIAL 250
- REWORKED MAGOTHY
- RARITAN CLAY NORTH
- LLOYD AQUIFER

Figure 2-1
Geologic Cross Section
Remedial Investigation, Lawrence Aviation Site
- Port Jefferson Station, New York

consisting of stratified sands and gravels. The glacial outwash sediments at the site range in thickness from 160 to 230 feet and are very permeable.

A local clay unit, the Smithtown clay lies directly underneath the outwash deposits. The Smithtown clay is an extensive lacustrine unit that lies within the glacial deposits between the Harbor Hill and Ronkonkoma moraines. The Smithtown Clay is estimated to vary in thickness beneath the site from approximately 10 feet at the northeastern corner, to just over 100 feet at the southeast portion.

Beneath this confining unit are Cretaceous sediments. The Cretaceous consists of the younger Magothy formation and the older Raritan formation. The Magothy is composed of 300 to 400 feet thick, moderate to highly permeable, fine to medium sand. Coarse sand or sandy clay lenses are also present. North of the Ronkonkoma moraine, the upper portion of the Magothy shows evidence of being reworked and redeposited, especially in the Smithtown and western Brookhaven area. The Raritan formation includes the Raritan clay an 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 underlying Lloyd sand unit consists of fine to coarse sand and gravel. The Lloyd sand has a moderate permeability and is nearly 150 thick.

The bedrock which underlies Long Island consists of precambrian crystalline rock, including nica schist, gneiss and granite. The bedrock has minor water-bearing fractures and is relatively impermeable. The bedrock depth is approximately 1,000 feet at the Lawrence Aviation site.

2.4.2 Hydrogeology

As shown in Figure 2-1, there are three water-producing aquifers, the Upper Glacial, the Magothy, and the Lloyd. The bedrock is considered the lower limit of the aquifer due to its relative impermeability.

The Upper Glacial is the most significant water-bearing unit at the site. Boring logs from nearby offsite borings and well installations indicate that sediments are typically

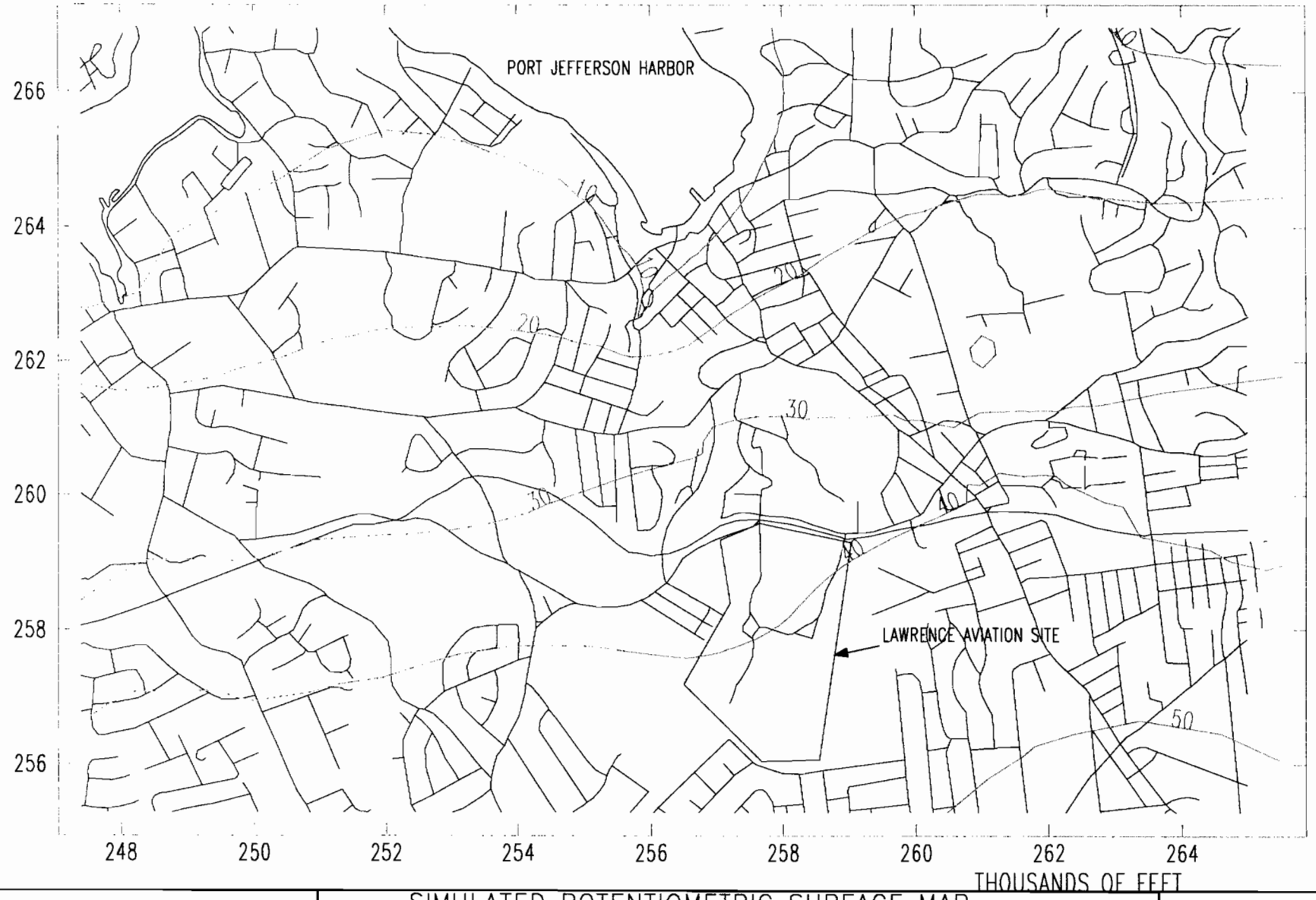
brown-tan-orange fine to coarse sands with some gravel and pebbles. This is typical sediment of the Upper Glacial aquifer.

In the vicinity of the site, the water table resides in the Upper Glacial aquifer. Depth to water at the site is expected to range from approximately 145 to 165 feet below ground surface. The Upper Glacial is unconfined and is recharged primarily by infiltration of precipitation. Recharge varies by season, but is approximately one-half of total precipitation, or 22 inches per year.

Groundwater in the Upper Glacial aquifer flows north from the site, and discharges to Port Jefferson Harbor. The site groundwater flow model (see Section 4.3.1) was used to generate a potentiometric surface map of groundwater in the Upper Glacial as shown in Figure 2-2. Because the water table generally lies just above the Smithtown Clay – Upper Glacial interface, variations in this interface cause localized northwesterly groundwater flow patterns near the site. This is illustrated in the simulated groundwater flow vectors shown in Figure 2-3. Note that areas where the groundwater surface dips below the bottom of the Upper Glacial aquifer, as depicted in the model, are represented by the lack of flow vectors.

The Magothy formation is composed of slightly less permeable sands with intermittent clay layers. Nearby public supply wells are screened in the upper, middle and basal portions of the Magothy, and below the Smithtown Clay, where present. Outside of localized influences, pumping from these wells does not significantly effect regional groundwater flow.

The Lloyd formation is separated from the Magothy aquifer by the impermeable Raritan clay. The Lloyd is located approximately 850 feet below ground surface at the site and is considered a confined aquifer. Recharge to the Lloyd comes from infiltration through the Raritan clay, predominately in the center of the island. SCDHS monitoring wells located approximately 1.25 miles southeast of the site



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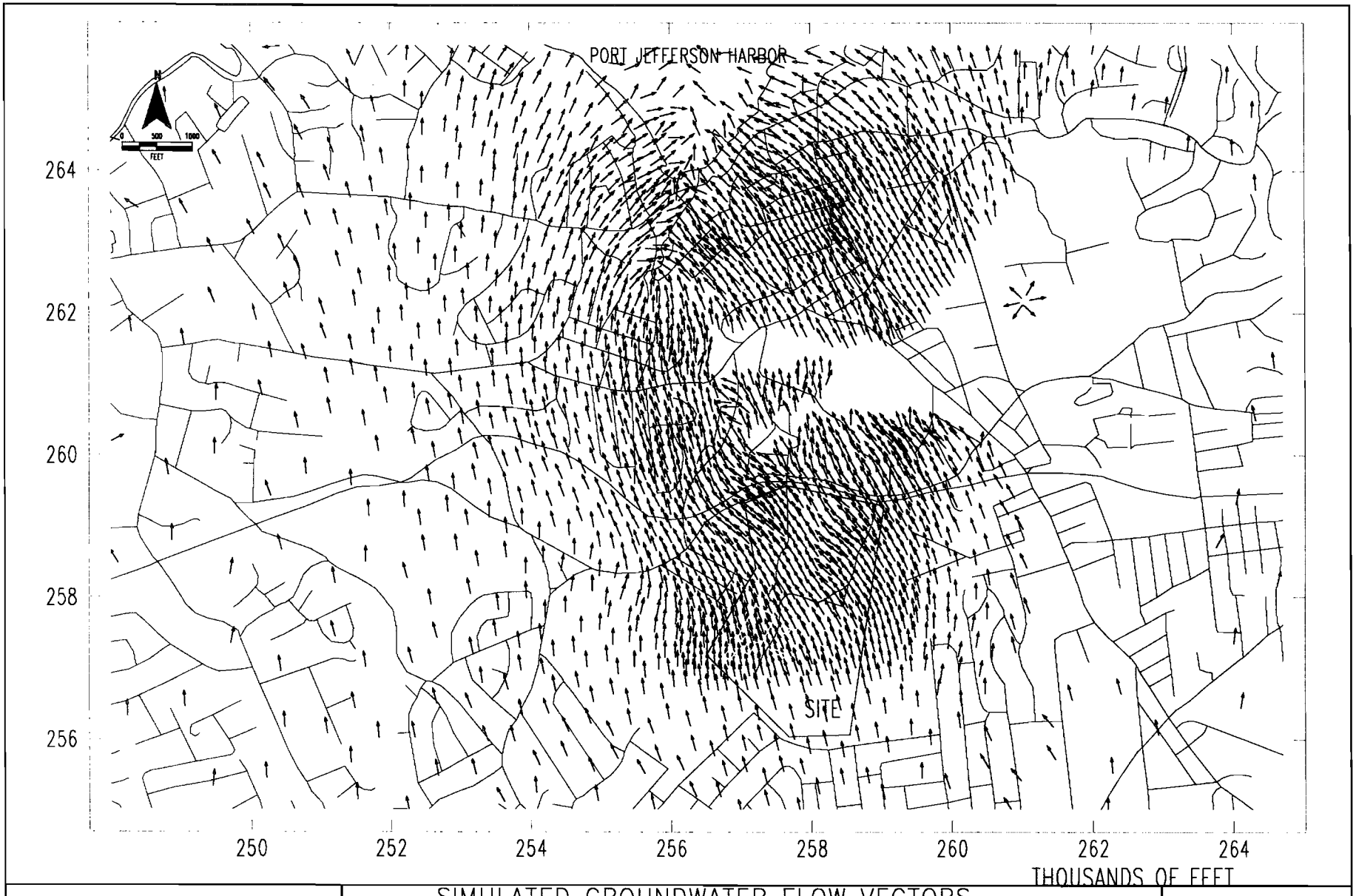
SIMULATED POTENTIOMETRIC SURFACE MAP OF THE UPPER GLACIAL AQUIFER (MARCH 1994)

LAWRENCE AVIATION SITE GROUNDWATER MODEL

FIGURE 2-2



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SIMULATED GROUNDWATER FLOW VECTORS
OF THE UPPER GLACIAL AQUIFER (MARCH 1994)

LAWRENCE AVIATION SITE GROUNDWATER MODEL

FIGURE
2-3

indicate a downward vertical gradient between the Magothy and Lloyd aquifers of 0.007 ft/ft.

Groundwater flow velocity (ft/day) within the Upper Glacial aquifer at, and downgradient of the site was calculated using a horizontal hydraulic gradient of 0.008 ft/ft; an average hydraulic conductivity of 185 ft/day in the upper glacial and 100 ft/day in the Harbor Hill ground moraine; and an estimated sediment porosity of 20%, which is typical for a mixture of sand and small gravels. The horizontal gradient was based on the difference in the water table elevation at the northern edge of the site and at Port Jefferson Harbor (the presumed discharge point for area groundwater). Groundwater velocity was estimated using a modified form of Darcy's Law, which governs flow through porous media. The modified form is:

$$V = (K * I) / n$$

where,

V = groundwater velocity
I = hydraulic gradient
K = hydraulic conductivity
n = aquifer porosity

Using this method, horizontal groundwater velocity in the glacial outwash sediments was estimated to be 5.7 ft/day. Note that the calculated groundwater velocity is a very rough estimate of the groundwater flow over distance of approximately 4,500 feet, in this instance. Due to the complex nature of site stratigraphy, groundwater velocities are likely to vary greatly.

Section 3
Study Area Investigations

The following section describes the Preliminary RI activities designed to meet the objectives of the project, as discussed in Section 1 of this report, and includes the results of the field activities conducted at and around the Lawrence Aviation Industries (LAI) site between September 1997 and April 2000 by CDM and its subcontractors. These activities include:

- Surface Water Sampling
- Drum Investigations
- Soil Boring and Surface/Shallow Subsurface Sampling
- Monitoring Well Installation
- Ground Water Sampling

All work was performed in accordance to the NYSDEC-approved RI/FS Work Plan and Site Operations Plan (CDM, 1997a; 1997b), except where noted for an individual task.

3.1 Surface Water Sampling

Although not performed as part of this Preliminary Remedial Investigation, surface water samples were collected from an unnamed stream and pond directly downgradient of the Lawrence Aviation Industries Site from December 1991 through May 1992. The approximate sampling locations in relation to the site are shown in Figure 3-1, which is contained in the back pocket.

Surface water samples were collected at six locations during the 1991/92 sampling effort. The locations included one from Brook Road Pond west of the site and five locations along the unnamed stream (all of which are downgradient of LAI). The surface water samples were analyzed for VOCs and other water quality parameters including pH, fluoride and nitrates.

Trichloroethene (TCE) was present in all of the samples collected from the unnamed stream. TCE levels were detected at a minimum of 400 to a maximum of 1200 parts per billion. SPJ1, the most downgradient sampling point and SPJ3, locations of the spillway, both had TCE levels as high as 1200 ppb. Current NYSDEC standards for Class GA water for TCE is 5 ppb. In addition to TCE, tetrachloroethene and 1, 2 Dichloroethene were detected, although at lower concentrations.

As part of the 1997 CDM work plan, the originally proposed surface water sampling effort included up to two rounds of sampling. Surface water samples were to be collected from this unnamed tidal creek and associated ponds running through Port Jefferson Village. Up to eight different locations were to be sampled. Because the stream is tidally influenced it was important that the samples be collected during the period just before mean low tide when groundwater recharge would be greatest.

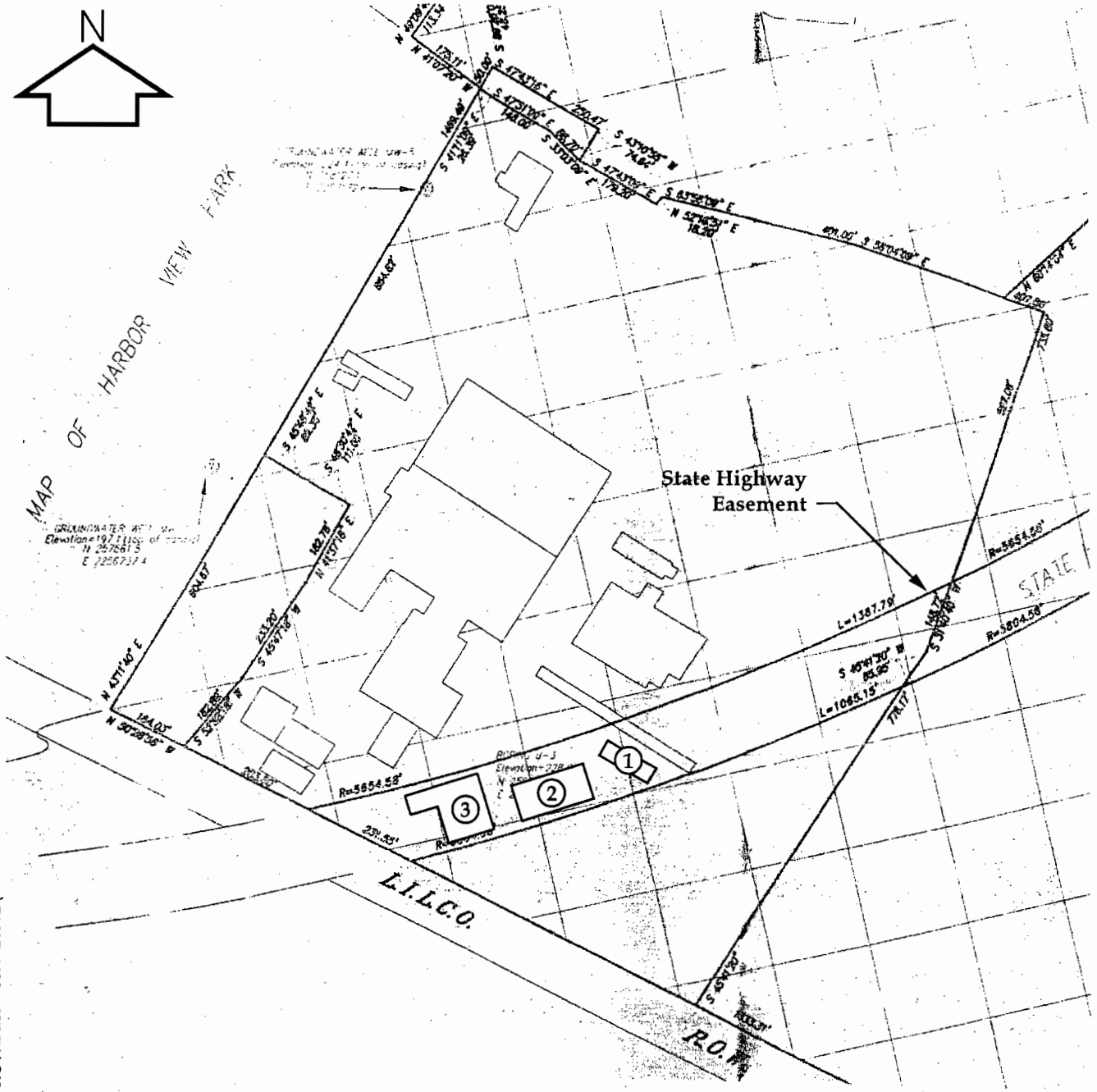
3.2 Drum Investigations

Based upon preliminary site observations of exposed drums, limited information on past disposal practices, and interviews with former employees, it was believed that hot spots of contamination (buried drums) might exist on the site. As part of the Preliminary RI outlined in the Work Plan (CDM 1997), a geophysical investigation was to be performed on up to 8 acres of the site property. Due to site restrictions the geophysical investigation was confined to that land within the New York State Highway easement as shown in Figure 3-2.

Three areas were staked out on the easement property south of building No. 9. The description of these areas is as follows:

Area 1: Adjacent to the south foundation of building No. 9. The dimensions of this area are 100-ft by 20-ft. The parcel was 20-ft wide in the north/south direction.

Area 2: South of Area 1 along the easement, the dimensions of this area are 100-ft by 170-ft.



O:\KALNY\Lawrence Aviation\Lilco ROW.PM6 0897-21362\T2.DREP

KEY:

① - Geophysics Investigation

Not To Scale

SOURCE: Hawkins Webb Jaeger Assoc. P.C., May 1998.

Figure 3.2
Location Of Lilco R.O.W. And NYS Highway Easement
Remedial Investigation, Lawrence Aviation Site
- Port Jefferson Station, New York

CDM Camp Dresser & McKee

Area 3: South of Area 2, this parcel is an L-shaped area with approximate dimensions of 130-ft in the north/south direction and 120-ft in the east/west direction.

The geophysical investigation, performed in August 1997, consisted of four types of tests or investigations: a magnetic survey, two types of terrain conductivity tests and seven ground penetrating radar (GPR) profiles. The GPR profiles were performed in areas selected from the results of the terrain conductivity tests.

The results of the field magnetic test, performed on all three areas, were highly erratic. The erratic results are due to an abundance of metal debris within the shallow subsurface. The data were unreliable and uninterpretable.

Results from the terrain conductivity tests, an instrument that is less sensitive to near surface metal objects are indicative of buried metal. Although Area 1 results indicate negative anomalies (presence of buried metal), these anomalies were most likely the result of the proximity of the metal storage building (Building No. 9).

The data collected from Areas 2 and 3 exhibited anomalies that were indicative of buried metal; possibly drums. Although it is also possible that these anomalies represent buried metal scrap. The latter may be more likely since GPR follow-up on Areas 2 and 3, performed along several lines crossing the anomalies, provided no evidence which would indicate buried drums. Based on the results from the three areas surveyed, it does not appear that a large "cash" of buried drums exists within the surveyed areas.

3.3 Subsurface Soil Testing (Soil Borings)

The objectives of the soil boring program were to (1) further investigate suspected areas of contamination identified during the pre-field investigations; (2) characterize native soils in and around the site; and (3) select locations for subsequent placement of monitoring wells.

The Work Plan called for (up to) 12 shallow borings to be completed using hollow stem augering drilling method up to a maximum depth of 195-feet. Soil samples were to be collected at 5-ft intervals and be field screened using a portable GC for VOCs. Upon reaching the water table, a groundwater sample was to be collected from each boring using the Hydropunch sample method. All groundwater (12) and soil (24) samples were to be analyzed for VOCs and conventional parameters.

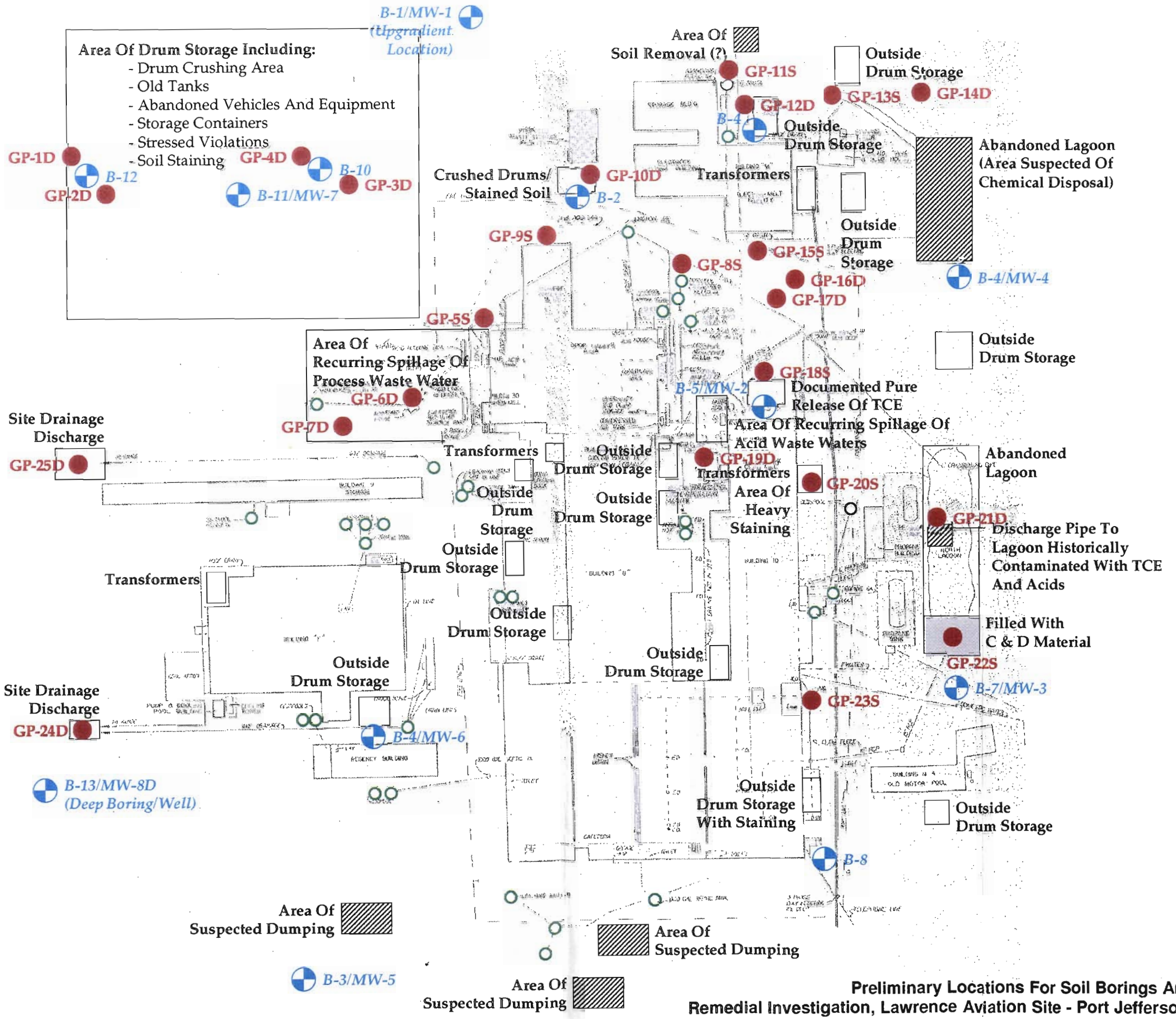
Seven of the twelve shallow borings were scheduled to be converted to on-site monitoring wells. Due to site restrictions no onsite borings or wells could be installed. The proposed locations, based on pre-field investigations, are shown in Figure 3-3.

Additionally one deep boring was proposed for the site. The boring, B-13, was to be located between the north and south lagoon on the western edge of the property downgradient of the acid holding tanks and most LAI production activities. The deep boring, scheduled for a depth of 300-ft, would serve to characterize the site geology. Upon completion, this boring was to be converted to a deep monitoring well.

3.3.1 Boring Installation

Only one soil boring was installed as part of this Preliminary Remedial Investigation. Boring B-3 was installed on the LAI site, but was restricted to the NYS highway easement. The location of the Boring B-3 is shown previously in Figure 3-1. The soil boring was installed in a location that would allow a basic assessment of the characterization of subsurface soil on the LAI site. Although installed in the location of past open drum storage and potentially a drum burial area, boring B-3 is located in the upgradient region of the site. As previously discussed, the groundwater flow within the upper glacial aquifer is from south to north in this general area.

During installation of the soil borings, samples were obtained near the surface, 4-6 ft below ground surface (bgs), and just before the encountering groundwater (188-190 ft bgs). The groundwater level was at 191-ft bgs. The screen was set at 195-ft bgs.



CDM Camp Dresser & McKee

Figure 3-3
Preliminary Locations For Soil Borings And Monitoring Wells
Remedial Investigation, Lawrence Aviation Site - Port Jefferson Station, New York

Soil samples were field-screened for VOCs at selected intervals during the installation of boring B-3. No "hits" were recorded from the field observations. The two soil samples sent to the contract laboratory were analyzed for VOCs, SVOCs, metals and pesticides.

Concentrations of VOC s were not detected at these locations during the soil boring activities (Nov. 1997). There were no semi-volatile concentrations detected at levels exceeding the NYSDEC Recommended Soil Cleanup Standard either. Metal concentrations were also below soil cleanup criteria and are probably typical of background conditions for a soil in Port Jefferson. Heavy metal concentrations (cadmium, chromium, lead, mercury, manganese, zinc) were present at low to undetectable concentrations. Both soil samples also showed there were no pesticides at detectable concentrations.

3.3.2 Push Probe Investigation

The Work Plan (CDM, 1997) originally planned on collecting soil samples at up to twenty-five (25) locations within the LAI site using the push probe (or geoprobe) soil sampling technology. The location of each sample point was determined from the pre-field investigations. The originally scheduled locations for the geoprobes are as shown previously in Figure 3-3.

Of the twenty-five geoprobes proposed, ten were to be shallow (15-ft in depth). The other fifteen geoprobes were to be 40-ft in depth. Soil samples were to be collected continuously at four-foot intervals and screened for presence of VOCs using a photo ionization detector (PID). Up to 20 samples were to be analyzed for TCL Volatiles at the contract laboratory to verify the field results. An additional 20 samples were to be selected for full TCL/TAL parameters.

Only 3 geoprobes were actually performed. The geoprobe locations (GP-23D, GP-24D and GP-25D) although not surveyed, were in the vicinity of Boring B-3, in the area where drum crushing was documented to occur (south of Bldg. No. 9).

The geoprobe investigation began at GP-24D where a sample was collected from the 0-4ft depth. This sample, a silty brown-black sand and clay, with some stones, was moist. The PID indicated

that there were no VOCs present at this level. Samples were collected and monitored for VOCs at 4-ft intervals to a depth of 30-ft. At this point, due to a lack of VOCs as indicated by the field PID, this borehole investigation was abandoned.

Approximately 85-ft southwest of GP-24D, the next geoprobe site, GP-23D, was selected. The 0-4 ft sample was collected, a silty-brown sand which was hard to loose, for observation with the field PID. The field PID indicated a maximum reading of 7.6 ppm with a steady reading of 5 ppm at the 3-4 ft interval, a hard silty black clay. This sample was collected for contract laboratory analysis. The sampling and monitoring efforts were continued at 4-ft intervals. No further samples were collected and sent to the contract laboratory.

The final geoprobe location, GP-25D proved to be too difficult due to rock conditions 10-12 ft below the ground surface. Initial surface samples were collected and screened with the PID. No VOCs were detected at 0-4 ft, 4-8 ft or 8-12 ft. Further advancement of the probe proved too difficult so another location was selected with similar results.

Two samples from GP-23D and GP-24D (one each) were collected from the 3-4 ft interval and sent to the contract laboratory. Samples were analyzed for full TCL/TAL and titanium. Detectable concentrations of VOCs and SVOCs were not found upon further analysis of these two soil samples.

3.4 Monitoring Well Installation

Scheduled drilling efforts, as per Work Plan (CDM, 1997), included the installation of seven shallow on-site monitoring wells. Shallow monitoring wells were estimated to have an average depth of 190-200 ft.

CDM supervised the installation of three shallow monitoring wells into the subsurface soil borings off-site. All wells were installed in accordance with the NYSDEC-approved work plan (CDM,

1997). Monitoring well construction diagrams and well logs are provided in Appendix A, and details are provided in Table 3-1.

3.4.1 Well Installation

Prior to initiating drilling activities, and between each well, all drilling equipment was pressure-washed in the field. The three shallow (maximum depth to 200-ft) water table wells were drilled using the hollow-stem auger method (using 9.625-inch I.D. augers).

Upon reaching the desired depths, 4-inch ID by 15-foot long, prepacked stainless steel well screens surrounded by Morie Number #1 sand, and 4-inch ID PVC risers were installed. For each of these wells, a continuous filter-pack in each borehole was installed consisting of Morie #1 sand around each screen. The filter pack was installed by pouring from grade along the outside of the riser pipe, while gradually backing out the augers flights as the sand was placed. The filter packs extend from two-feet beneath the screen to four-feet (five-feet for MW-5, a deeper well) above the top of the well screen. Two feet (three feet for MW-5) of bentonite pellets were installed above the filter pack. The pure bentonite grout was then mixed and tremied to the surface.

A flush mount-valve box was installed at monitoring well MW-1. The inner casing caps were locked and marked with an identification number and secured with a padlock. Steel-stickup valve boxes were used for monitoring wells MW-4 and 5. A 2-ft stickup was used for MW-4 and a 3-ft stickup box was used for MW-5.

3.4.2 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 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 upper glacial formation.

Table 3-1
Well Construction Summary

Lawrence Aviation Industries
NYSDEC Site # 1-52-016
Remedial Investigation

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-1	Katherine and Washington	Monitor	9.625"auger 4" casing	N/A	6.25"/150'	150'	PVC	4"	15'	.10"	146'-131'	Morie #1 / 148'-127'	Bentonite slurry / 127'-125'	Bentonite / 125'-surface	Steel flush-mount
MW-4	Rear of Chip-It-All Property	Monitor	9.625"auger 4" casing	N/A	6.25"/180'	180'	PVC	4"	15'	.10"	178'-163'	Morie #1 / 180'-159'	Bentonite slurry / 159'-157'	Bentonite / 157'-surface	Steel Stickup (2-ft.)
MW-5	End of Park Ave.	Monitor	9.625"auger 4" casing	N/A	6.25"/200'	200'	PVC	4"	15'	.10"	195'-180'	Morie #1 / 197'-185'	Bentonite slurry / 185'-182'	Bentonite / 182'-surface	Steel Stickup (3-ft.)

Each of the three newly installed monitoring wells was developed. The wells were surged and purged using a decontaminated submersible pump. Reversals or surges in flow were accomplished by periodically shutting the pump off and allowing a "backwashing" to occur. Turbidity of groundwater during 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.

3.5 Groundwater Sampling

Five monitoring wells, including the three new wells (MW-1, MW-4, MW-5) and two Suffolk County wells (PJ-6, PJ-11) were sampled to determine groundwater quality upgradient and downgradient of the site. In addition a hydropunch sample was collected from boring B-3. Samples were typically (although not all locations were sampled for all constituents) sampled for VOCs, SVOCs, metals including titanium, pesticides and inorganics including fluoride (hydrofluoric acid is used at the LAI site) and hexavalent chromium. Two rounds of groundwater samples were collected at MW-1, MW-4 and MW-5. One round of groundwater samples was collected at PJ-6 (immediately downgradient of the LAI site), PJ-11 (downgradient), and boring B-3. The location of these wells is shown in Figure 3-1

Prior to well evacuation, the water level and total depth of the well were measured to calculate the volume to be purged. In the MW wells dedicated decontaminated submersible pumps and attached polyethylene hose sections were lowered to approximately one-foot above the screen. Pump flow rates and start/end times were recorded.

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

Dedicated disposable sampling bailers were used to collect the groundwater samples. Samples were collected as per NYSDEC approved SOP/QAPP (CDM, 1997). Field blanks, trip blanks, duplicates and matrix-spike/matrix-spike duplicates were collected in order to achieve sample Q/A requirements for this amended Preliminary RI. Chain of custody reports were completed for each sample cooler shipment. H2M Labs, Inc. provided sample transport and analytical services.

Locations and rationales for monitoring well placement were based on pre-field investigations as previously described. MW-1, installed upgradient of the LAI site, is located at the intersection of Katherine St. and Washington St. The total depth of this well is 150-ft. This well was sampled for VOCs, SVOCs, metals, pesticides and inorganics. This well was sampled to provide a reasonable estimate of what background conditions at the Lawrence Aviation Industries Site are likely to be. Detectable concentrations of VOCs or SVOCs at this location would potentially contribute to possible downgradient contamination at the site.

There were no detectable concentrations of VOCs in either Round 1 (December, 1997) or Round 2 March, 2000) at monitoring well MW-1. This indicates that the potential for an upgradient source of VOC contamination affecting the LAI site is unlikely.

Section 4
Nature and Extent of Contamination

This section discusses the nature and distribution of organic and inorganic constituents associated with the Lawrence Aviation Industries site. Both the Round 1 (Oct/Nov/Dec 1997) and Round 2 (March 2000) data sets are used for this evaluation. To aid future risk management decisions regarding the need to remediate the LAI 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 in and around the LAI 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 Lawrence Aviation Industries 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; rev 4/95.

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 Surface Water

The following section presents the results of the surface water samples collected from the unnamed stream and Brook Road pond west and north (downgradient) of the LAI site. The location of these surface water samples, collected by SCDOH in 1991 and 1992, was discussed in Section 3. Analytical results obtained from this sampling event will be discussed briefly in this section.

Trichloroethene (TCE), a chlorinated solvent frequently used at the LAI site, was detected in the stream at concentrations as high as 1,200 micrograms per liter (ug/l = parts per billion (ppb)). The NYSDEC Standard for Class GA water is 5 ug/l. The level present in 1992, collected at three different sample points, was over 200 times the NYSDEC criteria. In addition to TCE, other chlorinated VOCs were detected in the stream downgradient from the LAI site. 1,1,1 trichlorethene, tetrachloroethene and 1,2 dichloroethene were detected, although at much lower concentrations, in the unnamed stream.

In addition to the chlorinated VOCs, fluoride was also sampled and detected within the pond and stream. Fluoride concentrations detected during this sampling period were less than 1 milligram per liter (mg/l) for all sampling points. Fluoride acts as a tracer for contamination from the LAI site since they are the only major industrial user in the area that uses this acid (hydrofluoric acid).

4.2 Soil Quality

The following section presents the results for the limited subsurface soil samples collected in boreholes, during the installation of Boring B-3 and during the push probe investigation. The analytical results of these samples are summarized in Tables 4-1 through Table 4-4.

Table 4-1
Volatile Organic Compounds in Soil - Data Summary
Lawrence Aviation Industries Remedial Investigation
NYSDEC Site #1-52-016

Sample ID		*GP23D*	*Q*	*GP24D*	*Q*	*B-3*	*Q*	*B-3*	*Q*	*FB (ug/L)*	*Q*
Date		*09/24/97*		*09/24/97*		*12/01/97*		*12/03/97*		*09/24/97*	
Depth(feet)		3-4 ft		3-4 ft		4-6 ft		188-190 ft		-	
Volatiles - (ug/kg)	NYSDEC Recommended Cleanup Guideline										
Chloromethane	NS	12	U	11	U	11	U	11	U	10	U
Bromomethane	NS	12	U	11	U	11	U	11	U	10	U
Vinyl chloride	200	12	U	11	U	11	U	11	U	10	U
Chloroethane	1900	12	U	11	U	11	U	11	U	10	U
Methylene chloride	100	12	U	11	U	10	U	10	U	10	U
Acetone	200	70		57		40	U	10	U	10	U
Carbon Disulfide	2700	12	U	11	U	10	U	11	U	10	U
1,1-Dichloroethene	NS	12	U	11	U	11	U	11	U	10	U
1,1-Dichloroethane	200	12	U	11	U	11	U	11	U	10	U
1,2-Dichloroethene (Total)	NS	8	J	11	U	11	U	11	U	10	U
2-Butanone	300	12	U	26		5	J	11	U	10	U
Chloroform	300	12	U	11	U	11	U	11	U	10	U
1,2-Dichloroethane	100	19		11	U	11	U	11	U	10	U
1,1,1-Trichloroethane	800	12	U	11	U	11	U	11	U	10	U
Carbon tetrachloride	600	12	U	11	U	11	U	11	U	10	U
Bromodichloromethane	NS	12	U	11	U	11	U	11	U	10	U
1,2-Dichloropropane	NS	12	U	11	U	11	U	11	U	10	U
cis-1,3-Dichloropropene	NS	12	U	11	U	11	U	11	U	10	U
Trichloroethene	700	12	U	11	U	11	U	11	U	10	U
Benzene	60	12	U	11	U	11	U	11	U	10	U
Dibromochloromethane	NS	12	U	11	U	11	U	11	U	10	U
trans-1,3-Dichloropropene	NS	12	U	11	U	11	U	11	U	10	U
1,1,2-Trichloroethane	NS	12	U	11	U	11	U	11	U	10	U
Bromoform	NS	12	U	11	U	11	U	11	U	10	U
4-Methyl-2-pentanone	1000	12	U	11	U	11	U	11	U	10	U
2-Hexanone	NS	12	U	11	U	11	U	11	U	10	U
Tetrachloroethene	1400	12	U	11	U	11	U	11	U	10	U
1,1,2,2-Tetrachloroethane	600	12	U	11	U	11	U	11	U	10	U
Toluene	1500	12	U	11	U	11	U	11	U	10	U
Chlorobenzene	1700	12	U	11	U	11	U	11	U	10	U
Ethylbenzene	5500	2	J	11	U	11	U	11	U	10	U
Styrene	NS	12	U	11	U	11	U	11	U	10	U
Xylenes (total)	1200	4	J	11	U	11	U	11	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 limit.
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 4-2
Semi-Volatile Organic Compounds in Soil - Data Summary
Lawrence Aviation Industeries Remedial Investigation
NYSDEC Site #1-52-016

	Sample ID	GP23D	Q	GP24D	Q	B-3	Q	B-3	Q	FB (ug/L)	Q
	Date	09/24/97		09/24/97		12/01/97		12/03/97		09/24/97	
	Depth(feet)	3-4 ft		3-4 ft		4-6 ft		188-190 ft		-	
Semi-Volatiles (ug/Kg)	NYSDEC Recommended Cleanup Guideline										
1,2,4-Trichlorobenzene	3,400	390	U	380	U	360	U	370	U	10	U
1,2-Dichlorobenzene	7,900	390	U	380	U	360	U	370	U	10	U
1,3-Dichlorobenzene	1,600	390	U	380	U	360	U	370	U	10	U
1,4-Dichlorobenzene	8,500	390	U	380	U	360	U	370	U	10	U
2,2'-oxybis(1-Chloropropane)	NS	390	U	380	U	360	U	370	U	10	U
2,4,5-Trichlorophenol	100	970	U	950	U	910	U	940	U	25	U
2,4,6-Trichlorophenol	NS	390	U	380	U	360	U	370	U	10	U
2,4-Dichlorophenol	400	390	U	380	U	360	U	370	U	10	U
2,4-Dimethylphenol	NS	390	U	380	U	360	U	370	U	10	U
2,4-Dinitrophenol	200 or MDL	970	U	950	U	910	U	940	U	25	U
2,4-Dinitrotoluene	NS	390	U	380	U	360	U	370	U	10	U
2,6-Dinitrotoluene	1,000	390	U	380	U	360	U	370	U	10	U
2-Chloronaphthalene	NS	390	U	380	U	360	U	370	U	10	U
2-Chlorophenol	800	390	U	380	U	360	U	370	U	10	U
2-Methylnaphthalene	36,400	390	U	380	U	360	U	370	U	10	U
2-Methylphenol	100 or MDL	390	U	380	U	360	U	370	U	10	U
2-Nitroaniline	430 or MDL	970	U	950	U	910	U	940	U	25	U
2-Nitrophenol	330 or MDL	390	U	380	U	360	U	370	U	10	U
3,3'-Dichlorobenzidine	NS	390	U	380	U	360	U	370	U	10	U
3-Nitroaniline	500 or MDL	970	U	950	U	910	U	940	U	25	U
4,6-Dinitro-2-methylphenol	NS	970	U	950	U	910	U	940	U	25	U
4-Bromophenyl-phenylether	NS	390	U	380	U	360	U	370	U	10	U
4-Chloro-3-methylphenol	240 or MDL	390	U	380	U	360	U	370	U	10	U
4-Chloroaniline	220 or MDL	390	U	380	U	360	UJ	370	UJ	10	U
4-Chlorophenyl-phenylether	NS	390	U	380	U	360	U	370	U	10	U
4-Methylphenol	900	390	U	380	U	360	U	370	U	10	U
4-Nitroaniline	NS	970	U	950	U	910	U	940	U	25	U
4-Nitrophenol	100 or MDL	390	U	380	U	360	U	370	U	10	U
Acenaphthene	50,000***	390	U	380	U	360	U	370	U	10	U
Acenaphthylene	41,000	390	U	380	U	360	U	370	U	10	U
Anthracene	50,000***	390	U	380	U	360	U	370	U	10	U
Benzo[a]anthracene	224 or MDL	390	U	380	U	360	U	370	U	10	U
Benzo[a]pyrene	61 or MDL	390	U	380	U	360	U	370	U	10	U
Benzo[b]fluoranthene	224 or MDL	390	U	380	U	360	U	370	U	10	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

Table 4-2
Semi-Volatile Organic Compounds in Soil - Data Summary
Lawrence Aviation Industeries Remedial Investigation
NYSDEC Site #1-52-016

	Sample ID	GP23D	Q	GP24D	Q	B-3	Q	B-3	Q	FB (ug/L)	Q
	Date	09/24/97		09/24/97		12/01/97		12/03/97		09/24/97	
	Depth(feet)	3-4 ft		3-4 ft		4-6 ft		188-190 ft		-	
Semi-Volatiles (ug/Kg)	NYSDEC Recommended Soil Cleanup Standard										
Benzo[g,h,i]perylene	50,000***	390	U	380	U	360	U	370	U	10	U
Benzo[k]fluoranthene	224 or MDL	390	U	380	U	360	U	370	U	10	U
bis(2-Chloroethoxy)methane	NS	390	U	380	U	360	U	370	U	10	U
bis(2-Chloroethyl)ether	NS	390	U	380	U	360	U	370	U	10	U
bis(2-Ethylhexyl)phthalate	50,000***	390	U	380	U	140	J	370	U	6	J
Butylbenzylphthalate	50,000***	390	U	380	U	360	U	370	U	10	U
Carbazole	NS	390	U	380	U	360	U	370	U	10	U
Chrysene	400	390	U	380	U	360	U	370	U	10	U
Dibenz[a,h]anthracene	14 or MDL	390	U	380	U	360	U	370	U	10	U
Dibenzofuran	6,200	390	U	380	U	360	U	370	U	10	U
Diethylphthalate	7,100	390	U	380	U	360	U	370	U	10	U
Dimethylphthalate	2,000	390	U	380	U	360	U	370	U	10	U
Di-n-butylphthalate	8,100	390	U	380	U	360	U	370	U	10	U
Di-n-octylphthalate	50,000***	390	U	380	U	360	U	370	U	10	U
Fluoranthene	50,000***	390	U	380	U	360	U	370	U	10	U
Fluorene	50,000***	390	U	380	U	360	U	370	U	10	U
Hexachlorobenzene	410	390	U	380	U	360	U	370	U	10	U
Hexachlorobutadiene	NS	390	U	380	U	360	U	370	U	10	U
Hexachlorocyclopentadiene	NS	390	U	380	U	360	U	370	U	10	U
Hexachloroethane	NS	390	U	380	U	360	U	370	U	10	U
Indeno[1,2,3-cd]pyrene	3,200	390	U	380	U	360	U	370	U	10	U
Isophorone	4,400	390	U	380	U	360	U	370	U	10	U
Naphthalene	13,000	390	U	380	U	360	U	370	U	10	U
Nitrobenzene	200	390	U	380	U	360	U	370	U	10	U
N-Nitroso-di-n-propylamine	NS	390	U	380	U	360	U	370	U	10	U
N-Nitrosodiphenylamine	NS	390	U	380	U	360	U	370	U	10	U
Pentachlorophenol	1,000	970	U	950	U	910	U	940	U	25	U
Phenanthrene	50,000***	390	U	380	U	360	U	370	U	10	U
Phenol	30 or MDL	390	U	380	U	360	U	370	U	10	U
Pyrene	50,000***	390	U	380	U	360	U	370	U	10	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

Table 4-3
TAL Metals in Soil - Data Summary
Lawrence Aviation Industries Remedial Investigation
NYSDEC Site #1-52-016

Metals - (ug/kg)	NYSDEC Recommended Cleanup Guideline	Sample ID	GP23D	Q	GP24D	Q	B-3	Q	B-3	Q	FB (ug/L)	Q
		Date	09/24/97		09/24/97		12/01/97		12/04/97		09/24/97	
		Depth(feet)	3-4 ft		3-4 ft		4-6 ft		188-190 ft		-	
Aluminum	33,000,000**		6930		6449		6545.3		725.1		144.3	B
Antimony	NA		0.7	U	3.8	BJ	6.1	B	0.7	U	3.0	U
Arsenic	7500.0		2.1	B	3.1		2.5		0.5	B	2.4	U
Barium	300,000		19.9	B	29.3	B	19.5	B	4.1	B	1.9	B
Beryllium	160		0.24	B	0.3	B	0.2	B	0.1	B	0.1	U
Cadmium	10,000		0.07	U	2.4		1.3		0.04	U	0.3	U
Calcium	130,000 - 35,000,000**		539	B	700.2	B	513.0	B	142.7	B	208.2	B
Chromium	50,000		19.8	R	124.0	R	25.8		3.4		1.2	B
Cobalt	30,000		2.5	B	5.1	B	4.1	B	0.9	B	1.1	U
Copper	25,000		5.4	B	28.8		7.6		2.0	B	1.8	B
Iron	2,000,000		7460		10416.9		8294.4		2029.4		327.6	
Lead	400,000***		15.8		188.1	J	173.1		1.5		3.1	
Magnesium	100,000 - 5,000,000**		780	B	994	B	928.7	B	306.7	B	79.4	B
Manganese	50,000 - 5,000,000**		64		131.6		106.9		36.1		5.9	B
Mercury	100		0.05	U	0.05	U	NA		NA		0.1	U
Nickel	13,000		11.7	R	95.6	R	19.0		1.4	B	1.3	U
Potassium	8,500,000 - 43,000,000**		368	B	440.6	B	1042.5	B	132.1	B	161.3	B
Selenium	2,000		0.65	U	0.6	U	0.6	B	0.5	U	2.8	U
Silver	NA		0.21	U	0.2	U	0.2	U	0.2	U	0.9	U
Sodium	6,000,000 - 8,000,000		36.9	BE	44.9	BEJ	353	B	19.0	B	179.4	B
Thallium	NA		0.60	U	0.73	B	0.4	U	0.43	U	2.6	U
Vanadium	150,000		12.5		17.2		13.6		3.1	B	1.2	U
Zinc	20,000		33.3	R	179.7		45.2		6.2		33.8	
Titanium	NA		227		434.9	J	0.6	U	0.66	U	20.5	B

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.

FB - Aqueous Field blank obtained from Geoprobe equipment

*NYSDEC, TAGM #4046, "Determination of Soil Cleanup Objectives and Cleanup Levels", May 5, 1998

**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 4-4
TCL Pesticides in Soil - Data Summary
Lawrence Aviation Industries Remedial Investigation NYSDEC 1-52-016

	Sample ID	GP23D	Q	GP24D	Q	GP24D-DL	Q	B-3	Q	B-3	Q	FB (ug/L)	Q
	Date	09/24/97		09/24/97		09/24/97		12/01/97		12/04/97		10/07/99	
	Depth(feet)	3-4 ft		3-4 ft		3-4 ft		4-6 ft		188-190 ft		-	
Pesticides (ug/Kg)	NYSDEC Recommended Cleanup Guideline												
alpha-BHC	110	2	UJ	1.9	UJ	3.9	UJ	1.2	JP	1.9	U	0.05	UJ
beta-BHC	200	2	UJ	1.9	UJ	3.9	UJ	1.8	U	1.9	U	0.05	UJ
delta-BHC	300	2	UJ	1.9	UJ	3.9	UJ	1.8	U	1.9	U	0.05	UJ
gamma-BHC (Lindane)	60	2	UJ	1.9	UJ	3.9	UJ	1.8	U	1.9	U	0.05	UJ
Heptachlor	100	2	UJ	1.9	UJ	3.9	UJ	1.8	U	1.9	U	0.05	UJ
Aldrin	41	2	UJ	1.9	UJ	3.9	UJ	1.8	U	1.9	U	0.05	UJ
Heptachlor epoxide	20	2	UJ	1.9	UJ	3.9	UJ	1.8	U	1.9	U	0.05	UJ
Endosulfan I	900	2	UJ	1.9	UJ	3.9	UJ	1.8	U	1.9	U	0.05	UJ
Dieldrin	44	5.6	XJ	7.6	PXJ	7.1	JDPX	3.6	U	3.7	U	0.10	UJ
4,4'-DDE	2100	14.1	PXJ	25	PXJ	27	DPJ	3.6	U	3.7	U	0.10	UJ
Endrin	100	8.4	PXJ	5.4	PXJ	5	DPJ	3.6	U	3.7	U	0.10	UJ
Endosulfan II	900	3.8	UJ	3.8	UJ	7.5	UJ	3.6	U	3.7	U	0.10	UJ
4,4'-DDD	2900	28.0	XJ	27	PXJ	28	DPXJ	3.3	J	3.7	U	0.10	UJ
Endosulfan sulfate	1000	3.8	UJ	3.8	UJ	7.5	UJ	3.6	U	3.7	U	0.10	UJ
4,4'-DDT	2100	6.7	PXJ	9.1	PXJ	16	DPXJ	3.6	U	3.7	U	0.10	UJ
Methoxychlor	***	20.0	UJ	19	UJ	39	UJ	18	U	19	U	0.50	UJ
Endrin ketone	NS	3.8	UJ	3.8	UJ	7.5	UJ	3.6	U	3.7	U	0.10	UJ
Endrin aldehyde	NS	5.0	PXJ	9.1	PXJ	13	DPJ	2.6	JPX	3.7	U	0.10	UJ
alpha-chlordane	540	2.0	UJ	5.6	PJ	6.6	DPJ	1.8	U	1.9	U	0.05	UJ
gamma-chlordane	540	2.0	UJ	5.4	PJ	5.9	DPJ	1.8	U	1.9	U	0.05	UJ
Toxaphene	NS	197.0	UJ	194	UJ	387	UJ	185	U	191	U	5.0	UJ
Aroclor-1016	NS	38	UJ	38	UJ	75	UJ	36	U	37	U	1.0	UJ
Aroclor-1221	NS	78	UJ	76	UJ	153	UJ	73	U	75	U	2.0	UJ
Aroclor-1232	NS	38	UJ	38	UJ	75	UJ	36	U	37	U	1.0	UJ
Aroclor-1242	NS	38	UJ	38	UJ	75	UJ	36	U	37	U	1.0	UJ
Aroclor-1248	NS	38	UJ	38	UJ	75	UJ	36	U	37	U	1.0	UJ
Aroclor-1254	NS	490	J	600	EJ	710	DJ	32	J	37	U	1.0	UJ
Aroclor-1260	NS	130	PJ	230	PJ	210	DPJ	36	U	37	U	1.0	UJ

Notes:

BOLD: Exceeds NYSDEC recommended soil cleanup criteria

U- Indieates 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

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

The samples collected were from Boring B-3 at the following depth intervals:

B-3, shallow 4-6 ft.
B-3, deep 188-190 ft.

In addition samples were collected at the push probe locations, GP-23D and GP-24D as discussed in Section 3. A soil sample from each push probe location was collected at the 3-4 ft interval.

No detectable concentrations of organic compounds above the method detection limit were found at any location or depth. Small concentrations of acetone were detected but these are more likely attributable to laboratory procedure.

The location of these sample points are located at the upgradient end of the LAI site. The borings were located in what was historically, based on aerial photographs, a drum storage area. It has been documented in previous reports and/or affidavits that these uncovered drums were located directly on the ground surface. It was also documented that a number of these drums contained TCE.

The concentrations of metals at B-3, GP-23 and GP-24 were all well below NYSDEC recommended soil cleanup standards. There were elevated concentrations of heavy metals in the soil. Heavy metals are present in the manufacturing of the titanium sheets, which is the finished product produced by LAI.

There were no detectable concentrations of TCL pesticides that exceeded NYSDEC Recommended Soil Cleanup Standards at any of the sampling locations. Trace concentrations of dieldrin and endrin aldehyde were detected in the sample analysis.

Summary of Soil Samples

The limited amount of soil samples obtained during the 1997 investigation did not indicate a presence of organic contamination as would be expected based on the manufacturing and chemical storage/disposal practices of LAI. The VOC and SVOC concentrations were all below NYSDEC criteria for soil cleanup.

4.3 Groundwater

The following section presents the results of the groundwater samples collected from the newly installed groundwater wells (MW-1, MW-4 and MW-5), Suffolk County Department of Health wells (PJ-6 and PJ-11), and a hydropunch groundwater sample collected from boring B-3.

The background groundwater samples collected from well MW-1 did not reveal detectable concentrations of organic compounds above the method detection limit. (It should be noted that the standard method detection limits for most organic compounds exceeded the NYS SCGs). Iron (1730 ug/l; criteria = 300ug/l), manganese (378ug/l; criteria=300 ug/l) and sodium (23,000 ug/l; criteria = 20,000 ug/l) were detected in the background well above the corresponding NYS SCGs. Other water quality parameters sampled for but not detected include hexavalent chromium and fluoride.

Volatile Organics

Volatile organic compounds, including trichloroethene (280 ug/l in 1997, 794 ug/l in 2000), tetrachloroethene (27 ug/l in 1997, 132 ug/l in 2000), 1,2 dichloroethene (13 ug/l in 2000), ethylbenzene (10 ug/l in 1997) and total xylenes (10 ug/l in 1997) were all detected at levels exceeding the NYS SCGs in MW-4. Monitoring well MW-4 is an offsite well that is directly downgradient, based on known groundwater flow patterns, of the former lagoons and drum storage area.

The groundwater sample collected at boring B-3 in December 1997, via the hydropunch method, indicated the presence of trichloroethene (200ug/l) and tetrachloroethene (10ug/l) at levels exceeding the NYS SCGs. Both of these compounds are chlorinated VOCs which have been present at the LAI site. Concentrations within monitoring wells MW-5, PJ-6 and PJ-11 did not indicate any detectable VOCs above the method detection limit. A summary of the results, with detected results reported in bold print, are presented in Table 4-5.

Table 4-5
Volatile Organic Compounds in Groundwater - Data Summary
Lawrence Aviation Remedial Investigation
NYSDEC Site #1-52-016

		MW-1			MW-4					MW-5		PJ-6	PJ-11	B-3 (HP)		Fieldblank	Tripblank
		Round 1	Round 2	Round 2	Round 1	Round 1	Round 1	Round 2	Round 2	Round 1	Round 2	Round 2	Round 2	-	-	-	-
	Sample ID	*MW-1*	*MW-1*	*MW-1DUP*	*MW-4 (HP)*	*MW-4*	*MW-4DL*	*MW-4*	*MW-4DL*	*MW-5*	*MW-5*	*PJ-6*	*PJ-11*	*B-3 (HP)*	*B-3(HP)DL*	*FB1*	*Tripblank*
	Date	*12/03/97*	*03/23/00*	*03/23/00 Blind Dupl*	*11/12/97*	*12/03/97*	*12/03/97*	*03/24/00*	*03/24/00*	*12/03/97*	*03/24/00*	*03/24/00*	*03/24/00*	*12/03/97*	*12/03/97*	*11/12/97*	*12/04/97*
Volatiles - (ug/l)	NYSDEC Standard for Class GA Water																
Chloromethane	5	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 U	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Bromomethane	NS	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 U	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Vinyl chloride	2	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 U	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Chloroethane	5	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 U	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Methylene chloride	5	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 U	10 U	10 U	10 U	10 U	10 U	25 UJ	5 J	10 U
Acetone	50	10 U	10 U	10 U	2 J	10 U	25 UJ	10 U	50 U	10 U	10 U	1.7 J	2.1 J	10 U	25 UJ	10 U	10 U
Carbon disulfide	50	1 J	10 U	10 U	10 U	8 J	7 JD	10 U	50 U	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
1,1-Dichloroethene	5	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 U	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
1,1-Dichloroethane	5	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
1,2-Dichloroethene (Total)	10	10 U	10 U	10 U	4 J	9 J	9 JD	10 U	13 JD	10 U	10 U	10 U	10 U	7 J	6 JD	10 U	10 U
2-Butanone	50	10 U	10 U	10 U	10 U	10 U	25 JD	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Chloroform	7	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
1,2-Dichloroethane	0.6	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
1,1,1-Trichloroethane	5	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Carbon tetrachloride	5	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Bromodichloromethane	NS	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
1,2-Dichloropropane	NS	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
cis-1,3-Dichloropropene	NS	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Trichloroethene	5	2 J	10 U	10 U	100	280 EJ	280 D	706 EJ	794 DJ	10 U	10 U	10 U	10 U	220 E	202 D	10 U	10 U
Benzene	1	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Dibromochloromethane	5	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
trans-1,3-Dichloropropene	NS	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
1,1,2-Trichloroethane	NS	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Bromoform	NS	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
4-Methyl-2-pentanone	50	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
2-Hexanone	NS	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Tetrachloroethene	5	10 U	10 U	10 U	6 J	28	27 DJ	121	132 DJ	10 U	10 U	10 U	10 U	10	9 JD	10 U	10 U
1,1,2,2-Tetrachloroethane	5	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Toluene	5	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Chlorobenzene	5	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Ethylbenzene	5	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Styrene	NS	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 U	10 U
Xylenes (total)	5	10 U	10 U	10 U	10 U	10 U	25 UJ	9.65 J	50 UJ	10 U	10 U	10 U	10 U	10 U	25 UJ	10 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

Semi-Volatile Organics

There were no detectable semi-volatile organic chemicals detected, at any of the monitoring locations, above the method detection limit. A summary of the results, with detected results reported in bold print, are presented in Table 4-6.

Metals

Cadmium, chromium, copper, iron, lead, manganese, mercury, thallium, zinc and titanium were all detected at concentrations above the NYS SCGs. Specifically, cadmium was detected in PJ-11 during the 2nd round of sampling. The cadmium concentration of 18.6 ug/l was almost four times the NYSDEC groundwater standard of 5 ug/l. Chromium was also detected in monitoring well, PJ-11 at a concentration of 423 ug/l. This is over eight times the standard for groundwater.

Copper concentrations exceeded the NYSDEC groundwater standards in monitoring wells PJ-6 and PJ-11. The copper concentration in PJ-11, 458 ug/l is over twice the groundwater standard of 200 ug/l. The copper concentration in PJ-6 was marginally above the groundwater standard.

Iron levels were elevated in PJ-6 and PJ-11 as well. Background concentrations (MW-1) were 1.7 mg/l while the downgradient concentrations at PJ-6 and PJ-11 were 50 mg/l and 159 mg/l, respectively. The NYSDEC groundwater standard for iron is 0.3 mg/l.

Lead levels in the groundwater were significantly above the groundwater criteria of 25 ug/l (Background concentrations for lead were 5 ug/l). Concentrations of lead in PJ-6 and PJ-11 were 172 ug/l and 616 ug/l, respectively.

Manganese concentrations in the groundwater were also detected at levels significantly above the groundwater criteria of 300 ug/l (Background concentrations for manganese were 276 ug/l). Concentrations of manganese in PJ-6 and PJ-11 were 1380 ug/l and 1460 ug/l, respectively.

Thallium levels were above the groundwater criteria of 0.5 ug/l (Background concentrations for thallium were undetected). The concentration of thallium in the sample obtained from well PJ-11 was 6.1 ug/l.

Table 4-6
Semi-Volatile Organic Compounds in Groundwater - Data Summary
Lawrence Aviation Industries Remedial Investigation
NYSDEC Site #1-52-016

	Sample ID	MW-1	Q	MW-1 DUP	Q	MW-4	Q	MW-5	Q	PJ-6	Q	PJ-11	Q
	Date	03/23/00		03/23/00 Blind Dup (MW-6)		03/23/00		03/23/00		03/24/00		03/24/00	
Semi-Volatiles (ug/l)	NYSDEC Standard for Class GA Water												
1,2,4-Trichlorobenzene	5	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
1,2-Dichlorobenzene	3	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
1,3-Dichlorobenzene	3	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
1,4-Dichlorobenzene	3	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
2,2'-oxybis(1-Chloropropane)	NS	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
2,4,5-Trichlorophenol	1	25.0	UJ	25.0	U	25.0	U	25.0	UJ	25.0	UJ	25.0	UJ
2,4,6-Trichlorophenol	NS	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
2,4-Dichlorophenol	1	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
2,4-Dimethylphenol	NS	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
2,4-Dinitrophenol	5	25.0	UJ	25.0	U	25.0	U	25.0	UJ	25.0	UJ	25.0	UJ
2,4-Dinitrotoluene	5	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
2,6-Dinitrotoluene	5	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
2-Chloronaphthalene	NS	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
2-Chlorophenol	50	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
2-Methylnaphthalene	50	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
2-Methylphenol	5	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
2-Nitroaniline	5	25.0	UJ	25.0	U	25.0	U	25.0	UJ	25.0	UJ	25.0	UJ
2-Nitrophenol	5	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
3,3'-Dichlorobenzidine	NS	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
3-Nitroaniline	5	25.0	UJ	25.0	U	25.0	U	25.0	UJ	25.0	UJ	25.0	UJ
4,6-Dinitro-2-methylphenol	NS	25.0	UJ	25.0	U	25.0	U	25.0	UJ	25.0	UJ	25.0	UJ
4-Bromophenyl-phenylether	NS	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
4-Chloro-3-methylphenol	5	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
4-Chloroaniline	5	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
4-Chlorophenyl-phenylether	NS	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
4-Methylphenol	50	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
4-Nitroaniline	NS	25.0	UJ	25.0	U	25.0	U	25.0	UJ	25.0	UJ	25.0	UJ
4-Nitrophenol	5	25.0	UJ	25.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
Acenaphthene	20	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
Acenaphthylene	20	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
Anthracene	50	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
Benzo[a]anthracene	0.002	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
Benzo[a]pyrene	0.002	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ
Benzo[b]fluoranthene	0.002	10.0	UJ	10.0	U	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ

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.

Table 4-6
Semi-Volatile Organic Compounds in Groundwater - Data Summary
Lawrence Aviation Industries Remedial Investigation
NYSDEC Site #1-52-016

	Sample ID	MW-1	Q	MW-1 DUP	Q	MW-4	Q	MW-5	Q	PJ-6	Q	PJ-11	Q
	Date	3/23/00		3/23/00		03/23/00		03/23/00		03/24/00		03/24/00	
Semi-Volatiles (ug/l)	NYSDEC Standard for Class GA Water												
Benzo[g,h,i]perylene	5	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Benzo[k]fluoranthene	0.002	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
bis(2-Chloroethoxy)methane	NS	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
bis(2-Chloroethyl)ether	NS	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
bis(2-Ethylhexyl)phthalate	5	1.0	J	3.0	J	10.0	UJ	10.0	UJ	10.0	UJ	1.0	J
Butylbenzylphthalate	50	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	1.0	J
Carbazole	NS	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Chrysene	0.002	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Dibenz[a,h]anthracene	50	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Dibenzofuran	5	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Diethylphthalate	50	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Dimethylphthalate	50	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Di-n-butylphthalate	50	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Di-n-octylphthalate	50	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Fluoranthene	50	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Fluorene	50	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Hexachlorobenzene	0.04	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Hexachlorobutadiene	NS	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Hexachlorocyclopentadiene	NS	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Hexachloroethane	NS	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Indeno[1,2,3-cd]pyrene	0.002	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Isophorone	50	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Naphthalene	10	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Nitrobenzene	0.4	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
N-Nitroso-di-n-propylamine	NS	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
N-Nitrosodiphenylamine	NS	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Pentachlorophenol	1	25.0	UJ	25.0	U	25.0	UJ	25.0	UJ	25.0	UJ	25.0	UJ
Phenanthrene	50	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Phenol	1	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ
Pyrene	50	10.0	UJ	10.0	U	10.0	UJ	10.0	UJ	10.0	UJ	10.0	UJ

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.

NS = No standard given in TAGM 4046

Zinc concentrations in the groundwater were also detected at levels significantly above the groundwater criteria of 2 mg/l (Background concentrations for zinc were 0.02 mg/l). Concentrations of zinc in PJ-6 and PJ-11 were 13.4 mg/l and 454 mg/l, respectively. A summary of the results, with detected results reported in bold print, are presented in Table 4-7.

Pesticides

There were no detectable levels of TCL pesticides that exceeded NYSDEC groundwater standards at any of the monitoring wells. A summary of the results, with detected results reported in bold print, are presented in Table 4-8.

Other Water Quality Parameters

Several additional water quality parameters that might identify contamination originating from LAI practices were sampled for. These parameters included hexavalent chromium, fluoride, nitrite and nitrate. Background conditions did not indicate the presence of any of these parameters in the groundwater (nitrate as N was detected at 2.5 mg/l (standard = 10 ug/l) in a background sample from MW-1 in 1997).

Hexavalent chromium was not detected in any of the wells that were sampled. Fluoride, an indicator of contamination from the LAI site, was detected in monitoring well MW-4. In 1997, results from the hydropunch sample indicated a fluoride concentration of 12 mg/l; three times the groundwater criteria of 4 mg/l. Another sample was taken from MW-4 a month later. The fluoride concentration from this sample was 13 mg/l. A sample was also taken from this well in the March 2000 sampling round. The fluoride concentration was 15 mg/l. A summary of the results, with detected results reported in bold print, are presented in Table 4-9.

4.3.1 Ground Water Modeling Summary

A mathematical model of groundwater flow was developed address the following objectives:

- provide a better understanding of the local flow regime;
- assist in determining the direction and movement of potentially contaminated groundwater from the site;
- assist in evaluating the suitability of existing monitoring well locations and identifying new monitoring well locations; and

Table 4-7
TAL Metals in Groundwater - Data Summary
Lawrence Aviation Industries Remedial Investigation
NYSDEC Site #1-52-016

	Sample ID	MW-1	Q	MW-1Dup	Q	MW-4	Q	MW-5	Q	PJ-6	Q	PJ-11	Q	B-3	Q	FB (ug/L)	Q
	Date	03/23/00		03/23/00 Blind dup		03/23/00		03/23/00		03/24/00		03/24/00		12/04/97		09/24/97 -	
Metals - (ug/l)	NYSDEC Groundwater Cleanup Standard																
Aluminum	none	925.1		1,600		6,312		180.8	B	1811		9,125		725		144	B
Antimony	3	3.2	U	3.2	U	3.2	U	3.2	U	3.2	U	3.2	U	0.56	U	3.0	U
Arsenic	25	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	5.7	B	0.51	B	2.4	U
Barium	1,000	45.7	B	53.8	B	78.2	B	24.8	B	147.2	B	125.9	B	4.1	B	1.9	B
Beryllium	3	0.5	B	0.41	B	1.10	B	0.20	U	0.3	B	2.30	B	0.07	B	0.1	B
Cadmium	5	1.30	B	1.10	B	0.4	U	0.40	U	4.30	B	**18.6**		0.04	U	0.3	U
Calcinm	none	9,154		9,070		12,450		8,382		15350		7,889		143	B	208	B
Chromium	50	4.5	B	7.3	B	8.6	B	2.9	B	20.9		**422.8**		3.4		1.2	B
Cobalt	none	2.8	B	3.8	B	2.0	U	2.0	U	24.6	B	33.0	B	0.92	B	1.1	U
Copper	200	3.8	B	7.3	B	1.5	U	1.5	U	**202.4**		**457.7**		2.0	B	1.8	B
Iron	300	**1,734**		**3,770**		93.1	B	**475.9**		**50,430**		**159,100**		2030		328	
Lead	25	5.1		8.6		1.6	U	1.6	U	**171.9**		**616.5**		1.5		3.1	
Magnesium	35,000	4,645	B	4,500	B	6,893		4,171	B	6063		4,728	B	307	B	79.4	B
Manganese	300	276		**378**		4.9	B	25		**1379**		**1,463**		36.1		5.9	B
Mercury	0.7	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.39		NA		0.1	U
Nickel	100	4.6	B	5.7	B	2.0	U	2.0	U	35.2	B	**120.3**		1.4	B	1.3	U
Potassium	none	2,323	BEJ	2,180	B	56,440	EJ	1,100	BEJ	2,132	BEJ	961.1	BEJ	132	B	161	B
Selenium	10	2.70	U	2.70	U	2.70	U	2.70	U	2.70	U	2.70	U	0.54	U	2.8	U
Silver	50	0.69	U	0.69	U	0.69	U	0.69	U	0.76	B	0.69	U	0.18	U	0.9	U
Sodium	20,000	**22,960**		**21,400**		19,120		7,217		10,600		**27,860**		19	B	179	B
Thallium	0.5	4.00	U	4.00	U	4.00	U	4.00	U	4.0	U	**6.14**	B	0.43	U	2.6	U
Vanadium	none	2.6	B	4.7	B	1.8	B	1.3	U	4.4	B	59.5		3.1	B	1.2	U
Zinc	2,000	22.5	R	31.4		3.2	R	21.3	R	**12,400**		**38,890**		6.2		33.8	
Titanium	none	11.3	B	38.7	B	2.2	B	7.60	B	16.90	B	38.0	B	0.56	U	20.5	B

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 none - No standard given in TAGM 4046

NYSDEC, TAGM #4046, "Determination of Soil Cleanup Objectives and Cleanup Levels", May 5, 1998

Table 4-8
Groundwater Sample Analysis Summary - Pesticides
Lawrence Aviation Industries Remedial Investigation
NYSDEC No. 1-52-016

		MW-1		MW-4	MW-5	PJ-6	PJ-11
		Round 2		Round 2	Round 2	Round 2	Round 2
	Sample ID	*MW1*	*MW1*	*MW4*	*MW5*	*PJ-6*	*PJ-11*
	Date	*03/23/00*	*03/23/00*	*03/23/00*	*03/23/00*	*03/24/00*	*03/24/00*
			Blind Dup				
Pesticides (ug/L)	NYSDEC Standard for Class GA Water						
alpha-BHC	0.01	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ
beta-BHC	0.04	0.05 U	0.05 U	0.05 U	0.05 U	0.065 J	0.05 UJ
delta-BHC	0.04	0.05 UJ	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ
gamma-BHC (Lindane)	0.05	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ
Heptachlor	0.04	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ
Aldrin	ND	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ
Heptachlor epoxide	0.03	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ
Endosulfan I	No standard	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ
Dieldrin	0.00	0.10 U	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ
4,4'-DDE	0.20	0.10 U	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ
Endrin	ND	0.10 U	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ
Endosulfan II	No standard	0.10 U	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ
4,4'-DDD	0.30	0.10 U	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ
Endosulfan sulfate	No standard	0.10 U	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ
4,4'-DDT	0.20	0.10 U	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ
Methoxychlor	35.0	0.50 U	0.50 U	0.50 U	0.50 U	0.50 UJ	0.50 UJ
Endrin ketone	5.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ
Endrin aldehyde	5.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ
alpha-chlordane	0.05	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ
gamma-chlordane	0.05	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ
Toxaphene	0.06	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 UJ
Aroclor-1016	NS	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ
Aroclor-1221	NS	2.0 U	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 UJ
Aroclor-1232	NS	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ
Aroclor-1242	NS	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ
Aroclor-1248	NS	1.0 U	1.0 U	1.0 U	1.0 U	1.0 Uj	1.0 UJ
Aroclor-1254	NS	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ
Aroclor-1260	NS	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ

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.

Table 4-9
Groundwater Sample Analysis Summary - Inorganics
Lawrence Aviation Industries - Remedial Investigation
NYSDEC Site #1-52-016

		MW-1			MW-4			MW-5		PJ-6	PJ-11	B-3 (HP)
		Round 1	Round 2		Round 1	Round 1	Round 2	Round 1	Round 2	Round 1	Round 1	
	Sample ID	*MW1*	*MW-1*	*MW-1Dup*	*MW-4 (HP)*	*MW-4*	*MW-4*	*MW-5*	*MW-5*	*PJ-6*	*PJ-11*	
	Date	*12/03/97*	*03/23/00*	*03/23/00*	*11/12/97*	*12/03/97*	*03/24/00*	*12/03/97*	*03/24/00*	*03/24/00*	*03/24/00*	*12/03/97*
	NYSDEC Standard for Class			*Blind dup*								
Inorganics (mg/l)	GA Water											
Chloride	250	50.4			20.0	19.6		8.9				10.4
Hexavalent Chromium	0.05	0.02 U			0.02 U	0.02 U		0.02 U				0.02 U
Fluoride	4.0	0.1 U	0.1 U	0.1 U	**12**	**13**	**15**	0.10 U	0.10 U	0.10 U	0.10 U	1.3
Nitrite (as N)	1	0.1 U			0.12	0.10 U		0.10 U				0.10 U
Nitrate (as N)	10	2.5			3.5	**10.3**		1.7				5
Total Alkalinity	NS	7.4			222	125		21.7				103
Total Dissolved Solids	500	160			410	357		110				243
Total Hardness	NS	72			1200	100		58				300

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", May 5, 1998

The site groundwater flow model was developed using DYNFLOW, a computer model developed by CDM that simulates three-dimensional groundwater flow using a finite element technique for solution of the governing equations. DYNFLOW solves both confined and unconfined groundwater flow equations to simulate the behavior of groundwater flow systems under several types of natural and artificial stresses. Theses stresses include natural and artificial recharge and discharge (e.g. precipitation infiltration, infiltration from or discharge to streams and well withdrawals or injections) and differing boundary conditions. DYNFLOW has been verified by the International Ground Water Modeling Center, located at the Colorado School of Mines, in Golden, CO. The model has been successfully used to represent the Long Island aquifer system including Nassau County and the western (main body) portion of Suffolk County. For the Lawrence Aviation site groundwater model, existing information including stratigraphy, aquifer hydraulic properties and boundary conditions were interpolated from the recently developed Suffolk County regional groundwater flow model.

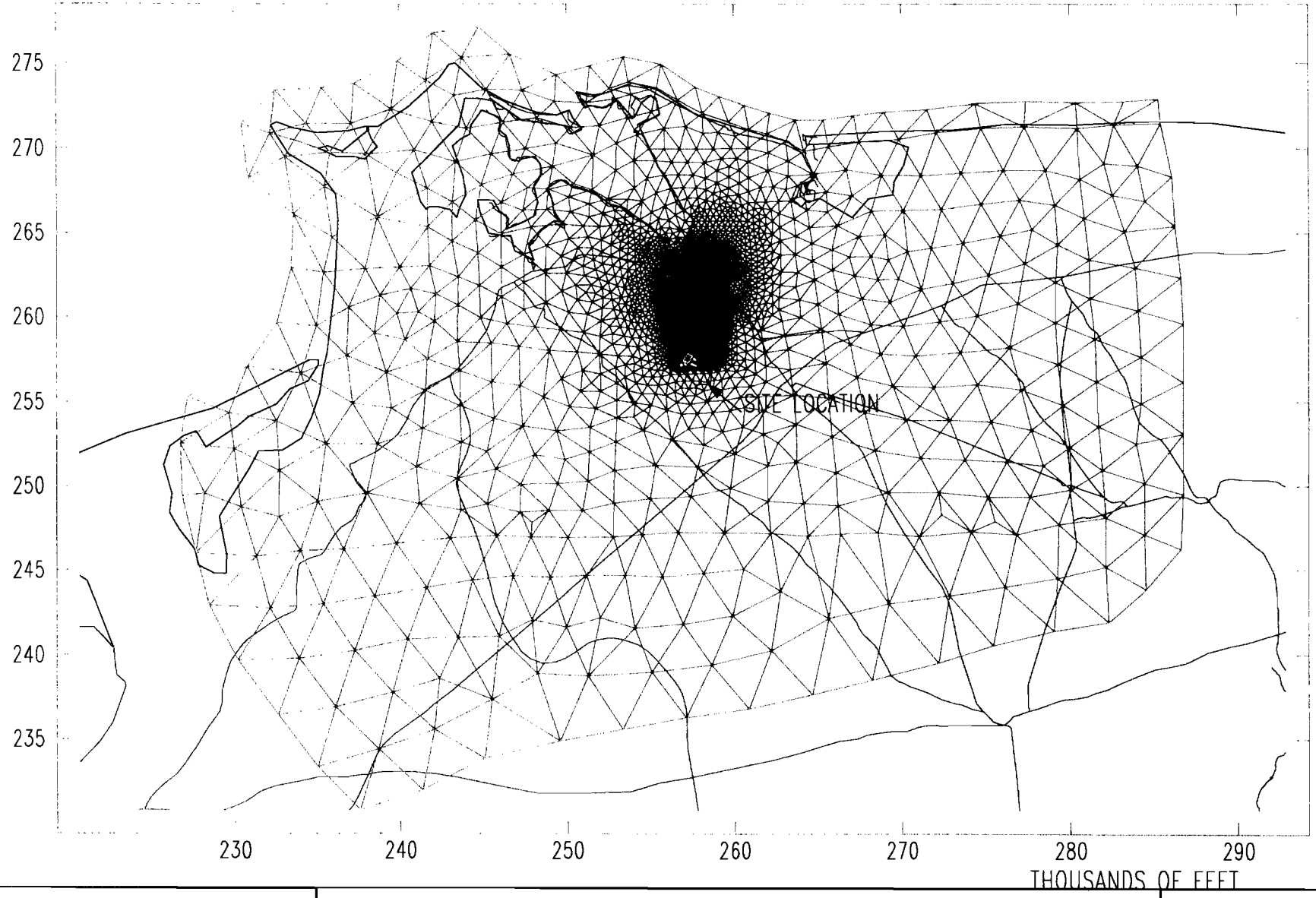
Model Domain

The model domain encompasses just over 74 square miles. The model boundaries were extended west to Stony Brook Harbor, north to Long Island Sound, south to the groundwater divide, and west approximately three miles beyond Mt. Sinai Harbor. Vertically, the model was extended to the top of bedrock, and therefore includes all major aquifers and confining units of the local groundwater system.

A finite element model grid was created by discretizing, or subdividing, the model domain into triangular elements shown in plan view on Figure 4-1. The grid has 1,993 non-uniformly spaced nodes (points of intersection among elements) and 3,922 elements. A greater density of nodes was placed at and downgradient of the Lawrence Aviation site, so as to provide a more detailed representation of groundwater flow within the area of interest. Node spacing in this area was set at approximately 200 feet.

Model Stratigraphy and Aquifer Properties

The model was developed to represent the stratigraphy and associated groundwater flow system across north central Suffolk County, with specific refinements in the Lawrence Aviation site area. The vertical configuration of the model includes a representation of the



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FINITE ELEMENT GRID

LAWRENCE AVIATION GROUNDWATER MODEL

FIGURE 4-1

major geologic units divided into eight layers. Figure 4-2 is a north-south cross section showing the vertical configuration of the model.

The increased discretization over the regional model allowed for refinements to the stratigraphy, given the availability of supporting data. Prior to calibration, the extent and elevation of the Smithtown Clay was adjusted to reflect the information provided in boring logs from SCDHS wells located near the site.

Aquifer properties, specifically the hydraulic conductivities of each stratigraphic unit were based on those used in the calibrated Suffolk County Regional model. Hydraulic conductivities for the major units are listed below.

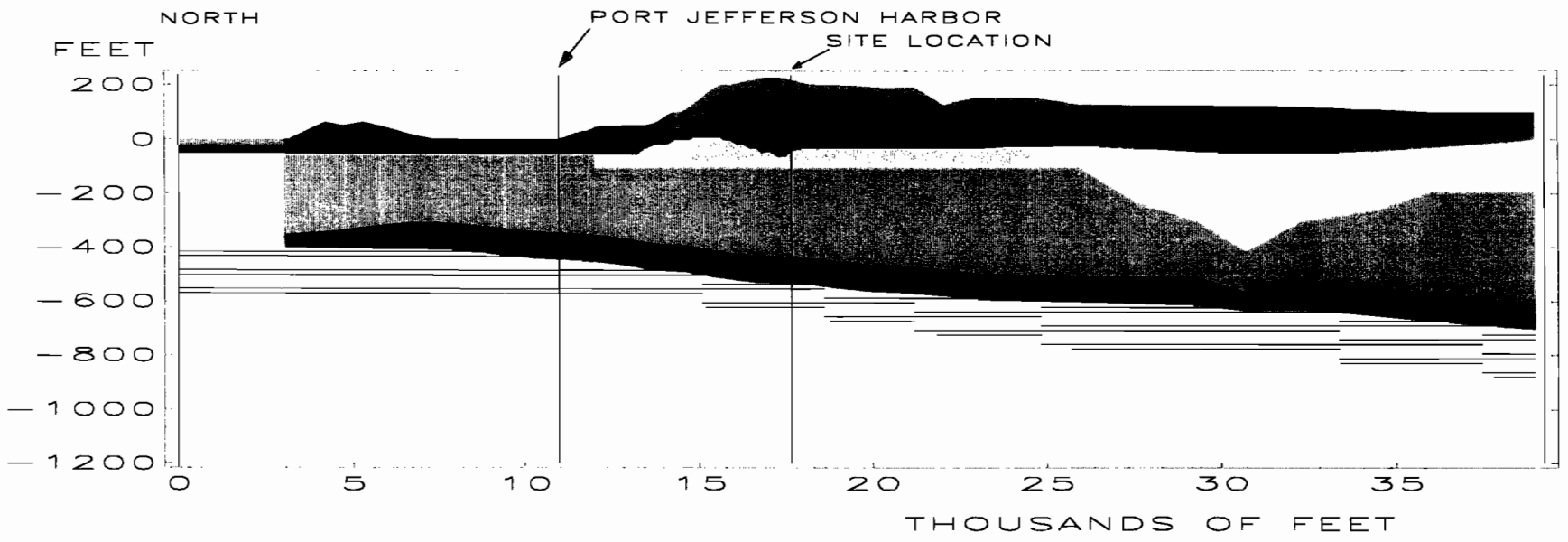
Geologic Unit	*Horizontal/ Vertical Hydraulic Conductivity (ft/ day)*
Upper Glacial	185/18.5
Harbor Hill Moraine	100/10
Smithtown Clay	0.5/0.05
Reworked Magothy	30/0.3
Upper/Middle Magothy	65/0.5
Basal Magothy	125/1.25
Raritan Clay	3/0.02
Lloyd	35/3.5

Recharge

Recharge from precipitation was incorporated into the model based on the method developed for the calibrated Suffolk County Regional groundwater model. Infiltration was varied spatially based on land type (residential, undeveloped or areas where stormwater is diverted to streams) and temporally based on season (growing and non-growing). The average amount of rainfall infiltrated the groundwater system is expected to be just over 50%. Rainfall data from the weather station in nearby Upton, New York was used to calculate infiltration.

Water Supply Pumping

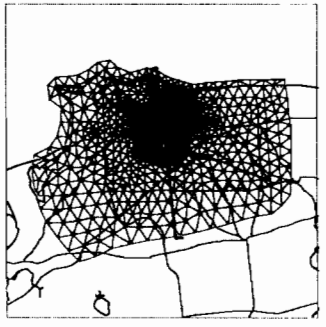
Sixteen public supply wells exist within the model boundary. Pumping data back to the early 1960's was made available for these wells by the Suffolk County Water Authority. Groundwater pumping was simulated in the model by assigning an appropriate flux to the node located closest to the pumping well. Since the majority of the area modeled (except downtown



MATERIALS CROSS-SECTION AA

- RLW MAGOTHY 60
- SMITHTOWN CLAY
- HH GRD MORAINE
- UPPER MAGOTHY 65
- MIDDLE MAGOTHY 65
- BASAL MAGOTHY 125
- UPPER GLACIAL 185
- GARDINERS CLAY
- REWORKED MAGOTHY
- RARITAN CLAY NORTH
- LLOYD AQUIFER

CROSS SECTION AA



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NORTH-SOUTH CROSS SECTION THROUGH MODEL
SHOWING MAJOR GEOLOGIC UNITS
LAWRENCE AVIATION GROUNDWATER MODEL

FIGURE
4-2

Port Jefferson) is not served by sanitary sewers, 85% of the pumping was returned to the groundwater system. The return flux was assigned to the same node (at the phreatic surface), as the pumping flux, since it is expected that most pumping wells serve the residences closest to the well.

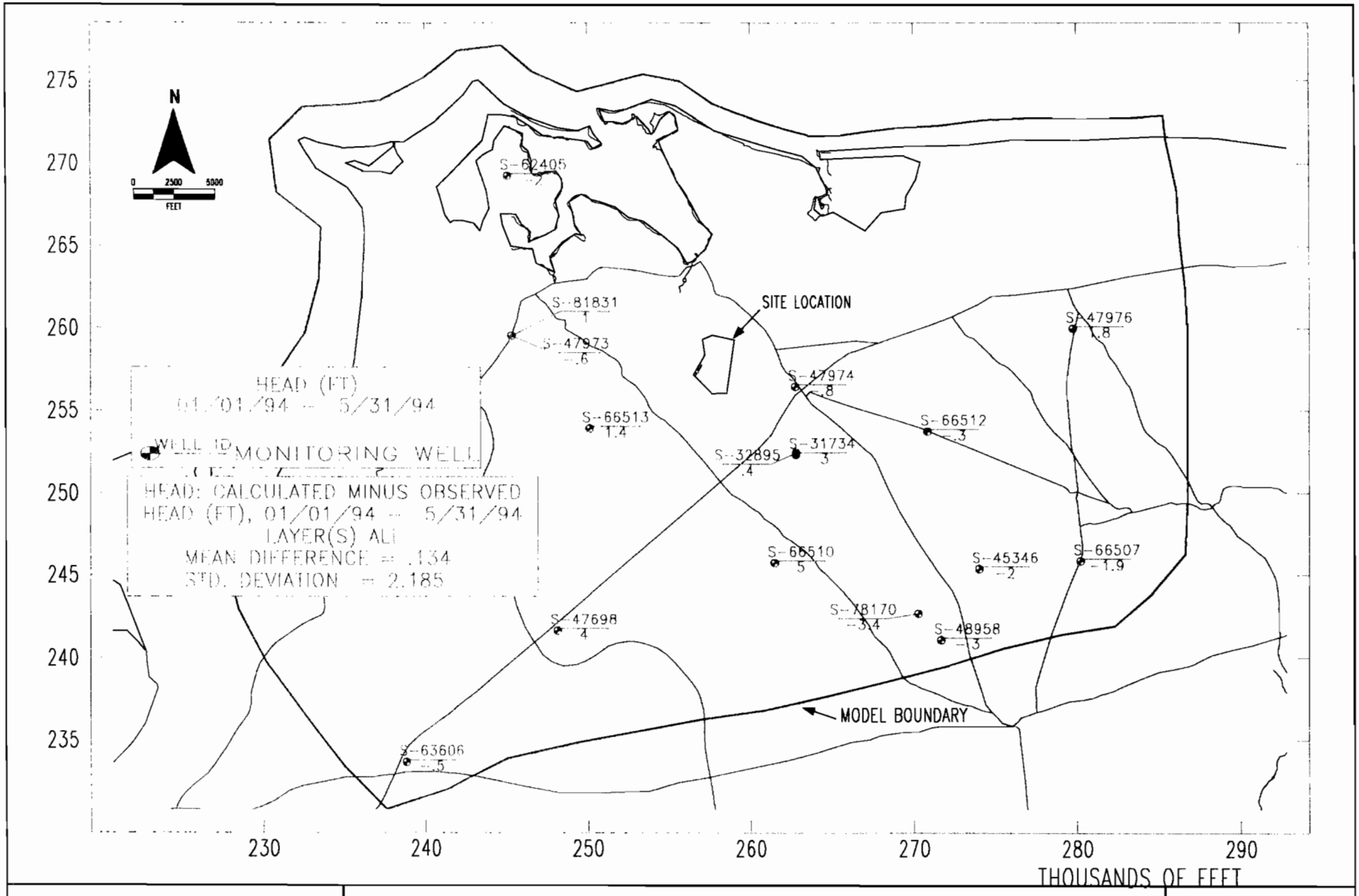
Model Calibration

The models ability to accurately reflect groundwater flow was tested by comparing simulated results with available field data from synoptic readings at SCDHS monitoring wells taken in March of 1994. Since access to the site was prevented, no water levels were available to check the accuracy of the model on-site. Figure 4-3 shows the difference between model simulated (steady-state) heads and actual heads. For the calibration target, the model reasonably depicts the observed heads. Typically, a larger number of wells, and wells located at and immediately surrounding the site are necessary to assess the models ability to predict heads. In this instance, the model was calibrated based on available data, which was regional in nature. Additional support for the model's accuracy is provided by the fact that the stratigraphy and material properties were left unchanged from the fully calibrated, regional groundwater model of Suffolk County.

Contaminant Transport Simulations

To assist in determining the direction and movement of contaminants in groundwater at the site, a number of contaminant transport runs were performed using the contaminant transport code DYNTRACK. Contaminant tracking was also used to evaluate the suitability of existing monitoring well locations and identifying potential locations for new monitoring wells.

To better predict the migration of contaminants in groundwater, pumping and recharge (precipitation) information was collected for the period 1963 through 1996, summarized, and incorporated into 12 different steady-state simulations. Pumping from six nearby wellfields was averaged into 12 periods, as presented in Table 4-10. Recharge was averaged over the same 12 periods. These simulations were then run in series to develop a transient contaminant transport model covering the period 1963 to 1996. 1963 was estimated as earliest potential source release and was used as the starting date for several of the contaminant simulations discussed below.



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SIMULATED VS. OBSERVED HEADS
MARCH 1994
LAWRENCE AVIATION GROUNDWATER MODEL

FIGURE
4-3

Table 4-10

Summary of Supply Well Pumping Rates 1963 - 1996

Lawrence Aviation Industries Remedial Investigation

NYSDEC Site #1-52-016

Well Field	*WELL*	*Average Pumpage (gpm) during each Period*											
		1963-64	*1965*	*1966-71*	*1972*	*1973*	*1974-75*	*1976-77*	*1978*	*1979*	*1980-83*	*1984-89*	*1990-96*
West Broadway	S-4372	55	5	37	95	84	52	45	46	165	39	25	78
	S-8439	185	122	80	52	74	52	46	46	143	37	24	32
Jayne Blvd.	S-14792	0	238	260	284	220	194	168	158	137	175	132	161
	S-17689	0	206	189	222	184	138	107	106	93	170	128	239
	S-23255	0	108	275	300	238	200	171	191	117	179	174	323
	S-46928	0	0	0	0	0	139	211	231	166	253	226	482
Belle Terre Rd.	S-22640	0	0	243	293	220	255	308	140	213	242	251	295
	S-24663	0	0	245	286	226	247	297	141	203	263	232	305
Crystal Brook	S-51953	0	0	0	0	0	0	236	168	239	269	376	481
Hollow Rd.	S-61910	0	0	0	0	0	0	0	0	0	272	270	434
Oak St.	S-40837	0	0	0	0	214	357	509	445	364	402	335	194
	S-40838	0	0	0	0	245	327	393	465	374	392	324	194
	S-57980	0	0	0	0	0	0	0	248	476	456	468	189
Sherry Dr.	S-34300	0	0	0	279	295	292	307	211	131	157	206	124
	S-34301	0	0	0	378	407	416	420	314	190	217	274	387
	S-57979	0	0	0	0	0	0	0	249	164	187	309	332

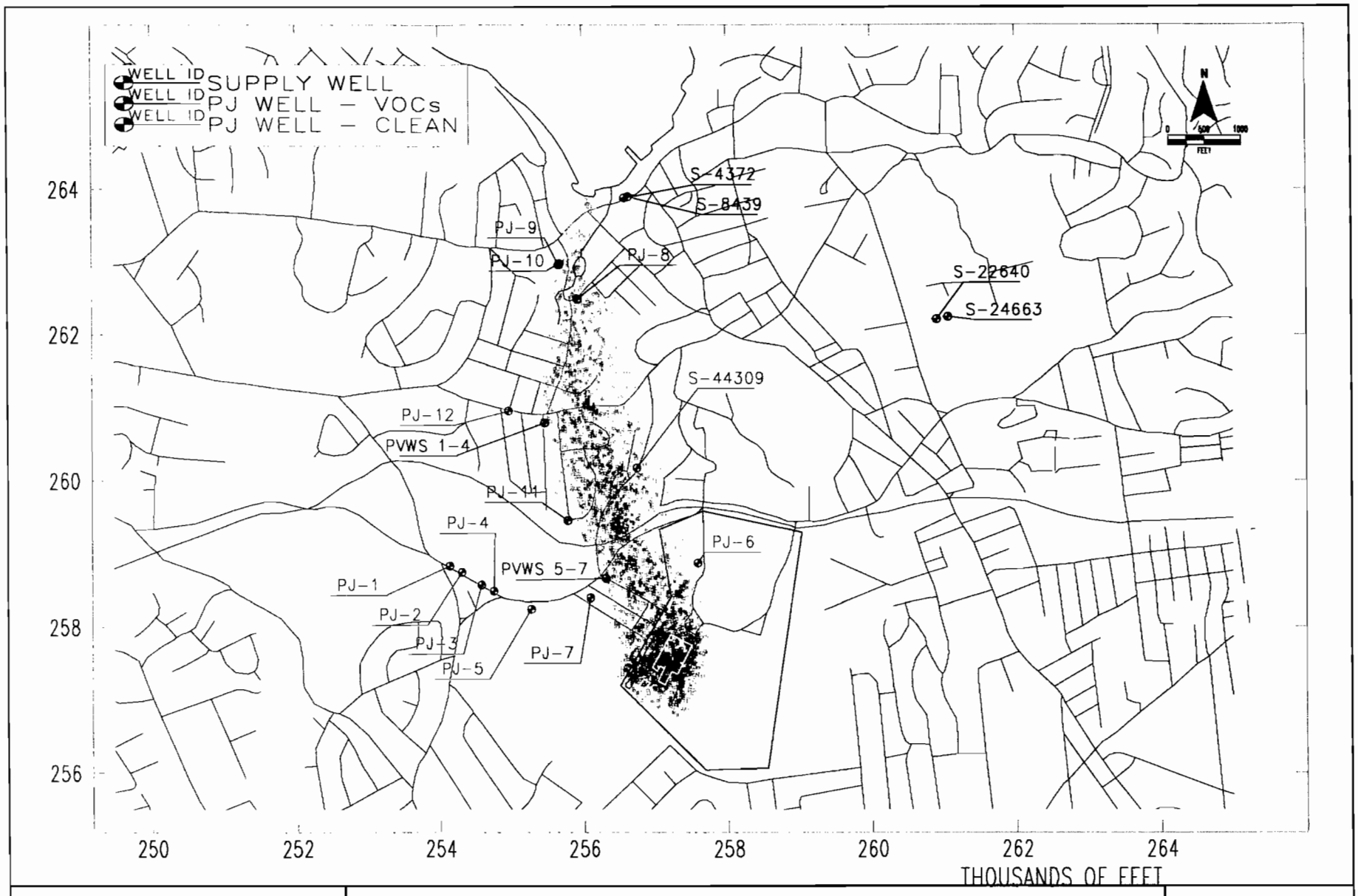
Figure 4-4 shows the simulate extent of a 33 year (continuous) source release, from a 1,000 by 1,000 foot source area at the southwest corner of the site. This source area was intended to include the majority of the operations area, and therefore account for a number of likely sources. Included in the figure are monitoring wells which have historically had detections of VOCs (labeled in red) and those which have not shown evidence of contamination (labeled in blue). A north-south cross section through the plume is shown in Figure 4-5. The simulated (33-year) plume coincides with each of the monitoring wells that have shown evidence of VOC contamination. The simulated plume also discharges to the pond (east of PJ-10) where VOCs have historically been detected. The plume does not appear to intersect any of the clean wells. Well S-44309, a "clean" well, is screened just above the simulated plume.

Particles are simulated to migrate along the top of the Smithtown Clay in the Upper Glacial aquifer. Particles also appear to migrate vertically downward through the clay and then horizontally across the top of the Magothy formation, before discharging to the pond or harbor. The equipotential lines shown in Figure 4-5 illustrate the downward gradient that exists at, and south of well S-44309, and the change to an upward gradient approaching the harbor.

A second potential source area was evaluated by simulating a 1,000 by 1,000 foot source area at the southeast corner of the site. As shown in Figure 4-6, the plume does not account for VOC detections at wells PJ-7, PJ-11, PVWS (private well supply) 5-7 and PVWS 1-4. The plume also passes through PJ-6, a well that has not shown evidence of VOC contamination.

The possibility of a source release in the northeast site corner was also evaluated. Figure 4-7 shows the simulated plume extent , after 33-years, based on a 1,000 by 1,000 foot source area at the northeast site corner. None of the "contaminated" wells coincide with the simulated plume in this scenario.

The likelihood of contaminants originating from the drum staging area was investigated. Particles were introduced over a 200 by 200 foot area, coinciding with the drum staging area location. A source release was simulated to begin in 1980, the year this area was first used for drum handling, based on available site information. Figure 4-8 shows the 1996 simulated plume configuration. Contamination originating from this location does not appear to effect



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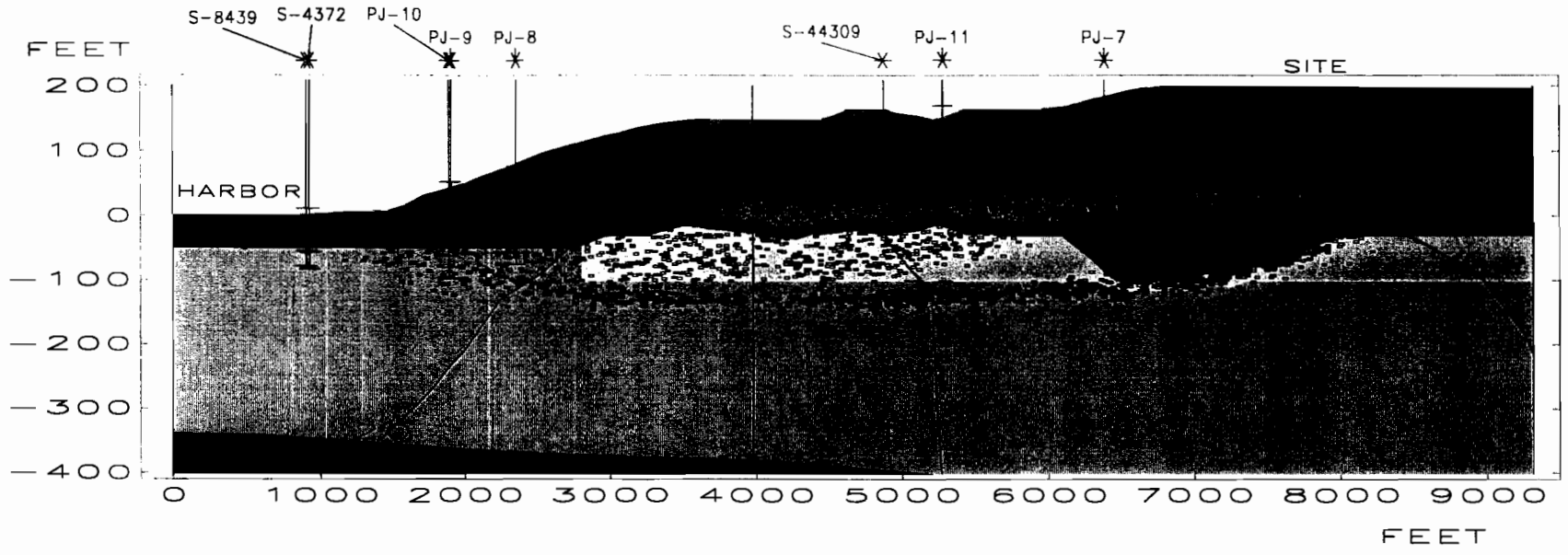
SIMULATED PLUME CONFIGURATION BASED ON SOUTHWEST SITE CORNER SOURCE AREAS (1,000' BY 1,000')
LAWRENCE AVIATION GROUNDWATER MODEL

FIGURE 4–4



MATERIALS CROSS-SECTION BB

- UPPER GLACIAL 185
- SMITHTOWN CLAY
- REWORKED MAGOTHY
- HT GRD MORAINE
- GARDINERS CLAY
- UPPER MAGOTHY 65
- MIDDLE MAGOTHY 65
- BASAL MAGOTHY 125
- RARITAN CLAY NORTH
- LLOYD AQUIFER

— HEAD

- SUPPLY WELL
- PJ WELL – VOCs
- PJ WELL – CLEAN WITHIN 900.0 FT
- GROUND SURFACE
- TOP OF SCREEN
- BOTTOM OF SCREEN

CROSS SECTION BB

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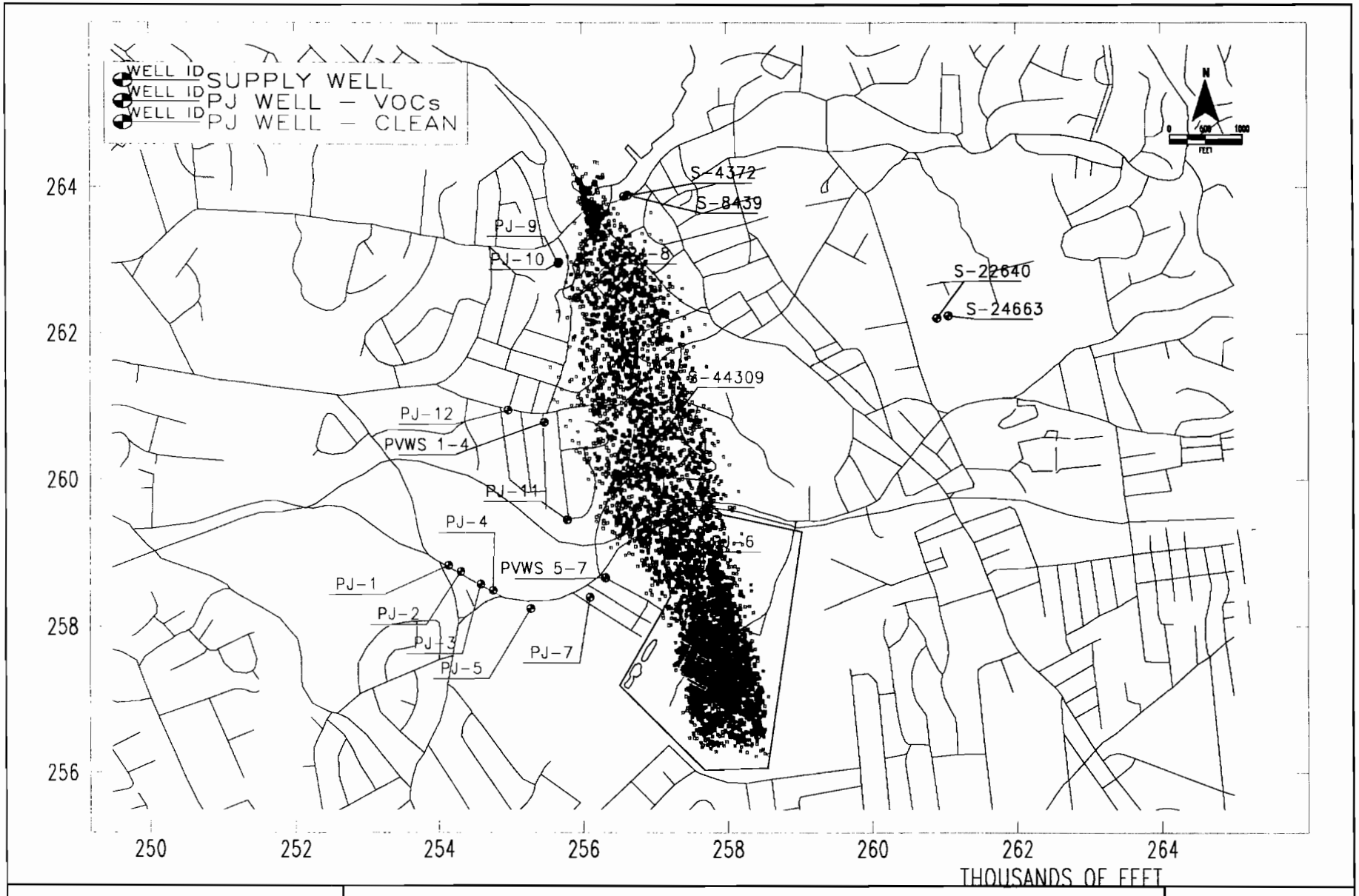
NORTH–SOUTH CROSS SECTION
SIMULATED PLUME CONFIGURATION BASED ON SOUTHWEST SITE CORNER SOURCE AREAS (1,000' BY 1,000')
LAWRENCE AVIATION GROUNDWATER MODEL

FIGURE 4–5



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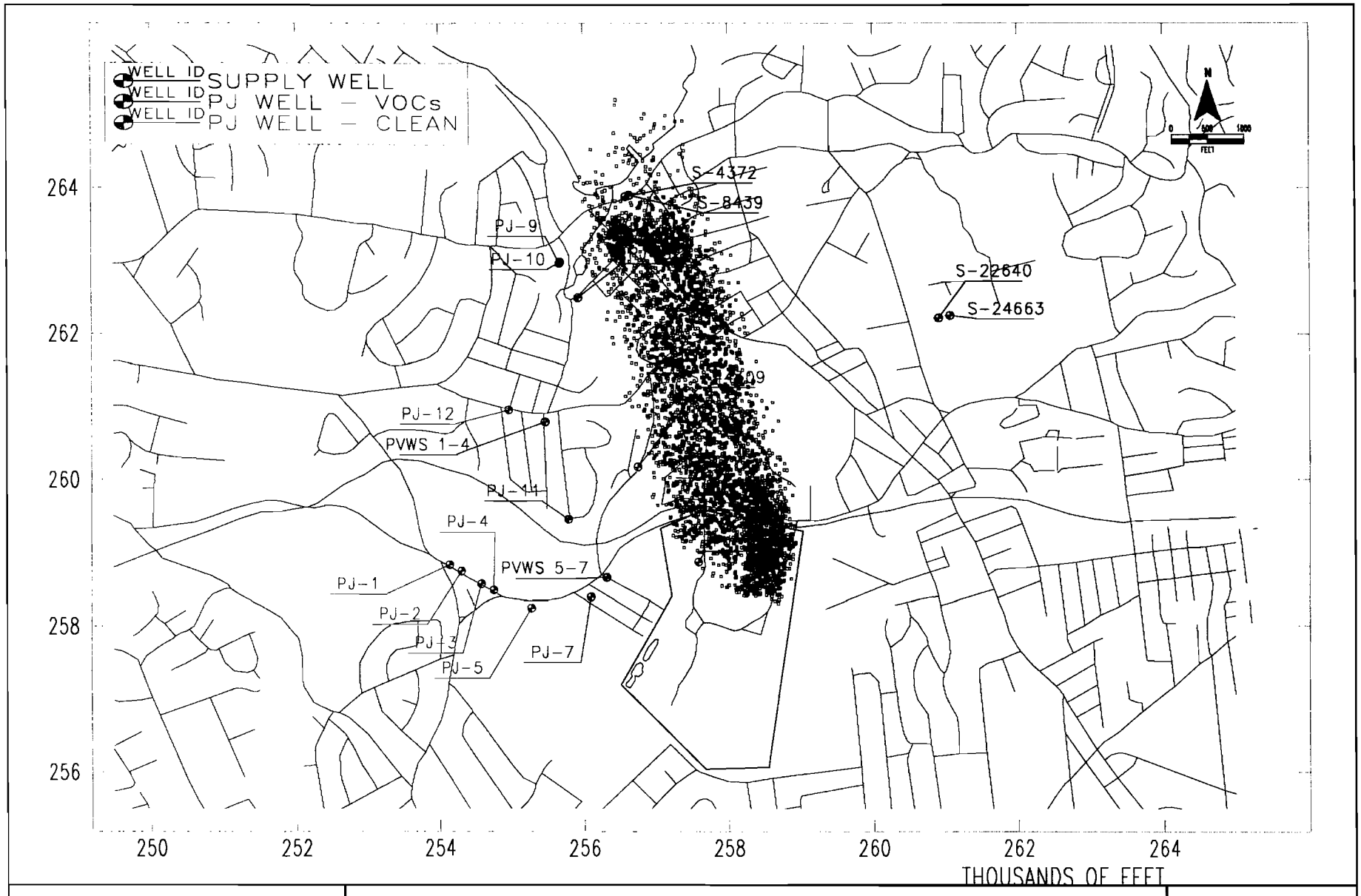
SIMULATED PLUME CONFIGURATION BASED ON SOUTHEAST SITE CORNER SOURCE AREAS (1,000' BY 1,000')
LAWRENCE AVIATION GROUNDWATER MODEL

FIGURE 4-6



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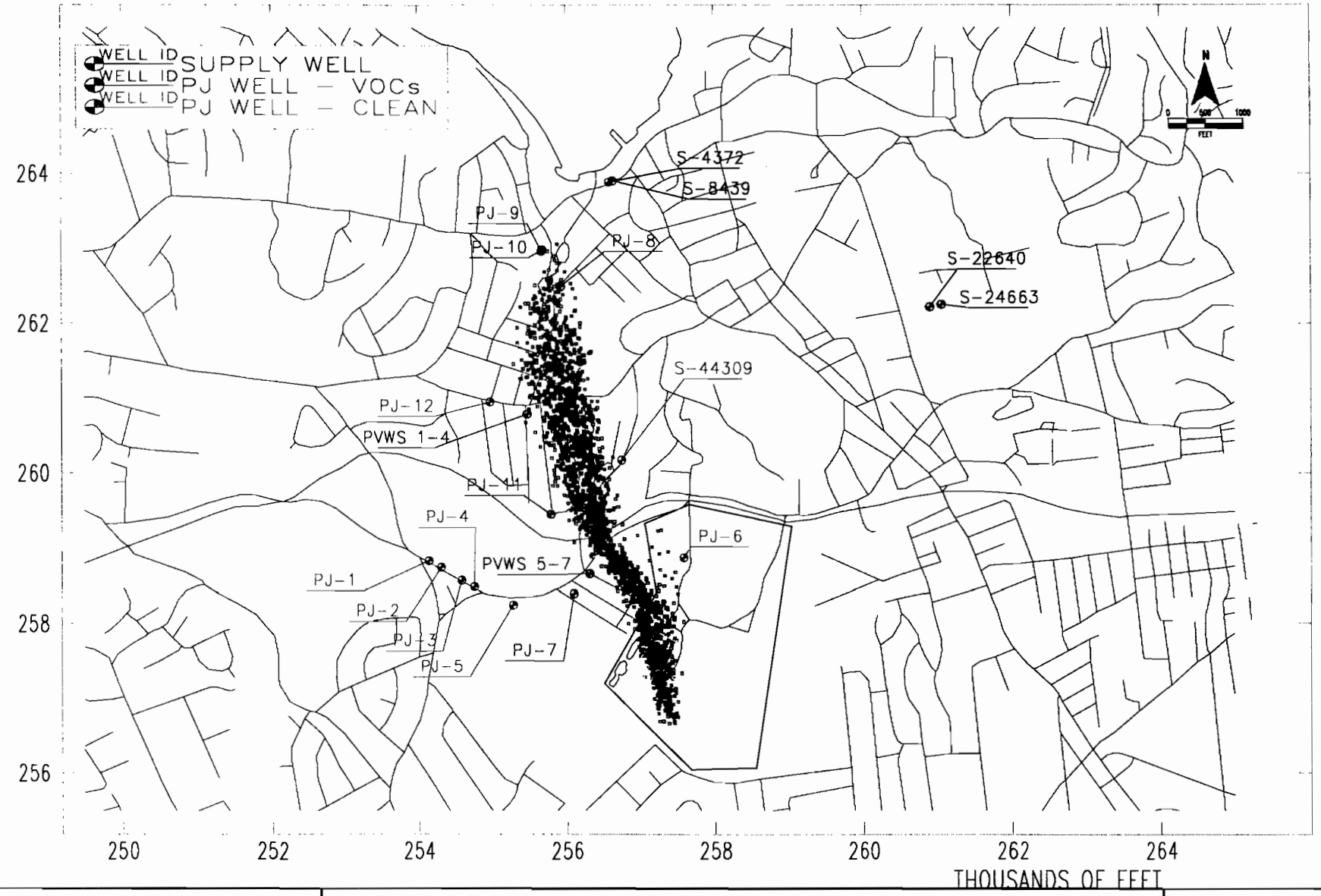
SIMULATED PLUME CONFIGURATION BASED ON NORTHEAST SITE CORNER SOURCE AREAS (1,000' BY 1,000) LAWRENCE AVIATION GROUNDWATER MODEL

FIGURE 4-7



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SIMULATED PLUME CONFIGURATION BASED ON DRUM STAGING AREA SOURCE RELEASE LAWRENCE AVIATION GROUNDWATER MODEL

FIGURE 4-8

wells PJ-7, PJ-11 or PVWS 5-7, but may account for VOC hits at PVWS-1-4, PJ-8, PJ-9 and PJ-10.

Based on the results presented above, the southwest corner of the site is a likely source area for groundwater contamination observed in downgradient monitoring wells. Contaminant migration, as predicted by the model, occurs in the Upper Glacial and Magothy aquifers to depths to approximately 190 feet below the water table.

Monitoring wells PJ-1 through PJ-5 are not expected to detect contaminants from the site, based on the simulated groundwater flow pattern and various contaminant transport runs. PJ-12 also appears to be located west of the plume.

Simulation of the southwest corner source area best explains the observed VOC detections in downgradient monitoring wells. The plume is simulated to leave the western perimeter of the site, and pass beneath the residential area that borders the site. Based on these results, monitoring wells MW-4 and MW-5 were installed in this area to provide further delineation of the plume.

Section 5
Conclusions

Groundwater and surface water analytical data indicate exceedances of cleanup criteria, providing clear justification for remedial action. Although not present in the limited sampling results from this Preliminary RI, based on the historical records previously discussed, the areal extents of drum storage, lagoon seepage and the 190 feet depth to groundwater at the site, it is highly likely that there is soil contamination, possibly significant, on the LAI site.

Elevated concentrations of volatile organic contaminants were detected in the most-likely downgradient wells. The high concentrations of chlorinated solvents detected in these off-site wells and not in the upgradient wells, points to LAI as the potential source of contamination.

Monitoring wells should be installed so that the well screens are positioned just above an aquitard such as a clay in an effort to intercept denser than water, nonaqueous-phase liquids (DNAPLS), such as TCE, DCE, and TCA which are presumed to be the most common VOC contaminants at the site.

An exhaustive Remedial Investigation, similar to the RI originally planned for the Lawrence Aviation Site, should be performed to determine the impact of this facility on the soil, groundwater and surface waters in the area.

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BORING NUMBER: B-3
Page 1 of 3

Log of Boring

Project Lawrence Aviation Location on NYSDOT Property Job. No 0897-21362-T2.WE
Date Drilled 12/1/97 - 12/3/97 Drilling Co. SJB Services Inc.
Total Depth 195 ft. Method Used 6¼" HSA
Inspector T. Fox Organic Vapor Instruments Used PID - OVM Water Table Depth 19ft.

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
								12/1/97 - 1430
5	1 & 3		1-5 ft.	24/10	0	Black to Brown silty sand and gravel, wood particles, loose (Reworked soil) moist (Fill)	Fill	Continuos split Spoon from 0 to 104ft. Select 4-6ft. Sample for lab analysis - Lots of cobbles at 8-12 ft.
10	4 & 5		5-10 ft.	24/10	0	Brown silty sand with gravel, wood particles, sweet Solvent Root odor - 5-8 ft. 8-10 ft. = Lt. Brn med Sand & gravel		
15	6		13-15	24/3	0	Coarse Sand and gravel, poor recovery		
20	7		18-20	24/6	0	Piece of metal blocked sample recovery, remaining sample fill from above		
25	8		23-25	24/10	0	tan-brown med.-coarse sand, some gravel, loose, moist		
30	9		28-30	24/24	0	Brown clayey silt, little med. fine sand, low plast. poor sort, thin lens of sands ½-1" Dry		End 17:00 12/2/97 - 8:00
35	10		33-35	24/24	0	Lt. Brown to Tan med. sand, qtz. gravel, loose, dry		
			38-40	24/24	0	Same as above (SAA)		
40			43-45	24/24	0	tan-brown med-coarse sand, little qtz gravel, loose, slightly moist		
45			48-50	24/21	0	SAA		
50			53-55	24/24	0	53-54½ SAA - but very moist (perched watertable?) 54½ - 55 · Brown clayey Sand some gravel, stiff, wet		
55			58-60	24/24	0	light brown to tan sands little gravel, loosely compact, moist		
60			63-65	24/12	0	SAA		
65			68-70	24/21	0	light brown, fine med Sand trace gravels, loose, moist.		

VY-1

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BORING NUMBER: B-3

Log of Boring

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. (PPM)	Sample Description	Strata Change	Remarks (Time of Day)
70								12/2/97
			73-75	24/24	0	light brown (Fe-staining) fine sand, little silt and little gravel, loose, moist		13:00
75			78-80	24/24	0	Brown-Tan fine-med sand, trace gravel, loose, dry?		
80			83-85	24/24	0	SAA		
85			88-90	N/A	0	cobble zone, slow drilling, could not recover sample		Could not collect sample due to cobble zone
90			93-95	24/8	0	Lt. Brown to tan fine to coarse sands, little gravel, loose, dry		
95			98-100	24/24	0	Brown med-fine sand with silt and gravel, soft, moist trace		
100			103-105	24/14	0	SAA - 103-104 ft. 104-105 ft white to brown med-coarse sands, trace fine gravel, loose, moist		
105			108-110	24/14	0	SAA		
110			113-115	24/16	0	SAA		
115			118-120	24/20	0	SAA		
120			123-125	24/14	0	SAA		16:30
125			128-130	24/18	0	Tan-white, med to coarse sands with gravel, loose moist		12/3/97 7:40
130			133-135	24/18	0	SAA		
135			138-140	24/18	0	SAA		
140			143-145	24/24	0	SAA but more gravel		
145			148-150	24/18	0	white med. grained sands (very well sorted) loose, moist		

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BORING NUMBER: B-3

Log of Boring

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. (PPM)	Sample Description	Strata Change	Remarks (Time of Day)
150								12/3/97
155			153-155	24/20	0	SAA		9:50 ↓
			158-160	24/18	0	white med-coarse sands, little gravel, loose, moist		
160			163-165	24/18	0	SAA		
165			168-170	24/18	0	SAA		
170			173-175	24/18	0	SAA		
175			178-180	24/10	0	SAA		
180			183-185	24/18	0	Tan med-coarse sand and gravel, loose, moist		
185			188 190	24/18	0	wet - Tan med coarse sand, little gravel		13:30 Hit water table at apx. 190ft. Collect 188-190ft. sample for lab analysis
190						End Boring		

NY-2

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BORING NUMBER: MW-1
Page 1 of 2

Log of Boring

Project Lawrence Aviation Location Dead End. Washington Ave Job. No 0897-21362-T2.WE
Date Drilled 11/24 to 11/25/97 Drilling Co. SJB Services Inc.
Total Depth 150 ft. Method Used 6¼" HSA
Inspector T. Fox Organic Vapor Instruments Used PID - OVM Water Table Depth Apx 139 ft.

Depth (feet)	Samp No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
								11/24/97
10	1		8-10	24/0	N/A	- No recovery, large cobbles		11:35
20			18-20	24/12	0	White - tan med. coarse sands w/ gravel, loose, moist		
30			28-30	24/18	0	Same as above (SAA)		
40			38-40	24/18	0	SAA		
50			48-50	24/18	0	SAA		
60			58-60	24/18	0	SAA		
70			68-70	24/18	0	white to tan med sands no gravel, loose, moist		
80			78-80	24/16	0	SAA		
90			88-90	24/20	0	SAA		
100			98-100	24/20	0	SAA		
110			108 110	24/16	0	SAA - but more gravel		
120			118 126	24/18	0	SAA		
130			128 130	24/16	0	SAA		16:30

NY-1

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BORING NUMBER: MW-1

Log of Boring

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. (PPM)	Sample Description	Strata Change	Remarks (Time of Day)
								11/25/97
140			138 140	24/18	0	tan med coarse sand and gravel, loose, wet		7:10 - Hit water at 140ft.
150			148 150	24/16	0	tan med, coarse sand no gravel, loose, wet		10:40
						End Boring at 150ft.		

NY-2

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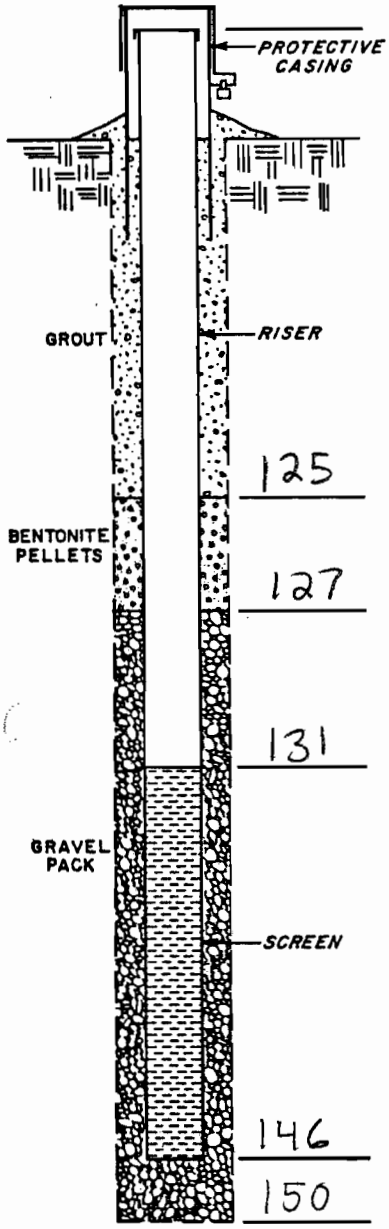
WELL CONSTRUCTION SUMMARY

Project: Lawrence Aviation Client: NYSDEC Well No: MW-1



DRILLING SUMMARY

Drilling Co: SJB Services Inc. Drillers: Mike Davidson

Drill Rig Make/Model: CME-85

Borehole Diameters: 9 5/8" Drilling Fluid: N/A

Bits/Depths: 6¼ HSA - 150 ft.

Total Depth: 150 ft. Depth to Water: Apx. 139 ft.

Supervisory Geologist: T. Fox

WELL DESIGN

Casing Material:	PVC	Diameter:	4"	Length:	131 ft.
Screen Material:	PVC	Diameter:	4"	Length:	15 ft.
Slot Size:	10	Setting:	131 - 146 ft.		
Filter Material:	#1 Morie sand	Setting:	127 - 148 ft.		
Seals Material:	Bentonite	Setting:	125 - 127 ft.		
Grout:	Bentonite	Setting:	Surface - 125 ft.		
Surface Casing Material:	Steel	Setting:	Flush Mount		

TIME LOG	Started	Completed
Drilling:	11/24/97	11/25/97
Installation:	11/25/97	11/26/97
Development:	12/3/97	12/3/97

WELL DEVELOPMENT

Method: Submersible Pump

Static Depth to Water: 139.50 ft.

Pumping Depth to Water: 142.50 ft.

Pumping Rate: Apx. 7 gpm Specific Capacity: 2.33 gpm/1 ft. drawdown

Volume Pumped: Apx. 840 gal.

NY-5

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BORING NUMBER: MW-4

Log of Boring

Project Lawrence Aviation Location ChipITAll Job. No 0897-21362-T2.WEI

Date Drilled 11-10 to 11-13-97 Drilling Co. SJB

Total Depth ____ Method Used 6¼" Hollow Stem Auger

Inspector Bob Cunningham Organic Vapor Instruments Used PID Water Table Depth 165.5'bgs

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
								11/10/97
10'	#1	NA	10'-12'	1.4'	0	0.2' moist, tan, Fine-medium sand, trace silt. 0.3' dry tan medium-coarse sand 0.2' Fine to medium sand, trace silt 0.5' tan, medium to coarse sand		F/M 1520
20'	2	NA	20-22'	1.1'	0	0.8' tan, medium to coarse, gravelly sand (0.1' white, medium to coarse gravelly sand at bottom) 0.3' medium to very coarse sand, tan, moist		1535
30'	3	NA	30-32'	1.1'	0	1.1' white, medium to coarse sand		1620 ? 1640
40'	4	NA	40-42'	1.3'	0	SAA, occasional gravel		11/11/97
50'	5	NA	50-52'	1.0'	0	1.0' light tan, medium to coarse sand, with rounded gravel		0820
60'	6	NA	60-62'	0.8'		0.8' light brown, Fine to coarse sand with gravel and cobbles, trace silt	Cobbles	

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BORING NUMBER: MW-4
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Log of Boring

Project Lawrence Aviation Location _____ Job. No _____

Date Drilled _____ Drilling Co. _____

Total Depth _____ Method Used _____

Inspector _____ Organic Vapor Instruments Used _____ Water Table Depth _____

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
70'	7	NA	70-72'	1.2'	0	0.2' coarse sand and gravel with black shale rock fragments 0.1' tan, very silty, fine sand 0.2' silty, coarse sand 0.7' white, medium to coarse sand		0920
80'	8	NA	80-82'	0.8'	0	0.3' brown, medium to coarse sand, with strong gravel, 1/4" to 3/4" dia. rounded pebbles 0.5' white and tan fine to coarse sand and gravel 0.2' white sand and gravel in nose	cobbles	1110 spoon refusal at 81.5'
90'	9	NA	90-92'	1.1'	0	1.1' white, medium to coarse sand, with moderate gravel, shale rock fragments		1140
100'	10	NA	100-102'	1.0'	0	1.0' light tan to white, coarse sand, moderate gravel, shale rock fragments		1210
110'	11	NA	110-112'	1.1'	0	1.1' light tan, medium to coarse sand, trace gravel, with thin, brown layers every 3/4" (tidal rings?) slightly moist		1245
120'	12	NA	120-122'	0.4'	0	0.4' SAA pushed pebble		1420
130'	13	NA	130-132'	1.1'	0	0.3' light tan medium sand 0.3' light tan and brown alternating layers, 1/16" to 3/16" thick of medium sand 0.5' light tan medium sand		1445

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BORING NUMBER: MW-4
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Log of Boring

Project Lawrence Aviation Location _____ Job. No _____

Date Drilled _____ Drilling Co. _____

Total Depth _____ Method Used _____

Inspector _____ Organic Vapor Instruments Used _____ Water Table Depth 165.5' bgs

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
140'	14	NA	140-142'	1.2'	0	Light tan, medium to coarse sand, 1.2' with green, chloritic shale rock fragments		1515
150'	15	NA	150-152'	1.1'	0	1.1' SAA		1550
160'	16	NA	160-162'	1.3'	0	1.3' wet S.A.A.		1620
							water table	11/12/97 water sample collected LAI MW4GW2
170'	17	NA	170-172'	1.2'	0	1.2' wet, Fine to coarse brown sand No stratification, contained pieces of 2" well screen broken in place previously. Probably mostly washed in from plug in bottom of augers		1405
180'			Bottom of			Boring No sample 180 to 182		

NY-1

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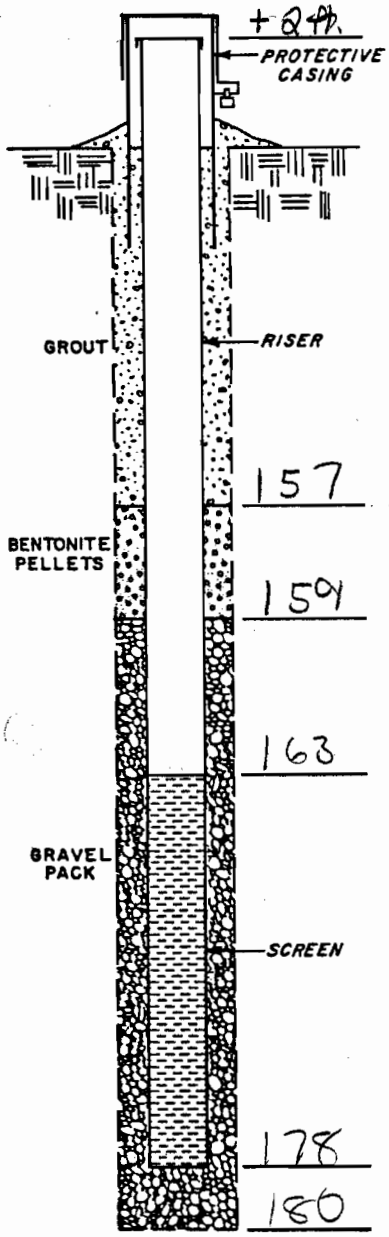
WELL CONSTRUCTION SUMMARY

Project: Lawrence Aviation Client: NYSDEC Well No: MW-4



DRILLING SUMMARY

Drilling Co: SJB Services Drillers: Mike Davidson

Drill Rig Make/Model: CME-85

Borehole Diameters: 9 5/8" Drilling Fluid: N/A

Bits/Depths: 6 1/4" HSA - 180 ft.

Total Depth: 180 ft. Depth to Water: Apx. 163 ft.

Supervisory Geologist: Robert Cunningham - YEC Inc.

WELL DESIGN

Casing Material: PVC Diameter: 4" Length: 163 ft.

Screen Material: PVC Diameter: 4" Length: 15 ft.

Slot Size: 10 Setting: 163 - 178 ft.

Filter Material: #1 Morie Sand Setting: 180 - 159 ft.

Seals Material: Bentonite Setting: 159 - 157 ft.

Grout: Bentonite Setting: 157 - Surface ft.

Surface Casing Material: Steel Setting: Stick up

TIME LOG	Started	Completed
Drilling:	11/10/97	11/12/97
Installation:	11/12/97	11/18/97
Development:	12/3/97	12/3/97

WELL DEVELOPMENT

Method: Submersible Pump

Static Depth to Water: 163.0

Pumping Depth to Water: 165.3

Pumping Rate: Apx. 8 gpm Specific Capacity: 4.76 GPM/1 ft. drawdown

Volume Pumped: Apx. 960 gallons

NY-5

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BORING NUMBER: MW-5

Log of Boring

Project Lawrence Aviation Location Dead End of Park Ave Job. No 0897-21362-T2.WE

Date Drilled 10/28/97 to 11/5/97 Drilling Co. SJB Services Inc.

Total Depth 206 ft. Method Used 6 1/4" Hollow Stem Auger

Inspector Tom Fox Organic Vapor Instruments Used PID - OVM Water Table Depth Apx. 187 ft.

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. - PPM	Sample Description	Strata Change	Remarks (Time of Day)
								10/28/97 -
							Top Soil	
	1	5-9 9-12	5-7	24/6	0	Tan-Brown med sand, some gravel, loose, dry		16:00
10	2	6-6 6-7	10-12	24/20	0	Same as Above (SAA)		
	3	9-9 11-10	15-17	24/6	0	SAA		17:05 10/29/97
20	4	7-6 8-12	20-22	24/16	0	Brown-Tan Med. Coarse sand w/ Gravel, loose dry		7:15
	5	13-15 8-8	25-27	24/18	0	SAA		
30	6	5-6 10-13	30-32	24/18	0	Tan med. Coarse sand and little gravel, moist, loose		
	7	3-6 8-8	35-37	24/20	0	Tan-White med sand (well sorted), trace gravel, loose, moist		
40	8	4-7 7-12	40-42	24/20	0	SAA		
	9	5-8 9-12	45-47	24/20	0	SAA		
50	10	13-23 20-21	50-52	24/24	0	Brown med-fine sand, little silt, slightly cohesive moist		10:40, switch to a 10 ft. sample interval per discuss w/ DEC
						Note- Drilling through Cobbles at apx. 55 to 60 ft.		
60								
	11	26-28 58-Ref.	55-57	20/20	0	Brown fine sand with silt, slightly cohesive, moist (some gravel)		

NY-1

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BORING NUMBER: MW-5

Log of Boring

Depth (feet)	Samp. No.	Blows per 6" lbs.	Sample Interval	Adv./ Recov.	Org. Vap. (PPM)	Sample Description	Strata Change	Remarks (Time of Day)
70								10/29/97
80	12	10-19 24-22	75-77	24/20	0	Brown fine sand, with silt slightly cohesive, some gravel moist.		12:42
90	13	26-36 58-Ref.	85-87	24/20	0	Brown-Tan med.-coarse sands, interlayered w/ fine silty sands (VARVE) (0.5-0.1 cm) cohesive, moist		
100	14	12-23 36-42	95-97	24/20	0	Brown very fine sand and silt (95-96) Coarse white sands, loose, little gravel moist		
110	15	15-28 44-50	105-107	24/20	0	White med. sand, some gravel, loose moist		End at 17:00
120	16	13-38- 64-54	115-117	24/16	0	med coarse sands, little gravel, loose, moist (well sorted)		10/30/97 8:20
130	17	22-23 23-35	125-127	24/20	0	SAA		
140	18	7-23 33-33	135-137	24/24	0	SAA		
150	19	7-19 31-42	145-147	24/20	0	SAA		12:30 - SJB uses "Rigged" Down Hole Hammer to collect Split Spoons, Speeds up process but blow counts cannot be accurately recorded.
160	20		155-157	24/18	0	SAA - but no gravel		
170	21		165-167	24/20	0	SAA		
180	22		175 177	24/18	0	Tan-white coarse sands and gravel, loose, increase moisture		
190	23		185 187	24/18	0	SAA - wet at 186 ft.		End at 17:20
195	24		190 192	24/18	0	tan med/coarse sands trace gravel, loose, saturated (wet)		16:40 - Attempt Hydropunch 10/31/97
	25		195-197	24/20	0	Brown fine sand and silt, slightly cohesive, no gravel wet		Sample, but cannot recover sample
						End Boring at Appx. 200 ft.		

NY-2

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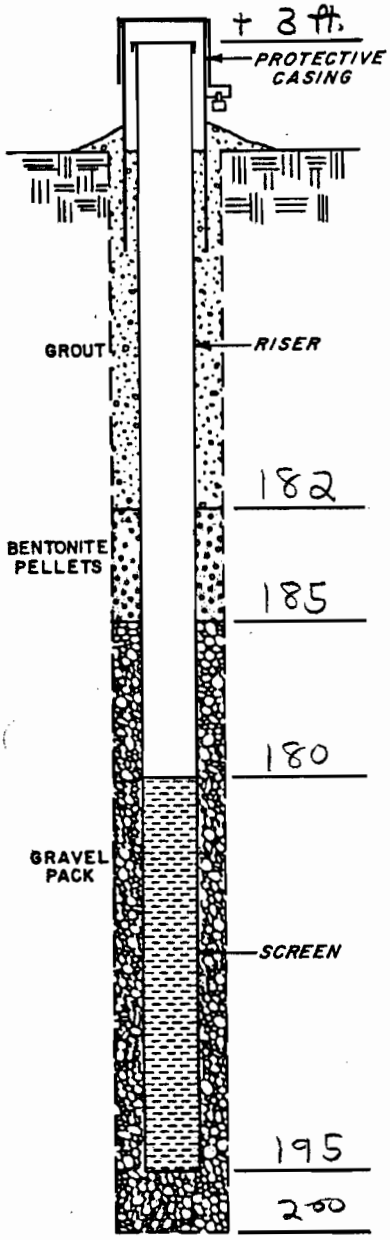
WELL CONSTRUCTION SUMMARY

Project: Lawrence Aviation Client: NYSDEC Well No: MW-5



DRILLING SUMMARY

Drilling Co: SJB Services Drillers: Mike Davidson

Drill Rig Make/Model: CME-85

Borehole Diameters: 9 5/8" Drilling Fluid: N/A

Bits/Depths: 6 1/4" HSA - 200 ft.

Total Depth: 200 ft. Depth to Water: Apx. 187

Supervisory Geologist: T. Fox

WELL DESIGN

Casing Material: PVC Diameter: 4" Length: 180 ft.

Screen Material: PVC Diameter: 4" Length: 15 ft.

Slot Size: 10 Setting: 180-195 ft.

Filter Material: #1 Morie Sand Setting: 185-197 ft.

Seals Material: Bentonite Setting: 182-185 ft.

Grout: Bentonite Setting: 182 - Surface ft.

Surface Casing Material: Steel Setting: Stick up

TIME LOG	Started	Completed
Drilling:	10/28/97	10/31/97
Installation:	11/4/97	11/7/97
Development:	12/2/97	12/2/97

WELL DEVELOPMENT

Method: 3-in Submersible Pump

Static Depth to Water: 187.60 ft.

Pumping Depth to Water: 187.70

Pumping Rate: 8 gpm Specific Capacity: Apx. 11 gpm/ft. drawd

Volume Pumped: Apx. 520 gallons

NY-5