October 11, 2007

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| PROJECT: | RAC II Contract No.: 68-W-98-210<br>Work Assignment: 173-RDRD-02PF |
| DOC. CONTROL NO.: | 3223-173-PP-WKPN-06894 |
| SUBJECT: | Final Work Plan, Volume I<br>Lawrence Aviation Industries Site<br>Remedial Design<br>Port Jefferson Station, New York |

Dear Mr. Rosado and Mr. Badalamenti:

CDM Federal Programs Corporation (CDM) is pleased to submit this Final Work Plan Volume I for the Remedial Design (RD) for the Lawrence Aviation Industries Site in Port Jefferson Station, New York.

If you have any comments concerning this submittal, please contact me or Mr. Demetrios Klerides at (212) 785-9123.

Very truly yours,
CDM FEDERAL PROGRAMS CORPORATION

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RAC II Document Control

**RESPONSE ACTION CONTRACT**
**FOR REMEDIAL RESPONSE, ENFORCEMENT OVERSIGHT,**
**CRITICAL REMOVAL ACTIVITIES AT SITES OF RELEASE OR**
**THREATENED RELEASE OF HAZARDOUS SUBSTANCES**
**IN EPA REGION 2**

# FINAL WORK PLAN
# VOLUME I

# LAWRENCE AVIATION INDUSTRIES SITE
# REMEDIAL DESIGN
# PORT JEFFERSON STATION, NEW YORK

**Work Assignment No. 173-RDRD-02PF**

**U.S. EPA CONTRACT NO. 68-W-98-210**
**Document Control No.: 3223-173-PP-WKPN-06894**
**October 11, 2007**

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FOR REMEDIAL RESPONSE, ENFORCEMENT OVERSIGHT,
CRITICAL REMOVAL ACTIVITIES AT SITES OF RELEASE OR
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**REMEDIAL DESIGN
LAWRENCE AVIATION INDUSTRIES SITE
PORT JEFFERSON STATION, NEW YORK
Work Assignment No. 173-RDRD-02PF**

**FINAL WORK PLAN
VOLUME I**

**U.S. EPA CONTRACT NO. 68-W-98-210
Document Control No.: 3223-173-PP-WKPN-06894
October 11, 2007**

Prepared by: ______________________________ Date: ______________
Demetrios Klerides, P.E.
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# Section 1
# Introduction

CDM Federal Programs Corporation (CDM) received Work Assignment 173-RDRD-02PF under the Response Action Contract (RAC) II to prepare a Remedial Design (RD) for the United States Environmental Protection Agency (EPA), Region 2 at the Lawrence Aviation Industries, Inc. (LAI) Site (the site) located in Port Jefferson Station, New York. The purpose of this work assignment is to develop the final plans and specifications, general technical provisions, and special requirements necessary to convert the Record of Decision (ROD) into the remedy to be implemented and constructed as the remedial action (RA). The RD will comprise the basis for the RA to achieve the remediation goals specified in the ROD.

Acronyms are defined in Section 9. For presentation purposes, work plan figures and tables are presented at the end of Volume I.

## 1.1 Overview of the Problem

The overview of the LAI site is summarized from the Remedial Investigation (RI) Report (CDM 2006a) and the Feasibility Study (FS) report (CDM 2006b) and ROD (EPA 2006). Additional site history and background information are included in Section 2.

The site (Superfund site number NYD002041531) covers approximately 126 acres in Port Jefferson Station, New York. The site includes LAI's active manufacturing plant (referred to as the "LAI facility"), covering approximately 40 acres, which historically produced titanium sheeting for the aeronautics industry. Approximately 80 acres located to the northeast and east of the LAI facility are referred to as the "Outlying Parcels," which are vacant, wooded areas that are part of the LAI site. The site also includes a downgradient contaminated groundwater plume to the north of the LAI facility, within a primarily residential area.

Investigations in the site vicinity suggest that releases of hazardous substances from the facility have affected site soils, groundwater, surface water and sediment downgradient of the site. Human health risks associated with using groundwater for future LAI facility and Outlying Parcels residents are above the EPA acceptable range. Surface water in Old Mill Creek and Old Mill Pond, due to cis-1,2-dichloroethene (cis-1,2-DCE), and on-site soils, due to polychlorinated biphenyls (PCBs), have the potential to cause ecologically adverse effects.

In September 2006, EPA issued the ROD, specifying the following:

- The removal and off-site disposal of approximately 2,000 cubic yards (CY) of surface soils and 25 CY of catch basin sediments at the LAI facility exhibiting PCB concentrations greater than 1,000 micrograms per kilogram (µg/kg)
- The installation of a groundwater extraction and treatment system at the LAI facility, with treated groundwater discharged to an onsite recharge basin
- The installation of a groundwater extraction and treatment system within the plume area near Old Mill Pond, with treated groundwater discharged to Old Mill Creek and potentially Old Mill Pond

- The application of in-situ chemical oxidation (ISCO) technology as an initial enhancement within the area of high trichloroethene (TCE) concentration at the LAI facility

The statement of work (SOW) issued by EPA and this work plan cover only the pre-design and design activities to support the design and installation of the groundwater treatment system at the LAI facility, the application of ISCO at the LAI facility, and the investigation to further refine the potential source area at the LAI facility and refine the boundaries of the groundwater plume.

## 1.2 Approach to the Development of the Work Plan

CDM reviewed all available information on the LAI site prior to formulating the scope of work presented in this work plan. Section 8 provides a list of all documents reviewed and referenced during development of the work plan. The RD for this site will include a pre-design investigation, a treatability study, the preparation of design specifications and drawings, and the basis of design report.

The pre-design investigation at the LAI facility will include the advancement of soil borings within the area of highest detected contaminant concentrations in groundwater to further investigate for the presence of subsurface source(s) which could contribute to the groundwater plume. The pre-design investigation will also include installation of additional monitoring wells to refine the boundaries of the groundwater plume and an aquifer test to provide data on the aquifer properties.

The treatability study will be performed to evaluate the applicability of chemical oxidants in remediating the site groundwater, and to provide data to be used for the design the full-scale ISCO remedy.

Design drawings and specifications will be prepared for the ISCO treatment and installation of a groundwater extraction and treatment system at the LAI facility which will prevent contaminated groundwater from migrating off-site. The groundwater treatment system is expected to include measures to equalize influent flow, filter particulates, remove contaminants from groundwater via air stripping, and contingent treatment of offgas. Treated groundwater will be discharged to a new recharge basin to be located at the southeast corner of the LAI facility.

## 1.3 Work Plan Content

This work plan contains nine sections, as described below.

Section 1 Introduction - The introductory section lays out the approach to and the format of the work plan.

Section 2 Site Background and Setting - This section describes the site background, including the current understanding of the location, history, and existing conditions at the site.

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| Section 3 | Physical Setting - This section presents a review and evaluation of existing data, including a description of previous sampling results, site geology and hydrogeology, the current conceptual site model (CSM), and a summary of the remedy as defined within the ROD. |
| Section 4 | Work Plan Rationale - This section includes the Data Quality Objectives (DQOs) for the RD investigation and the approach for preparing the work plan to satisfy the DQOs. |
| Section 5 | Task Plans - This section presents a discussion of each task of the RD in accordance with the RAC II SOW for RD for the LAI site and discussions with EPA. |
| Section 6 | Schedule - The project schedule is presented in this section. |
| Section 7 | Project Management Approach - Project management considerations that define relationships and responsibilities for selected task and project management teams are described. |
| Section 8 | References - The references used to develop material presented in this work plan are listed in this section. |
| Section 9 | Glossary of Abbreviations - The acronyms and abbreviations used in the work plan are defined in this section. |

# Section 2
# Site Background and Setting

The information below briefly summarizes the characteristics of the site that are relevant to the pre-design investigation and the design of the onsite groundwater remedy. For greater detail concerning the physical characteristics, demographics, site history, and nature and extent of contamination, please refer to the Outlying Parcels Technical Memorandum (CDM 2004a), Final Technical Memorandum (CDM 2004b), and Final Remedial Investigation Report (CDM 2006a) The RI documented a chlorinated volatile organic compound (VOC) plume originating at the LAI site and identified PCB contaminated soil at the site.

## 2.1 Site Location and Description

The site is located in Port Jefferson Station, Suffolk County, New York (Figure 2-1). The LAI site encompasses approximately 126 acres and consists of the LAI facility and the LAI Outlying Parcels, the wooded areas located east and northeast of the LAI facility (Figure 2-2). The Long Island Railroad 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 a residential area with single family houses. The Village of Port Jefferson and Port Jefferson Harbor, an embayment of Long Island Sound, lie approximately one mile to the north.

The LAI facility, approximately 40 acres in size, is an active manufacturer of titanium sheeting for the aeronautics industry. The LAI facility consists of 10 buildings located in the southwestern portion of the property. An abandoned, unlined earthen lagoon which formerly received liquid wastes lies west of the buildings, and a former drum crushing area is situated south of the buildings. Figure 2-3 provides the layout of the LAI facility.

## 2.2 Site History

The section of the property currently occupied by LAI was previously a turkey farm owned by LAI's corporate predecessor, Ledkote Products Co. of New York (Ledkote). Originally located in Brooklyn, New York, Ledkote produced items that included lead gutters and spouts for roof drains. When the company moved to Port Jefferson Station in 1951, all the existing equipment and material from the original manufacturing processes was transferred to the new location. In 1959, Ledkote changed its name to Lawrence Aviation Industries, Inc. From approximately 1959 to the present, the LAI facility has manufactured products from titanium sheet metal, including golf clubs and products for the aeronautics industry.

Federal, State and local regulatory bodies have investigated the facility since the 1970s. Past disposal practices have resulted in a variety of contaminant releases including TCE, tetrachloroethene (PCE), acid wastes, oils, sludge, metals, and other plant wastes. Previous investigations indicated that releases of hazardous substances from the facility have affected site soils and groundwater, surface water and sediment downgradient of the site.

### 2.2.1 Previous Investigations and Regulatory Activity

Several Suffolk County and New York State investigations concerning contamination of the LAI site were conducted during the 1970s and 1980s. In 1970, the Suffolk County Department of Health Services (SCDHS) collected an aqueous sample from within a sump at the facility and determined that its contents exceeded permissible discharge limits for pH, hexavalent chromium (Cr+6) and nitrates. Further inspections by the SCDHS (SCDHS 1981) and the Brookhaven Department of Environmental Protection (BHDEP) found that adjacent residential wells were contaminated with fluoride, nitrates, TCE, 1,1-dichloroethylene, cis-1,2-DCE, PCE, and heavy metals. In conjunction with the SCDHS, the New York State Department of Environmental Conservation (NYSDEC) also investigated the site during the 1980s. Samples of surface liquids collected between 1982 and 1985 by SCDHS from sumps, puddles, laboratory cesspools, and surficial runoff exhibited high concentrations of fluoride, toluene, carbon tetrachloride, and heavy metals.

Additional SCDHS and NYSDEC site visits documented other potential environmental concerns at the LAI site. These concerns included a battery storage pile, a construction and demolition debris landfill, and pits used for the routine disposal of degreasing solvents, lubricating oils, and heavy equipment insulating oils. The disposal pits reportedly were six to eight feet deep and often were covered with soil to hide their contents. In addition, it was reported that approximately 100 drums were buried about 15 feet deep at the northeast section of the plant. Another dump reportedly existed on the east side of the facility buildings.

Groundwater samples collected in 1987 from four private wells downgradient of the site exhibited the presence of TCE, PCE, and dichloroethene (DCE). In 1991, the NYSDEC Region 1 Resource Conservation and Recovery Act (RCRA) Hazardous Substance Group oversaw a major drum removal action. Between July 1991 and March 1992, nine test wells were installed downgradient and five wells were installed crossgradient (northwest) of the LAI site by the SCDHS.

In 1997, NYSDEC contracted CDM to perform a remedial investigation/feasibility study (RI/FS) at the site under the NYSDEC State superfund program. Once LAI withdrew access, NYSDEC decided to pursue a preliminary RI along the site perimeter until site access could be achieved via legal means. In the interim, NYSDEC referred the LAI site to the National Priorities List (NPL). During the preliminary RI, CDM installed three monitoring wells, advanced one deep boring and three shallow Geoprobe borings on the New York State Department of Transportation (NYSDOT) easement, and collected groundwater samples from the three newly installed wells and two previously installed SCDHS wells. Associated activities included an ecological assessment and a cultural resources survey.

The site was eventually accepted on the NPL. At that point in time, CDM was directed by NYSDEC to write the preliminary RI report to document NYSDEC actions (CDM 2000). EPA prepared a hazard ranking system (HRS) report and proposed the site for inclusion on the NPL on October 22, 1999 (Weston 1999). The site was listed on March 6, 2000.

In April 2003, NYSDEC performed a multimedia inspection of the LAI site and found violations of air, soil, solid waste, chemical bulk storage, and hazardous waste regulations. LAI was ordered to cease production until all violations were resolved.

In March and April 2004, EPA's Emergency Response and Removal Section (ERRS) unstacked and restaged approximately 1,300 drums/containers/cylinders containing various flammable solids, acids, bases, gas cylinders and unknowns. A total of 1,205 samples of the various contents were collected for onsite hazardous categorization analysis. ERRS also inventoried the onsite laboratory area and identified at least 390 containers. The drums and containers were disposed at an off-site facility in October and November 2004.

An RI/FS of the site soils and groundwater was performed from August 2003 to May 2005. The RI included soil and groundwater screening, surface water and sediment sampling, soil sampling, and multiport monitoring well installation and sampling. The results of these investigations are presented in the Outlying Parcels Technical Memorandum (CDM 2004a), Final Technical Memorandum (CDM 2004b), and RI Report (CDM 2006a) The RI documented a chlorinated VOC plume originating at the LAI site and identified PCB-contaminated soil at the site. The FS Report presented remedial alternatives for groundwater, soil, surface water and sediment; it was completed in July 2006 (CDM 2006b). The ROD was signed on September 29, 2006.

## 2.3 Current Conditions

LAI is an active facility, currently engaged in the manufacture of titanium sheeting for the aeronautics industry, although plant operations have been scaled down and the plant is operating well below its capacity.

CDM and EPA performed a site visit on June 19, 2007 to identify sampling locations to support development of the RD work plan. There was no activity at the plant during the site visit. Overall, conditions at the site were similar to those reported in the RI Report (CDM 2006a). Piles of soil covered with plastic tarpaulins were observed at the site. An LAI representative reported that the soil was derived from underground storage tank (UST) cleanup activities. An excavation, reportedly associated with the UST cleanup, was observed adjacent to monitoring well MPW-07.

# Section 3
# Physical Setting

This section summarizes the physical characteristics of the study area that are relevant to the RD elements in this Work Plan. A more detailed discussion of the physical characteristics of the site, including the topography, drainage and surface water characteristics, regional and site-specific geology and hydrogeology, climate, population, and land use can be found in the RI Report (CDM 2006a).

## 3.1 Geological and Hydrogeological Characteristics

The following sections summarize the regional and site-specific geology and hydrogeology that are relevant to the pre-design investigation and the RD at the LAI facility. Complete discussions of the regional and site-specific geology and hydrogeology are presented in the RI Report (CDM 2006a).

### 3.1.1 Regional Geology and Hydrogeology

<u>Pleistocene Deposits</u>: Within the study area, the Pleistocene deposits include three depositional sequences: the fluvial Jameco Gravel and marine Gardiners Clay (both of which are of post-Mannetto age); and the Late Pleistocene glacial deposits of the Wisconsin glacial stage. Undifferentiated gravels and clays described in buried valleys within northern Long Island have been attributed to the Jameco Gravel and Gardiners Clay units. The Jameco Gravel and Gardiners Clay formations are well-defined, mappable, stratigraphic units beneath the southern margin of Long Island where they are of hydrogeological significance; these lithological units have not been defined within the Port Jefferson area. However, Lubke (1964) collectively refers to these deposits as Undifferentiated Pleistocene Deposits. The remainder of the Pleistocene succession belongs to the Wisconsin glacial stage and is called the Upper Glacial Deposits.

The total thickness of the Pleistocene deposits in northwestern Suffolk County ranges from zero to more than 650 feet, but averages 200 feet. The thickness and distribution of the Pleistocene Upper Glacial Deposits were controlled by the older, now buried, paleotopography of the underlying Magothy Formation.

The Pleistocene Upper Glacial Deposits in the Port Jefferson area include (Lubke 1964):

- At least one and possibly two sheets of glacial till deposited as ground moraine by continental ice
- Ice contact deposits within the Harbor Hill terminal moraine
- A considerable thickness of glaciofluvial deposits laid down by meltwater streams on outwash plains and spillways during the advance, stagnation, and recession of the ice
- Discontinuous bodies of silt and clay deposited in glacial lakes

The Upper Glacial Deposits predominantly are composed of brown or gray stratified sand and gravel, although thick layers of non-marine silt and clay occur in buried valleys, and a thin surficial mantle of unstratified glacial till is common on the upland area terminal moraines. The sands and gravels are quartz-rich but also contain igneous and metamorphic lithoclasts and heavy minerals.

Smithtown Clay Unit: The Smithtown Clay Unit (informal usage) is an extensive clay unit identified in several wells in northwestern Suffolk County (Lubke 1964; Krulikas and Koszalka 1983; Koszalka 1984). The clay unit was probably deposited in a large post glacial lake or series of lakes in the intermorainal area between the Harbor Hill moraine to the north, and the Ronkonkoma moraine to the south, during wasting of the Ronkonkoma ice sheet in the Upper Pleistocene.

Geologic data to define the northern extent and thickness of the clay are lacking. Existing well data suggest the surface of the clay unit dips gradually to the north or northwest beneath the LAI site. The Smithtown Clay Unit is composed of brown or gray variegated clay, but locally lenses of sand and sandy gravel are found. The thickness is variable and ranges from a few tens of feet to 200 feet. The clay unit generally is over 50 feet thick over a relatively large part of northern Suffolk County, but is over 100 feet just north of the Ronkonkoma moraine and just south of the Harbor Hill moraine in the town of Brookhaven, and over 150 feet thick in northern Smithtown.

The Harbor Hill terminal moraine, which runs through the LAI site, is mantled with less than 10 feet of glacial till which represents the ground moraine of the Harbor Hill ice deposited during glacial re-advance. A second, older till sheet associated with the Ronkonkoma ice may be found below glacial outwash sands and gravels, beneath the Harbor Hill till deposits.

Hydrogeology: Nine major hydrogeologic units have been identified beneath Long Island. From youngest to oldest they are:

- Upper Glacial aquifer
- Smithtown Clay
- Gardiners Clay
- Jameco aquifer
- Monmouth greensand
- Magothy aquifer
- Raritan Clay
- Lloyd aquifer
- Bedrock

The Monmouth greensand, Jameco aquifer, and the Gardiners Clay have not been identified within the Port Jefferson area. The Lloyd aquifer unit is a confined aquifer underlying the entire island. The Magothy and Upper Glacial aquifers overlie the Raritan Clay and are found across most of Long Island and can be confined, semi-confined, and unconfined aquifers. Combined, they are the most productive and heavily utilized groundwater resource on Long Island.

The shallow unconfined water table aquifer over most of Long Island is within the Upper Glacial aquifer unit. In general, water north of the regional groundwater divide, which trends east-west along the island, moves northward towards Long Island Sound, and water south of the divide flows southward toward the Atlantic

Ocean. The rate of horizontal flow in the Upper Glacial aquifer is controlled by the hydraulic gradient of the water table and by the water-transmitting characteristics of the aquifer material.

### 3.1.2 Site-Specific Geology and Hydrogeology

Site-specific geologic data was obtained from literature review, three stratigraphic borings, the deep exterior soil borings (SBD) and multiport monitoring wells (MPW) installed at the LAI facility, south of the facility and between the facility and Port Jefferson Harbor.

Three aquifers are present beneath the LAI site: the Upper Glacial aquifer, the Magothy aquifer and the Lloyd sand member of the Raritan Formation (Koszalka 1984). The Magothy and underlying Lloyd Sand Aquifers are separated by the Raritan Clay member of the Raritan Formation. Consequently, water is interchanged much more readily between the Upper Glacial and Magothy aquifers than between the Magothy and Lloyd aquifers. The presence of the virtually impermeable Raritan Clay, directly underlying the Magothy aquifer, is the lower boundary of the upper flow system.

Magothy Formation: The Magothy aquifer consists of Upper Cretaceous Magothy deposits to the top of the confining clay unit of the Raritan Formation. The aquifer is wedge shaped, and thickens progressively towards the south and southeast. The top of the aquifer is irregular and may be marked by discontinuous clay bodies within the deposits of the Pliocene-Pleistocene succession, Smithtown Clay Unit, or Magothy Formation.

Upper Glacial Aquifer: Cross section A-A′ (Figure 3-1) shows the extent and lithology of the Upper Glacial Aquifer underlying the LAI Facility. Figure 3-2 shows the location of the cross sections and includes historical source areas identified in the HRS (Weston 1999).

The LAI facility itself is directly underlain by the Pleistocene-age Harbor Hill moraine which is up to 70 feet thick and composed primarily of sand and gravel with occasional lenses of silty sand and silt. The moraine deposits thin to the south, and to the north. At the LAI facility, the moraine deposits are underlain by a silt layer. Beneath this silt unit at the LAI facility, and to the north of the facility, a gravel-rich layer is present which extends to a depth of 140 to 145 feet. This unit thins to the north and is absent at location MPW-06.

Well MPW-06 is near the base of a tunnel valley which was formed during the Pleistocene by glacial melt water. Glacial melt water flowed to the south, out from under the glacier which was located to the north of present day Port Jefferson. This flow eroded the Magothy and overlying glacial deposits, including the gravel-rich layer, and deposited this material to the south. This valley was not formed by stream flow to the north and erosion and there are no perennial streams in the valley today.

Cross section B-B′ is shown on Figure 3-3. This cross section was prepared along an east-west axis parallel to Sheep Pasture Road, covering the area north of the beginning of the tunnel valley. This cross section shows a similar lithology to that observed in cross section A-A′. Importantly, this cross section also shows the Smithtown Clay in the depth range of 135 to 145 feet below ground surface (bgs) in the MPW-03 and MPW-04 borings. The unit appears to be relatively thin and discontinuous.

Groundwater Flow: The water level elevation data from these cross sections were used to prepare a potentiometric surface map for the Upper Glacial aquifer at the LAI site and north of the site to the Village of Port Jefferson. The March 2005 potentiometric surface map is shown on Figure 3-4. These maps show that groundwater flow in the vicinity of the LAI facility is to the north towards Port Jefferson Harbor.

Estimates of Hydraulic Conductivity and Transmissivity: CDM performed a series of packer tests at the site to estimate hydraulic conductivity and transmissivity. Tests were performed at MPW-07, located at the LAI facility, MPW-10 located approximately 1,700 feet downgradient of the LAI facility, and at MPW-09, near Port Jefferson Harbor. Using several different analytical methods, hydraulic conductivity values were calculated to range from <0.02 foot/day to 89 feet/day, and transmissivity estimates to range from 12 to 22,219 gallons per day/foot (or 2 to 2,973 $feet^2$/day). Lithologic logs indicate that the saturated portion of the Upper Glacial and Magothy aquifers at the site, where the multiport wells were screened, generally consisted of a layer of fine to medium sand overlying a silty sand layer.

In general, the values measured during packer testing are lower than published values for these aquifers. It is likely that the difference in measured and published values is a result of several factors, which include the volume of aquifer material tested and the limitations of conducting single well tests. The results of packer testing represent the hydraulic properties of the portion of aquifer material that surrounds the selected test zones. It is expected that the range in values would be greater when the hydraulic properties of individual intervals are tested separately as compared to a long term aquifer test.

## 3.2 Summary of the Nature and Extent of Contamination

This section summarized the nature and extent of contamination at the site as characterized by the RI. For a more complete discussion of the nature and extent of contamination at the site, see the RI Report (CDM 2006a).

### 3.2.1 Summary of Soil Contamination

Metals at concentrations exceeding delineation criteria are widely distributed in exterior and sub-slab soils at the LAI facility and Outlying Parcels. Metals including antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, titanium, vanadium, and zinc were detected at concentrations exceeding delineation criteria which generally decreased with increasing depth in on-site soils. Below 50 feet bgs, all exceedances were at or near the delineation values. VOCs, semi-volatile organic compounds (SVOCs), and PCBs were detected infrequently in soil samples at concentrations exceeding delineation criteria. VOCs, SVOCs, and pesticides were not detected at concentrations exceeding delineation criteria in any of the interior soil boring samples or outlying parcels. In limited areas of the site, PCBs were detected in soil samples at concentrations exceeding delineation criteria and required remediation. These areas of PCB-contaminated soils are currently the subject of a remedial action by EPA.

In accordance with the EPA SOW, this work plan does not include the design of the soil remedy.

### 3.2.2 Summary of Groundwater Contamination

No chlorinated VOCs (including PCE, TCE, DCEs, and vinyl chloride) were detected in existing monitoring wells or residential and public supply wells. PCE and TCE were detected at concentrations exceeding delineation criteria in multiple levels of the majority of multiport monitoring wells, with TCE detected most frequently and at the highest concentrations in shallow groundwater samples collected directly below the facility.

The TCE plume emanates from the vicinity of MPW-02 and MPW-07 and migrates downgradient to the northwest. The TCE plume is shown on Figure 3-4. In the vicinity of multiport well MPW-10, approximately 1,000 feet from the western boundary of the LAI facility, groundwater flow and the TCE plume bend to the north toward Port Jefferson Harbor. There is an upward hydraulic gradient near MPW-09, indicating that contaminated groundwater is moving upward as it moves northward in the vicinity of this well.

No soil samples within the LAI facility were found to be contaminated with chlorinated solvents. However, residual soil contamination might still exist in low permeability zones, serving as sources for groundwater contamination based on the following three considerations: (1) high TCE concentrations in groundwater were detected at the site more than 20 years after releases of free product had stopped, (2) only a limited number of deep borings/monitoring wells have been advanced at the site, as deep drilling and sampling is difficult and costly, and (3) residual soil contamination generally exists in sporadic, thin layers and has only been located at other sites with unique investigative tools and very closely spaced soil borings.

Given the lack of information regarding the timing and nature of releases, the following scenarios are plausible based on the site data:

- High VOC concentrations near MPW-09 are the result of a significant onsite release that occurred in the past and migrated as a slug. Lower contaminant concentrations in the plume center are a result of residual contamination or a continuous, lower-concentration release over time.
- Monitoring wells are located on the edges of the plume and an area of higher contamination may be present between the wells.

### 3.2.3 Summary of Surface Water Contamination

Surface water samples collected from Old Mill Pond and Old Mill Creek contained chlorinated VOCs, primarily TCE, PCE, cis-1,2-DCE, and vinyl chloride, at concentrations exceeding delineation criteria. Samples SW-05 through SW-10 had the highest levels of TCE and PCE and showed evidence of reductive dechlorination of TCE and PCE. VOCs in surface water are related to groundwater discharge to surface water in the Old Mill Pond and Old Mill Creek area. MPW-09 (adjacent to Old Mill Pond) shows similar TCE concentrations and has a strong upward hydraulic gradient. Surface water samples collected from Port Jefferson Harbor did not exceed any delineation criteria.

### 3.2.4 Summary of Sediment Contamination

Sediment samples collected from Old Mill Pond and Old Mill Creek are primarily contaminated with elevated levels of TCE. VOCs in sediments are likely related to the discharge of VOC-contaminated groundwater to the pond and creek. VOCs did not exceed delineation criteria in sediment samples collected from the harbor.

Onsite catch basin sediment samples were primarily contaminated with metals and PCBs. The catch basins receive direct runoff from the LAI facility. Points of discharge for the catch basin system are uncertain, but based on observations during sampling, some of the basins have apparently been disconnected from the system.

In accordance with the EPA SOW, this work plan does not include design of the sediment remedy.

## 3.3 Conceptual Site Model

The CSM integrates the different types of information collected during the RI into a coherent generalized model of contaminant distribution and migration at the site. The CSM summarized below emphasizes the components relevant to this RD work plan. A complete discussion of the CSM is presented in the RI Report (CDM 2006a). A schematic diagram of the CSM is shown in Figure 3-5.

### 3.3.1 Physical Setting and Groundwater Movement

The LAI facility sits atop the Harbor Hill moraine at an elevation of about 225 feet above mean sea level (msl) while Port Jefferson harbor is located to the north at an elevation close to sea level. In the site vicinity groundwater in the Upper Glacial and Magothy aquifers flows north toward Long Island Sound. The potentiometric surface of the Magothy aquifer in the site's vicinity is similar to that of the water table in the Upper Glacial aquifer when pumping wells are off. However, heads in the Magothy are generally several feet lower than the Upper Glacial water table aquifer. Groundwater flow in the Magothy aquifer generally is horizontal, as with the shallow aquifer. Water level data from the multiport wells is consistent with the general groundwater flow characteristics cited above. Potentiometric data indicate a downward hydraulic gradient beneath the LAI facility. Groundwater in this area moves downward through the sediments as it moves laterally to the north.

### 3.3.2 Groundwater Contamination and Movement

Site contaminants released to the soil surface would be expected to infiltrate into the soil and move primarily downward, through the unsaturated zone. Chlorinated solvents such as PCE and TCE can move downward in the undissolved phase or dissolved in precipitation-derived water. When the undissolved solvents reach the groundwater they dissolve in the groundwater and move in the direction of groundwater flow. Based on the RI data, there is no evidence that undissolved solvent is present below the LAI facility. The highest concentration of TCE (1,200 micrograms per liter [µg/L]) was detected in the shallowest sample interval of a monitoring well on the LAI facility.

The dissolved VOC plume is moving north from the facility towards Port Jefferson Harbor. The highest concentrations of VOCs occur at the southwest portion of the LAI facility. VOC concentrations generally decrease as the plume moves north and increase again near Old Mill Pond and Port Jefferson Harbor. The plume moves toward the surface under a significant upward hydrologic gradient in this area, resulting in VOCs being discharged to Old Mill Pond and Old Mill Stream.

This plume configuration may be related to the manner in which the release occurred (i.e., as a slug) or to the location of the monitoring wells relative to the centerline of the plume. Lower contaminant concentrations in the plume center are a result of residual contamination or a continuous, lower-concentration release over time. Monitoring wells are located on the edges of the plume and an area of higher contamination may be present between the wells.

Chlorinated VOCs such as TCE and PCE can be attenuated through a microbially-mediated anaerobic degradation process known as reductive dechlorination. Evidence that reductive dechlorination is occurring at the site is limited. A common by-product of the process, cis-1,2-DCE, was detected only in one multiport well (MPW-09), located near Port Jefferson Harbor. Although reducing conditions are present in a number of the multiport wells (MPW-03 and MPW-05), typical degradation products were not found. Thus, significant attenuation of the plume is not expected to occur as a result of the reductive dechlorination process.

## 3.4 Summary of ROD Requirements

This section summarizes the site ROD, which specifies the remedy that was selected by EPA in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The selected remedy addresses soil and groundwater contamination at the site. Although surface water and sediments at Old Mill Pond and Old Mill Creek have been contaminated via discharge of groundwater to these surface water bodies, it is expected that by remediating the groundwater source of contamination, the contamination levels in the surface water and sediments will also be reduced and ultimately eliminated.

### 3.4.1 Soil

The ROD specifies that the selected soil remedy is Soil Alternative S2 - Excavation, Off-site Disposal, and Backfill, which involves the removal of surface soils at the site exhibiting contaminant concentrations above the Preliminary Remediation Goals (PRGs) of 1,000 µg/kg for PCBs (the New York State TAGM Soil Cleanup Objective) will be transported off-site and disposed of at an appropriate facility. The estimated quantity to be excavated includes approximately 2,000 CY of surface soils and 25 CY of catch basin sediments at the LAI facility, for a total excavation volume of 2,025 CY. The major components of the soil remedy include:

- A pre-design investigation to further delineate the extent of on-site surface soil contamination
- Excavation of on-site LAI facility soils exceeding the PRGs
- Post-excavation sampling to verify achievement of soil cleanup objectives
- Disposal of excavated soils at off-site facilities
- Backfilling of excavated areas with clean fill
- Institutional controls consisting of an environmental easement/restrictive covenant filed in the property records of Suffolk County that will limit the use of the active industrial area to commercial and/or industrial uses only
- Evaluation of additional catch basins and removal of catch basin sediments
- Evaluation of approximately 30 electrical transformers for leakage of PCBs with subsequent remedial actions if cleanup objectives are exceeded

### 3.4.2 Groundwater

The ROD specifies that the selected groundwater remedy to address the TCE and PCE contaminated plume is Groundwater Alternative GW3 - Option 3: Groundwater Extraction/Treatment/Chemical Oxidation Enhancement/Surface Recharge or Surface Water Discharge/Institutional Controls/Long-term Monitoring. The major components of the groundwater remedy are:

- Installation of groundwater extraction and treatment systems both at the LAI facility and within the plume area near Old Mill Pond
- ISCO applied as an initial enhancement within the area of high TCE concentrations in groundwater at the LAI facility in order to potentially reduce the overall groundwater cleanup time
- Imposition of institutional and engineering controls
- Development of a Site Management Plan (SMP)
- Long-term groundwater and surface water monitoring to provide an understanding of changes in contaminant concentrations and distribution over time
- Periodic site reviews at a frequency of no less than every five years
- An investigation of vapor intrusion into structures within the groundwater plume area, with implementation of an appropriate remedy (such as subslab ventilation systems) if required

**Pre-design Investigation**

At the LAI facility, additional borings will be conducted within the area of highest groundwater concentrations to further investigate for the presence of subsurface source soil contamination that could contribute to the groundwater plume. Additional data will be collected in the area between Old Mill Pond and Port Jefferson Harbor to better define hydrogeologic conditions and groundwater contamination. Based on the selected location of the Old Mill Pond facility, a Coastal Zone Consistency Assessment, floodplain assessment and wetlands assessment may also be required.

**Groundwater Modeling**

Three-dimensional (3-D) groundwater modeling will be performed by EPA as part of the pre-design investigation and RD to determine the number and location of extraction wells, extraction well pumping rates, potential salt water intrusion impacts, groundwater discharge alternatives, and other required design parameters.

**Groundwater Extraction and Treatment Systems**

Groundwater extraction and treatment systems will be installed both at the LAI facility and within the plume area near Old Mill Pond. The groundwater extraction and treatment system at the LAI facility will prevent contaminated groundwater from migrating off-site, and the Old Mill Pond facility will be constructed to establish hydraulic control of the plume. The groundwater treatment systems will consist of the following components:

- Influent flow equalization
- Green sand or bag filtration
- Air stripping
- Offgas treatment, if required

At the LAI facility, treated groundwater will be discharged to a new recharge basin to be located at the southeast corner of the facility. At the Old Mill Pond facility, treated water will be discharged to Old Mill Creek and/or Old Mill Pond. Effluent samples will be collected to verify compliance with the required State Pollution Discharge Elimination System (SPDES) permits. Results from long-term groundwater monitoring will be used to evaluate the treatment facility performance and to adjust operating parameters, as necessary.

**Institutional and Engineering Controls**

An environmental easement/restrictive covenant will be filed in the property records of Suffolk County that will, at a minimum, require:

- Restriction of new construction at the site unless an evaluation of the potential for vapor intrusion is conducted and mitigation, if necessary, is performed in compliance with an EPA approved SMP
- Restriction of the use of groundwater as a source of potable or process water unless groundwater quality standards are met

Engineering controls will consist of fencing or signage at Old Mill Pond and Old Mill Creek to prevent future use of and dermal contact with contaminated surface water.

A SMP will be developed to provide for the proper management of all post-construction site components that relate to maintenance of the institutional and engineering controls.

### 3.4.3 Remedial Design Requirements

The RD will comprise the basis for the remedial action to achieve the remediation goals specified in the site ROD. The RD SOW, dated May 30, 2007, upon which this Work Plan is based, covers only the ROD requirements involving the pre-design and design activities for:

- The groundwater extraction and treatment system at the LAI facility
- Application of ISCO at the LAI facility
- Additional investigation to further refine the extent of the groundwater plume and the source area at the LAI facility

The design and implementation of the soil remedy at the LAI facility and the groundwater treatment system near Old Mill Pond will be conducted by EPA Region 2 ERRS Removal Action Branch.

# Section 4
# Work Plan Rationale

## 4.1 Data Quality Objectives

DQOs are qualitative and quantitative statements which specify the quality of data required to support decisions regarding remedial response activities. DQOs are based on the end uses of the data collected. The data quality and level of analytical documentation necessary for a given set of samples will vary, depending on the intended use of the data.

Sampling data will be collected to obtain information necessary for siting and design of the treatment facility building foundation, the extraction well system, the recharge basin, and the groundwater treatment system at the LAI facility, including the evaluation of the applicability of chemical oxidants to site remediation. The intended uses of these data dictate the data confidence levels. The guidance document *Guidance for the Data Quality Objectives Process* (EPA 2000) was used in the planning process to determine the appropriate analytical levels necessary to obtain the required confidence levels. The levels of data required for this project are discussed in Table 4-1.

The applicability of these levels of data will be further specified in the Quality Assurance Project Plan (QAPP). Sampling and analytical data quality indicators (DQIs) such as precision, accuracy, representativeness, comparability, completeness, and sensitivity will also be defined in the QAPP.

## 4.2 Work Plan Approach

### 4.2.1 Development of the Technical Approach

CDM has developed the technical approach in accordance with the EPA SOW, the ROD issued September 29, 2006, the RD/RA Handbook (EPA 1995), and other relevant EPA RD guidance.

CDM reviewed all available information on the LAI site prior to formulating the scope of work presented in this work plan. Section 8 provides a list of all documents reviewed and referenced during development of the work plan. The RD for this site will include a pre-design investigation, a treatability study, and the preparation of design specifications and drawings. EPA's comments on the draft work plan have been incorporated into this final work plan.

The major elements of the field investigation for the RD include:

- Monitoring well installation including groundwater screening samples at selected screening depths to further refine information on groundwater contamination and to assist in screen placement
- Collection of samples for geotechnical characterization of building and recharge basin areas
- Collection of two rounds of groundwater samples from monitoring wells
- Synoptic water level measurements taken in conjunction with the two rounds of monitoring well sampling

- Aquifer testing with continuous water level monitoring in selected monitoring wells
- Source area subsurface soil sampling at the LAI facility

The treatability study will be performed to evaluate the applicability of chemical oxidants in remediating the site, and to provide data to be used for the design of the full-scale ISCO remedy.

Design drawings and specifications will be prepared for ISCO treatment and the installation of a groundwater extraction and treatment system at the LAI facility which will prevent contaminated groundwater from migrating off-site. The groundwater treatment system is expected to include measures to equalize influent flow, filter particulates, remove contaminants from groundwater via air stripping, and contingent treatment of offgas. Treated groundwater will be discharged to a new recharge basin to be located at the southeast corner of the LAI facility.

A technical scoping meeting was held on June 5, 2007. Input from the technical scoping meeting is incorporated into this work plan.

CDM's technical approach includes elements from EPA's TRIAD approach guidance. The Triad approach is a conceptual and strategic framework that explicitly recognizes the scientific and technical complexities of site characterization, risk estimation, and treatment design. The groundwater screening program employs a dynamic sampling approach intended to focus the sample locations and sample depths on contaminated areas. Data from the previous day's samples will be used to make decisions about subsequent sampling locations and will refine the site CSM as the investigation proceeds. Regular discussions will be held with the EPA remedial project manager (RPM), the site manager (SM), and technical staff regarding the progress of sampling and to modify sample locations and depths. This strategy will ensure placement of subsurface installations at the appropriate location and depth.

### 4.2.2 Anticipated Laboratory Analyses

RAC II field team personnel will collect environmental samples in accordance with the rationale described in Section 5.3 of this work plan. All standard EPA sample collection and handling techniques will be utilized. Routine Analytical Service (RAS) samples will be analyzed in compliance with the Field and Analytical Services Teaming Advisory Committee (FASTAC) Policy. FASTAC procedures will be used to assign laboratories to analyze samples collected during the investigation (see Section 5.4.2).

RAS Contract Laboratory Program (CLP) and Division of Environmental Science and Assessment (DESA) analytical results will be validated by EPA Region 2. CDM will validate all subcontract laboratory data using the protocols specified in CDM's validation Standard Operating Procedure (SOP) which will be attached to the QAPP. CDM will then tabulate and evaluate the data and use it to support the remedial design. All samples will be analyzed using the most current EPA-approved methods. Sampling procedures and specific analytical methods will be detailed in the site-specific QAPP.

The following sample analyses will be conducted.

- **Groundwater Screening Samples**: Target Compound List (TCL) trace VOCs, with 24-hour turn-around for faxed analytical results.

- **Source Area Soil Samples**: Soil samples will be analyzed for TCL VOCs, grain size, and total organic carbon (TOC).

- **Soil Boring Groundwater Screening Samples**: TCL VOCs.

- **Monitoring Well Samples**: Monitoring well samples will be analyzed for TCL trace VOCs, fluoride and titanium.

- **Step Test Samples**: Influent and effluent groundwater samples will be analyzed for TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, Target Analyte List (TAL) inorganics, cyanide, alkalinity, ammonia, chloride, hardness, nitrate/nitrite, ferrous iron, sulfate, pH, total kjehldahl nitrogen (TKN), TOC, total suspended solids (TSS), and total dissolved solids (TDS), with 24 hour turn-around for faxed results.

- **Aquifer Test Samples**: Influent and effluent groundwater samples will be analyzed for TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, TAL inorganics, cyanide, alkalinity, ammonia, chloride, hardness, nitrate/nitrite, ferrous iron, sulfate, pH, TKN, TOC, TSS, and TDS, with 24 hour turn-around for faxed analytical results.

- **Building Foundation Geotechnical Soil Samples**: Soil samples will be analyzed for grain size, moisture content and Atterberg limits.

- **Recharge Basin Soil Samples**: Soil samples will be analyzed for grain size and rigid wall permeability.

- **Bench-scale Treatability Testing Samples**: Soil and groundwater sample analyses for the bench-scale treatability testing are described in Section 5.7.

# Section 5
# Task Plans

This section describes in detail the work to be performed for the RD. The tasks identified in this section correspond to EPA's RD SOW for the site, dated May 30, 2007.

## 5.1 Task 1 - Project Planning and Support

The project planning task involves several subtasks that must be performed in order to execute the RD, which generally include project administration; attending meetings and site visits; performing review and detailed analysis of existing data; preparing the RD work plan, QAPP and health and safety plan (HASP); and procuring and managing subcontractors.

### 5.1.1 Project Administration

The project administration activity involves regular duties performed by the CDM SM and the Program Support Office throughout the duration of this work assignment. CDM will provide the following project administration support in the performance of this work assignment.

The SM will:

- Prepare the technical monthly report
- Review weekly financial reports
- Review and update the project schedule
- Attend quarterly internal RAC II meetings
- Communicate regularly with the EPA RPM
- Prepare staffing plans

The Program Support Office personnel will:

- Review the work assignment technical and financial status
- Review the monthly progress report
- Provide technical resource management
- Review the work assignment budget
- Respond to questions from the EPA Project Officer (PO) and Contracting Officer (CO)
- Prepare and submit monthly invoices

### 5.1.2 Attend Scoping Meeting

Following the receipt of this work assignment on May 30, 2007, the CDM RAC II Program Manager (PM), Senior Scientist (SS) and SM attended an initial scoping meeting with the EPA in EPA's New York office on June 5, 2007, to outline and discuss the project scope and schedule.

### 5.1.3 Conduct Site Visit

The CDM SM, CDM SS, and CDM Field Task Manager (FTM) conducted a site visit with the EPA RPM on June 19, 2007. The site visit consisted of visual observation of current site conditions and evaluation of potential logistical and health and safety issues. The team assessed potential monitoring well, piezometer, extraction well, and boring locations and identified potential site access issues.

### 5.1.4 Develop Draft Work Plan and Associated Cost Estimate

CDM has prepared this RD work plan in accordance with the contract terms and conditions. CDM used existing site data and information, information from EPA guidance documents, as appropriate, and technical direction provided by the EPA RPM as the basis for preparing this work plan.

This work plan includes a comprehensive description of project tasks, the procedures to accomplish them, project documentation, and a project schedule. CDM uses internal quality assurance/quality control (QA/QC) systems and procedures to insure that the work plan and other deliverables are of professional quality requiring only minor revisions (to the extent that the scope is defined). Specifically, the work plan includes the following:

- Identification of RD project elements including planning and activity reporting documentation, field sampling, and analysis activities. A detailed work breakdown structure of the RD corresponds to the work breakdown structure provided in the EPA SOW (dated May 30, 2007).

- CDM's technical approach for each task to be performed, including a detailed description of each task, the assumptions used, any information to be produced during and at the conclusion of each task, and a description of the work products that will be submitted to EPA. Issues relating to management responsibilities, site access, site security, contingency procedures and storage and disposal of investigation derived wastes are also addressed. Information is presented in a sequence consistent with the SOW.

- A schedule with dates for completion of each required activity, critical path milestones and submission of each deliverable required by the SOW and the anticipated review time for EPA.

- A list of key CDM personnel supporting the project (Section 7) and the subcontractor services required for the work assignment.

CDM will prepare and submit a draft work plan budget (as Volume II of this RD work plan) that follows the work breakdown structure in the SOW. The draft work plan budget contains a detailed cost breakdown, by subtask, of the direct labor costs, subcontractor costs, other direct costs, projected base fee and award fee, and any other specific cost elements required for performance of each of the subtasks included in the SOW. Other direct costs (ODCs) are broken down into individual cost categories as required for this work assignment, based on the specific cost categories negotiated under CDM's contract. A detailed rationale describing the assumptions for estimating the professional level of effort (PLOE), professional and technical levels and skills mix, subcontract amounts, and ODCs are provided for each subtask in the SOW.

### 5.1.5 Negotiate and Revise Draft Work Plan/Budget

CDM personnel will attend a work plan negotiation meeting at EPA's direction. EPA and CDM personnel will discuss and agree upon the final technical approach and costs required to accomplish the tasks detailed in the work plan. CDM will submit a negotiated work plan and budget incorporating the agreements made in the negotiation meeting. The negotiated work plan budget will include a summary of the negotiations. CDM will submit the negotiated work plan and budget in both hard copy and electronic formats.

### 5.1.6 Evaluate Existing Data and Documents

As part of the preparation of the work plan, CDM reviewed data collected during previous investigations at the site, including the RI and FS Reports, prepared by CDM. CDM is familiar with the LAI site and no additional effort was needed for this subtask. Analytical data and other information were incorporated, where applicable, into this planning document. Existing data are summarized in Sections 2 and 3.

### 5.1.7 Quality Assurance Project Plan

CDM will prepare a RD QAPP in accordance with the Uniform Federal Policy (UFP) for QAPPs and current EPA Region 2 guidance and procedures. The QAPP describes the project objectives and organization, functional activities, and QA/QC protocols that will be used to achieve the required DQOs. The DQOs will, at a minimum, reflect the use of analytical methods to identify and address contamination consistent with the levels for remedial action objectives identified in the NCP.

The existing QAPP for the site, prepared in September 2003, is not considered adequate for the current scope of work for the following reasons:

- Analytical methods and field procedures have changed significantly since September 2003.
- The existing QAPP was prepared for an RI scope and does not address a number of elements of the RD field work.
- The existing QAPP does not conform to the current UFP QAPP requirements and format.

Whenever possible, CDM will use information from the September 2003 RI/FS QAPP to prepare the QAPP for the RD. The QAPP will be submitted as a separate deliverable.

The QAPP will include sampling objectives, sample locations and frequency, sampling equipment and procedures, personnel and equipment decontamination procedures, sample handling and analysis, and a breakdown of samples to be analyzed through the CLP and through other sources, as well as the justification for those decisions. The QAPP will consider the use of all existing data and will justify the need for additional data whenever existing data will meet the same objective. The QAPP is written so that a field sampling team unfamiliar with the site would be able to gather the samples and field measurements. Technical SOPs are included in the QAPP. Each SOP or QA/QC protocol has been prepared in accordance with EPA Region 2 guidelines and the site-specific HASP. Any significant changes to the QAPP will require an amendment;

minor changes will be documented on a Field Change Request Form and submitted in a letter to the EPA RPM and EPA QA officer.

The QAPP also addresses site management, including site control and site operations. The site control section describes how approval to enter the areas of investigation will be obtained, along with the site security control measures, and the field office/command post for the field investigation. The logistics of all field investigation activities are also described. The site operations section includes a project organization chart and delineates the responsibilities of key field and office team members. A schedule will present the proposed sequence and dates of each major field activity.

Quality assurance activities to be performed during the implementation of this work plan may also include internal office and field or laboratory technical systems audits, field planning meetings, and quality assurance reviews of all project plans, measurement reports, and subcontractor procurement packages. The QA requirements are discussed further in Section 7.2 of this work plan.

### 5.1.8 Health and Safety Plan

CDM will prepare a site-specific HASP that specifies employee training, protective equipment, medical surveillance requirements, standard operating procedures and a contingency plan in accordance with 40 CFR 300.150 of the NCP and 29 CFR 1910.120 (l)(1) and (l)(2). The HASP will be submitted as a separate deliverable. Whenever possible, CDM will use information from the existing HASP prepared during the RI/FS. The HASP includes the following site-specific information:

- Hazard assessment
- Training requirements
- Definition of exclusion, contaminant reduction, and other work zones
- Monitoring procedures for site operations
- Safety procedures
- Personal protective equipment (PPE) and clothing requirements for various field operations
- Disposal and decontamination procedures
- Other sections required by EPA

The HASP also includes a contingency plan which addresses site-specific conditions which may be encountered.

In addition to the preparation of the HASP, health and safety activities will be monitored throughout the field investigation. The HASP will specify air monitoring procedures in the exclusion zone established around the drilling rig or sampling locations. A qualified health and safety coordinator (HSC), or designated representative will attend the initial field planning meeting and may perform a site visit to ensure that all health and safety requirements are being adhered to. A member of the field team will be designated to serve as the onsite HSC throughout the field program. This person will report directly to both the field team leader and the health and safety coordinator. The HASP will be subject to revision, as necessary, based on new information that is discovered during the field investigation.

### 5.1.9 Non-RAS Analyses

This subtask is not required for this work assignment. Non-RAS analyses are described in Section 5.4.3.

### 5.1.10 Meetings

CDM will participate in various meetings with EPA during the course of the work assignment. As directed by EPA's SOW, CDM has assumed three meetings, with three people in attendance, for four hours per meeting. The meetings will be held at the EPA's office in New York City or at CDM's office in New York City. CDM will prepare minutes which list the attendees and summarize the discussions in each meeting for review by the EPA RPM.

### 5.1.11 Subcontract Procurement

This subtask will include the procurement of all subcontractors required to complete the field investigation activities. Procurement activities include: preparing the technical statement of work; preparing IFB or Request for Proposal (RFP) packages; conducting pre-bid site visits (when necessary); responding to technical and administrative questions from prospective bidders; performing technical and administrative evaluations of bid documents; performing the necessary background, reference, insurance, and financial checks; preparing consent packages for approval by the EPA CO (when necessary); and awarding the subcontract.

To support the proposed field activities, the following subcontractors will be procured:

- A New York-licensed driller to install monitoring wells, extraction well, piezometers, deep soil borings, geotechnical soil borings and conduct the aquifer test.
- An analytical laboratory subcontractor to perform non-RAS analyses (if EPA's DESA laboratory does not have space) as described in Section 5.4.3 and on Table 5-1
- A New York-licensed surveyor to survey the location and elevation of all monitoring wells and soil borings
- A subcontractor responsible for the removal and proper disposal of drums and storage tanks containing RD generated waste liquids and solids and other investigation derived waste (IDW)

All subcontractor procurement packages will be subject to CDM's technical and QA reviews.

### 5.1.12 Perform Subcontract Management

The CDM SM and the CDM subcontracts managers will perform the necessary oversight of the subcontractors (identified under Section 5.1.11) needed to perform the RD. CDM will institute procedures to monitor progress, and maintain systems and records to ensure that the work proceeds according to the subcontract and RAC II contract requirements. CDM will review and approve subcontractor invoices and issue any necessary subcontract modifications.

## 5.2 Task 2 - Community Involvement

CDM will provide technical support to EPA during the performance of the following community involvement activities throughout the RD in accordance with *Community Relations in Superfund-A Handbook* (EPA 1992).

### 5.2.1 Community Interviews
In accordance with the SOW, this subtask is not applicable to this work assignment.

### 5.2.2 Community Relations Plan
In accordance with the SOW, this subtask is not applicable to this work assignment.

### 5.2.3 Public Meeting Support
CDM will perform the following activities in support of two public meetings and one availability sessions:
- Make reservations for meeting space, in accordance with EPA's direction
- Attend public meetings and availability sessions, and prepare draft and final meeting summaries, including sign-in sheets. For budgetary purposes, it is assumed that three public meetings will be held.
- CDM will develop draft visual aids (i.e., transparencies, slides, and handouts) as instructed by EPA. CDM will develop final visual aids incorporating all EPA comments. For budgeting purposes, CDM will assume 30 slides and 50 handouts for each public meeting.
- Reserve a court reporter for each of the three public meetings.
- Provide full-page and "four on one" page copy of meeting transcripts, both in hard copy and on a 3.5-inch diskette in Word Perfect 12 or latest version, with additional copies placed in the information repositories as directed by the RPM.

### 5.2.4 Fact Sheet Preparation
In accordance with the SOW, this subtask is not applicable to this work assignment.

### 5.2.5 Public Notices
CDM will prepare newspaper announcements/public notices for each public meeting. Three newspaper advertisements will be prepared for inclusion in the most widely read local newspapers, with each advertisement placed in a large area-wide newspaper and a small town local newspaper.

### 5.2.6 Site Mailing List
In accordance with the SOW, this subtask is not applicable to this work assignment.

## 5.3 Task 3 - Data Acquisition
This task includes all activities related to implementing field investigations for the RD at the LAI site. The task descriptions have been developed after review and evaluation of site data currently available to CDM. The overall objective of the field investigation is to provide the data necessary to complete the RD and to further refine information obtained during the RI. The media to be sampled include groundwater and soil. The data generated from the investigation will satisfy the DQOs and be used to support

the RD. All activities will be conducted in accordance with the EPA-approved QAPP. The major elements of the field investigation are the following:

- Mobilization and demobilization
- Site reconnaissance
- Hydrogeologic assessment
- Soil boring, drilling and testing
- Environmental sampling
- IDW

The CDM Regional QA Coordinator (RQAC) will ensure that the CDM subcontract laboratory meets all EPA requirements for laboratory services. The FASTAC procedures will be followed. Unless otherwise specified, analysis for TCL/TAL parameters through the CLP will be performed in accordance with the most current EPA CLP statements of work for multi-media, multi-concentration analyses for organics and inorganics. Non-RAS parameters will be analyzed as described in Section 5.4.3. QC samples will be collected in addition to the environmental samples discussed below. The number and type of QC samples will be in accordance with the EPA Region 2 CERCLA QA Manual.

## 5.3.1 Mobilization and Demobilization

This subtask will consist of site preparation and restoration, access support, field personnel orientation, field office and equipment mobilization and demobilization, and field supply ordering, staging and transport to the site.

### 5.3.1.1 Site Preparation and Restoration

CDM will visually inspect drilling areas for the presence of overhead utilities and surface features that could limit the mobility or use of a drill rig at the proposed locations. The drilling subcontractor will be responsible for contacting an appropriate utility location service to locate and mark out underground utilities. CDM plans to use existing roadway rights-of-way, open space, and clearings to the maximum extent possible to access sampling locations. However, it may be necessary to clear some areas of vegetation in order to access sampling locations. The drilling subcontractor will be responsible for clearing vegetation. CDM will direct and oversee any necessary clearing activities conducted by the drilling subcontractor.

Health and safety work zones including personnel decontamination areas will be established at the beginning of each field activity in accordance with the site-specific HASP. Local authorities such as the police and fire departments will be notified prior to the start of field activities.

Some field activities are expected to occur on private and public properties. In the event that property damage occurs on and around these properties (e.g., landscaping and paving) as a result of the proper performance of field investigation activities, such damages will be restored, as near as practicable, to the conditions existing immediately prior to such activities. CDM will maintain photographic documentation of site conditions prior to commencement of and after completion of the field activities.

At the completion of the field activities, decontamination pad materials will be decontaminated and removed from the command post area, unless otherwise instructed by EPA. The decontamination and command post area will be restored, as near as practicable, to its original condition.

#### 5.3.1.2 Access Support

Access to public areas and private property will be needed to execute the field investigation. EPA will be responsible for obtaining site access. CDM will assist EPA with site access. Access support is anticipated for the monitoring well installation and source area soil sampling. CDM will provide a list of property owners (public and private) to be accessed during the field activities. The list will include the mailing address and telephone number of the property owners. Once EPA has established that access has been granted monitoring well installation can begin. CDM will contact and coordinate with property owners and local officials (for work in public areas) to schedule sampling activities.

#### 5.3.1.3 Field Planning Meetings

Prior to performing the pre-design field activities, each field team member will review all project plans and participate in a field planning meeting conducted by the CDM SM and FTM to become familiar with the history of the site, health and safety requirements, quality control requirements, field procedures, and the QAPP. All new field personnel will receive a comparable briefing if they do not attend the initial field planning meeting and/or the tailgate kick-off meeting. Supplemental meetings may be conducted as required by any changes in site conditions or to review field operation procedures.

#### 5.3.1.4 Field Equipment and Supplies

Equipment and field supply mobilization will entail ordering, renting, and purchasing all equipment and supplies needed for each part of the pre-design field investigation. This will also include staging and transferring all equipment and supplies to and from the site. Measurement and Test Equipment forms will be completed for rental or purchase of equipment (instruments) that will be utilized to collect field measurements. The field equipment will be inspected for acceptability, and instruments calibrated as required prior to use. This task also involves the construction of a decontamination area for sampling equipment and personnel. A separate decontamination pad will be constructed by the drilling subcontractor for drilling equipment.

It is anticipated that one major mobilization will be required at the beginning of the field investigation and one major demobilization event will be required at the conclusion of the field investigation.

**Field Trailer, Utilities, and Services**

Arrangements for the lease of a field trailer and associated utilities (telephone, data line, and electricity), a secure storage area for IDW, trash containers, and portable sanitary facilities will be made. CDM assumes that the laydown area set up will be essentially the same as for the RI. The support trailer, trash container and portable sanitation will be located next to the LAI offices. The drilling laydown area will be located in the large paved parking lot and contain a decontamination pad, drilling equipment and supplies, a 21,000 gallon liquid waste storage tank, and six, 20-CY roll-offs for drill cuttings storage.

Equipment will be demobilized at the completion of each field event, as necessary. Demobilized equipment will include sampling equipment, drilling subcontractor equipment, health and safety equipment, and decontamination equipment.

## 5.3.2 Field Investigation

The RI provided data to define the nature and extent of contamination at the site, develop remedial alternatives in the FS, and prepare a ROD. This section describes the pre-design field activities to be performed to support the design of the groundwater remedy and to refine the boundaries and geometry of the groundwater plume. Section 4.2 describes the overall technical approach to the RD and the major elements of the field investigation.

- Site reconnaissance
- Monitoring well drilling and installation (including monitoring wells, extraction well and piezometers)
- Gamma logging
- Synoptic water level measurements
- Aquifer testing
- Deep soil borings
- Geotechnical borings
- Groundwater sampling

Table 5-1 summarizes the number of samples and associated analytical parameters for the various environmental media that will be sampled during the pre-design investigation.

### 5.3.2.1 Site Reconnaissance

To complete this RD work plan, CDM's SM, SS and FTM conducted a reconnaissance of the site and surrounding area to evaluate logistical issues relevant to monitoring well, extraction well, and piezometer installation, and deep soil boring drilling.

Additional site reconnaissance activities will be performed to support mobilization and to prepare for drilling and sampling activities. During the site reconnaissance, sample locations will be identified and marked, property boundaries and utility rights-of-way will be located, utility mark outs will be completed by CDM's drilling subcontractor, and photographs will be taken.

The following reconnaissance activities are also required to support the field activities:

- Identify and mark final locations for monitoring wells
- Identify and mark extraction well location
- Identify and mark soil boring locations
- Identify and mark geotechnical boring locations
- Identify and locate aquifer test water discharge location

#### 5.3.2.1.1 Well Installation Reconnaissance

Prior to installing monitoring wells, the extraction well, and piezometers, the field team will visit proposed monitoring well locations to identify and mark exact drilling locations and assess potential logistical issues and physical access constraints for the drill rig. Potential problem locations will be documented and photographed and locations may be adjusted to facilitate access. Because many of the monitoring wells are located along roadways, it is anticipated that close coordination will be required with local authorities and police regarding access and safety issues.

#### 5.3.2.1.2 Soil Boring Installation Reconnaissance

Prior to advancing the deep soil borings and geotechnical borings, CDM will visit the site to identify and mark the exact sampling locations and to identify any potential logistical issues.

#### 5.3.2.1.3 Aquifer Test Water Discharge Reconnaissance

Prior to conducing the aquifer tests, CDM will identify the location for discharge of the pumped water after it has been treated. CDM will evaluate the need for piping or other methods to move the water from the aquifer test location to the discharge area.

#### 5.3.2.1.4 Topographic Survey Oversight

The existing topographic map and geographic information system (GIS) database and maps prepared during the RI/FS will be used for this project. The locations of all additional sampling locations will be surveyed and added to the existing GIS and topographic maps. The additional sampling locations include monitoring wells, piezometers, an extraction well, deep soil borings, and geotechnical soil borings. Three elevations will be determined at each monitoring well, piezometer, and extraction well: the ground surface, the top of the inner casing, and the top of the outer casing.

### 5.3.2.2 Hydrogeological Assessment

This section describes the objectives of the hydrogeological assessment and describes the hydrogeologic investigation activities that will be performed to collect additional data needed to complete the RD. The primary objectives of the hydrogeological assessment are to better define the boundaries of the plume and collect data on the hydraulic properties of the aquifer in the area of the LAI facility. In support of these objectives, the following hydraulic investigation activities will be performed:

- Installation of wells to refine plume continuity
- Installation of wells to refine the eastern and western boundaries of the plume
- Gamma logging
- Synoptic water level measurements
- Performance of an aquifer test, including installation of an extraction well and piezometers

#### 5.3.2.2.1 Monitoring Well, Extraction Well, and Piezometer Drilling and Installation

This section describes the monitoring well, extraction well and piezometer drilling and installation activities that will be performed to support the RD. Monitoring wells will be installed following completion of the first round of groundwater sampling.

The primary objectives of the monitoring well installation and sampling are to:

- Refine the centerline of the groundwater plume
- Refine the eastern and western boundaries of the groundwater plume
- Provide wells and piezometers for aquifer testing

**Monitoring Wells**

Seven conventional monitoring wells will be installed during the pre-design investigation including: three monitoring wells along the approximate centerline of the plume, two wells along the western boundary of the plume, and two wells along the eastern boundary of the plume. Figure 5-1 shows the proposed locations of monitoring wells. Monitoring well locations and depths may be modified based on evaluation of the first round of groundwater sampling data. In order to decrease the overall schedule and budget for drilling activities it is assumed that two drill rigs will be used to install monitoring wells. For cost estimation purposes, proposed well depths and screen intervals are provided in Table 5-2.

The mud rotary drilling method was selected for cost estimating purposes. A number of drilling methods were considered for the installation of the deep monitoring wells including sonic drilling, hollow-stem auger, and cable-tool methods. Consideration was given to the costs, expected duration of drilling, and compatibility with collection of screening samples. Experience with drilling deep wells in geologic materials with a deep unsaturated zone using the sonic and hollow stem auger drilling methods indicated that there could be difficulties that would affect the project schedule and budget. Although, mud rotary drilling methods will generate more drilling waste, it is considered to be an effective method for drilling in the site materials, especially for the deepest wells.

Prior to monitoring well installation, eight-inch diameter boreholes will be drilled to 10 feet above the target depth. Three groundwater screening samples will be collected, one each from 10 feet above, within, and 10 feet below the proposed screen interval. Groundwater screening samples will be collected with a slotted probe advanced beyond the rotary bit. The samples will be submitted for TCL trace VOC analysis with a 24-hour turn around time. The 8-inch borehole will be advanced to the selected depth and well screen will be installed at the interval of highest contamination. If no contamination is detected, the screen will be installed at the target depth.

If the screening samples collected contain excessive amounts of drilling mud, CDM will work with the laboratory and the driller to revise the approach. Contingencies could include changing the type or size of the sample bottles, additional development of the screening interval or alternative sampling methods. The CDM RQAC will ensure that all DQOs will be met by the alternative sampling methods.

Monitoring wells will be constructed of 4-inch diameter Schedule 40 stainless steel casing. In accordance with EPA Region 2 low-flow, minimal drawdown sampling protocols, the screens will be ten-foot lengths of slotted stainless steel screen. It is assumed that wells will be single-cased. The annulus around the well screen will be backfilled with sand which will extend two feet above the well screen. A two-foot bentonite seal will be placed above the sand pack and the remaining annulus will be grouted to the surface. An eight-inch steel protective casing with a locking cap will be installed and a concrete collar will be poured around the well. Well drilling and construction details will be specified in the site-specific QAPP.

**Extraction Well**

One extraction well, to be used for the aquifer test, will be installed just downgradient of the site. The approximate location is shown on Figure 5-1. The extraction well will be installed using the mud rotary drilling method. A twelve-inch diameter borehole will be drilled to 245 feet bgs. The extraction well will be constructed of 8-inch diameter stainless steel casing and 60 feet of slotted stainless steel screen. Centralizers will be used to ensure the well casing/screen is centered within the borehole. The extraction well will be screened from 180 to 240 feet bgs. The annulus around the well screen will be backfilled with sand which will extend two feet above the well screen. A two-foot bentonite seal will be placed above the sand pack and the remaining annulus will be grouted to the surface. A twelve-inch steel protective casing with a locking cap will be installed and a concrete collar will be poured around the well. Extraction well drilling and construction details will be specified in the site-specific QAPP.

**Piezometers**

Four piezometers will be installed during the pre-design investigation to monitor groundwater elevations during the aquifer test. Figure 5-1 shows the approximate location and layout of the piezometers. The piezometers will be installed using the mud rotary drilling method. Four-inch diameter boreholes will be drilled to the target depth. The piezometers will be constructed of two-inch diameter stainless steel casing and 20 feet of slotted stainless steel screen. The total depth of the piezometer will be 225 feet bgs and the screened interval will be from 205 to 225 feet bgs. The annulus around the well screen will be backfilled with sand which will extend two feet above the well screen. A two-foot bentonite seal will be placed above the sand pack and the remaining annulus will be grouted to the surface. A six-inch steel protective casing with a locking cap will be installed and a concrete collar will be poured around the piezometer. Piezometer drilling and construction details will be included in the site-specific QAPP.

**Development**

Monitoring well, extraction well, and piezometer installation will not be considered complete until the wells have been fully developed. Development will be performed to remove drilling mud, silt and well construction materials from the well and sand pack and to provide a good hydraulic connection between the well and the aquifer materials. Turbidity, pH, temperature, conductivity, and dissolved oxygen will be monitored during development. Development will continue until all parameters have stabilized (within 10 percent for successive measurements) and the water is clear. Well development procedures will be detailed in the site-specific QAPP.

**IDW Management**

Drill cuttings and water from drilling operations will be containerized at the drilling location and transported by the drilling subcontractor to a central waste storage area. Liquid wastes will be transferred to a 21,000-gallon Baker tank, and drill mud and cuttings will be transferred into 20-CY roll-off containers for subsequent sampling, characterization, and disposal by CDM's IDW subcontractor.

**Natural Gamma Logging**

Once monitoring well, extraction well and piezometer construction is complete, natural gamma logs will be run in each well. Gamma logs will provide data on the lithology because no lithologic samples will be collected during well installation. The gamma logs will be correlated with the lithologic data collected during the RI. Gamma logging will be performed by CDM personnel. Geophysical logging procedures will be fully detailed in the QAPP.

#### 5.3.2.2.2 Continuous Water Level Measurements

Continuous water level measurement will be collected over the two week period prior to the aquifer test (Section 5.3.2.2.4), during the step drawdown test, aquifer test and the recovery period. The continuous water level monitoring will be conducted to determine the baseline groundwater conditions prior to the aquifer test, the aquifer reaction to the step drawdown test, the aquifer test, and aquifer recovery. Six locations will be monitored including the four proposed piezometers, FG-01 and MW-05. The aquifer test is not anticipated to impact the water levels at FG-01, so this data from this well will be used to assess the impact of climatic impacts on the aquifer during the test. Barometric pressure and rainfall measurements will also be collected during this two week period. Procedures for collection of continuous water level measurements will be provided in the site-specific QAPP.

#### 5.3.2.2.3 Synoptic Water Level Measurements

Two rounds of synoptic water level elevation measurements will be collected prior to the two rounds of groundwater sampling. Water levels will be collected from all wells scheduled to be sampled in each round. The data will be used to update the potentiometric surface maps created for the RI Report and to provide current groundwater elevation data for the RD. Before collecting groundwater elevation measurements, each new well location and elevation will be determined by a licensed land surveyor. Elevation measurements will be made at marked points on the inner casing, the top of outer protective casing, and the adjacent ground surface. The wells will be allowed to equilibrate after development for a minimum of two weeks before water level measurements are taken.

#### 5.3.2.2.4 Aquifer Test

An aquifer test, consisting of a step-drawdown test and a constant-rate test, will be conducted in the extraction well. The tests will be performed to determine well yields (Q), aquifer transmissivity (T), and to refine estimates of influent concentrations to be delivered to the proposed groundwater treatment system. Prior to the aquifer test, CDM will obtain permits for discharge of the treated groundwater and air emissions from the temporary treatment system.

The test duration and pumping rates will be determined in the field and will depend on current site conditions. It is anticipated that the step-drawdown test will consist of four steps, each pumping at a higher rate than the previous, with each step lasting two hours. The aquifer tests will be performed by CDM personnel with support from the drilling subcontractor. The drilling subcontractor will be responsible for the setup and operation of pumps and the groundwater treatment system. For cost estimating purposes, the pumping rates for each step are assumed to be 50 gallons per minute (gpm), 100 gpm, 150 gpm, and 200 gpm. Recovery between steps will not be allowed. Aquifer recovery will be measured after the last step test.

During the step tests, the water will be treated onsite using a portable liquid phase granular activated carbon (GAC) treatment system and stored in three 20,000-gallon tanks staged onsite. Influent samples will be collected at the beginning and end of the step test. At the completion of the step test, samples will be collected from the tanks to verify the effectiveness of the treatment system. All samples will be analyzed for TCL trace VOCs and full TCL/TAL parameters with a 24-hour turn around time. After the treated water has been determined to meet all applicable standards, it will be discharged to an onsite area where it will not affect the results of the pumping test.

Following the step test, a constant rate aquifer test will be conducted for up to 72-hours followed by aquifer recovery. The pumping rate for the constant-rate test will be based on the analysis of the step-drawdown tests; for cost estimating purposes, the assumed rate is 150 gpm. Water elevations in the test well, four adjacent piezometers, and two monitoring wells will be measured by pressure transducers and recorded by automatic data loggers. Rainfall and barometric pressure will also be measured during continuous groundwater elevation measurement and during the aquifer testing phase. Manual measurements will also be taken periodically to verify transducer data. The aquifer test data will be used to analyze the response of the aquifer system to pumping and to estimate the hydraulic capture zone of extraction wells.

Groundwater samples for TCL trace VOCs and full TCL/TAL analysis will be collected prior to and during the aquifer test. The purpose of the aquifer test sampling is to (1) evaluate the effectiveness of the system that will be used to treat the groundwater prior to discharge, (2) collect chemical data to supplement the aquifer characteristics data collected during the aquifer test, and (3) have sufficient data to complete the permits for the treatment plant. The chemical data will be used to evaluate fluctuations or trends in groundwater VOC concentrations in response to pumping. VOC concentrations in samples from the pumped well may be different than concentrations detected in samples collected from wells under static conditions. Such data will be useful for development of the RD.

At the start of the aquifer test, one groundwater sample will be collected from the influent from the extraction well and from the effluent from the water treatment unit. After the aquifer test is underway, samples will be collected from the influent and effluent of the treatment system after 6 hours and at 6-hour intervals for the first 12 hours then at 12-hour intervals for the duration of the test, for a total of 16 samples.

All influent and effluent samples will be analyzed for TCL trace VOCs and full TCL/TAL parameters, alkalinity, hardness, TDS, TSS, TKN, ammonia, nitrate-nitrite, chloride, sulfate, TOC, ferrous iron and pH. All samples will be analyzed using a 24-hour turnaround time for analytical results to satisfy discharge permit requirements. Aquifer test samples will be analyzed using the most current EPA-approved methods.

Water pumped from the aquifer during the aquifer test will be treated prior to discharge at the facility at a location that will not impact the results of the test. Approximately 708,000 gallons of water will be generated during the 72-hour constant rate aquifer test, assuming a pumping rate of 150 gpm. For cost estimation purposes it is assumed that EPA will obtain pernission to discharge purge water at the facility. Specific procedures for the aquifer test will be provided in the QAPP.

### 5.3.2.3 Deep Soil Borings

This section describes the objectives of the deep soil borings that will be advanced at the LAI Facility as part of the RD investigation. Four deep soil borings will be installed at the LAI Facility (Figure 5-2). The borings will be installed to:

- Determine if a residual source of contamination remains in the subsurface
- Provide soil samples for the bench scale treatability testing
- Provide additional data on site lithology
- Provide contaminant profiles for the design of ISCO injection
- Further delineate on-site groundwater contamination

The deep soil borings will be advanced to approximately 260 feet bgs. The proposed depths and location rationale are presented in Table 5-3.

At each deep soil boring, subsurface soil samples will be collected in split spoons every 10 feet from 10 feet bgs to a total depth of approximately 260 feet bgs. It is assumed that a total of 26 split spoons will be collected at each deep soil boring. Upon retrieval from the drill rod, each two-foot split spoon will be screened for VOCs using a photoionization detector (PID). The lithology of each sample will be characterized and logged by the field geologist. Depth to groundwater and PID readings also will be recorded in the field log. The sampling and lithologic logging procedures will be detailed in the QAPP.

A maximum of 104 soil samples will be collected from the deep soil borings. Soil samples will be analyzed for TCL VOCs. In addition, all of the soil samples will be analyzed for TOC and grain size.

Two additional split spoon samples will be collected just below the water table in each of the deep soil borings to collect saturated soil volume for the bench-scale treatability testing. Details are provided in Section 5.3.2.6.

Two groundwater screening samples will be collected from each boring, one each from 10 feet below the groundwater table and 20 feet below the groundwater table. Groundwater screening samples will be collected with a slotted probe advanced beyond the rotary bit. Samples will be purged with a submersible pump and sampled following the site-specific low-flow, minimal drawdown sampling procedure, which follows the EPA SOP "Ground Water Sampling Procedure, Low Stress (Low Flow) Purging and Sampling (EPA 1998). Groundwater screening sampling procedures will be fully detailed in the site-specific QAPP. Samples will be analyzed for TCL trace VOCs.

#### 5.3.2.4 Groundwater Sampling

Two rounds of groundwater samples will be collected at the LAI site.

Round 1 - At the beginning of the field activities, samples will be collected from the 10 existing multiport wells, MW-01, MW-5 and FG-01 to establish current baseline conditions, provide updated data to support pre-design monitoring well installation for the RD, and provide groundwater samples for use in the bench scale tests. A total of 44 (41 ports and 3 monitoring wells) groundwater samples will be collected and analyzed for TCL trace VOCs, fluoride and titanium. Multiport wells will be sampled using the bladder pumps that are included as part of the Waterloo system. Conventional monitoring wells will be purged with a Grundfos Rediflow 2 submersible pump and sampled according to the site-specific low-flow, minimal drawdown sampling procedure, which follows the EPA SOP "Ground Water Sampling Procedure, Low Stress (Low Flow) Purging and Sampling (EPA 1998). Groundwater sampling procedures will be fully detailed in the site-specific QAPP. Details of sample collection for the bench scale treatability testing are provided in Section 5.3.2.6.

Round 2 - After the 7 new monitoring wells are installed, a second round of groundwater samples will be collected from the 10 existing multiport wells, MW-01, MW-5, FG-01 and the 7 new monitoring wells. A total of 51 (41 ports and 10 monitoring wells) groundwater samples will be collected and analyzed for TCL trace VOCs, fluoride and titanium. Multiport wells will be sampled using the bladder pumps that are included as part of the Waterloo system. Conventional monitoring wells will be purged with a Grundfos Rediflow 2 submersible pump and sampled following the site-specific low-flow, minimal drawdown sampling procedure which follow the EPA SOP "Ground Water Sampling Procedure, Low Stress (Low Flow) Purging and Sampling (EPA 1998). Groundwater sampling procedures will be fully detailed in the site-specific QAPP.

Dissolved oxygen (DO), oxidation reduction potential (as Eh), turbidity, pH. temperature, ferrous iron, and conductivity will be measured in the field. A flow-through cell will be used when measuring oxygen-sensitive field parameters.

#### 5.3.2.5 Geotechnical Investigation

Geotechnical field investigation activities will be performed to obtain information necessary to design the treatment facility building foundation and the treated effluent recharge basin at the LAI facility. The following activities will be performed:

- Two geotechnical borings for the building foundation design
- One boring to characterize the soils below the proposed recharge basin
- Two infiltration tests in the vicinity of the proposed recharge basin

All geotechnical investigation activities will be performed by the drilling subcontractor or the drilling subcontractor's lower tier geotechnical subcontractor, including all sample collection, geotechnical sample analyses, infiltration testing, and preparation of a geotechnical report. All sample analyses will be performed in accordance with American Society for Testing and Materials (ASTM) standards.

#### 5.3.2.5.1 Treatment Facility Building Foundation Borings

Geotechnical testing will be conducted to obtain information about the bearing capacity and settling characteristics of the soil, which are necessary for the building foundation design. This information will be provided to the prospective bidders for the treatment facility to better estimate the cost of the building foundation. Additional borings may be required during construction to comply with local building requirements.

Two borings, one at each of two potential building locations, are proposed. The approximate boring locations are shown on Figure 5-2. The borings will be conducted using hollow stem augers, and each boring will be completed to a depth of 30 feet bgs. Split spoon samples will be collected continuously up to twelve feet bgs and at 15, 20, 25, and 30 feet bgs, with standard penetration testing (ASTM D1586) performed on each sample. The lithology of each sample will be characterized and logged by the drilling subcontractor's geotechnical representative. Soil samples will be collected at intervals 2 to 4 feet, 6 to 8 feet, 10 to 12 feet and 14 to 16 feet bgs and sent to the geotechnical laboratory for particle size (sieve and hydrometer, ASTM D422) and natural moisture content (ASTM D2216) analyses. Soil samples will be collected at the 6 to 8 foot bgs interval and sent to the geotechnical laboratory for testing for Atterberg limits (ASTM D4318).

#### 5.3.2.5.2 Groundwater Recharge Basin Boring

Treated effluent from the groundwater treatment facility will be discharged to a recharge basin to be located at the southeast corner of the site (upgradient of the extraction well). The design of the recharge basin requires that information be collected in the field to determine the rate of infiltration of the native soils and to ensure that the anticipated hydraulic loading rate will be met. A soil boring will be conducted in the area of the proposed recharge basin to ensure there are no low permeability soils that could impact the design of the basin. One boring will be advanced to a depth of 100 feet bgs using a hollow stem auger with continuous split spoon sampling. The lithology of each sample will be characterized and logged by the drilling subcontractor's geotechnical representative. The approximate boring location is shown on Figure 5-2. Soil samples will be collected at 30, 60 and 90 feet bgs and sent to the geotechnical laboratory for analysis for particle size (sieve and hydrometer, ASTM D422) and rigid wall permeability (ASTM D2434).

#### 5.3.2.5.3 Groundwater Recharge Basin Infiltration Tests

Two percolation tests will be performed in the vicinity of the proposed recharge basin using the sealed double ring infiltraometer (SDRI) method in accordance with ASTM D3385 to obtain estimated infiltration rates for the site soils. The test locations will be separated by approximately 50 feet, and will be performed at the elevation of the recharge basin bottom, estimated to be approximately eight feet bgs. Each infiltration test will require the excavation of a test pit, approximately 10 feet long, 10 feet wide, and 8 feet deep.

#### 5.3.2.5.4 Geotechnical Report

The drilling subcontractor or the drilling subcontractor's lower tier geotechnical subcontractor will prepare and submit a geotechnical report to CDM that summarizes the results of the geotechnical investigation activities. The report will include infiltration rates, the International Building Code (IBC) classification, bearing capacity estimates, and recommendations regarding the design of the recharge basin and treatment facility building foundation. The report will be stamped by a licensed geotechnical professional engineer (PE) employed by the drilling subcontractor or the drilling subcontractor's lower tier geotechnical subcontractor.

#### 5.3.2.6 Bench-Scale Testing

Soil and groundwater samples will be collected during the pre-design investigation for use during the bench-scale treatability testing, which will be performed by CDM's in-house bench-scale testing laboratory. Three split spoon samples will be collected just below the groundwater table in three of the four deep soil borings for collection of saturated soil volume. Six 8-ounce jars of soil from each boring will be required. Eleven liters of groundwater will be collected from the most contaminated interval of MPW-7 during Round 1 of the groundwater sampling. The soil and groundwater samples for the bench-scale testing will be collected and shipped concurrently. The bench-scale testing will be performed by CDM's in-house laboratory immediately upon receipt of the sample shipment. Details of the bench-scale treatability testing are provided in Section 5.7.

### 5.3.3 Investigation Derived Waste Characterization and Disposal

A subcontractor will be procured that will be responsible for the removal and proper disposal of all IDW, including drilling cuttings, drilling mud, waste soils, solids, and PPE in accordance with all Federal, state, and local regulations and in accordance with the QAPP. Representative waste samples will be collected and analyzed by a laboratory to characterize the waste. Effluent from the aquifer test will be treated onsite and discharged to the ground. A technical statement of work will be prepared for the procurement of the waste hauling and disposal subcontractor under Subtask 5.1.11. Field oversight and health and safety monitoring will be conducted during all waste disposal field activities.

## 5.4 Task 4 - Sample Analysis

Section 5.3 and Table 5-1 specify the analyses for each type of samples. Details are summarized below.

- **Groundwater Screening Samples**: TCL trace VOCs, with 24-hour turn-around for faxed analytical results.

- **Source Area Soil Samples**: Soil samples will be analyzed for TCL VOCs, grain size, and TOC.

- **Soil Boring Groundwater Screening Samples**: TCL trace VOCs.

- **Monitoring Well Samples**: Monitoring well samples will be analyzed for TCL trace VOCs, fluoride and titanium.

- **Step Test Samples**: Groundwater samples will be analyzed for TCL trace VOCs TCL SVOCs, TCL pesticides/PCBs, TAL inorganics, cyanide, alkalinity, ammonia, chloride, hardness, nitrate/nitrite, ferrous iron, sulfate, pH, TKN, TOC, TSS, TDS, with 24 hr turn-around for faxed results.

- **Aquifer Test Samples**: Groundwater samples will be analyzed for TCL trace VOCs TCL SVOCs, TCL pesticides/PCBs, TAL inorganics, cyanide, alkalinity, ammonia, chloride, hardness, nitrate/nitrite, ferrous iron, sulfate, pH ,TKN, TOC, TSS, TDS, with 24 hr turn-around for faxed analytical results.

- **Building Foundation Geotechnical Soil Samples**: Soil samples will be analyzed for grain size, moisture content and Atterberg limits.

- **Recharge Basin Soil Samples**: Soil samples will be analyzed for grain size and rigid wall permeability.

- **Bench-scale Treatability Testing Samples**: Soil and groundwater sample analyses for the bench-scale treatability testing are described in Section 5.7.

### 5.4.1 Innovative Methods/Field Screening Sample Analysis

This subtask is not applicable to the RD investigation.

### 5.4.2 Analytical Services Provided via CLP or DESA

RAS samples will be analyzed in compliance with the FASTAC policy. CDM will pursue the use of the CLP or DESA and alternatives to standard CLP analysis will be sought with the EPA Regional Sample Control Center (RSCC) prior to any sample collection activities and analyses via the subcontract CDM RAC II basic ordering agreement (BOA) laboratory. Under the CLP "flexibility clause", modifications are often made to CLP SOWs, to achieve method detection limits (MDLs) that meet the stated criteria. CDM will implement the EPA Region 2 policy as shown below:

| | |
|---|---|
| Tier 1: | DESA Laboratory |
| Tier 2: | EPA CLP |
| Tier 3: | Region specific analytical services contracts or use CLP flexibility clause |
| Tier 4: | Obtain analytical services using subcontractors via field contracts (such as the CDM RAC II BOA subcontractors) |

All fixed laboratory analytical needs will to be submitted to the EPA RSCC regardless of the EPA or CLP laboratories' ability to perform. CDM will utilize the CDM RAC II laboratory BOA only in the event that the first three tiers are not available.

## 5.4.3 Non-RAS Analyses

### 5.4.3.1 Subcontractor Laboratory

CDM will procure subcontract laboratories for analysis of non-RAS samples, including fast turnaround (24 hour) TCL trace VOCs. If DESA does not have the capacity to analyze the non-RAS parameters listed in Section 5.4, the samples will be analyzed by a CDM RAC II BOA subcontract laboratory.

CDM will select a subcontractor from the BOA laboratories based on the ability to meet analytical QA and QC requirements in the project-specific statements of work for non-RAS analytical services and costs. The BOA laboratory subcontractors have been selected in compliance with EPA procurement rules and have been reviewed for technical and quality criteria for laboratory services. CDM has provided EPA with copies of the QA manuals and/or QA plans of the BOA subcontract laboratories and will monitor the subcontractor laboratory's analytical performance. A project-specific SOW will be prepared to govern the analytical work performed by the selected BOA laboratory subcontractor. The number of samples and analytical parameters are defined on Table 5-1. The analytical test methods, levels of detection, holding times, parameters, field sample preservation and QC samples will be provided in the QAPP.

### 5.4.3.2 Geotechnical Laboratory

Geotechnical sample analysis will be performed by the drilling subcontractor's geotechnical laboratory or the drilling subcontractor's lower tier geotechnical subcontractor. CDM will monitor the subcontractor laboratory's analytical performance. All sample analyses will be performed in accordance with ASTM standards and the subcontract SOW.

### 5.4.3.3 Bench-scale Treatability Testing Laboratory

Sample analyses for the bench-scale treatability testing will be perform by CDM's in-house laboratory. The analytical testing procedures will be provided in the QAPP.

# 5.5 Task 5 - Analytical Support and Data Validation

This task includes sample management and data validation activities.

## 5.5.1 Collect, Prepare and Ship Samples

Sample preparation and shipment is included under Task 3. CDM will prepare and ship the analytical samples collected under Task 3 in accordance with the approved QAPP.

### 5.5.2 Sample Management

The CDM Analytical Services Coordinator (ASC) will be responsible for all RAS CLP laboratory bookings and coordination with the Sample Management Office (SMO), RSCC, DESA, and/or other EPA sample management offices regarding analytical, data validation, and shipping issues.

For all RAS activities, CDM will notify the SMO to enable them to track the shipment of samples from the field to the laboratories and to ensure timely laboratory receipt of samples. Sample trip reports will be sent directly to the RSCC and the EPA RPM within seven working days of final sample shipment, with a copy sent to the CDM ASC.

The CLP laboratories will be responsible for providing organic and inorganic analytical data packages to EPA for data validation.

Samples analyzed by the DESA laboratory and/or the subcontract laboratory will be coordinated by the ASC. All analytical data packages from the subcontract laboratory will be sent directly to CDM for data validation. If requested, CDM will send these validated data packages to EPA for QA review purposes. The data will be delivered in a format conducive to database input. CDM will provide the subcontract laboratory with a format for the electronic data deliverable (EDD).

CDM will provide chain-of-custody (COC), sample retention, and data storage functions in accordance with the approved Quality Management Plan (QMP) and contract requirements. CDM will ensure that accurate COC procedures are implemented and carried out for sample tracking, protective sample packing, and proper sample preservation techniques.

### 5.5.3 Data Validation

All analytical data for samples analyzed by DESA or a laboratory participating in the CLP will be validated by EPA. All analytical data for samples analyzed by CDM's subcontract laboratory will be validated by CDM validators, who will use the requirements and the QC procedures outlined in the associated methods, the analytical SOW for the laboratory subcontractor and the validation SOP. Geotechnical and bench-scale treatability testing data is used for engineering purposes only and will not be validated. Data validation will determine the usability of the data, and verify that the analytical results were obtained following the protocols specified in the QAPP and CLP SOW. The validated data results and the data validation report summarizing the results of data validation will be presented in an appendix to the Data Evaluation Report. As part of the subtask, CDM will perform the following activities:

- Review analysis results against validation criteria
- Review the data and make a data usability determination
- Provide a data validation report to the EPA RPM after all data have been validated

## 5.6 Task 6 - Data Evaluation

This task includes efforts related to the compilation of analytical and field data. All data will be entered into a relational database that will serve as a repository for data analysis, GIS, and data visualization. Environmental Quality Information Systems (EQuIS) will be used as the database. The data will be reviewed and carefully evaluated for use in developing the RD.

### 5.6.1 Data Usability Evaluation

CDM will evaluate the usability of data collected during the pre-design investigation, including any uncertainties associated with the data. Field sampling techniques, laboratory analytical techniques, and data validation will be considered. Data will be evaluated against DQOs for the RD, as identified in the QAPP, prior to use. Any qualifications to the data will be discussed in the Data Evaluation Report or the design reports. EPA's protocol for eliminating field sample analytical results based on laboratory/field blank contamination results will be clearly explained. If the reported result has passed established data validation procedures without rejection, it will be considered valid.

### 5.6.2 Data Reduction, Tabulation and Evaluation

CDM will tabulate, evaluate, and interpret data in an appropriate presentation format for final data tables. General guidelines in the preparation of data for use during the RD include: tables of analytical results organized in a logical manner such as by sample location number, sampling zone, or some other logical format; the analytical tables will indicate the sample collection dates; and the detection limit will be indicated in instances where a parameter was not detected.

CDM will use a relational environmental database and standard industry spreadsheet software programs to manage all data related to the sampling program. The system will provide data storage, retrieval, and analysis capabilities, and be able to interface with a variety of spreadsheet, word processing, statistical, GIS, and graphics software packages to meet the full range of site and media sampling requirements necessary for this work assignment. Data collected during the pre-design investigation will be organized, formatted, and input into the database for use in the data evaluation phase. All data entry will be QC checked throughout the project. Electronic data submitted will comply with EPA's EDD requirements.

CDM will update the existing GIS that was developed during RI with the data collected during the pre-design investigation. Locations of all samples and wells will be included in the GIS. The GIS may be used for figure and map generation to support the design report and presentations for public meetings.

### 5.6.3 Data Evaluation Report

CDM will present the results of the data evaluation in a Data Evaluation Report for review and approval by the EPA RPM. This report will summarize and evaluate the results of the pre-design investigation activities and include information related to the refinement of the nature and extent of the groundwater plume. The Data Evaluation Report will include a tabulated summary of the data results. Figures will include geological profiles and cross-sections, water table maps, contaminant iso-concentration maps, and longitudinal and cross-sectional profiles of groundwater contamination. A data usability summary will also be included. If additional analytical data are needed or if significant data problems are identified during the evaluation, CDM will provide a separate memorandum describing these problems to the RPM for review. Engineering data will be summarized in the design documents.

## 5.7 Task 7 - Treatability Study and Pilot Testing

CDM will conduct a treatability study to evaluate the applicability of chemical oxidants in remediating the site groundwater, and to provide data to be used for the design of the full-scale ISCO remedy. Per direction of the EPA RPM, only bench-scale testing will be required; a field pilot test will not be performed. The work under this task will be based on progress from the results of the literature search and other preliminary investigation activities performed under Task 8 of Work Assignment 147-RICO-02PF.

### 5.7.1 Literature Search

In accordance with the SOW, this subtask is not applicable to this work assignment. The ISCO literature search was performed under Task 8 of Work Assignment 147-RICO-02PF.

### 5.7.2 Develop Treatability Study Work Plan

Detailed procedures for the bench-scale treatability testing will be included in the RD QAPP, and a Treatability Study Work Plan will therefore not be required. The RD QAPP will describe the bench-scale test objectives, test equipment or systems, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety procedures, and residual waste management.

### 5.7.3 Conduct Treatability Study

Per direction of the EPA RPM, bench-scale treatability testing will be performed to evaluate the applicability of chemical oxidants in remediating site groundwater and residual soil contamination and to provide data to be used for the design of the full-scale ISCO remedy. Bench-scale testing helps quantify the kinetics of contaminant degradation and the half-life of the oxidant in the soil, which are useful in determining injection well spacing and expected full-scale kinetics. Information to be obtained during the bench-scale testing includes soil oxidant demand (SOD), required oxidant concentrations for VOC oxidation, and rates of oxidant consumption and VOC oxidation. The bench-scale testing will evaluate the oxidants permanganate and persulfate.

Field samples for the bench-scale testing will be collected as described in Section 5.3.2.6, and the bench-scale treatability tests will commence immediately upon receipt of the soil and groundwater samples. The bench-scale tests are summarized in Table 5-4. Permanganate tests will be conducted using potassium permanganate ($KMnO_4$), and persulfate tests will be conducted using sodium persulfate ($NaS_2O_8$). In addition, persulfate may require activation by a catalyst (ferrous iron), so the tests for persulfate will be conducted both with and without the catalyst. For each oxidant, tests will be performed at two different oxidant concentrations for each boring for both SOD and oxidant consumption/VOC oxidation. The treatability testing will be conducted in sealed 250-milliliter (ml) bottles or jars filled with 75 grams of site soil. The test jars for oxidant consumption/VOC will also contain 150 ml of site groundwater, and the test jars for SOD will contain 150 ml of distilled water. Each test will be conducted in duplicate for a total of 72 bottles.

The bottles will be stored in the dark at room temperature and will be mixed by hand twice per day during the work week. Samples from the test jars will be analyzed after set up and then after one, two, three, four, and eight days. Water samples will be collected from each bench-scale test bottle using a syringe. Samples from bottles testing for oxidant consumption/VOC oxidation will be analyzed for both VOCs and the oxidant, and samples from bottles testing for SOD will be analyzed for the oxidant. VOCs will be analyzed using headspace gas chromatography with mass selective detection. Permanganate will be analyzed spectrophotometrically because of its purple color. Persulfate will be analyzed using a Chemetrics test kit. Analytical methods will be specified in the RD QAPP.

### 5.7.4 Treatability Study Report

CDM will prepare and submit a treatability study evaluation report that summarizes the results of the bench-scale treatability testing. The report will also provide recommendations regarding the full-scale ISCO application, including recommended oxidant type, estimated dosage rates, and expected injection well spacing.

## 5.8 Task 8 - Preliminary Design

The preliminary design consists of completion of the 30 percent design. CDM will provide design documents and supporting documentation to demonstrate conclusively that the completed project will be effective in meeting the remedial goals and applicable or relevant and appropriate requirements (ARARs). CDM will submit the preliminary design in accordance with the schedule established in this RD work plan.

The design of the groundwater treatment system and ISCO treatment will be prepared using a performance-based approach. CDM will specify treatment requirements, and the RA subcontractor will be responsible for developing and executing the detailed design. The performance-based requirements will be developed based upon industry standards and technical considerations specific to the site. Examples include:

- Extraction well performance requirements and pumping rates
- Groundwater treatment system effluent criteria
- Groundwater treatment system minimum equipment and instrumentation/control requirements
- Minimum construction and/or operation standards for equipment and materials
- Minimum requirements for groundwater treatment system initial start-up testing and long-term groundwater monitoring
- Contaminant reduction criteria for the ISCO treatment remedy

A conceptual baseline design for the groundwater treatment system and ISCO treatment will be developed, which will establish minimum construction standards and provide the basis for RA construction and long-term operation cost estimates. Bidders will have the option to submit proposals for the baseline system or alternate systems that conform to the objectives and requirements of the performance-based specifications in the contract documents.

CDM has prepared a preliminary list of specifications and drawings that will be required for the RD. The specification outline is included as Appendix A. The preliminary design drawing list is presented below.

- Cover Sheet
- Sheet 1 - General Notes and Legend
- Sheet 2 - Site Plan
- Sheet 3 - In Situ Chemical Oxidation Treatment
- Sheet 4 - Process and Instrumentation Diagram
- Sheet 5 - Well Construction Details
- Sheet 6 - Civil Details I
- Sheet 7 - Civil Details II

### 5.8.1 Preliminary Design

CDM will prepare a Preliminary Design Report to present the design approach and define in detail the technical parameters on which the RD will be based. The report will include assumptions regarding the following parameters:

- Pretreatment requirements
- Treatment schemes, rates, and required waste stream qualities (influent and effluent rates and qualities, potential air emissions, etc.)
- Operational time frame of the groundwater treatment facility relative to the ISCO treatment
- Performance standards
- Waste characterization
- Long-term performance monitoring and operation and maintenance (O&M) requirements
- Compliance with all ARARs, pertinent codes and standards
- Technical factors relating to construction of the remedy, including environmental control measures, constructability, and acceptable construction practices and techniques

As part of the preliminary design, CDM will perform the following activities:

- Prepare a summary and detailed justification of assumptions, including design calculations, a detailed description of how all ARARs will be met, a plan for minimizing impact to the public and the environment, and permitting requirements
- Provide recommendations for the project delivery strategy and scheduling, including an evaluation of a phased approach to expedite the RA
- Prepare a preliminary construction schedule appropriate to the size and complexity of the RA project
- Prepare a revised specifications outline that includes all specifications to be used

- Prepare preliminary drawings, including an index of proposed contract drawings, a process and instrumentation diagram, and a site plan
- Prepare a preliminary RA cost estimate that has an accuracy of within plus 40 percent and minus 20 percent, and will include results of the value engineering (VE) screening (described below)
- Describe variances from the ROD, and prepare a technical memorandum for the EPA RPM if preliminary evaluations conclude that the design differs from the ROD, or that the ARARs cannot be met
- Provide technical support to EPA for land acquisition/easement requirements pertaining to the siting of the new monitoring wells and extraction well
- Conduct and/or provide technical support for VE screening, which includes an evaluation of cost and function relationships, focusing on the high-cost areas of the remedy
- Conduct preliminary work regarding the SPDES and air emissions permits that are required for the treatment facility
- Prepare a consolidated response to review comments by EPA, New York State, and other stakeholders prior to beginning the Pre-Final design
- Participate in two preliminary design review meetings to be held at the EPA Region 2 New York office

## 5.9 Task 9 - Equipment, Services, and Utilities

This task covers planning activities relating to procurement of long-lead equipment, services, and utilities required for implementation of the RA, as identified during the preliminary design.

### 5.9.1 Identify Long-Lead Equipment, Services, and Utilities

This is a performance-based design and there will not be any specific equipment to be purchased before the RA contractor completes the detailed design. Also, CDM does not anticipate the use of any specialized equipment, services, or utilities with long-lead purchasing time. Therefore, no PLOE hours are expected to be incurred in this activity.

## 5.10 Task 10 - Intermediate Design

In accordance with the SOW, this task is not applicable to this work assignment.

## 5.11 Task 11 - Pre-Final and Final Design

CDM will submit the pre-final design according to the schedule included in this RD work plan. The pre-final design will function as the draft version of the final design. The pre-final design will address comments generated from the preliminary design review. After EPA reviews and provides comment on the pre-final design, CDM will prepare and submit the final design. All final design documents will be approved by a PE registered in the State of New York. EPA approval of the final design is required before initiating the RA, unless specifically authorized by EPA. RA activities beyond the activities described in Task 12 are not part of the scope of this work assignment.

The pre-final and final submittal will include a complete set of construction drawings and specifications and a basis of design report. All specifications will conform to

Construction Specifications Institute (CSI) format. CDM will coordinate and cross-check all specifications and drawings.

CDM will submit the SPDES and air emissions permit equivalencies to NYSDEC as part of the pre-final and final designs.

### 5.11.1 Pre-Final and Final Design Specifications and Drawings

CDM will submit a complete set of construction drawings and specifications as part of the pre-final design. VE report recommendations from the preliminary design (under Subtask 5.8.1) that have been approved by EPA will be incorporated into the pre-final design drawings and specifications. The final design plans and specifications will be consistent with the technical requirements of all ARARs. Any off-site disposal requirements will be in compliance with the policies stated in the "Procedure for Planning and Implementing Off-Site Response Actions" (*Federal Register*, Volume 50, Number 214, November 1985, pages 45933–45937) and other applicable guidance.

### 5.11.2 Pre-Final/Final RA Cost Estimate

CDM will prepare a definitive cost estimate covering each work item and activity of the RA, based on definitive engineering data, within an accuracy of plus 15 percent to minus 5 percent. As part of this definitive cost estimate, CDM will also prepare a range estimate and analysis of the project's potential scope, cost, and schedule change during the RA, presented by work activity. CDM will include one copy of the quantity takeoff sheets, including all appropriate items, with each estimate submitted.
CDM will base the final estimate on the final approved RA plans and specifications, including amendments, and will provide a detailed description of the basis for development of all unit prices used in the estimate. The final estimate will reflect current prices for labor, materials, and equipment. All work items will be broken down into labor, materials, and equipment. Unit prices, overhead, profit, and other categories will be shown as separate items. The estimate will separately identify contingencies within the defined project scope.

### 5.11.3 Pre-Final/Final Design Review Meeting

CDM will participate in a pre-final design review meeting. The meeting will be held at the EPA Region 2 office in New York. CDM's written responses to EPA's review comments on the preliminary and pre-final design documents, and the prospective changes to be made to the RD based on these comments will be discussed. CDM will provide written responses to all EPA comments for the EPA RPM's review prior to incorporating the changes into the final RD.

### 5.11.4 Prepare Final Design Submittal

CDM will prepare the 100 percent final design submittal, incorporating all comments and/or changes recommended in the pre-final/final design review meeting. The final design submittal will include the final cost estimate and a schedule for execution of the RA. The final design documents will also include the following:

- final review and documentation of constructability, operability, biddability, environmental measures, and claims prevention

- a revised project delivery strategy
- a VE study, if the VE screening performed during the preliminary design identified potential cost savings for the RA

### 5.11.5 RA Subcontract Documents

In accordance with the SOW, this subtask is not applicable to this work assignment.

### 5.11.6 Operation and Maintenance Plan

The RD will be performed with a performance-based approach, and, therefore, the detailed design will be performed during the RA by the selected RA subcontractor. The O&M plan for the treatment facility cannot be prepared until the detailed design is complete, and therefore will be completed during the RA and not under this work assignment. As part of the performance based design specifications, CDM will specify the requirements under which the O&M plan will be developed by the RA subcontractor. The O&M plan requirements include the following:

- A description of O&M requirements including start-up procedures, O&M procedures and tasks, and a schedule for O&M activities
- A description of potential operating problems and common and/or anticipated remedies, as well as a useful-life analysis of significant components and their replacement costs
- A specific description of system equipment, including identification numbers, O&M procedures, and replacement schedules
- A description of records and reporting mechanisms, including but not limited to operating logs, laboratory test records, and maintenance records
- An O&M quality assurance plan, including a description of routine O&M tasks, required data collection and analyses, and procedures for preventing the release of any hazardous substances, pollutants, or contaminants which may endanger public health
- An O&M health and safety plan, including a description of protective equipment, safety precautions, and safety tasks
- A description of the specific corrective actions to be implemented in the event that cleanup standards for groundwater, surface water discharges, and air emissions are exceeded, and a schedule for implementing these corrective actions

CDM's costs for developing the O&M performance-based design specifications are included under Subtasks 5.11.1 and 5.11.4.

## 5.12 Task 12 - Post-Remedial Design Support (Optional)

This task covers activities for technical support of EPA's solicitation of a contract for construction and implementation of the RA. CDM's role under this task will be limited to clarifying and revising, if necessary, the RD documents completed under Task 11 above. This subtask is an optional requirement. In the event that EPA determines that performance of this subtask is necessary, a work assignment amendment will be issued to formally implement these requirements into this work assignment.

### 5.12.1 Update Site-Specific Plans

CDM will review and update the RD plans, specifications, and drawings to ensure that these requirements are up-to-date and in line with the requirements of the RA solicitation, that will comprise the basis for the bids and offers received. At the direction of EPA, CDM will perform the following activities under this subtask:

- Participate in meetings with EPA to review and discuss requirements of the RD that will require resolution prior to preparation of the solicitation for the RA
- Prepare revisions and supplements to the RD plans, specifications, and drawings completed under Task 11 above to implement any changes, corrections, or other updates required for the RA after completion of Task 11 but prior to issuance of the RA solicitation

This subtask will not include any update of plans developed by the selected RA subcontractor during the detailed design, including the construction QA plan, health and safety plan, sampling and analysis plan, site management plan, pollution control and mitigation plan, transportation and disposal/waste management plan, data management plan, and other plans prepared by the RA subcontractor.

## 5.13 Task 13 - Work Assignment Closeout

Upon notification from EPA that the technical work under the work assignment is complete, CDM will perform the necessary activities to close out this work assignment in accordance with contract requirements. Project closeout includes work efforts related to the project completion and closeout phase. Project records will be transferred to EPA. A Work Assignment Closeout Report (WACR) will be completed.

### 5.13.1 Submission of RD Documents to EPA

CDM will package and send one set of all original RD documents for each subtask to the EPA Region 2 Records Center.

### 5.13.2 File Archiving and Storage

CDM will organize the work assignment files in its possession in accordance with the current approved EPA file index structure [e.g., Administrative Record Index, EPA Superfund Site File Index, and/or RAC Guidelines for Closeout of Work Assignments]. CDM will duplicate, distribute and store files as part of contract closeout, as directed by the EPA RPM. CDM will archive files in accordance with EPA Records Center requirements. CDM will convert all relevant paper files into an appropriate long-term storage format. EPA will define the specific long-term storage format prior to closeout of this work assignment.

### 5.13.3 Work Assignment Closeout Report

CDM will prepare a WACR that will include all level-of-effort hours, by professional level, and costs in accordance with the project work breakdown structure.

# Section 6
# Schedule

A project schedule for the remedial design is included as Figure 6-1. The project schedule is based on assumptions for durations and conditions of key events occurring on the critical and non-critical path. These assumptions are as follows:

- Access to all essential properties will be obtained by EPA
- Field activities will not be significantly delayed due to severe weather conditions (e.g., snow and icing conditions, hurricanes)
- Timely review and approval of the work plan and QAPP and the provision of adequate funding by EPA
- All field activities will be performed in Level D or Level C PPE
- Receipt of validated data for analyses performed by EPA's CLP eight weeks after sample collection
- Environmental conditions encountered during the field investigations are not significantly different than those encountered during the RI and described in the ROD

# Section 7
# Project Management Approach

## 7.1 Organization and Approach

The proposed project organization is shown in Figure 7-1.

The SM, Mr. Demetrios Klerides, P.E., has primary responsibility for plan development and implementation of the RD, including coordination with the task managers and support staff, development of bid packages for subcontractor services, acquisition of engineering or specialized technical support, and all other aspects of the day-to-day activities associated with the project.  The SM identifies staff requirements, directs and monitors project progress, ensures implementation of quality procedures and adherence to applicable codes and regulations, and is responsible for performance within the established budget and schedule.

The FTM, Ms. Seth Kellogg, P.G., reports to, and will work directly with the SM to develop and coordinate the work plan, QAPP, staffing and physical resource requirements, and technical statements of work for professional subcontractor services. She will be responsible for the implementation of the field investigation, performance tracking of the CDM subcontractor laboratory, the analysis, interpretation and presentation of data acquired relative to the site and preparation of the Data Evaluation Report.

The Design Task Manager (DTM), Mr. Brendan MacDonald, P.E., will work closely with the FTM to ensure that the field investigation generates the proper type and quantity of data for use in the RD. The DTM will also ensure that the treatability study generates data appropriate for use in the evaluation of the technology, an associated cost analysis if required, and the RD. The RD will be developed by the DTM, the Senior Engineer (SRE), Mr. Frank Tsang, P.E., and the project engineer, Ms. Ellen Gallerie.

The field team leader (FTL), Mr. Joseph Button, is responsible for on-site management for the duration of all site operations including activities conducted by CDM such as equipment mobilization, sampling, and work performed by subcontractors such as drilling.

The Quality Assurance Coordinator (QAC) is Ms. Jeniffer Oxford, who is responsible for overall project quality including development of the QAPP, review of specific task QA/QC procedures, and auditing of specific tasks.  The QAC reports to the CDM Quality Assurance Manager (QAM).

The RAC QAM, Mr. Michael Schwan, is responsible for overall quality for the RAC contract, and will have approved QACs, perform the required elements of the RAC II QA program of specific task QA/QC procedures, and auditing of specific tasks at established intervals.  These QACs report to CDM's corporate QA Manager and are independent of the SM's reporting structure.

The ASC, Mr. Scott Kirchner, will ensure that the subcontract analytical laboratory will perform analyses as described in the QAPP. The ASC provides assistance with meeting EPA sample management and paperwork requirements.

The task numbering system for the RD effort is described in Section 5 of this work plan. Each of these tasks has been scheduled and will be tracked separately during the course of the work. For the RAC II contract, the key elements of the monthly progress report will be submitted within 20 calendar days after the end of each reporting period and will consist of a summary of work completed during that period and associated costs.

Project progress meetings will be held, as needed, to evaluate project status, discuss current items of interest, and review major deliverables such as the QAPP, the Data Evaluation Report, Treatability Study Work Plan, Treatability Study Report, Preliminary Design/Design Criteria Report, Final Remedial Design Submittal, and the O&M Plan.

## 7.2 Quality Assurance and Document Control

All work by CDM on this work assignment will be performed in accordance with the *CDM RAC II Quality Management Plan* (CDM 2006c).

The RAC II RQAC will maintain QA oversight for the duration of the work assignment. A CDM QAC has reviewed this work plan for QA requirements. A QAPP governing field sampling and analysis is required and will be prepared in accordance with the UFP for QAPPs and current EPA Region 2 guidance and procedures. It will be submitted to an approved QAC for review and approval before submittal to EPA. Any reports for this work assignment which present measurement data generated during the work assignment will include a QA section addressing the quality of the data and its limitations. Such reports are subject to QA review following technical review. Statements of work for subcontractor services and subcontractor bids and proposals will receive technical and QA review.

The CDM SM is responsible for implementing appropriate QC measures on this work assignment. Such QC responsibilities include:

- Implementing the QC requirements referenced or defined in this work plan and in the QAPP
- Adhering to the CDM RAC Management Information System (RACMIS) document control system
- Organizing and maintaining work assignment files
- Conducting field planning meetings, as needed, in accordance with the RAC II QMP
- Completing measurement and test equipment forms that specify equipment requirements

Technical and QA review requirements as stated in the QMP will be followed on this work assignment.

Document control aspects of the program pertain to controlling and filing documents.

CDM has developed a program filing system that conforms to EPA's requirements to ensure that the documents are properly stored and filed. This guideline will be implemented to control and file all documents associated with this work assignment. The system includes document receipt control procedures, a file review, an inspection system, and file security measures.

The RAC II QA program illustrated on Table 9-1 of the QMP (CDM 2006c) includes both self-assessments and independent assessments as checks on quality of data generated on this work assessment. Self assessments include management system audits, trend analyses, calculation checking, data validation, and technical reviews. Independent assessments include office, field and laboratory audits and the submittal of performance evaluation samples to laboratories.

One QA internal system audit and one field technical system audit are required. A laboratory technical system audit may be conducted by the CDM QA staff. Performance audits (i.e., performance evaluation samples) may be administered by CDM as required for any analytical parameters. An audit report will be prepared and distributed to the audited group, to CDM management, and to EPA. EPA may conduct or arrange a system or performance audit.

## 7.3 Project Coordination

The SM will coordinate all project activities with the EPA RPM. Regular telephone contact will be maintained to provide updates on project status. Field activities at the site will require coordination among federal, State, and local agencies and coordination with involved private organizations. Coordination of activities with these stakeholders is described below.

EPA is responsible for overall direction and approval of all activities for the LAI site. EPA may designate technical advisors and experts from academia or its technical support branches to assist on the site. Agency advisors could provide important sources of technical information and review, which the CDM team will use from initiation of RD activities through final reporting.

Sources of technical information include EPA, NYSDEC, NYSDOH, SCDOH, USGS, and sampling conducted during previous investigations. These sources can be used for background information on the site and surrounding areas.

NYSDEC may provide review, direction, and input during the RD. EPA's RPM will coordinate contact with personnel from other agencies.

Local agencies that may be involved include local departments such as planning boards, zoning and building commissions, police, fire, health departments, and utilities (water and sewer). Contacts with these local agencies will be coordinated through EPA.

Private organizations requiring coordination during the RD include potentially responsible parties (PRP), residents in the area and public interest groups such as environmental organizations and the press. Coordination with these interested parties will be performed through EPA.

# Section 8
# References


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# Section 9
# Glossary of Abbreviations

| | |
|---|---|
| ARARs | Applicable or Relevant and Appropriate Requirements |
| ASC | Analytical Services Coordinator |
| ASTM | American Society for Testing and Materials |
| bgs | below ground surface |
| BHDEP | Brookhaven Department of Environmental Protection |
| BOA | basic ordering agreement |
| CDM | CDM Federal Programs Corporation |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act of 1980 |
| cis-1,2-DCE | cis-1,2-dichloroethene |
| CLASS | Contract Laboratory Analytical Support Services |
| CLP | Contract Laboratory Program |
| CO | Contracting Officer |
| COC | chain-of-custody |
| Cr+6 | hexavalent chromium |
| CSI | Construction Specifications Institute |
| CSM | conceptual site model |
| CVOC | chlorinated volatile organic compounds |
| CY | cubic yard |
| DCE | Dichloroethene |
| DESA | Division of Environmental Science and Assessment |
| DO | dissolved oxygen |
| DPT | direct push technology |
| DQI | Data Quality Indicator |
| DQO | Data Quality Objective |
| EDD | Electronic Data Deliverable |
| Eh | Oxidation-Reduction Potential |
| EPA | United States Environmental Protection Agency |
| EQuIS | Environmental Quality Information Systems |
| ERRS | Emergency Response and Remedial Section |
| FAM | Finance and Administration |
| FASTAC | Field and Analytical Services Teaming Advisory Committee |
| FS | feasibility study |
| FTL | Field Team Leader |
| FTM | Field Task Manager |
| GAC | Granular activated carbon |
| GIS | Geographic Information System |
| gpm | gallons per minute |
| HASP | Health and Safety Plan |
| HRS | Hazard Ranking System |
| HSC | Health and Safety Coordinator |
| IBC | International Building Codes |
| IDW | Investigation Derived Waste |
| IFB | Invitation For Bid |

| | |
|---|---|
| ISCO | In-situ Chemical Oxidation |
| LAI | Lawrence Aviation Industries |
| LDL | Low detection limit |
| Ledkote | Ledkote Products Co. |
| MCL | Maximum Contaminant Level |
| MDL | Method detection limit |
| ml | milliliters |
| MPW | Multiport Monitoring Well |
| msl | mean sea level |
| NCP | National Contingency Plan |
| NPL | National Priorities List |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOT | New York State Department of Transportation |
| ODCs | other direct costs |
| OSWER | Office of Solid Waste and Emergency Response |
| O&M | operation and maintenance |
| PCB | Polychlorinated Biphenyl |
| PCE | Tetrachloroethene |
| PE | Professional Engineer |
| PID | photoionization detector |
| PLOE | professional level of effort |
| PM | Program Manager |
| PO | Project Officer |
| PPE | personal protective equipment |
| PRGs | Preliminary Remediation Goals |
| PRP | Potentially Responsible Party |
| Q | well yield |
| QA/QC | quality assurance/quality control |
| QAC | Quality Assurance Coordinator |
| QAM | Quality Assurance Manager |
| QAPP | Quality Assurance Project Plan |
| QMP | Quality Management Plan |
| RA | Remedial Action |
| RAC | Response Action Contract |
| RACMIS | RAC Management Information System |
| RAS | Routine Analytical Services |
| RCRA | Resource Conservation and Recovery Act |
| RD | Remedial Design |
| RFP | request for proposal |
| RI | Remedial Investigation |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| RPM | Remedial Project Manager |
| RQAC | Regional Quality Assurance Coordinator |
| RSCC | Regional Sample Control Center |
| SBD | Deep Soil Boring |
| SCDHS | Suffolk County Department of Health Services |
| SDRI | sealed double ring infiltraometer |

| | |
|---|---|
| SM | site manager |
| SMO | Sample Management Office |
| SMP | Site Management Plan |
| SOD | Soil Oxidant Demand |
| SOP | Standard Operating Procedures |
| SOW | Statement of Work |
| SPDES | State Pollution Discharge Elimination System |
| SRE | Senior Engineer |
| SS | Senior Scientist |
| SVOC | semi-volatile organic compound |
| T | Transmissivity |
| TAL | Target Analyte List |
| TCE | Trichloroethene |
| TCL | Target Compound List |
| TDS | Total dissolved solids |
| the site | the Lawrence Aviation site |
| TKN | total Kjehldahl nitrogen |
| TOC | total organic carbon |
| TSS | total suspended solids |
| UFP | Uniform Federal Policy |
| UST | underground storage tank |
| VE | Value Engineering |
| VOC | volatile organic compound |
| WACR | Work Assignment Close-Out Report |
| µg/kg | micrograms/kilogram |
| µg/L | micrograms/liter |
| 1,1-DCE | 1,1-dichloroethylene |
| 1,2-DCE | 1,2-dichloroethylene |
| 3D | three dimensional |


adapted from NYSDEC Interactive Mapping Gateway: http://www.nysgis.state.ny.us/gateway/index.html

Figure 2-1
Site Location Map
Lawrence Aviation Industries Superfund Site
Port Jefferson Station, New York

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# Environmental Site Assessment Summary Report

## Commercial Envelope Manufacturing
## Deer Park, New York

### April 1997

**MAC CONSULTANTS, INC.**
**515 Route 111**
**Hauppauge, New York 11788**
**(516) 265-7700**
**(516) 265-9073 FAX**

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**MAC CONSULTANTS, INC.**
515 Route 111
Hauppauge, NY 11788
(516) 265-7700
Fax: (516) 265-9073

May 13, 1997

Robert Becherer, P.E.
New York State Department Of Environmental Conservation
Building 40 SUNY
Stony Brook, NY 11790-2356

**RE: Commercial Envelope Manufacturing, 900 Grand Blvd., Deer Park, New York**

Dear Mr. Becherer:

Commercial Envelope Manufacturing (CEM) requested that **MAC CONSULTANTS, INC. (MAC)** provide you with the enclosed "Environmental Site Assessment Report" which summarizes the most recent environmental site investigation conducted at its 900 Grand Boulevard, Deer Park New York facility.

The purpose of this report is to provide you with current information concerning facility operations, environmental regulatory files, environmental compliance actions taken by CEM in response to federal, state and local agencies, and soil and groundwater assessment conducted at the facility in December 1996 and January 1997. This report provides background information to support delisting and/or reclassifying the site on the New York State Department of Environmental Conservation (NYSDEC) Inactive Hazardous Waste Registry. CEM is currently listed as a Class 2a site.

We kindly request that you review this report and provide us with an understanding of the technical and administrative requirements necessary for NYSDEC to evaluate CEM's status on the State list, and the steps necessary to reclassify or delist the site.

I will contact you within the next couple of weeks to discuss the report and the tasks necessary to move forward with the project.

Sincerely,
**MAC CONSULTANTS, INC.**

Nicholas A. Andrianas, P.E.

Enclosure

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## TABLES

## 1.0 INTRODUCTION

Commercial Envelope Manufacturing (CEM) retained **MAC CONSULTANTS, INC. (MAC)** to prepare this report to summarize background information on the facility to support the reclassification and/or delisting of the facility from the New York State Department of Environmental Conservation's Inactive Hazardous Waste Registry. CEM is presently listed as a Class 2a site. This report describes the facility operations, surrounding property information, facility environmental compliance status, results of regulatory agency file reviews, and recent soil and groundwater sampling results.

# 2.0 FACILITY AND SURROUNDING PROPERTY INFORMATION

## 2.1 Site location and Adjoining Property Description

CEM is located at 900 Grand Boulevard, Deer Park, Suffolk County, New York as shown on Figure 1. The property is zoned for industrial use and is privately owned.

The site is approximately 7 acres and contains a 131,000 square foot building. Property owned by an electronics and aerospace manufacturer (AIL) is north and across Grand Boulevard and a optics manufacturer (Innovision, Inc.) occupies the adjacent property to the east. A freight storage company (ELM, Freight Handlers, Inc.) operates a warehouse on the property which adjoins the west and south sides of the site. Other properties in the vicinity of the site consist of industrial/manufacturing and commercial establishments.

## 2.2 Facility Structures and Production

The site contains an approximately 131,000 square foot, single story, brick and steel frame, slab on grade building. The building was constructed around 1972 and a stand alone warehouse building was constructed around 1984. Asphalt-paved parking lots are on the east and west sides of the building and a grassed and landscaped area extends from the front of the building to the concrete sidewalk parallel to Grand Boulevard.

The production area is heated by several fuel oil-fired, forced hot air heating units located on the ceiling throughout the production area. The office area is heated by a separate fuel-oil fired, hot water heating system and is cooled by a roof-mounted air conditioning unit. Fuel oil used to operate the heating systems is stored in a 10,000 gallon underground storage tank (UST) on the west side of the building. The building is also serviced by natural gas which is used to fire the on site wastewater evaporator and some of the plant machinery.

Three free-standing electric transformers on concrete pads are located on the property, two on the west side and one east side of the building. The transformers are owned by LILCO.

A natural gas-fired wastewater evaporator system is on the east side of the building and is used for non-hazardous wastewater from the production area. Forklifts used in the production area are fueled by propane and the propane tanks are stored in a fenced-in area on the east side of the building. A trash compactor is located on the west side of the facility and is used to dispose of non-hazardous solid waste. Two loading docks on the northeast side of the building are used for receiving and shipping raw materials and finished goods. Flammable materials are stored in a hazardous materials storage room on the southwest side of the building.

Sanitary wastewater is discharged to an on-site septic tank and leaching system on the northeast side of the property. Stormwater from the parking lot and roof drains are directed to drywells in the parking lot areas. A dry well used to manage stormwater in the loading dock area was cleaned and closed by removing contaminated soil and backfilling with clean fill several years ago as part of a soil remediation project required by the Suffolk County Department of Health Service (SCDOH). Standing water in the loading dock is now pumped and discharged to a paved area outside the loading dock area. Potable water is supplied by the Suffolk County Water Authority.

CEM has been manufacturing envelopes at this facility since the 12 acre property was developed around 1972. The original CEM building consisted of a 131,000 square foot facility separated into an office space, production area, and warehouse. A stand alone warehouse which provided additional warehouse and production space was constructed around 1985. CEM sold a portion of the property in the early 1990s to ELM, Inc., a freight storage company. The property sale transferred approximately 5 acres and the stand alone warehouse to ELM. CEM also leases approximately 42,500 square feet of the southern-most portion of the original building to ELM. The leased space is used to warehouse freight.

CEM currently has approximately 260 employees and operates three work shifts per day, five days per week. The manufacturing process consists of paper cutting, folding, gluing, and printing. Raw materials used in the manufacturing process include various paper stock, water and starch-based glues for sealing the envelopes, and water-based inks for printing designs on the envelopes. Small amounts of alcohol-based inks are also used. CEM produces its own printing plates for applying art work and designs on the envelopes. Limited quantities of photographic chemicals and resins are used to produce the design plates. The plant's air compressors and water cooling systems are housed in a mechanical equipment room on the west side of the building.

## 2.3 Historical Review of Facility and Adjacent Property

A review of aerial photographs from 1955, 1962, 1966, 1969, 1972, 1972, 1977, 1984, 1992, and 1996 shows that the 12 acre parcel was undeveloped before the CEM facility was constructed at the property. The 1955 photographs shows that the area consisted of farmland and some industrial facilities, including AIL to the north and an airfield to the west. The area continued to become more industrialized over time with the farmland completely replaced by manufacturing and commercial facilities by the late 1960s and early 1970s. The 1966 photograph shows that the land south of Grand Boulevard was being prepared for development but no buildings had been constructed at that time. The CEM building was constructed after the 1972 photograph was taken, and the 1977 photograph shows that CEM was the only facility present on the parcel south of Grand Boulevard and between Burt Drive and West Jefryn Boulevard. The air field is no longer in operation as of 1977. The 1984 photograph shows the stand alone warehouse under construction and additional buildings are present east and west of the site. There were no significant changes in land use from 1984 to the present.

Properties surrounding the CEM facility are currently used for manufacturing and freight storage. AIL Systems, Inc., which is north of CEM and across Grand Boulevard, is an electronics and aerospace systems manufacturer. ELM Freight Handlers, Inc. stores various consumer goods for repackaging and distribution and adjoins the CEM property to the east and south. The property adjoining CEM on the west is occupied by Innovision, Inc., a manufacturer of optical equipment.

## 3.0 FACILITY OPERATIONS AND ENVIRONMENTAL COMPLIANCE

### 3.1 Hazardous Substances and Hazardous Wastes

CEM uses various inks and water-based glues which are not considered RCRA hazardous, as defined by the USEPA, but are hazardous substances under SCDOH regulations. The inks and glues are stored inside the building secondary containment areas that were designed in accordance with SCDOH Article 12 regulations and approved by the Department. Isopropyl alcohol, which is purchased in 55 gallon drums and used as a solvent for some of the inks, is stored in a SCDOH-permitted secondary containment area in a garage attached to the west side of the building.

Small quantities of solvents used in the machine shop area for cleaning various parts and machinery are generally stored in small containers on shelves inside the machine shop. Ink pots used in the printing process are cleaned in a tank containing a water-based detergent. The tank is in a SCDOH-permitted secondary containment area. The wash water is pumped via aboveground piping to a 2,000 above grade tank (AST) which is in an SCDOH-permitted secondary containment area.

Spent water-based ink and glue, which is characterized as non-hazardous industrial waste by SCDOH, is disposed of off site by a commercial hauler. The alcohol-based ink and any other spent solvents or solvent-coated materials are handled separately as RCRA hazardous waste. The hazardous waste is drummed and staged in the hazardous waste storage area on the west side of the building. Hazardous wastes are disposed of by Safety Kleen, Inc. in accordance with applicable Federal and state regulations. CEM is classified as a small quantity hazardous waste generator.

The file review indicated that CEM has been in compliance with the applicable SCDOH Article 12 regulations since the facility was permitted in the 1980s.

## 3.2 Underground Storage Tanks

CEM uses a 10,000 gallon underground storage tank (UST) to store fuel oil for on-site heating. The tank is registered with SCDOH and has been tightness tested in accord with the Department's testing schedule. The tank failed a tightness test in 1991 and CEM's contractor assessed the cause of the failure by exposing the top of the tank and inspecting the vent and fill line fittings. The UST passed a second tightness test after repairs were made to piping and fittings on the tank. Photographs of the repair work did not show any significant fuel oil contamination in the surrounding soil. A report was issued to NYSDEC indicating that the tank passed the second tightness test, but the documentation did not indicate whether NYSDEC closed the spill file after receiving the report. The tank is scheduled to be tightness tested in June 1997.

A UST used to store gasoline for fueling company vehicles was located on the southwest side of the building. This tank was removed in the early 1990s under agency oversight.

Three USTs used to store wastewater from the ink pot washer and other equipment washing processes were abandoned in-place and clean closed in accordance with SCDOH regulations. The tank closure was performed as part of an Order on Consent entered into by SCDOH and CEM.

## 3.3 Aboveground Storage Tanks

Several SCDOH-permitted aboveground storage tanks (AST) in the building store glues and inks used in the manufacturing process. These tanks are inside secondary containment areas permitted by SCDOH. A 2,000 gallon tank located on the east side of the facility is used to store wastewater from the ink pot washer and other equipment washing processes. The tank is located in a secondary containment area permitted by SCDOH and the contents are pumped to the wastewater evaporator.

**3.4 Wastewater**

Wastewater generated by the various ink washing and equipment cleaning processes is pumped to the indoor 2,000 AST and then is pumped to the wastewater evaporator. Liquids which cannot be processed by the evaporator or are incompatible with the evaporator components, such as the alcohol-based inks and glues, are handled separately and shipped off-site to a permitted treatment, storage, and disposal (TSD) facility.

**3.5 Solid Waste Disposal**

An on-site trash compactor is used to consolidate non-hazardous solid wastes which are then disposed of off site by a local carter. Scrap paper generated during the paper cutting process is bailed for recycling. Miscellaneous trash, including wooden pallets, plastic, paper and tires, was found at several outside areas on the east side of the building near the wastewater evaporator. Several empty drums were also observed in this area.

**3.6 Air Emissions**

The wastewater evaporator was permitted by NYSDEC in accordance with applicable regulations.

**3.7 Environmental Compliance Orders on Consent and State Listing**

In November 1985, SCDOH issued a Notice of Violation to CEM regarding a discharge of spent ink and other wastewater from a trash compactor to a stormwater drain in the loading dock on the east side of the building. CEM entered into an Order on Consent with SCDOH which required CEM to complete the following tasks:

- Remove liquids and sludge from the loading dock area and stormwater drain;

- Remove liquids and sludge from a spillage area east of the loading dock;
- Document that the three USTs which were used to store ink waste were abandoned properly;
- Prepare an engineering report concerning toxic and hazardous materials used at the site and engineering plans for constructing storage facilities in accordance with Article 12 regulations;
- Ensure that the wastewater evaporator is operating in accordance with all applicable State regulations; and
- Install groundwater monitoring wells and perform an investigation to assess groundwater quality at the site and to determine the nature and extent of impacts from CEM operations.

CEM complied with the Order requirements by recovering the liquid and sludge from the loading dock and spillage areas. The stormwater drain and surrounding subsurface soil were removed and disposed of off site and the excavation was backfilled with clean fill. An engineering report and design plans were prepared to construct hazardous material storage areas in accordance with SCDOH's Article 12 regulations and the constructed storage areas were inspected and permitted by the Department. Air emissions from the wastewater evaporator were permitted to comply with State air permitting requirements.

Previous Groundwater Investigations

Groundwater quality at the site was assessed by installing three monitoring wells as show on Figure 2. Monitoring well DP-1 was installed north of the property to evaluate background water quality conditions. Well DP-2 was installed immediately downgradient of the loading dock area and well DP-3 was installed further downgradient on property which is now owned by ELM. Groundwater samples were collected from the wells in 1986, 1987, and 1988 and analyzed for volatile organic compounds (VOCs) and metals. The data show that VOCs were found sporadically in the upgradient well and downgradient well DP-2 at relatively low concentrations. Metals were not found at concentrations of concern.

SCDOH issued a letter to CEM's counsel on February 23, 1990 stating that CEM had complied with all provisions of the Order on Consent and that no further action with respect to the Order was required.

The SCDOH investigation and Order triggered a notification to NYSDEC which resulted in the site being listed on the State's Inactive Hazardous Waste Site Registry. The site was listed as Class 2a, meaning that additional investigations would be necessary to determine whether contamination at the site poses a risk to human health and/or the environment. The Department issued a draft work plan in August 1991 outlining the proposed scope of work to further characterize environmental conditions at the site. In January 1995 NYSDEC issued a letter to CEM inquiring whether CEM would consider entering into an Order on Consent to perform a Preliminary Site Assessment (PSA) to obtain necessary information for NYSDEC to determine whether further environmental studies are required to reclassify a site. There has been no correspondence from NYSDEC since the January 1995 letter was issued indicating the Department's intention to continue with the PSA/Phase II investigation program. Recent discussions with NYSDEC, Region I representatives confirmed that the Department would allow CEM to conduct the Phase II investigation by agreement.

## 4.0 REGULATORY AGENCY RECORDS REVIEW

**MAC** reviewed environmental records on file at SCDOHS, NYSDEC, and USEPA. The following provides a summary of the information contained in the agency files.

### Suffolk County Department of Health Services

**MAC** reviewed the SCDOHS files on January 17, 1997. The SCDOHS files included information concerning the following:

- site inspections and notices of violations from the early 1980s;
- documentation of the Order on Consent remedial work; and
- various permits, reports, engineering drawings and correspondences concerning above and below grade storage tanks, Article 12 issues, and air emissions.

The documents available for review did not provide any indication that the County is currently pursuing or intending to pursue further environmental investigations or remedial actions at the site.

### New York State Department of Environmental Conservation

**MAC** reviewed the NYSDEC files on January 24, 1997. The State files included information concerning the following:

- the SCDOHS remedial actions performed under the Order on Consent;
- fuel oil UST testing and repair work;

- a 1987 Phase I Investigation performed by EA Science and Technology, Inc. The Phase I work was commissioned by NYSDEC and used to further characterize site conditions and develop the database necessary to assess whether additional studies at the site were warranted. The report concluded that information on upgradient groundwater quality (an upgradient well was not sampled during the EA work) would be required before a final decision on the nature and scope of additional studies (i.e. Phase II) could be made;

- a draft Phase II investigation work plan outlining the scope of work proposed by NYSDEC to further evaluate groundwater conditions at the site.

**MAC** discussed the status of the CEM project with several NYSDEC representatives. Although the State intends to implement the Phase II work some time in the future, an exact date has not been set because the Department does not consider the site a priority.

United States Environmental Protection Agency

The CEM site is listed in the USEPA's CERCLIS (Comprehensive Environmental Recovery, Compensation and Liability Information System) database, which provides information on potential hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies, and private persons. Roy F. Weston, Inc. was commissioned by USEPA to prepare a Site Inspection Prioritization (SIP) Report which consists of a detailed review of the physical and demographic conditions surrounding the site, as well as a summary of all the previous investigation results and remedial actions. The purpose of the SIP work is similar to the NYSDEC Phase I process in that it is used to determine whether further study at the site is required. The report concludes that additional work is recommended, but the scope of this work is not indicated.

**MAC** discussed the status of the CEM project with USEPA representatives and they indicated that

USEPA is now the "lead agency" for this project. USEPA also indicated that it considers the site a very low priority and that it does not envision taking any action in the foreseeable future.

## 5.0 RECENT SITE INVESTIGATIONS

### 5.1 Soil and Groundwater Sampling

**MAC** performed a limited soil and groundwater sampling program during December, 1996 and January, 1997 to update the groundwater monitoring database established in the late 1980s and to assess soil conditions near the fuel oil UST, the backfilled excavation of the gasoline UST, the ink storage USTs and the three drywells.

Sampling Methodology-December, 1996

Groundwater samples were collected from monitoring wells DP-2 and DP-3, which were installed during the SCDOH groundwater investigation. Additional groundwater samples were collected using a GeoProbe sampling device from the north property boundary and from the area downgradient of the fuel oil UST and the gasoline UST excavation. Soil samples were collected 8 to 10 feet below grade and 18 to 20 feet below grade at two locations around the fuel oil tank and gasoline tank excavation. The sampling locations are shown on Figure 2.

The groundwater samples from DP-2 and DP-3 were analyzed for VOCs using USEPA Method 601 and 602. The suite of compounds covered by these methods includes the chemicals typically found in gasoline and organic solvents. The groundwater sample from the north property boundary was analyzed for VOCs and semivolatile organic compounds (SVOCs) using USEPA Method 8270. The SVOC parameters cover the compounds typically found in fuel oil. The groundwater sample from the downgradient side of the UST and UST excavation, as well as the soil samples from this area, were analyzed for VOCs and SVOCs.

The samples were analyzed by EcoTest Laboratories, North Babylon, New York, a New York State-certified laboratory. The laboratory data are summarized in Tables 1,2 and 3.

Sampling Methodology-January, 1997

The January, 1997 sampling program focused on the area east of the CEM building shown on Figure 3. According to CEM representatives, this area contains three underground storage tanks which were used to store ink waste prior to on site treatment. The tanks were cleaned and closed in place in accordance with SCDOHS Article 12 regulations in the 1980s. Three dry wells which received process wastewater and ink waste from the CEM facility were also located in this area but were subsequently cleaned and backfilled with sand in response to an SCDOHS Order on Consent entered into by CEM in the mid 1980s. The purpose of the sampling program was to determine whether soil at and around the drywell and tank areas are a continuing source of volatile organic compounds (VOCs) in groundwater downgradient of the site.

A GeoProbe sampling device operated by American Environmental Assessment Corp., Farmingdale, New York, was used to collect the soil and groundwater samples at the locations shown on Figure 3. Soil samples were collected at 8 to 10 feet and 18 to 20 feet below grade at each location to vertically profile soil conditions. The groundwater sample (GW-1) was obtained from sampling location SS-1 on the south side and hydraulically downgradient of the area of concern. Groundwater at the site flows south-southeast based on previous site investigations performed by others.

MAC had proposed to sample soil adjacent to the location where a drywell in the loading dock area was cleaned and closed during the Order on Consent work. The presence of below grade LILCO electric and gas lines running through the area created a health and safety concern which prevented this work from being performed.

The samples were placed in containers provided by the laboratory, stored in a cooler with ice, then hand delivered with chain of custody documentation to EcoTest Laboratories, Inc., North Babylon, New York, a New York-certified laboratory. The samples were analyzed for VOCs using USEPA

Methods 601 and 602. The analytical results are summarized in Table 4.

Sample Results-Soil

The shallow soil sample from TW-2 did not contain VOCs, but low levels of SVOCs were found at concentrations estimated by the laboratory. The deeper sample did not contain VOCs or SVOCs. The shallow and deep sample from TW-3 did not contain VOCs or SVOCs at concentrations exceeding the laboratory reporting limits.

Analytical results of soil samples collected during January, 1997 show that VOCs were not found in any of the soil samples at concentrations exceeding the laboratory reporting limits except for the 8 to 10 foot sample from SS-5. The shallow soil sample from SS-5 contains 1,2-dichloroethene, trichloroethylene, and tetrachloroethene at 11, 9, and 15 micrograms per kilogram (ug/kg). These concentrations are marginally greater than the laboratory method detection limits and are well below the recommended soil cleanup criteria established by NYSDEC.

Sampling Results-Groundwater

Previous investigations performed at CEM indicate that groundwater flows south-southeast across the site. During the December 1996 sampling, the groundwater sample from the north property boundary (TW-1) contained low levels of various SVOCs, indicating an off-site source. VOCs were not found in TW-1 at concentrations exceeding the laboratory detection limits. The VOCs 1,2-dichloroethylene, trichloroethene, and tetrachloroethylene were found in the sample from DP-2 at 160, 120, and 100 ug/l, respectively. VOCs were not found in the sample from DP-3. The groundwater sample from the UST area (TW-2) did not contain VOCs at concentrations exceeding the laboratory reporting limits. SVOCs were found in TW-2 at levels marginally exceeding the laboratory reporting limits and at concentrations similar to those found in the upgradient TW-1 sample.

With respect to groundwater sample GW-1 collected at SS-1, the laboratory data show that VOCs were not found in the sample at concentrations exceeding the laboratory reporting limits. This indicates that no VOCs were found immediately downgradient of the drywell and tank areas.

## 5.2 Findings and Conclusions

The findings and conclusions of the soil and groundwater sampling during December 1996 and January 1997 are summarized below.

The groundwater sample from the north property boundary contained low levels of SVOCs, indicating a contribution from an off-site source. Groundwater and soil samples from the UST area did not contain VOCs or SVOCs at concentrations that would suggest that a release of fuel oil or gasoline has occurred from the tanks as of the time the samples were collected.

Analytical data from the DP-2 and DP-3 samples show that the type and concentration of VOCs detected during the recent sampling program are similar to the VOCs found during the 1986 through 1988 SCDOH investigation. VOCs have been found sporadically in these wells and at varying concentrations. The suspected source of VOCs in the DP-2 area is the loading dock stormwater drain, which was cleaned and removed as required by the SCDOH Order on Consent. Considering the nature and concentrations of VOCs found in DP-2 between 1986 and December 1996, there does not appear to be a continuing source of VOCs in this area.

The soil and groundwater sampling database collected during January, 1997 does not indicate that a significant source of VOCs is present in the drywell and underground storage tank areas. The analytical results of sludge and wastewater removed from the drywells during the SCDOHS Order on Consent work showed that this material contained VOCs at relatively high concentrations. Since these compounds were not present or were found at significantly lower concentrations during the recent sampling program, it is reasonable to conclude that the remedial operations performed during the SCDOHS Order on Consent work were effective at eliminating the most significant sources of contamination to soil and groundwater.

**Commercial Envelope Manufacturing Co., Inc.**
**Deer Park, New York**

**Table 1**

**Soil Analytical Results - December 1996 (Units - ug/kg)**
**Volatile and Semi-Volatile Organic Compounds (STARS 8021/8270)**

| Compound | TW-2A 8-10' | TW-2B 18-20 | TW-3A 8-10 | TW-3B 18-20 |
|---|---|---|---|---|
| Benzene | ND | ND | ND | ND |
| Ethylbenzene | ND | ND | ND | ND |
| Toluene | ND | ND | ND | ND |
| o-Xylene | ND | ND | ND | ND |
| Xylene | ND | ND | ND | ND |
| m + p Xylene | ND | ND | ND | ND |
| Isopropylbenzene | ND | ND | ND | ND |
| n-Propylbenzene | ND | ND | ND | ND |
| p-Isopropyltoluene | ND | ND | ND | ND |
| 1,2,4-Trimethylbenzene | ND | ND | ND | ND |
| 1,3,5-Trimethylbenzene | ND | ND | ND | ND |
| n-Butylbenzene | ND | ND | ND | ND |
| sec-Butylbenzene | ND | ND | ND | ND |
| t-Butylbenzene | ND | ND | ND | ND |
| Naphthalene | ND | ND | ND | ND |
| Anthracene | ND | ND | ND | ND |
| Flourene | ND | ND | ND | ND |
| Phenanthrene | ND | ND | ND | ND |
| Pyrene | 24 | ND | ND | ND |
| Acenaphthene | ND | ND | ND | ND |
| Benzo(a)anthracene | ND | ND | ND | ND |
| Flouranthene | 24 | ND | ND | ND |
| Benzo(b)flouranthene | 18 | ND | ND | ND |
| Benzo(k)flouranthene | 18 | ND | ND | ND |
| Chrysene | ND | ND | ND | ND |
| Benzo(a)pyrene | 21 | ND | ND | ND |
| Benzo(g,h,i)perylene | ND | ND | ND | ND |
| Indeno(1,2,3-cd)pyrene | ND | ND | ND | ND |
| Dibenzo(a,h)anthracene | ND | ND | ND | ND |

ND - Not Detected

**Commercial Envelope Manufacturing Co., Inc.**
**Deer Park, New York**

**Table 2**

**Groundwater Analytical Results - December 1996 (Units - ug/l)**
**Volatile Organic Compounds Method 601/602**

| COMPOUND | TW-1 | TW-2 | DP-2 | DP-3 |
|---|---|---|---|---|
| Chloromethane | ND | ND | ND | ND |
| Bromomethane | ND | ND | ND | ND |
| Chlorodibromomethane | ND | ND | ND | ND |
| Vinyl Chloride | ND | ND | ND | ND |
| Chloroethane | ND | ND | ND | ND |
| 2-Chloroethyl vinyl ether | ND | ND | ND | ND |
| Methylene chloride | ND | ND | ND | ND |
| Trichloroflouromethane | ND | ND | ND | ND |
| Dichlorodiflouromethane | ND | ND | ND | ND |
| 1,1-Dichloroethene | ND | ND | ND | ND |
| 1,1-Dichloroethane | ND | ND | ND | ND |
| 1,2-Dichloroethene | ND | ND | 160 | ND |
| Chloroform | ND | ND | ND | ND |
| 1,2-Dichloroethane | ND | ND | ND | ND |
| 1,1,1-Trichloroethane | ND | ND | ND | ND |
| Carbon tetrachloride | ND | ND | ND | ND |
| Bromodichloromethane | ND | ND | ND | ND |
| 1,2-Dichloropropane | ND | ND | ND | ND |
| Trichloroethene | ND | ND | 120 | ND |
| trans-1,3-Dichloropropene | ND | ND | ND | ND |
| cis-1,3-Dichloropropene | ND | ND | ND | ND |
| 1,1,2-Trichloroethane | ND | ND | ND | ND |
| Bromoform | ND | ND | ND | ND |
| Tetrachloroethene | ND | ND | 100 | ND |
| Chlorobenzene | ND | ND | ND | ND |
| 1,3-Dichlorobenzene | ND | ND | ND | ND |
| 1,4-Dichlorobenzene | ND | ND | ND | ND |
| 1,2-Dichlorobenzene | ND | ND | ND | ND |
| 1,1,2,2-Tetrachloroethane | ND | ND | ND | ND |
| Benzene | ND | ND | ND | ND |
| Toluene | ND | ND | ND | ND |
| Ethylbenzene | ND | ND | ND | ND |
| Xylenes (total) | ND | ND | ND | ND |

ND - Not Detected

**Commercial Envelope Manufacturing Co., Inc.**
**Deer Park, New York**

**Table 3**

**Groundwater Analytical Results - Semi-Volatile Organic Compounds**
**Units - ug/l**

| Compounds | TW-1 | TW-2 |
|---|---|---|
| N-Nitrosodimethylamine | ND | ND |
| Bis(2-chloroethyl)ether | ND | ND |
| 1,3-Dichlorobenzene | ND | ND |
| 1,4-Dichlorobenzene | ND | ND |
| 1,2-Dichlorobenzene | ND | ND |
| Bis(2-chloroisopropyl)ether | ND | ND |
| N-Nitrosodi-n-propylamine | ND | ND |
| Hexachloroethane | ND | ND |
| Nitrobenzene | ND | ND |
| Isophorone | ND | ND |
| Bis(2-chloroethoxy)methane | ND | ND |
| 1,2,4-Trichlorobenzene | ND | ND |
| Naphthalene | 1.9 | ND |
| Hexachlorobutadiene | ND | ND |
| Hexachlorocyclopentadiene | ND | ND |
| 2-Chloronaphthalene | ND | ND |
| Dimethyl Phthalate | ND | ND |
| Acenaphthylene | 0.6* | ND |
| 2,6-Dinitrotoluene | ND | ND |
| 2,4-Dinitrotoluene | ND | ND |
| Acenaphthene | 0.6* | ND |
| Diethyl Phthalate | ND | ND |
| Flourene | 0.7* | ND |
| 4-Chlorophenyl phenyl ether | ND | ND |
| N-Nitrosodiphenylamine | ND | ND |
| 1,2-Diphenylhydrazine | ND | ND |
| 4-Bromophenyl phenyl ether | ND | ND |
| Hexachlorobenzene | ND | ND |
| Phenanthrene | 4.6 | 1.3 |
| Anthracene | 0.6* | ND |
| Di-n-Butyl Phthalate | 0.6* | ND |
| Flouranthene | 3.5 | 1 |
| Benzidine | ND | ND |
| Pyrene | 4.3 | 1.3 |
| Benzyl Butyl Phthalate | ND | ND |
| Benzo(a) Anthracene | 1.1 | ND |
| 3,3'-Dichlorobenzidine | ND | ND |
| Chrysene | 1.5 | ND |
| Bis(2-ethylhexyl)phthalate | 2.7 | 2.1 |
| Di-n-octyl phthalate | ND | ND |
| Benzo-(b) flouranthene | 1.5 | ND |
| Benzo-(k) flouranthene | 1.5 | ND |
| Benzo (a)pyrene | 1.9 | ND |
| Indeno(1,2,3-cd)pyrene | 0.6* | ND |
| Dibenzo (a,h)anthracene | ND | ND |
| Benzo(ghi)perylene | 0.6* | ND |

ND- Not Detected
* Reported below quantification limit

COMMERCIAL ENVELOPE MANUFACTURING, INC.
DEER PARK, NEW YORK

TABLE 4

SOIL AND GROUNDWATER SAMPLING RESULTS - JANUARY 1997

| Sample ID / Sample Depth (ft) / Date Collected / Parameter (ug/kg) | SS-1A 8 to 10 01/31/97 | SS-1B 18 to 20 01/31/97 | SS-2A 8 to 10 01/31/97 | SS-2B 18 to 20 01/31/97 | SS-3A 8 to 10 01/31/97 | SS-3B 18 to 20 01/31/97 | SS-4A 8 to 10 01/31/97 | SS-4B 18 to 20 01/31/97 | SS-5A 8 to 10 01/31/97 | SS-5B 18 to 20 01/31/97 | SS-6A 8 to 10 01/31/97 | SS-6B 18 to 20 01/31/97 | GW-1 (*) 01/31/97 | Field Blank (*) 01/31/97 | Trip Blank (*) 01/31/97 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloromethane | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| Bromomethane | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| Dichlorodifluomethane | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <2 | <2 | <2 |
| Vinyl Chloride | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| Chloroethane | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| Methylene Chloride | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| Trichlorofluomethane | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <2 | <2 | <2 |
| 1,1 Dichloroethene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| 1,1 Dichloroethane | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| 1,2 Dichloroethene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | 11 | <5 | <5 | <5 | <1 | <1 | <1 |
| Chloroform | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| 1,2 Dichloroethane | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| 111 Trichloroethane | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| Carbon Tetrachloride | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| Bromodichloromethane | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| 1,2 Dichloropropane | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <2 | <2 | <2 |
| t-1,3 Dichloropropene | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <1 | <1 | <1 |
| Trichloroethylene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | 9 | <5 | <5 | <5 | <2 | <2 | <2 |
| Chlorodibromomethane | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <2 | <2 | <2 |
| 112 Trichloroethane | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <2 | <2 | <2 |
| c-1,3 Dichloropropene | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <2 | <2 | <2 |
| 2 Chloroethvinylether | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <2 | <2 | <2 |
| Bromoform | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <2 | <2 | <2 |
| 1122 Tetrachloroethane | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <2 | <2 | <2 |
| Tetrachloroethene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | 15 | <5 | <5 | <5 | <1 | <1 | <1 |
| Chlorobenzene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| 1,3 Dichlorobenzene | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <2 | <2 | <2 |
| 1,2 Dichlorobenzene | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <2 | <2 | <2 |
| 1,4 Dichlorobenzene | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <2 | <2 | <2 |
| Benzene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| Toluene | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <2 | <2 | <2 |
| Ethyl Benzene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <1 | <1 | <1 |
| m Xylene | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <2 | <2 | <2 |
| o+p Xylene | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <4 | <4 | <4 |

Notes:
(*) Results in ug/l

# Figure 1 - Site Location Map

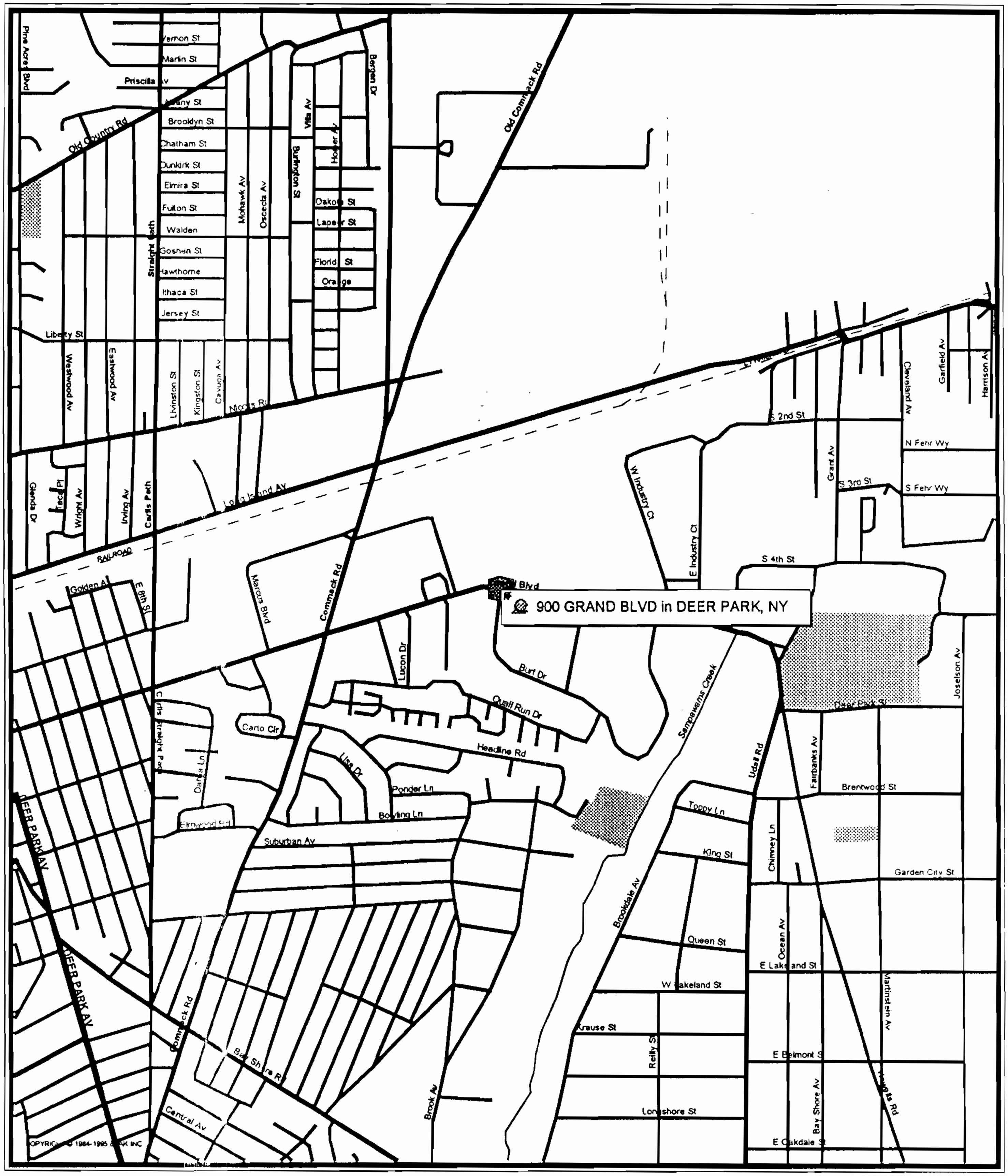

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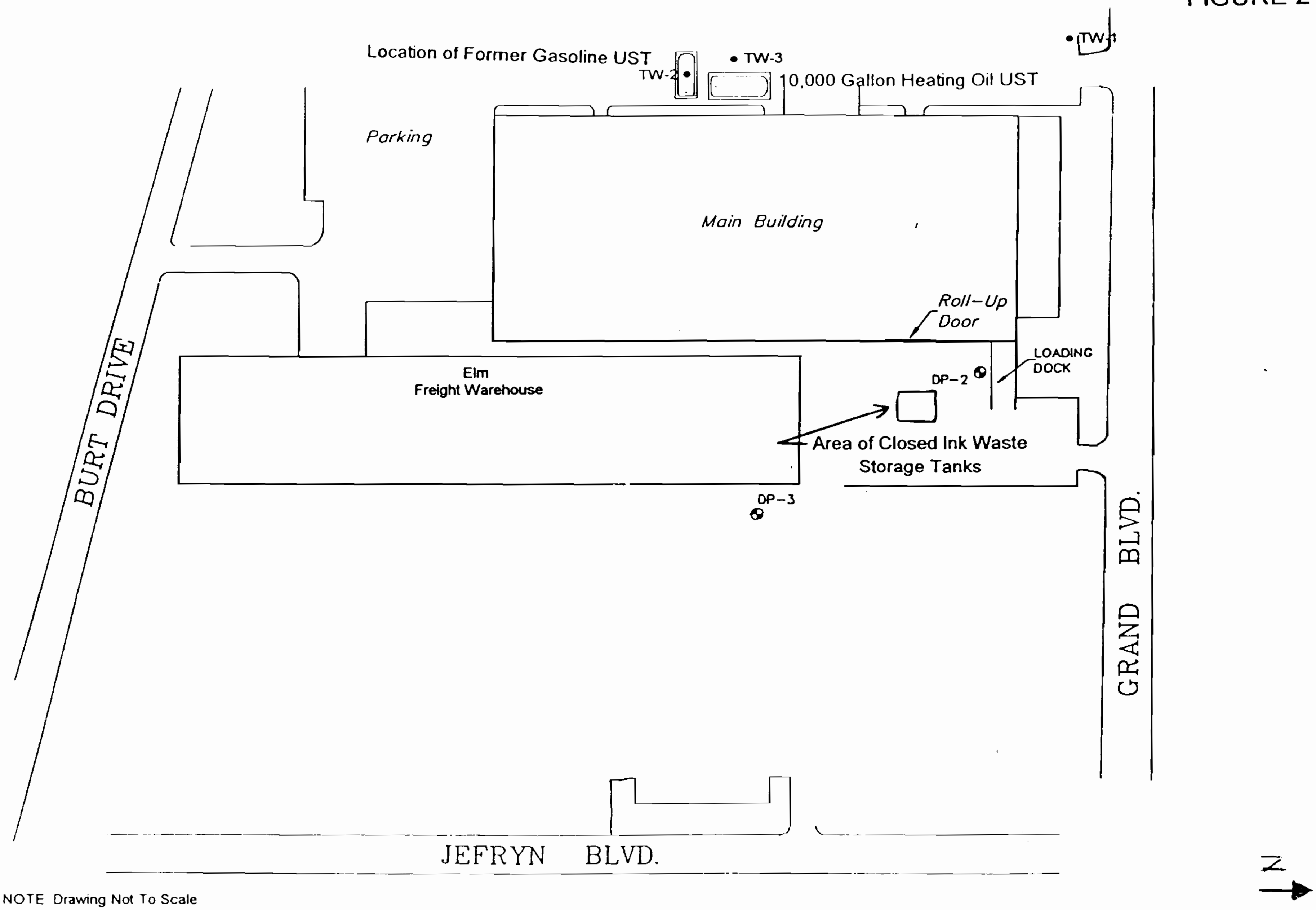
FIGURE 2

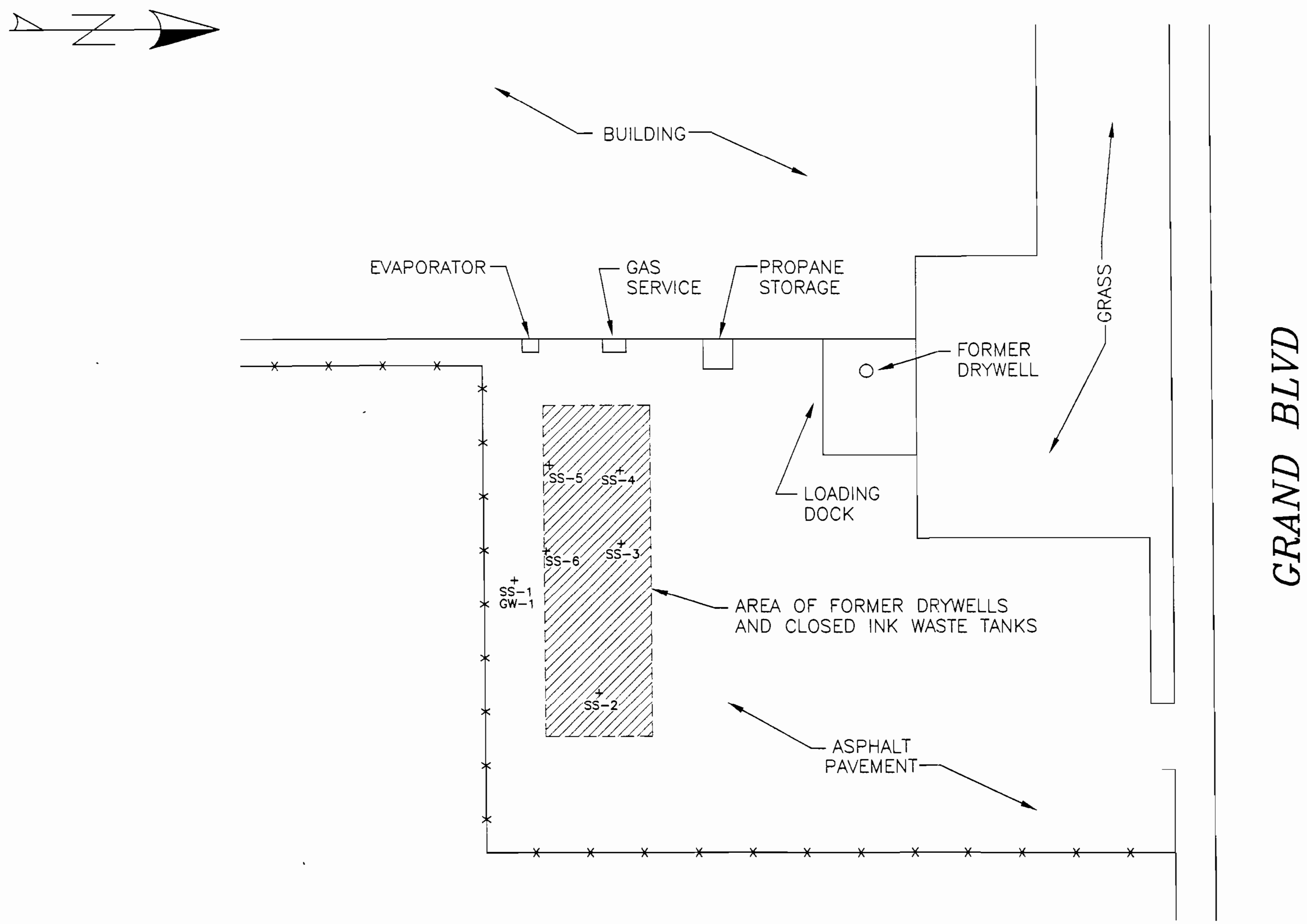



NOTE Drawing Not To Scale

SAMPLING LOCATIONS

COMMERCIAL ENVELOPE MFG CO , INC

DEER PARK, NEW YORK




## LEGEND

+ SS-1 SOIL SAMPLE LOCATIONS

+ GW-1 GROUNDWATER SAMPLING LOCATION

## SITE PLAN

SCALE: 1" = 40'-0"

PLOT: 480

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(516) 265-7700

SOIL SAMPLING LOCATIONS

COMMERCIAL ENVELOPE MANUFACTURING, INC.
DEER PARK, NEW YORK

FIGURE NO. 3

**Table 5-4**
**Bench-scale Treatability Testing Summary**
**Lawrence Aviation Industries Site**
**Port Jefferson Station, New York**

| Test | Purpose | Oxidant | Oxidant (%) | Soil (g) | Soil Sample | Groundwater (ml) | Distilled Water (ml) | Oxidant (g) | Bottles | Samples |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | VOC Removal | $KMnO_4$ | 1% | 75 | 1 | 150 | 0 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 2 | VOC Removal | $KMnO_4$ | 5% | 75 | 1 | 150 | 0 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 3 | VOC Removal | $KMnO_4$ | 1% | 75 | 2 | 150 | 0 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 4 | VOC Removal | $KMnO_4$ | 5% | 75 | 2 | 150 | 0 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 5 | VOC Removal | $KMnO_4$ | 1% | 75 | 3 | 150 | 0 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 6 | VOC Removal | $KMnO_4$ | 5% | 75 | 3 | 150 | 0 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 7 | SOD | $KMnO_4$ | 1% | 75 | 1 | 0 | 150 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 8 | SOD | $KMnO_4$ | 5% | 75 | 2 | 0 | 150 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 9 | SOD | $KMnO_4$ | 1% | 75 | 3 | 0 | 150 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 10 | SOD | $KMnO_4$ | 5% | 75 | 1 | 0 | 150 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 11 | SOD | $KMnO_4$ | 1% | 75 | 2 | 0 | 150 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 12 | SOD | $KMnO_4$ | 5% | 75 | 3 | 0 | 150 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 13 | VOC Removal | $NaS_2O_8$ | 1% | 75 | 1 | 150 | 0 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 14 | VOC Removal | $NaS_2O_8$ | 5% | 75 | 1 | 150 | 0 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 15 | VOC Removal | $NaS_2O_8$ | 1% | 75 | 2 | 150 | 0 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 16 | VOC Removal | $NaS_2O_8$ | 5% | 75 | 2 | 150 | 0 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 17 | VOC Removal | $NaS_2O_8$ | 1% | 75 | 3 | 150 | 0 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 18 | VOC Removal | $NaS_2O_8$ | 5% | 75 | 3 | 150 | 0 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 19 | SOD | $NaS_2O_8$ | 1% | 75 | 1 | 0 | 150 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 20 | SOD | $NaS_2O_8$ | 5% | 75 | 2 | 0 | 150 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 21 | SOD | $NaS_2O_8$ | 1% | 75 | 3 | 0 | 150 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 22 | SOD | $NaS_2O_8$ | 5% | 75 | 1 | 0 | 150 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 23 | SOD | $NaS_2O_8$ | 1% | 75 | 2 | 0 | 150 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 24 | SOD | $NaS_2O_8$ | 5% | 75 | 3 | 0 | 150 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |

**Table 5-4**
**Bench-scale Treatability Testing Summary**
**Lawrence Aviation Industries Site**
**Port Jefferson Station, New York**

| Test | Purpose | Oxidant | Oxidant (%) | Soil (g) | Soil Sample | Groundwater (ml) | Distilled Water (ml) | Oxidant (g) | Bottles | Samples |
|---|---|---|---|---|---|---|---|---|---|---|
| 25 | VOC Removal | $NaS_2O_8$ + Catalyst | 1% | 75 | 1 | 150 | 0 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 26 | VOC Removal | $NaS_2O_8$ + Catalyst | 5% | 75 | 1 | 150 | 0 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 27 | VOC Removal | $NaS_2O_8$ + Catalyst | 1% | 75 | 2 | 150 | 0 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 28 | VOC Removal | $NaS_2O_8$ + Catalyst | 5% | 75 | 2 | 150 | 0 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 29 | VOC Removal | $NaS_2O_8$ + Catalyst | 1% | 75 | 3 | 150 | 0 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 30 | VOC Removal | $NaS_2O_8$ + Catalyst | 5% | 75 | 3 | 150 | 0 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 31 | SOD | $NaS_2O_8$ + Catalyst | 1% | 75 | 1 | 0 | 150 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 32 | SOD | $NaS_2O_8$ + Catalyst | 5% | 75 | 2 | 0 | 150 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 33 | SOD | $NaS_2O_8$ + Catalyst | 1% | 75 | 3 | 0 | 150 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 34 | SOD | $NaS_2O_8$ + Catalyst | 5% | 75 | 1 | 0 | 150 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 35 | SOD | $NaS_2O_8$ + Catalyst | 1% | 75 | 2 | 0 | 150 | 1.50 | 2 | 0, 1, 2, 3, 4, 8 days |
| 36 | SOD | $NaS_2O_8$ + Catalyst | 5% | 75 | 3 | 0 | 150 | 7.50 | 2 | 0, 1, 2, 3, 4, 8 days |

Notes:
1. All tests will be conducted in duplicate.
2. Catalyst will be ferrous sulfate EDTA.

Acronymns:

| | |
|---|---|
| EDTA | ferrous sulfate ethylenediamine tetraacetic acid |
| g | grams |
| $KMnO_4$ | potassium permanganate |
| ml | milliliter |
| $MnO_4$ | permanganate |
| $NaS_2O_8$ | sodium perfulfate |
| $S_2O_8$ | persulfate |
| SOD | soil oxidant demand |
| VOCs | volatile organic compounds |

**Table 5-4**
**Bench-scale Treatability Testing Summary**
**Lawrence Aviation Industries Site**
**Port Jefferson Station, New York**

| Analyses |
|---|
| VOCs, $MnO_4$ |
| VOCs, $MnO_4$ |
| VOCs, $MnO_4$ |
| VOCs, $MnO_4$ |
| VOCs, $MnO_4$ |
| VOCs, $MnO_4$ |
| $MnO_4$ |
| $MnO_4$ |
| $MnO_4$ |
| $MnO_4$ |
| $MnO_4$ |
| $MnO_4$ |
| VOCs, $S_2O_8$ |
| VOCs, $S_2O_8$ |
| VOCs, $S_2O_8$ |
| VOCs, $S_2O_8$ |
| VOCs, $S_2O_8$ |
| VOCs, $S_2O_8$ |
| $S_2O_8$ |
| $S_2O_8$ |
| $S_2O_8$ |
| $S_2O_8$ |
| $S_2O_8$ |
| $S_2O_8$ |

**Table 5-4**
**Bench-scale Treatability Testing Summary**
**Lawrence Aviation Industries Site**
**Port Jefferson Station, New York**

| Analyses |
|---|
| VOCs, $S_2O_8$ |
| VOCs, $S_2O_8$ |
| VOCs, $S_2O_8$ |
| VOCs, $S_2O_8$ |
| VOCs, $S_2O_8$ |
| VOCs, $S_2O_8$ |
| $S_2O_8$ |
| $S_2O_8$ |
| $S_2O_8$ |
| $S_2O_8$ |
| $S_2O_8$ |
| $S_2O_8$ |

**Table 5-3**
**Deep Soil Boring Depths and Location Rationale**
**Lawrence Aviation Industries Site**
**Port Jefferson Station, New York**

| Soil Boring | Total Depth (ft bgs) | Rationale[1] |
|---|---|---|
| SBD-PD-16 | 260 | SBD-PD-16 is located upgradient of the area of highest known TCE contamination (MPW-07) and at a location identified by ERT as having high soil vapor concentrations. |
| SBD-PD-17 | 260 | SBD-PD-17 is located adjacent to the area of highest known TCE contamination (MPW-07) and is upgradient of MPW-02 |
| SBD-PD-18 | 260 | SBD-PD-18 is located where there was a reported spill of "pure TCE" and is upgradient of MPW-02 |
| SBD-PD-19 | 260 | SBD-19 is located adjacent to the area of highest known TCE contamination (MPW-07) |

Notes:
1. The general purpose of the deep soil borings in to detemine the most appropriate location for the ISCO treatment and to collect samples for the bench-scale treatability study.
2. Boring locations are shown on Figure 5-2.

Acronyms:

| | |
|---|---|
| bgs | below ground surface |
| ft | feet |
| ISCO | in situ chemical oxidation |
| MPW | multiport well |
| MW | monitoring well |
| PD | pre-design investigation |
| SBD | deep soil boring |
| TCE | Trichloroethene |

**Table 5-2**
**Monitoring Well Depths and Location Rationale**
**Lawrence Aviation Industries Site**
**Port Jefferson Station, New York**

| Well | Screen Interval (ft bgs) | Total Depth (ft bgs) | Screening Sample Depths (ft bgs) | Rationale |
|---|---|---|---|---|
| **Plume Boundary Monitoring Wells [1]** | | | | |
| MW-PD-11 | 195-205 | 210 | 190, 200, 210 | Refine the western boundary of plume between MPW-04 and MPW-10 |
| MW-PD-13 | 210-220 | 215 | 185, 215, 245 | Refine the eastern boundary of the plume and address resident concerns regarding the linear distance between MPW-03 and MPW-06 |
| MW-PD-15 | 180-190 | 195 | 155, 185, 215 | Refine the western boundary of plume between MPW-05 and MPW-09 |
| MW-PD-17 | 80-90 | 95 | 75, 85, 95 | Refine the eastern boundary of the plume between MPW-06 and MPW-08 |
| **Plume Continuity Monitoring Wells [2]** | | | | |
| MW-PD-12 | 240-250 | 255 | 215, 245, 275 | Refine delineation of the centerline of plume and detemine if areas of higher groundwater contamination are present between the LAI Facility and Port Jefferson Harbor |
| MW-PD-14 | 240-250 | 255 | 215, 245, 275 | Refine delineation of the centerline of plume and detemine if areas of higher groundwater contamination are present between the LAI Facility and Port Jefferson Harbor |
| MW-PD-16 | 135-145 | 150 | 110, 140, 170 | Refine delineation of the centerline of plume and detemine if areas of higher groundwater contamination are present between the LAI Facility and Port Jefferson Harbor |

Notes:
1. Plume boundary wells are intended to be located outside of the plume boundary to refine the interpretation of the eastern and western boundaries of the plume.
2. Plume continuity wells are intended to refine the interpretation of plume concentrations between the LAI Facility and Old Mill Pond. These wells are intended to be located as close to the centerline of the plume as possible. Deviations from the centerline are the result of limitations in potential drilling locations.
3. Monitoring well locations are shown on Figure 5-1.

Acronyms:

| | |
|---|---|
| bgs | below ground surface |
| ft | feet |
| MPW | multiport well |
| MW | monitoring well |
| PD | pre-design investigation |

**Table 5-1**
**Summary of Sampling Activities**
**Lawrence Aviation Industries Site**
**Port Jefferson Station, New York**

| SAMPLE TYPE/ LOCATION | SAMPLE MEDIA | CLP ANALYTICAL PARAMETERS | NO. OF SAMPLES | NON-RAS ANALYTICAL PARAMETERS | NO. OF SAMPLES | SAMPLING FREQUENCY |
|---|---|---|---|---|---|---|
| **Groundwater Screening Sampling**<br>1 event, 7 locations | Groundwater [1] | None | NA | TCL trace VOCs - 24 hour TAT | 21 | Three per well location |
| **Soil Boring Groundwater Screening Sampling**<br>1 event, 4 locations | Groundwater [1] | None | NA | TCL trace VOCs - 24 hr TAT | 8 | Two per soil boring |
| **Source Area Soil Sampling**<br>1 event, 4 location | Soil | TCL VOCs | 104 | Grain Size, TOC | 104 | Twenty-six per location |
| **Monitoring Well Sampling**<br>1 Round; 44 samples<br>2 Round; 51 samples | Groundwater [1] | TCL trace VOCs | 95 | Fluoride and titanium | 95 | Two Rounds |
| **Step Test Samples**<br>1 event, 1 location | Groundwater [1] | None | NA | TCL trace VOCs<br>TCL SVOCs<br>TCL Pest/PCBs<br>TAL Inorganics [2],<br>Alkalinity, Ammonia, Chloride, Hardness, Nitrate/Nitrite, Ferrous Iron, Sulfate, pH, TKN, TOC, TSS, TDS - 24 hour TAT | 3 | Influent samples at the beginning and end of the test, 1 sample from tanks at conclusion of test |

**Table 5-1**
**Summary of Sampling Activities**
**Lawrence Aviation Industries Site**
**Port Jefferson Station, New York**

| SAMPLE TYPE/ LOCATION | SAMPLE MEDIA | CLP ANALYTICAL PARAMETERS | NO. OF SAMPLES | NON-RAS ANALYTICAL PARAMETERS | NO. OF SAMPLES | SAMPLING FREQUENCY |
|---|---|---|---|---|---|---|
| **Aquifer Test Samples** 1 event, 1 locations | Groundwater [1] | None | NA | TCL trace VOCs, TCL SVOCs, TCL Pest/PCBs, TAL Inorganics [2], Alkalinity, Ammonia, Chloride, Hardness, Nitrate/Nitrite, Ferrous Iron, Sulfate, pH, TKN, TOC, TSS, TDS 24 hour TAT | 16 | Samples at the beginning of the test, 6 hours, 12 hours, 24 hours, 36 hours, 48 hours, 60 hours, 72 hours. |
| **Building Foundation Geotechnical Sampling** 1 event, 2 locations | Soil [3] | None | NA | Grain size, moisture content, and Atterberg limits | 8 grain size and moisture content, 2 Atterberg limits | 4 per soil boring for grain size and moisture content, 1 per soil boring for Atterberg limits |
| **Recharge Basin Geotechnical Sampling** 1 event, 1 location | Soil | None | NA | Grain size and rigid wall permeability | 3 | 3 per soil boring |
| **Bench-scale Treatability Testing** 1 event, 4 locations | Soil | None | NA | See note 4 | 4 | One per soil boring |
| **Bench-scale Treatability Testing** 1 event, 1 location | Groundwater [1] | None | NA | See note 4 | 1 | One per location |

**Table 5-1**
**Summary of Sampling Activities**
**Lawrence Aviation Industries Site**
**Port Jefferson Station, New York**

Notes:
1. Groundwater samples also will be measured for field parameters: dissolved oxygen, oxidation-reduction potential, turbidity, temperature, and conductivity.
2. TAL Inorganics includes TAL metals and cyanide
3. Standard penetrations measurements will also be performed at all sample locations.
4. A description of the analyses to be performed as part of the bench-scale treatability testing are described in Section 5.7 and Table 5-4.

Abbreviations:

| | |
|---|---|
| CLP | Contract Laboratory Program |
| No. | number |
| Pest/PCBs | Pesticides/polychlorinated biphenyls |
| RAS | Routine analytical services |
| SVOCs | Semivolatile organic compounds |
| TAL | Target Analyte List |
| TAT | Turnaround time |
| TCL | Target Compound List |
| TDS | Total dissolved solids |
| TKN | Total Kjehldahl nitrogen |
| TOC | Total organic carbon |
| TSS | Total suspended solids |
| VOC | Volatile organic compounds |

**Table 4-1**
**Summary of Data Quality Levels**
**Lawrence Aviation Industries Site**
**Port Jefferson Station, New York**

| Data Uses | Analytical Level [1] | Types of Analysis |
|---|---|---|
| Site characterization | Definitive - Level 3 | VOCs in groundwater using EPA methods, no validation (24 hour VOCs) |
| Site characterization | Definitive - Level 4 | - Organics/Inorganics using EPA-approved methods<br>- CLP SOWs<br>- Standard water analyses<br>- Analyses performed by fixed base laboratory (TCL organics, TAL inorganics, wet chemistry) |
| Site characterization | Screening - Level 1 | - Measurements from field equipment<br>- Qualitative measurements<br>- Water quality field measurements using portable instruments (ferrous iron, pH, DO, turbidity) |
| Geotechnical samples for design of the building foundation and recharge basin | Definitive - Level 3 | - Analyses performed by laboratory in accordance with ASTM standards (soil moisture, atterberg limits, permeability) |
| Bench-scale treatability testing | Screening - Level 2 | - Analyses performed by laboratory (VOCs, persulfate, permanganate) |

Notes:
1. Definitions of analytical levels: Screening data are generated by rapid, less precise methods of analysis with less rigorous sample preparation. Screening data provide analyte (or at least chemical class) identification and quantification, although the quantification may be relatively imprecise. For definitive confirmation, approximately 10 percent of the screening data are confirmed using analytical methods and quality control procedures and criteria associated with definitive data. Screening data without associated confirmation data are generally not considered to be data of known quality.

   Definitive data are generated using rigorous analytical methods, such as EPA reference methods and ASTM standards. For environmental samples, data are analyte-specific, with confirmation of analyte identity and concentration. Methods generating definitive data produce tangible raw data (e.g., chromatograms, spectra, digital values) in the form of paper printouts or computer-generated electronic files. Data may be generated at the site or at an off-site location, as long as the quality control requirements are satisfied. For the data to be definitive, either analytical or total measurement error must be determined.

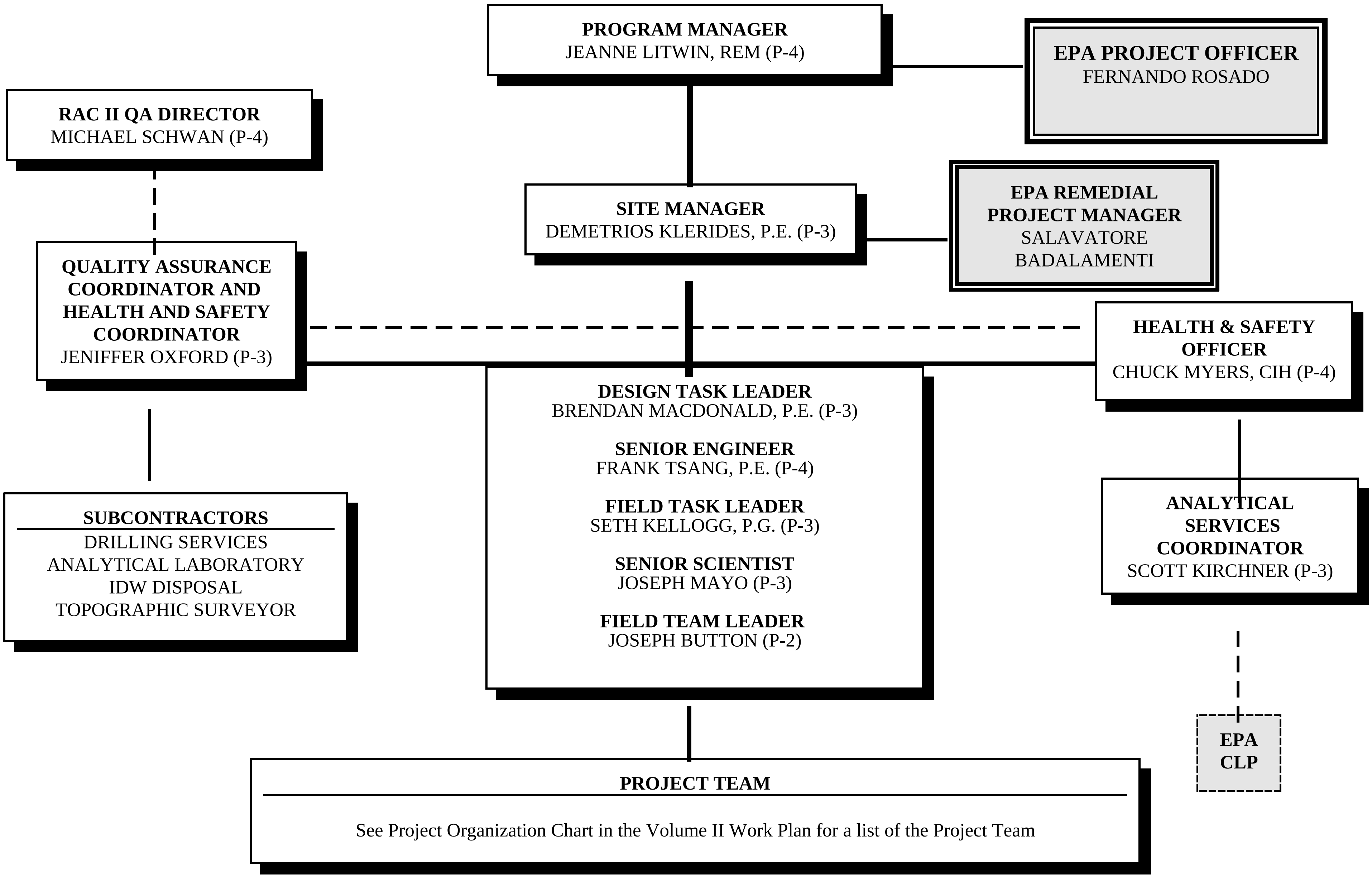
2. Measurement-specific Data Quality Objective requirements will be defined in the QAPP.

Acronyms:

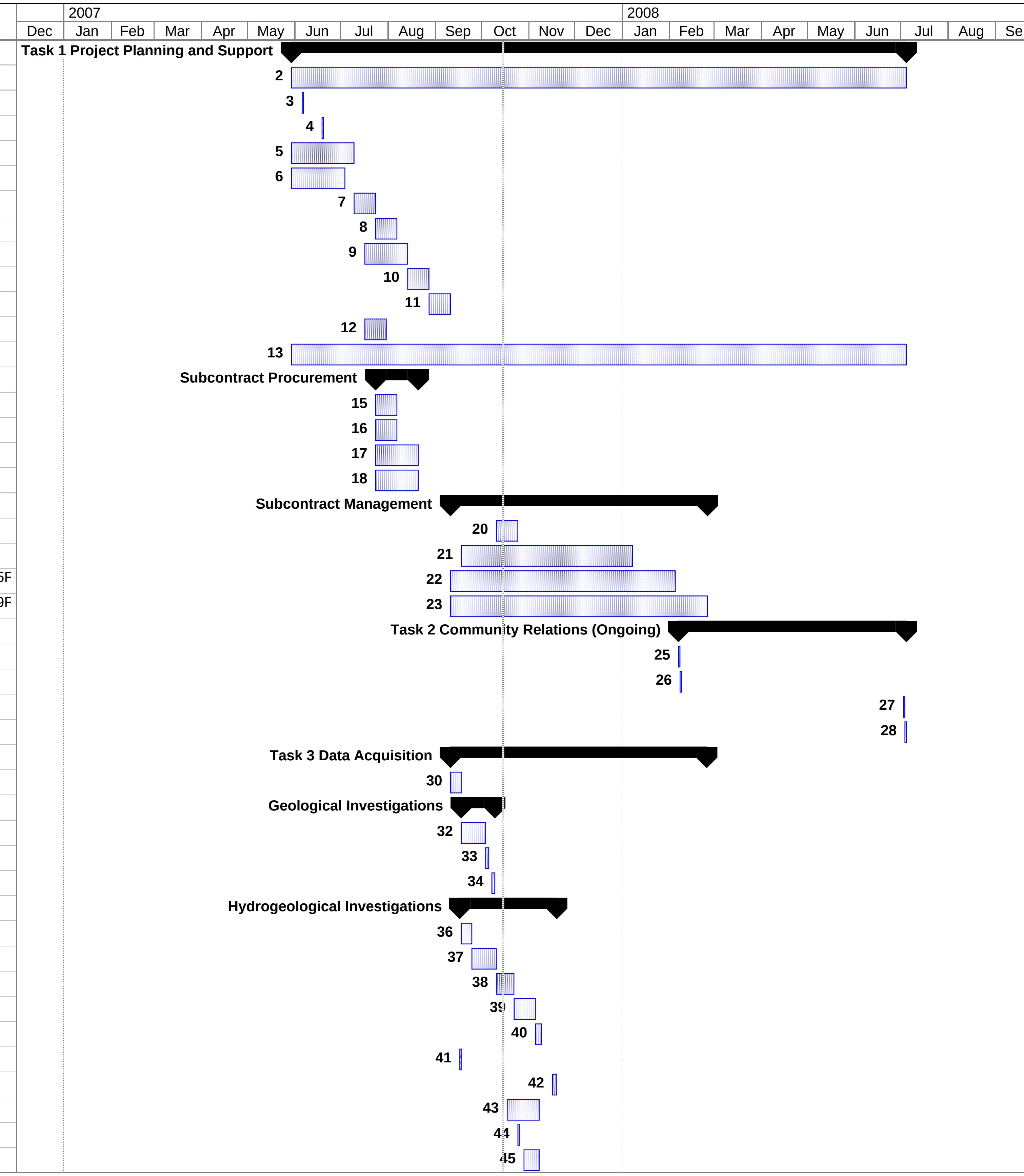
| | |
|---|---|
| ASTM | American Society of Testing and Materials |
| CLP | Contract Laboratory Program |
| EPA | Environmental Protection Agency |
| QAPP | Quality Assurance Project Plan |
| SOW | Scope of Work |

**Figure 7-1**

**Project Organization**
**Lawrence Aviation Industries Site**
**Port Jefferson Station, New York**



| ID | | Task Name | Task | Duration | Start | Finish | Predecessors |
|---|---|---|---|---|---|---|---|
| 1 | | **Task 1 Project Planning and Support** | | **288 days** | **Wed 5/30/07** | **Fri 7/4/08** | |
| 2 | | Project Administration | 1.1 | 288 days | Wed 5/30/07 | Fri 7/4/08 | |
| 3 | | Attend Scoping Meetings | 1.2 | 1 day | Wed 6/6/07 | Wed 6/6/07 | |
| 4 | | Conduct Site Visit | 1.3 | 1 day | Tue 6/19/07 | Tue 6/19/07 | |
| 5 | | Develop Draft Work Plan and Associated Cost Estimate | 1.4 | 29 days | Wed 5/30/07 | Mon 7/9/07 | |
| 6 | | Evaluate Existing Data and Documents | 1.6 | 25 days | Wed 5/30/07 | Tue 7/3/07 | |
| 7 | | EPA Review of Work Plan | | 10 days | Tue 7/10/07 | Mon 7/23/07 | 5 |
| 8 | | Negotiate and Revise Draft Work Plan/Budget | 1.5 | 10 days | Tue 7/24/07 | Mon 8/6/07 | 7 |
| 9 | | Prepare/Submit Draft QAPP | 1.7 | 20 days | Tue 7/17/07 | Mon 8/13/07 | 7FS-1 wk |
| 10 | | EPA Review of Draft QAPP | | 10 days | Tue 8/14/07 | Mon 8/27/07 | 9 |
| 11 | | Prepare/Submit Final QAPP | 1.7 | 10 days | Tue 8/28/07 | Mon 9/10/07 | 10 |
| 12 | | Prepare/Submit HASP | 1.8 | 10 days | Tue 7/17/07 | Mon 7/30/07 | 9SS |
| 13 | | Meeting (ongoing support) | 1.10 | 288 days | Wed 5/30/07 | Fri 7/4/08 | |
| 14 | | **Subcontract Procurement** | **1.11** | **20 days** | **Tue 7/24/07** | **Mon 8/20/07** | |
| 15 | | 1. Surveying | | 10 days | Tue 7/24/07 | Mon 8/6/07 | 7 |
| 16 | | 2. Analytical Laboratory | | 10 days | Tue 7/24/07 | Mon 8/6/07 | 7 |
| 17 | | 3. Drilling Services | | 20 days | Tue 7/24/07 | Mon 8/20/07 | 7 |
| 18 | | 4. Investigation Derived Waste Disposal | | 20 days | Tue 7/24/07 | Mon 8/20/07 | 7 |
| 19 | | **Subcontract Management** | **1.12** | **120 days** | **Tue 9/11/07** | **Mon 2/25/08** | |
| 20 | | 1. Surveying | | 2 wks | Thu 10/11/07 | Wed 10/24/07 | 37 |
| 21 | | 2. Analytical Laboratory | | 16 wks | Tue 9/18/07 | Mon 1/7/08 | 30 |
| 22 | | 3. Drilling Services | | 21 wks | Tue 9/11/07 | Mon 2/4/08 | 30FS-5 days,45F |
| 23 | | 4. Investigation Derived Waste Disposal | | 24 wks | Tue 9/11/07 | Mon 2/25/08 | 30FS-5 days,49F |
| 24 | | **Task 2 Community Relations (Ongoing)** | | **107 days** | **Thu 2/7/08** | **Fri 7/4/08** | |
| 25 | | Public Notices | 2.5 | 1 day | Thu 2/7/08 | Thu 2/7/08 | 68 |
| 26 | | Public Meeting Support - Pre-Design | 2.3 | 1 day | Fri 2/8/08 | Fri 2/8/08 | 25 |
| 27 | | Public Notices | 2.5 | 1 day | Thu 7/3/08 | Thu 7/3/08 | 80 |
| 28 | | Public Meeting Support - Final Design | 2.3 | 1 day | Fri 7/4/08 | Fri 7/4/08 | 27 |
| 29 | | **Task 3 Data Acquisition** | | **119.5 days** | **Tue 9/11/07** | **Mon 2/25/08** | |
| 30 | | Mobilization | 3.1 | 5 days | Tue 9/11/07 | Mon 9/17/07 | 11 |
| 31 | | **Geological Investigations** | **3.2** | **16 days** | **Tue 9/18/07** | **Tue 10/9/07** | |
| 32 | | Source Area Borings (4) | 3.2 | 12 days | Tue 9/18/07 | Wed 10/3/07 | 30 |
| 33 | | Treatment Building Foundation Borings (2) | 3.2 | 2 days | Thu 10/4/07 | Fri 10/5/07 | 32 |
| 34 | | Groundwater Recharge Basin Borings (2) | 3.2 | 2 days | Mon 10/8/07 | Tue 10/9/07 | 33 |
| 35 | | **Hydrogeological Investigations** | **3.2** | **45.5 days** | **Mon 9/17/07** | **Mon 11/19/07** | |
| 36 | | Extraction Well Installation (1) | 3.2 | 5 days | Tue 9/18/07 | Mon 9/24/07 | 32SS |
| 37 | | Piezometer Installation | 3.2 | 12 days | Tue 9/25/07 | Wed 10/10/07 | 36 |
| 38 | | Plume Continuity Wells & Screening (3) 2-rigs | 3.2 | 7.5 days | Thu 10/11/07 | Mon 10/22/07 | 37 |
| 39 | | Plume Boundary Wells (4) - 2 rigs | 3.2 | 10 days | Mon 10/22/07 | Mon 11/5/07 | 38 |
| 40 | | Downhole Geophysics | 3.2 | 4 days | Mon 11/5/07 | Fri 11/9/07 | 39 |
| 41 | | Synoptic Water Level Monitoring Round 1 | 3.2 | 1 day | Mon 9/17/07 | Mon 9/17/07 | 47SS-1 day |
| 42 | | Synoptic Water Level Monitoring Round 2 | 3.2 | 1 day | Fri 11/16/07 | Mon 11/19/07 | 48SS-1 day |
| 43 | | Continuous Water Level Monitoring | 3.2 | 3 wks | Thu 10/18/07 | Wed 11/7/07 | 37FS+1 wk |
| 44 | | Step Test | 3.2 | 1 day | Thu 10/25/07 | Thu 10/25/07 | 43SS+1 wk |
| 45 | | Pump Test (7-day TAT) | 3.2 | 8 days | Mon 10/29/07 | Wed 11/7/07 | 44FS+1 day |



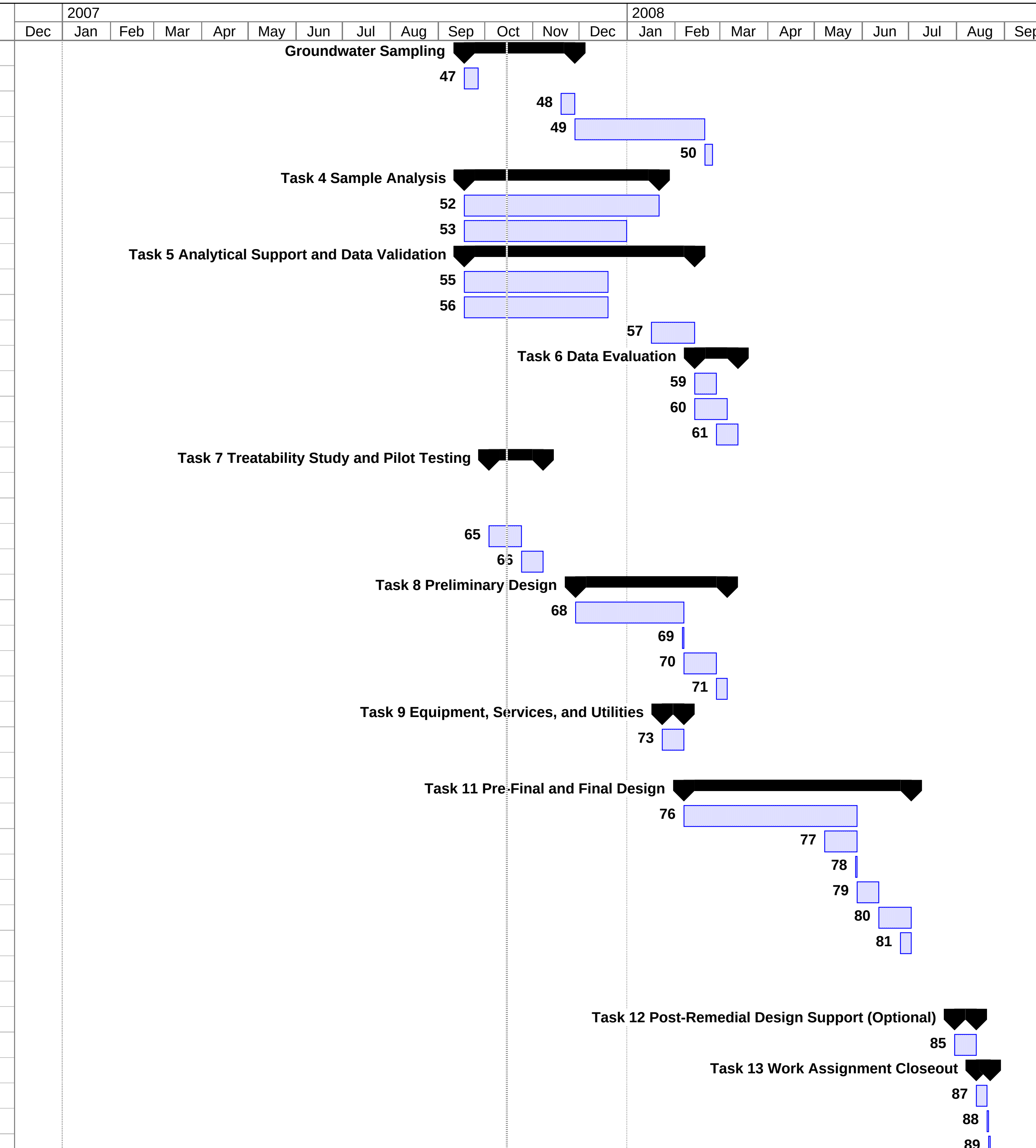

Date: Mon 10/15/07 | Task | Split | Progress | Milestone | Summary



CDM

Figure 6-1
Remedial Design Schedule
Lawrence Aviation Industries Site, Port Jefferson Station, New York

| ID | | Task Name | Task | Duration | Start | Finish | Predecessors |
|---|---|---|---|---|---|---|---|
| 46 | | **Groundwater Sampling** | | **51.5 days** | **Tue 9/18/07** | **Wed 11/28/07** | |
| 47 | | Monitoring Well Sampling Round 1 (7-day TAT) | 3.2 | 7 days | Tue 9/18/07 | Wed 9/26/07 | |
| 48 | | Monitoring Well Sampling Round 2 (21-day TAT) | 3.2 | 7 days | Mon 11/19/07 | Wed 11/28/07 | 39FS+2 wks |
| 49 | | IDW Characterization and Disposal | 3.3 | 60 days | Wed 11/28/07 | Wed 2/20/08 | 48 |
| 50 | | Demobilization | 3.1 | 3 days | Wed 2/20/08 | Mon 2/25/08 | 49 |
| 51 | | **Task 4 Sample Analysis** | | **90 days** | **Tue 9/18/07** | **Mon 1/21/08** | |
| 52 | | CLP Analyses | 4.2 | 90 days | Tue 9/18/07 | Mon 1/21/08 | 32SS |
| 53 | | Non-RAS Analyses | 4.3 | 75 days | Tue 9/18/07 | Mon 12/31/07 | 32SS |
| 54 | | **Task 5 Analytical Support and Data Validation** | | **107 days** | **Tue 9/18/07** | **Wed 2/13/08** | |
| 55 | | Prepare and Ship Samples | 5.1 | 67 days | Tue 9/18/07 | Wed 12/19/07 | 32SS |
| 56 | | Sample Management (Collect, Prepare and Ship Samples) | 5.2 | 67 days | Tue 9/18/07 | Wed 12/19/07 | 32SS |
| 57 | | Data Validation (Non-CLP) | 5.3 | 20 days | Thu 1/17/08 | Wed 2/13/08 | 56FS+4 wks |
| 58 | | **Task 6 Data Evaluation** | | **20 days** | **Thu 2/14/08** | **Wed 3/12/08** | |
| 59 | | Data Usability Evaluation | 6.1 | 10 days | Thu 2/14/08 | Wed 2/27/08 | 57 |
| 60 | | Data Reduction, Tabulation, and Evaluation | 6.2 | 15 days | Thu 2/14/08 | Wed 3/5/08 | 57 |
| 61 | | Data Evaluation Report | 6.3 | 10 days | Thu 2/28/08 | Wed 3/12/08 | 59 |
| 62 | | **Task 7 Treatability Study and Pilot Testing** | | **25 days** | **Thu 10/4/07** | **Wed 11/7/07** | |
| 63 | | Literature Search (Not applicable) | 7.1 | | | | |
| 64 | | Develop Treatability Study Work Plan (Not applicable) | 7.2 | | | | |
| 65 | | Conduct Treatability Study | 7.3 | 15 days | Thu 10/4/07 | Wed 10/24/07 | 32 |
| 66 | | Treatability Study Report | 7.4 | 10 days | Thu 10/25/07 | Wed 11/7/07 | 65 |
| 67 | | **Task 8 Preliminary Design** | | **70 days** | **Thu 11/29/07** | **Wed 3/5/08** | |
| 68 | | Preliminary Design | 8.1 | 50 days | Thu 11/29/07 | Wed 2/6/08 | 45FS+3 wks |
| 69 | | Preliminary Design Meeting | 8.1 | 1 day | Wed 2/6/08 | Wed 2/6/08 | 68FF |
| 70 | | EPA Review | | 15 days | Thu 2/7/08 | Wed 2/27/08 | 68 |
| 71 | | Respond to EPA Comments | 8.1 | 5 days | Thu 2/28/08 | Wed 3/5/08 | 70 |
| 72 | | **Task 9 Equipment, Services, and Utilities** | | **10 days** | **Thu 1/24/08** | **Wed 2/6/08** | |
| 73 | | Identify Long-Lead Equipment, Services, and Utilities | 9.1 | 10 days | Thu 1/24/08 | Wed 2/6/08 | 68FF |
| 74 | | **Task 10 Intermediate Design (Not Applicable)** | | | | | |
| 75 | | **Task 11 Pre-Final and Final Design** | | **105 days** | **Thu 2/7/08** | **Wed 7/2/08** | |
| 76 | | Pre-Final Specifications and Drawings | 11.1 | 80 days | Thu 2/7/08 | Wed 5/28/08 | 69 |
| 77 | | Pre-Final RA Cost Estimate | 11.2 | 15 days | Thu 5/8/08 | Wed 5/28/08 | 76FF |
| 78 | | Pre-Final Design Review Meeting | 11.3 | 1 day | Wed 5/28/08 | Wed 5/28/08 | 76FF |
| 79 | | EPA Review | | 10 days | Thu 5/29/08 | Wed 6/11/08 | 77 |
| 80 | | Prepare Final Design Submittal | 11.4 | 15 days | Thu 6/12/08 | Wed 7/2/08 | 79 |
| 81 | | Prepare Final RA Cost Estimate | 11.2 | 5 days | Thu 6/26/08 | Wed 7/2/08 | 80FF |
| 82 | | RA Subcontract Documents (Not Applicable) | 11.5 | | | | |
| 83 | | Operation and Maintenance (O&M) Plan (Not Applicable) | 11.6 | | | | |
| 84 | | **Task 12 Post-Remedial Design Support (Optional)** | | **10 days** | **Thu 7/31/08** | **Wed 8/13/08** | |
| 85 | | Update Final Design Plans and Specifications (Optional) | 12.1 | 10 days | Thu 7/31/08 | Wed 8/13/08 | 80FS+4 wks |
| 86 | | **Task 13 Work Assignment Closeout** | | **7 days** | **Thu 8/14/08** | **Fri 8/22/08** | |
| 87 | | Submission of RD Documents to EPA | 13.1 | 5 days | Thu 8/14/08 | Wed 8/20/08 | 85 |
| 88 | | File Archiving and Storage | 13.2 | 1 day | Thu 8/21/08 | Thu 8/21/08 | 87 |
| 89 | | Work Assignment Closeout Report | 13.3 | 1 day | Fri 8/22/08 | Fri 8/22/08 | 88 |




Date: Mon 10/15/07 | Task | Split | Progress | Milestone | Summary



CDM

Figure 6-1
Remedial Design Schedule
Lawrence Aviation Industries Site, Port Jefferson Station, New York

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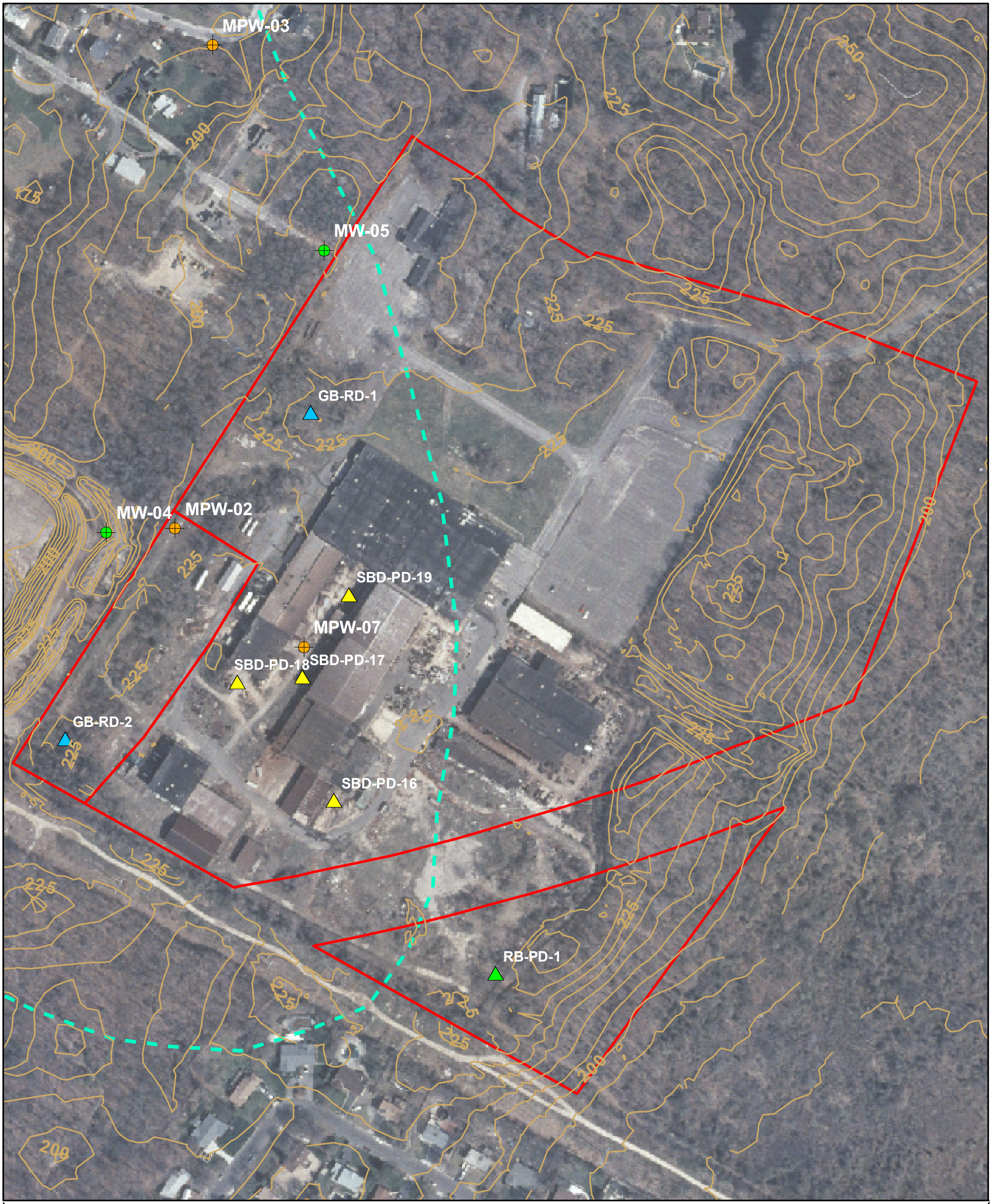


Proposed Geotechnical Boring for Building Foundation
Proposed Recharge Basin Boring
Proposed Source Area Deep Boring
Topographic Contour
Existing Well 2003
Existing Multiport Wells
TCE Plume
LAI Facility

N

0 100 200 400 Feet

CDM

Figure 5-2
Proposed Soil Boring Locations
Lawrence Aviation Industries Superfund Site
Port Jefferson Station, New York

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Multiport Wells
Existing Well 2003
LAI Facility
TCE Plume
(1 ug/L iso-contour - March 2005)

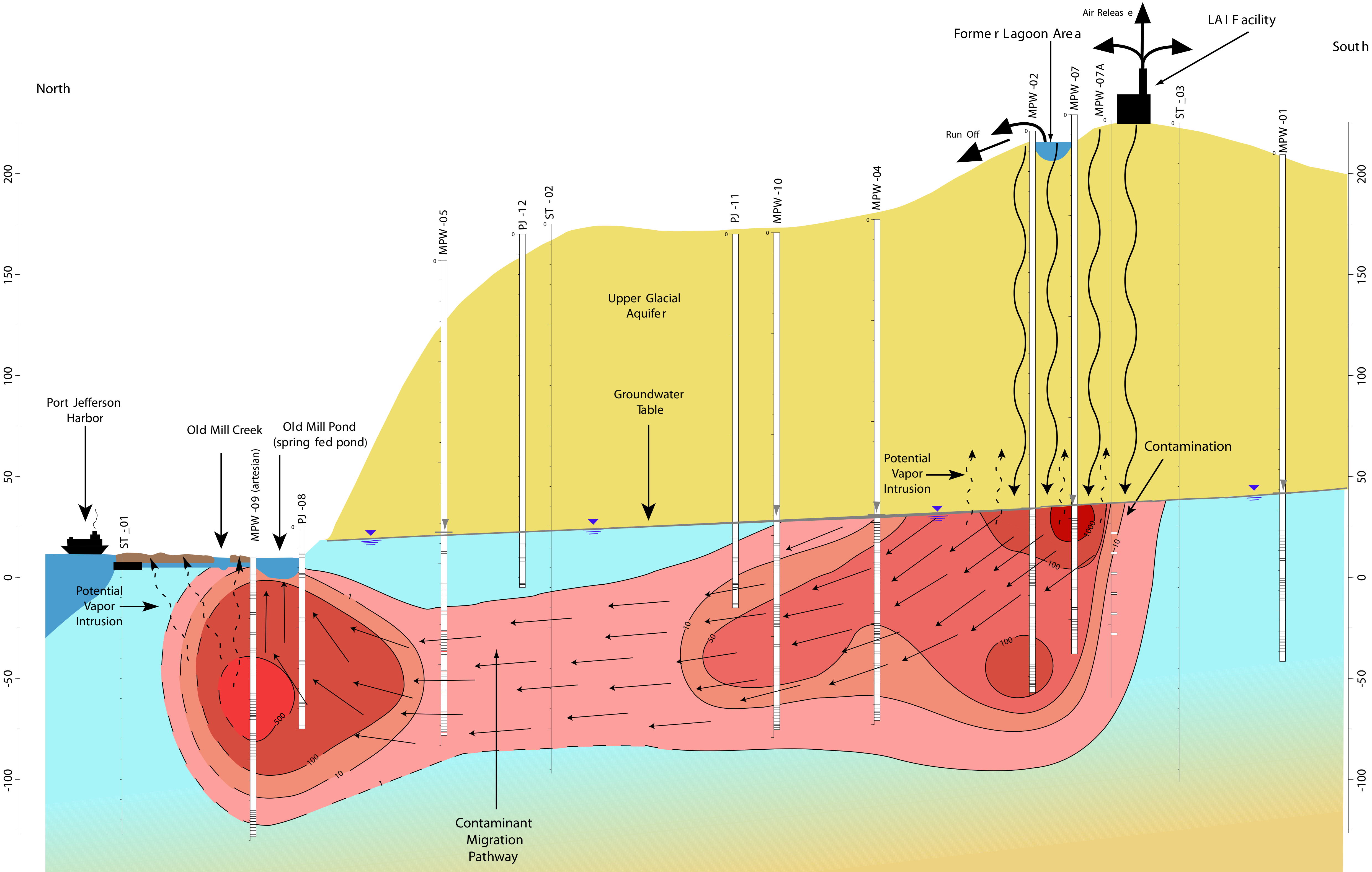
**Proposed Wells**
Extraction Well
Monitoring Well
Piezometer

N

0 250 500 1,000 Feet

CDM

Figure 5-1
Proposed Monitoring Well, Extraction Well and Piezometer Locations
Lawrence Aviation Industries Superfund Site
Port Jefferson Station, New York




LEGEND

- TCE Isoconcentration contour, dashed where inferred, March 2005, micrograms/liter

| | | |
|---|---|---|
| 1000 | 100 | 10 |
| 500 | 50 | 1 |

Top of Water Table

Figure 3-5
Conceptual Site Model
Lawrence Aviation Industries Superfund Site
Port Jefferson Station, New York

CDM

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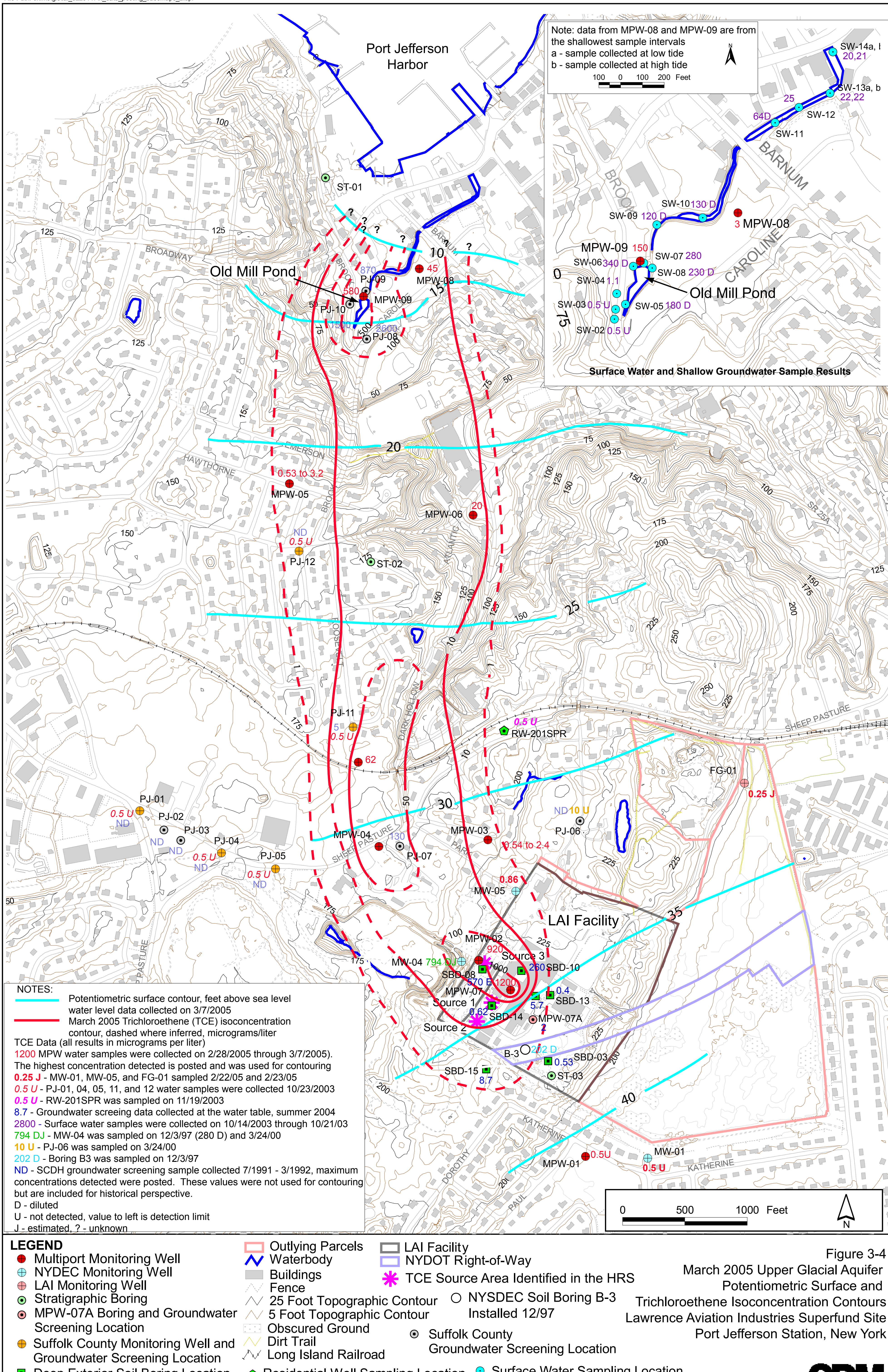
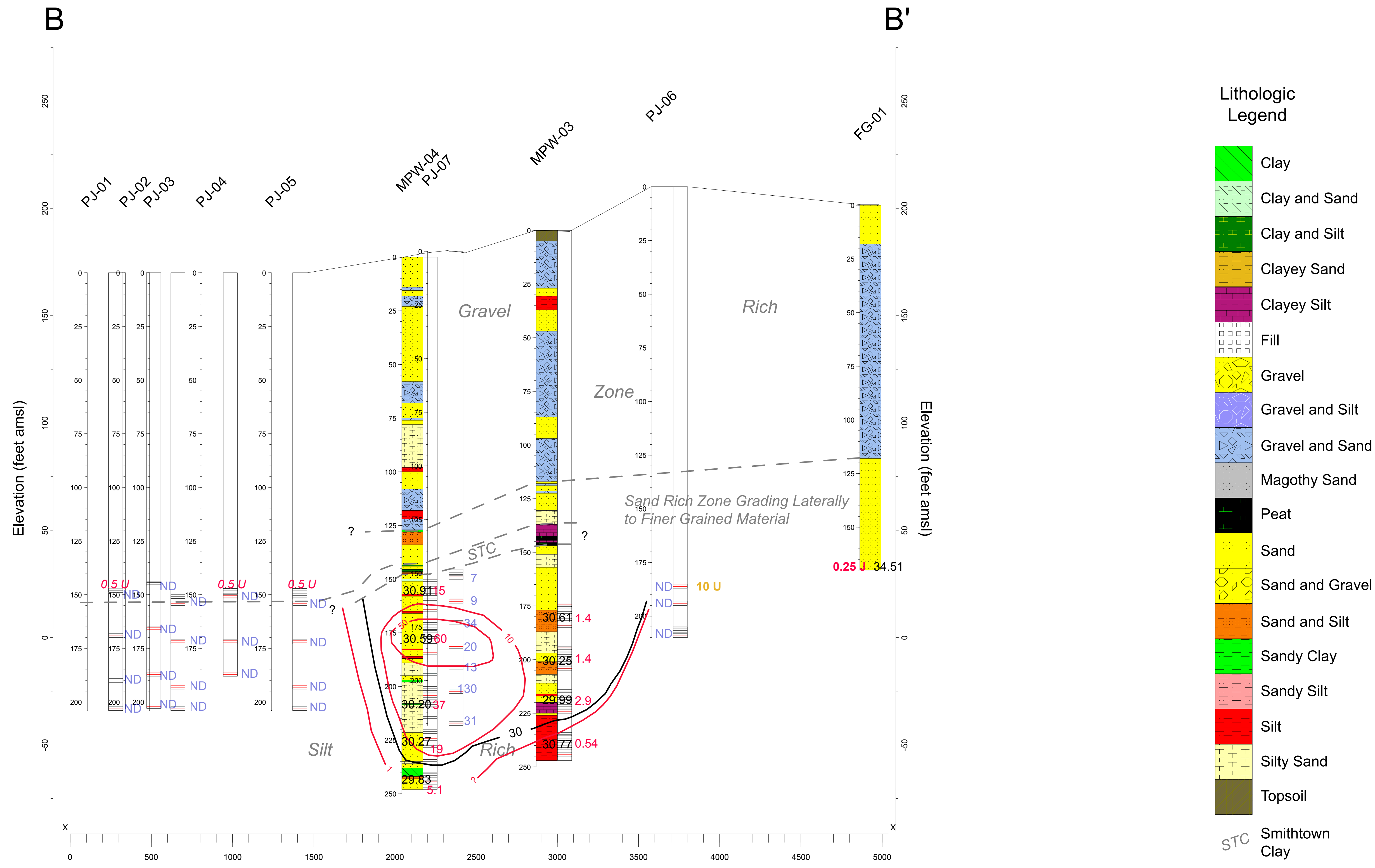



Figure 3-4
March 2005 Upper Glacial Aquifer Potentiometric Surface and Trichloroethene Isoconcentration Contours
Lawrence Aviation Industries Superfund Site
Port Jefferson Station, New York

CDM




LEGEND

U or ND - Not Detected, if U value to is the detection limit

59 - TCE Results, Round 1 Groundwater samples, February-March 2005

0.25 J - TCE Results, 2/23/2005

0.5 U - TCE Results, 10/23/2003

J - Estimated ? - Unknown

2600 - SCHD TCE Groundwater Screening Data, July 1991-March 1992

1 - TCE Groundwater Screening Data, Summer 2004

10 U - TCE in Groundwater Sample, 3/24/2000

12.53 - Water Level Elevation, feet amsl, March 7, 2005

MPW - multiport monitoring well

PJ - Suffolk County Health Dept. (SCHD) Groundwater Screening Location

ST - Stratigraphic boring

amsl - above mean sea level

- Potentiometric surface contour, dashed where inferred, March 7, 2005, feet amsl

- TCE Isoconcentration contour, dashed where inferred, March 2005, micrograms/liter

All TCE Data is in micrograms/liter

Vertical Exagerration: 14

Horizontal Scale: 1:8400

Vertical Scale: 1:600

Figure 3-3
Cross Section B-B'
Lawrence Aviation Industries Superfund Site
Port Jefferson Station, New York

CDM

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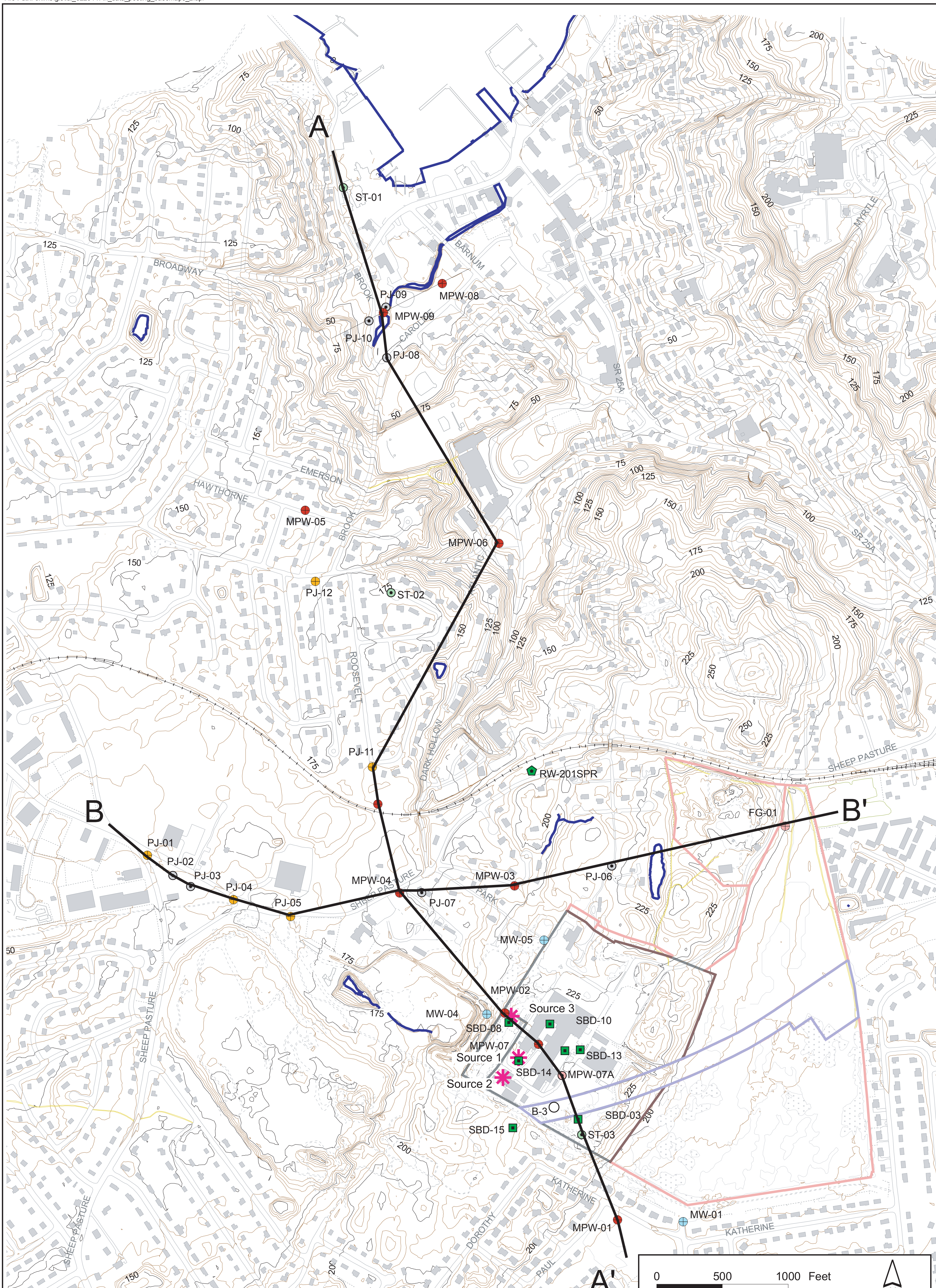
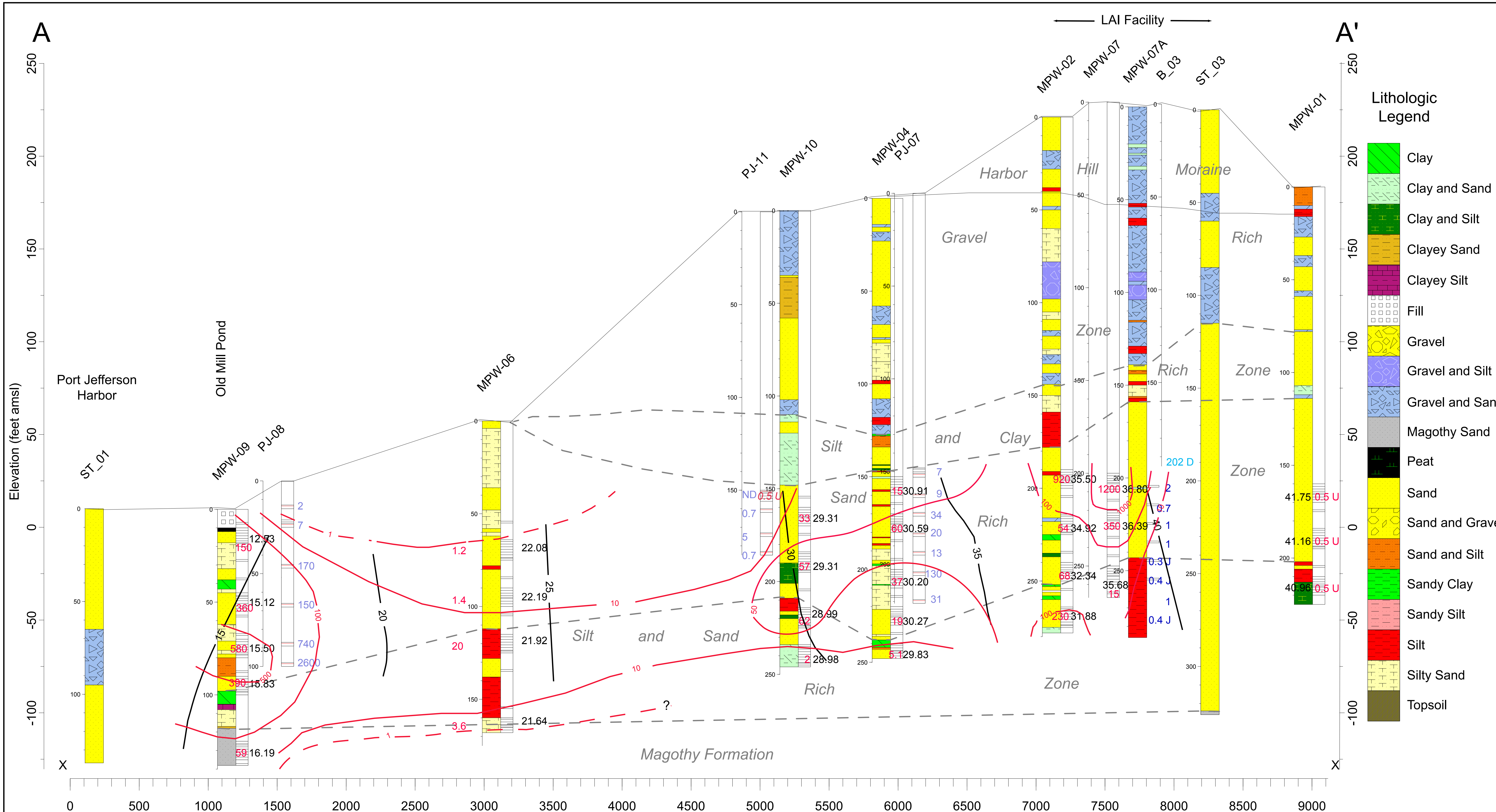



**LEGEND**

- Multiport Monitoring Well
- NYDEC Monitoring Well
- LAI Monitoring Well
- Stratigraphic Boring
- MPW-07A Boring and Groundwater Screening Location
- Suffolk County Monitoring Well and Groundwater Screening Location
- Deep Exterior Soil Boring Location
- Outlying Parcels
- Waterbody
- Buildings
- Fence
- 25 Foot Topographic Contour
- 5 Foot Topographic Contour
- Obscured Ground
- Dirt Trail
- Long Island Railroad
- Residential Well Sampling Location
- LAI Facility
- NYDOT Right-of-Way
- TCE Source Area Identified in the HRS
- NYDEC Soil Boring B-3 Installed 12/97
- Suffolk County Groundwater Screening Location

Figure 3-2
Cross Section Locations
Lawrence Aviation Industries Superfund Site
Port Jefferson Station, New York

CDM




LEGEND

U or ND - Not Detected, if U value to is the detection limit

59 - TCE Results, Round 1 Groundwater samples, February-March 2005

202 D - TCE Results, groundwater screening sample, 12/3/1997

J - Estimated

D - Dilluted Sample

2600 - SCHD TCE Groundwater Screening Data, July 1991-March 1992

1 - TCE Groundwater Screening Data, Summer 2004

0.5 U - TCE Results, 10/23/2003

E - Estimated, result above calibration range

U - Not Detected

12.53 - Water Level Elevation, feet amsl, March 7, 2005

MPW - multiport monitoring well

PJ - Suffolk County Health Dept. (SCHD) Groundwater Screening Location

ST - Stratigraphic boring

amsl - above mean sea level

— - Potentiometric surface contour, dashed where inferred, March 7, 2005, feet amsl

— - TCE Isoconcentration contour, dashed where inferred, March 2005, micrograms/liter

All TCE Data is in micrograms/liter

Vertical Exagerration: 14

Horizontal Scale: 1:8400

Vertical Scale: 1:600

Figure 3-1

Cross Section A-A'

Lawrence Aviation Industries Superfund Site

Port Jefferson Station, New York

CDM

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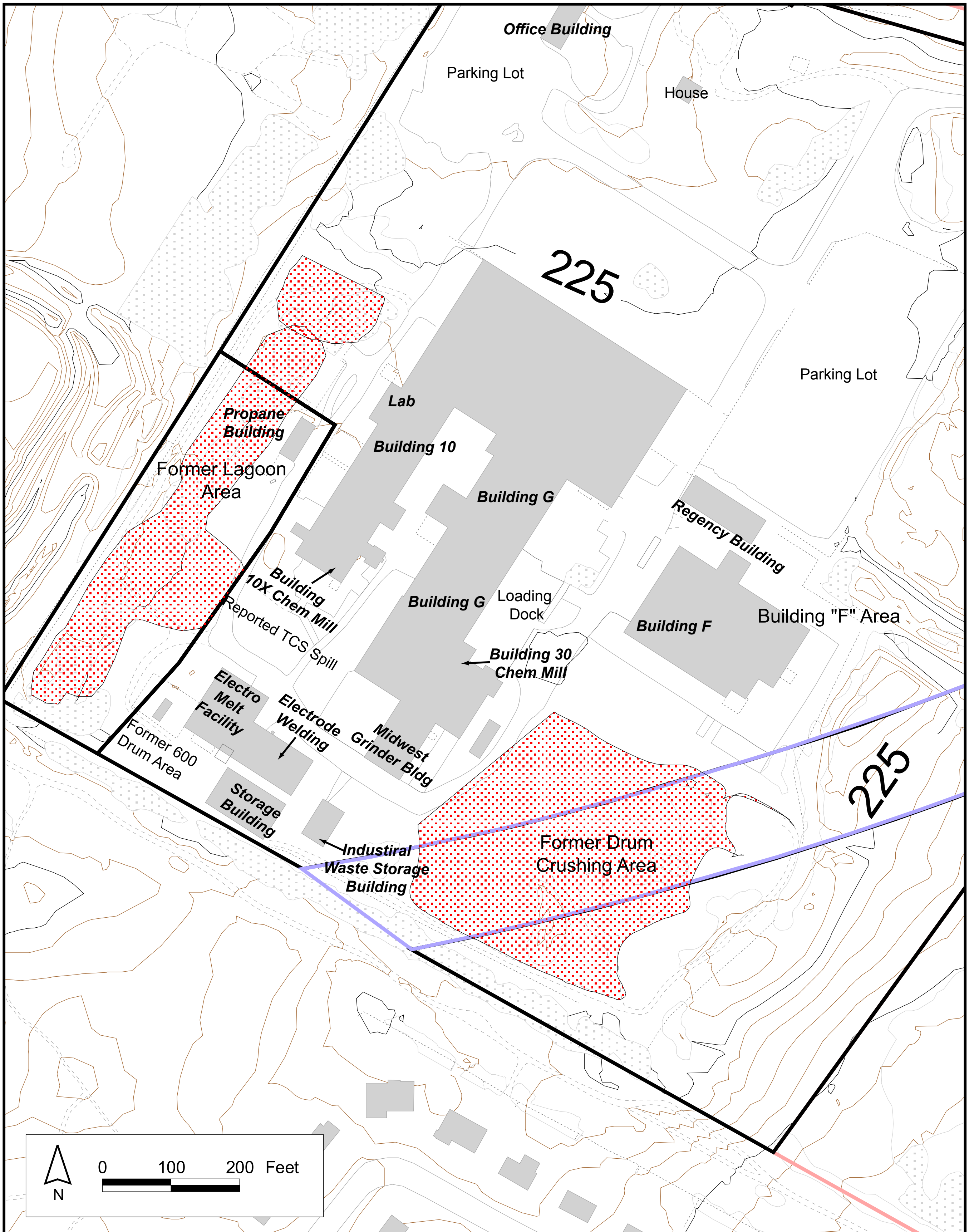


LEGEND

- NYDOT ROW
- LAI Facility
- Outlying Parcels
- Waterbody
- Buildings
- Obscured Ground
- Dirt Trail
- Fence
- 25 Foot Topographic Contour
- 5 Foot Topographic Contour

Figure 2-3
Lawrence Aviation Industries Facility Layout
Lawrence Aviation Industries Superfund Site
Port Jefferson Station, New York

CDM

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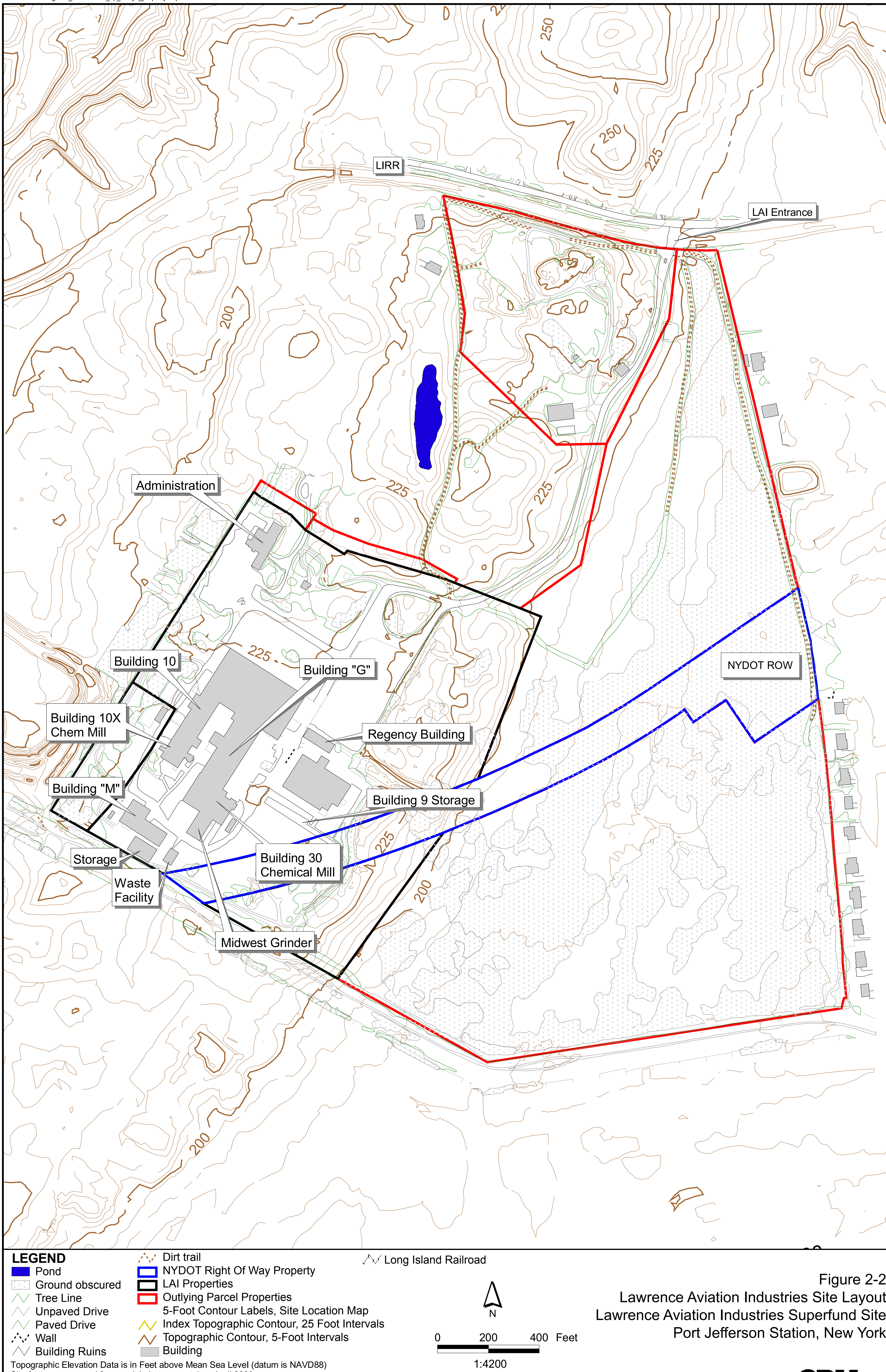


Figure 2-2
Lawrence Aviation Industries Site Layout
Lawrence Aviation Industries Superfund Site
Port Jefferson Station, New York

CDM