PHASE I
REMEDIAL INVESTIGATION

Sunnyside Yard
Queens, New York

Volume I of III

January 22, 1992

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Sunnyside Yard
Queens, New York

EXECUTIVE SUMMARY

The Phase I Remedial Investigation (RI) of the Sunnyside Yard, Queens, New York (Yard) was performed by Roux Associates, Inc. from October 1990 through March 1991. The RI was undertaken in accordance with the March 14, 1989 Work Plan titled "Work Plan for the Remedial Investigation and Feasibility Study, Sunnyside Yard, Queens, New York" (Roux Associates, Inc., 1989). The Work Plan was prepared in accordance with the provisions of the Order on Consent (OOC), Index #W2-0081-87-06 between the New York State Department of Environmental Conservation (NYSDEC), the National Railroad Passenger Corporation (AMTRAK) and New Jersey Transit Corporation.

As specified in the Work Plan, the RI was performed "to address the nature, extent (including off-site) and the potential migration pathways of separate phase petroleum containing low concentrations of PCBs which has been previously identified in a limited area of the Yard (Area 1)". Additionally, the RI was performed "to develop hydrogeologic, soil quality and ground-water quality information to determine the nature and extent of any other areas of contamination at the Yard."

As reported in the data validation report (DVR) prepared by Data Validation Services, Inc. (Appendix F), a review of the analytical laboratory quality assurance/quality (QA/QC) procedures raised questions as to the usability of some of the soil and water quality analytical data. Based on the NYSDEC review of the analytical data and the DVR, Roux Associates, Inc. was directed by the NYSDEC to prepare a data usability report (DUR) which evaluated the usability of the analytical results and made recommendations on areas that should be resampled and where confirmatory sampling was necessary. The DUR is included as Appendix I.

After the field investigation was completed and the Phase I RI Report was written, but not yet accepted, the NYSDEC provided Water Quality Regulations for Surface Waters and Groundwaters, 6 NYCRR Parts 700-705, Effective September 1, 1991, and Division of Water Technical and Operational Guidance Series (1.1.1) (TOGS) Ambient Water Quality

Standards and Guidance Values dated November 15, 1991, and asked that these standards be used/referenced instead of the September 25, 1990 TOGS originally included in the Report.

At the request of the NYSDEC, Roux Associates has compared the most recent standards to the analytical results and standards previously referenced in the Report. Since no additional compounds of concern have been identified (i.e., all compounds previously referred to as being detected at concentrations below the applicable standards are still below the most recent standards) the Report will not be rewritten to incorporate the most recent standards. The standards applicable at the time when the investigation was performed and when the Report was written will remain in the Report. However, the most recent standards will be incorporated into all future investigations performed at the Yard.

The major findings and conclusions resulting from an evaluation of the hydrogeologic, soil and ground-water quality data developed during the RI indicate the following.

HYDROGEOLOGY

- The Yard lies in a reclaimed marshland and is underlain by a layer of fill material which ranges from 8 feet to 27 feet thick.
- The water table at the Yard lies within the fill material. In view of the considerable thickness of fill deposits at the Yard (up to 27 feet thick), almost all of the water-table (shallow) monitoring wells are screened within the fill deposits. Only the deeper monitoring well (MW-23) is completely screened within the Upper Glacial aquifer, which is the regional water-table aquifer.
- The ground water flows to the west and northwest beneath the Yard. Calculated average horizontal ground-water velocity in the fill deposits is approximately 0.4 feet per day. The flow velocity, if any, of the separate phase petroleum accumulation in Area 1 is significantly less than that of ground water due to the greater viscosity of the petroleum.

SOIL QUALITY

- Due to the presence of a thick, continuous layer of fill immediately underlying the Yard, soil-quality data developed are representative of fill deposits.
- As expected at an active railyard, elevated levels (greater than 500 ppm) of petroleum hydrocarbons (PHC) were detected in shallow fill. However, based upon ground-water quality results, the PHCs have not impacted ground-water quality, with the exception of Area 1.

- Only very low concentrations of volatile organic compounds (less than 0.35 ppm) were detected in shallow fill samples collected at the Yard.

- Petroleum-related semivolatiles were detected in shallow fill samples. However, many of the semivolatile compounds detected were those which are commonly associated with the types of fill material (asphalt, cinders, etc.) encountered at the Yard.

- Pesticide compounds were not detected except in soil boring sample S-90.

- The only polychlorinated biphenyl (PCB) compound detected in fill was Arochlor 1260. PCBs were generally detected in concentrations less than 1 ppm. Only two samples across the entire Yard yielded PCB concentrations above 10 ppm.

- Metals concentrations in fill samples detected significantly above site-specific background concentrations (i.e., one order of magnitude above established Yard background levels) throughout the Yard were arsenic, barium, copper, lead, and zinc.

GROUND-WATER QUALITY

- Ground-water quality results are representative of water quality within the saturated fill deposits that underlie the Yard. Only one monitoring well provides ground-water quality data for the deeper natural deposits (Upper Glacial Aquifer).

- In general, Yard ground-water quality has not been affected by the separate phase petroleum accumulation in Area 1 and by the facility-wide Yard activities.

- As identified during previous investigations, an area of separate phase petroleum accumulation is present in Area 1 extending northward from the Metro Shop to the northern property boundary. Apparent petroleum thicknesses measured in monitoring wells within the area have exceeded 4 feet.

- Despite the presence of the separate phase petroleum accumulation in Area 1, no VOCs were detected above standards in shallow ground-water quality samples. In addition, low concentrations of only a limited number of semivolatile compounds were detected. PCBs, however, were detected in two perimeter monitoring wells. Area 1 ground-water quality results indicate that, in general, with the exception of concentrations of PCBs detected, the shallow ground water within the fill in Area 1 has not been impacted by organic constituents. Above standard concentrations of certain metals were detected; however, these concentrations may reflect the nature of the fill and not be a result of Yard activities.

- Ground-water quality samples collected from the 11 facility-wide (excluding Area 1) shallow monitoring wells screened within the fill unit indicate:
  - no VOCs or semivolatiles were detected above standards;
  - only a limited number of semivolatile compounds were detected;

- only monitoring well MW-25 contained detectable levels of PCBs; and
- only iron, lead, manganese and sodium were detected at concentrations above the standards.

- Ground-water quality samples collected from the one deep (Upper Glacial aquifer) monitoring well (MW-23) detected ethylbenzene and total xylenes in concentrations of 0.0088 ppm and 0.018 ppm, respectively. In addition, low concentrations of semivolatile compounds were detected. Metals detected in concentrations above the standards include iron, manganese, sodium and lead.

1.0 · INTRODUCTION

The Phase I Remedial Investigation (RI) of the Sunnyside Yard, Queens, New York (Yard) was performed by Roux Associates, Inc. from October 1990 through March 1991. The RI was undertaken in accordance with the March 14, 1989 Work Plan titled "Work Plan for the Remedial Investigation and Feasibility Study, Sunnyside Yard, Queens, New York" (Roux Associates, Inc., 1989). The Work Plan was prepared in accordance with the provisions of the Order On Consent (OOC), Index #W2-0081-87-06 between the New York State Department of Environmental Conservation (NYSDEC), the National Railroad Passenger Corporation (AMTRAK) and the New Jersey Transit Corporation.

The Remedial Investigation of the Yard is intended to:

1) evaluate the nature, extent, and potential migration pathways of separate-phase petroleum containing low concentrations of polychlorinated biphenyls (PCBs) which have been previously identified in a limited area of the Yard; and

2) develop hydrogeologic, soil quality and ground-water quality information to determine the nature and extent of any other areas of contamination at the Yard.

Occurring simultaneously with the field tasks of the RI was the installation of Interim Remedial Measures (IRMs) designed to recover separate phase petroleum hydrocarbons from the former diesel fuel storage area.

The Phase I RI report summarizes all soil and ground-water quality, geologic, and hydrologic data generated by Roux Associates as part of this investigation. This information was utilized in conjunction with information developed during previous investigations to characterize environmental conditions at the Sunnyside Yard. Additionally, the Phase I RI report identifies areas which require further investigation.

1.1 Site Background

1.1.1 Site Description

The Sunnyside Yard is located in an urban area in northwestern Queens County, a borough of New York City, New York. The East River is located approximately 1 mile to the west (Figure 1). The Yard consists of a railroad maintenance and storage facility which encompasses approximately 105 acres. It functions primarily as a maintenance facility for electric locomotives and railroad cars for both AMTRAK and New Jersey Transit. The Yard is surrounded by commercial, light industrial, and residential areas.

1.1.2 Site History

The Yard was originally constructed in the early 1900's by the Pennsylvania Tunnel and Terminal Company, a subsidiary of the Pennsylvania Railroad (later known as the Penn Central Transportation Company). On April 1, 1976, the Consolidated Rail Corporation (Conrail) acquired the site, and the same day conveyed it to AMTRAK, which has continued to operate it as a storage and maintenance facility for railroad rolling stock. Prior to September 29, 1961, a portion of the Yard was owned by the Long Island Rail Road (LIRR). Today, the LIRR maintains a right-of-way through the Yard.

1.1.3 Previous Investigations

This list of previous investigations at the Yard is taken from a letter dated November 22, 1989, from Robert T. Noonan, Senior Director - Environmental Control and Industrial Hygiene for AMTRAK, to the NYSDEC in response to Paragraph III of the OOC Index #W2-0081-87-06 (Noonan, 1989). This letter lists the five previous investigations for which AMTRAK has records.

1) On November 1, 1983, representatives of Canberra RMC, Pottstown, Pennsylvania, collected thirty-eight soil samples to determine the extent of polychlorinated biphenyls (PCBs) contamination. These samples were taken from the beds of tracks 5 through 15, and from areas where soil from the beds of tracks 3 and 4 was known to be deposited. Soil found to be contaminated at a level above 50 parts per million (ppm) was disposed of off site.

2) On August 21 and 22, 1985, three soil samples were collected by Atlantic Environmental, Dover, New Jersey, in the area surrounding the engine house. All three samples were determined to have PCB concentrations below 50 ppm.

3) On November 12, 1985, RMC Environmental Services, Pottstown, Pennsylvania, collected two wall scrapings from the Engine House. The test results indicated both samples to have PCB concentrations below 50 ppm.

4) On November 21, 22, 23, 25, and 26, 1985, all stationary transformers located on AMTRAK's New York Division, which includes the Yard, were tested for PCBs by RMC Environmental Services. Of the 49 on-site transformers, nine were determined to have PCB levels above 500 ppm, and five transformers had PCB levels between 50 and 499 ppm.

5) Geraghty & Miller, Inc., Plainview, New York, was retained by AMTRAK in February 1986 to conduct an investigation of the former underground storage tank area, the engine house, the former oil house, and the former fuel transfer area to determine if leakage of hydrocarbon compounds had occurred and, if so, to determine the extent of contamination in both soil and ground water. Their June 1986 report, titled "Results of Hydrogeologic Investigation at the AMTRAK, Sunnyside, Queens, New York Train Yard" concluded that a plume of separate phase petroleum exists in the area east of the Engine House, and that this plume appears to have originated at the underground storage tanks of the former fuel storage area and has migrated beyond the Yard's northern property boundary. PCB concentrations in this plume range from 5 to 360 ppm, with the highest concentrations being detected in samples collected immediately to the east of the Engine House. PCBs were also detected in soil samples, with concentrations ranging from 0.19 to 24 ppm in the 0 to 2 feet interval, but no PCBs were detected in ground water.

1.2 Scope and Objectives of the RI

The objectives of the RI were to: 1) address the nature and extent (including off-site) and the potential migration pathways of separate phase petroleum located in a limited area of the Yard to the east of the Engine House (Area 1); and 2) provide an overall assessment of hydrogeologic conditions, soil, and ground-water quality conditions to determine the nature and extent of any other areas of contamination at the Yard. In addition to Area 1, 15 other areas at the Yard (Figure 2) were identified in the Work Plan as possible sources of contamination based on the results of site inspections and discussions with AMTRAK personnel. A brief description of each of the remaining 15 areas is provided below.

Area		Description
Area 2:	Material Control Area (Yard receiving area)	Central receiving, temporary storage and distribution point for materials and supplies received at the Yard.
Area 3:	Gas Tank Area	22,000-gallon underground storage tank (UST) and pump used for storing and dispensing gasoline.
Area 4:	Fuel Oil Tank Area	20,000-gallon UST used to store fuel oil for boiler house boiler.
Area 5:	Transformer Area	Two transformers containing PCBs are located in this area.
Area 6:	Drum Storage Area (Oil House)	Drum and equipment storage area; formerly the Yard receiving area.
Area 7:	Storage Area	Reported to be a former empty drum storage area; currently an empty area.
Area 8:	Transformer Area	Former PCB transformer area.

Area		Description
Area 9:	Compressor Area (Substation 1-A)	Contains a two-story brick structure which houses air compressors and transformers.
Area 10:	Transformer Area (Substation 44)	Contains PCB transformers.
Area 11:	Empty Drum Area	Former empty drum storage area.
Area 12:	Car Washer Area	Used to wash railroad cars.
Area 13:	Storage Area	Former storage area for materials including non-PCB transformers; currently contains a Consolidated Edison transformer substation.
Area 14:	Empty Drum Area	Former empty drum storage area.
Area 15:	Empty Drum Area	Former empty drum storage area.
Area 16:	Underground Storage Tank Area	Approximately twelve USTs are located in this area. These tanks were emptied in 1989.

To accomplish the objectives of the RI, the following field tasks were performed by Roux Associates between October 1990 and March 1991:

Task I: Reconnaissance Program

- A site survey was conducted in order to characterize surface conditions at the Yard. The information developed was used to assemble a surface drainage survey, to identify potential hydrocarbon source areas, to inspect and inventory the existing monitoring well network and to determine the types of materials stored in areas of concern A-2 (Material Control Area), A-6 (Drum Storage Area) and A-7 (Storage Area).

Task II: Hydrogeologic Investigation

Facility-Wide Investigation

- Soil borings were drilled and samples were analyzed to determine facility-wide soil quality information (i.e., outside of areas of concern);
- Monitoring wells were installed and ground-water samples were analyzed from each monitoring well to determine facility-wide ground-water quality; and
- Water-level measurements and a series of slug tests (aquifer tests) were conducted to determine the facility-wide hydrogeologic characteristics.

Area-1 Investigation

- Soil borings were drilled and soil samples analyzed to determine the nature and extent of petroleum hydrocarbon constituents and PCBs in soils;

- Monitoring wells were installed in addition to the previously existing wells, and ground-water samples were obtained from selected existing and each newly installed monitoring well to further define the extent of separate phase petroleum and to determine ground-water quality for Area 1.

Task III: Soil Investigation

- A soil boring/soil sampling program was conducted to determine the extent of soil contamination in areas A-2 through A-16; and

- A soil gas survey was conducted to further delineate the extent of the separate phase petroleum in Area 1.

2.0 STUDY AREA INVESTIGATION

2.1 Task I - Reconnaissance Program Field Activities

2.1.1 Drainage Survey

This survey was conducted in order to more fully understand the drainage patterns at the Yard, with a focus on drainage from previously identified areas of concern. Field reconnaissance, a review of existing storm sewer and topographic maps and aerial photographs, and interviews with Yard personnel were utilized in the development of this survey. The information derived from these sources was formulated into a series of descriptive paragraphs, with references to the base maps. Results of this survey are contained in Section 3.1.

2.1.2 Hydrocarbon Source Area Delineation

A catalog of current or potential hydrocarbon source areas was compiled using information derived from previous site investigations, interviews with Yard personnel, site reconnaissance, laboratory analytical results, and aerial photograph review. Included in this catalog are current and former fuel storage tanks, fuel transfer areas, maintenance areas, transformer areas, and drum storage areas which could act as potential sources for hydrocarbons. Section 4.1.4 lists and discusses these potential hydrocarbon source areas.

2.1.3 Inventory/Inspection of Existing Monitoring Wells

During the course of a previous investigation (Geraghty & Miller, 1986), fifteen 2-inch diameter polyvinyl chloride (PVC) monitoring wells were installed in the vicinity of the Engine House, in Area 1 (Plate 1) to delineate the extent of separate phase petroleum. During the current investigation, each of these monitoring wells still in existence were inspected and sounded. Since 1986, three of these monitoring wells, MW-4, MW-6 and MW-13, had been destroyed and MW-14 appears to have collapsed or been backfilled.

Monitoring well MW-13 was replaced with a 4-inch diameter well due to its critical location (outside of the area of separate phase hydrocarbon accumulations) in defining the extent of the separate phase petroleum in Area 1. The remaining wells appeared to be in usable condition; however, the elevations of the monitoring well measuring points were resurveyed to ensure that accurate water-level elevations were determined.

2.1.4 Materials Stored in Areas A-2, A-6 and A-7

Area A-2 (Material Control Area) is the Yard receiving area. It functions as a central receiving and distribution point and temporary storage area. During the course of the field investigation, the following materials were observed in this area:

- cleaning solutions in 250 gallon plastic tanks and 55 gallon drums;
- empty 250 gallon plastic tanks;
- brake pads;
- nickel-cadmium battery packs; and
- rock salt.

Area A-6 (Drum Storage Area) is referred to by Yard personnel as the Oil House, and is located to the west of the Engine House. This structure was once the Yard receiving area, but is now used for drum and equipment storage. Yard personnel report that most of the drums stored here contain cleaning solutions. In addition, substances used for locomotive maintenance are also stored here, such as oils, lubricants, coolants and spare parts. Bagged sand, used for locomotive traction, is stored under the covered portion of the Oil House.

Area A-7 (Storage Area), located to the south of Area A-6, was reported to be a former empty drum storage area. During this investigation, however, no drums were stored here.

2.2 Tasks II and III Field Activities

Land, Air, Water Environmental Services, Inc., Center Moriches, New York, was contracted to provide drilling services for both Task II and Task III, and utilized two drill rigs during the course of the investigation. A total of 89 soil borings were drilled and 19 monitoring wells were installed during the performance of Tasks II and III. A truck-mounted Mobile Drill Model B-61 was used to advance 4-inch diameter hollow stem augers at 39 of the borehole locations. In the 21 locations that could not be reached by the truck mounted drill rig, a Mobile Drill Model B-53 mounted on a Gotract all-terrain body was used to advance

4-inch diameter hollow stem augers. In 13 locations that could not be reached by the Gotract, boreholes were drilled using either a tripod mounted cathead (winch) which drove a two-inch diameter split-barrel sampler directly by hammer, or, in 16 cases, by digging the boring with a shovel and posthole digger.

Well construction details are shown in Table 1. Details of the well installation procedures are included in Appendix A (Methods of Investigation). Well construction logs are included in Appendix B. Geologic logs are included in Appendix C. A summary of sampling activities and analyses performed on soil samples collected at soil boring/monitoring well locations is provided in Table 2.

2.2.1 Task II - Hydrogeologic Investigation Field Activities

2.2.1.1 Soil Boring and Soil Sampling

The soil boring/soil sampling program was designed to determine soil quality conditions in Area 1 (Plate 1) and to determine the facility-wide (Plate 2) lithologic characteristics of deposits underlying of the Yard. A total of 34 soil borings and 19 monitoring well pilot boreholes were completed for this part of the investigation. Investigations of Areas 2 through 16 were performed under Task III. The entire program was performed under the supervision of the NYSDEC.

All soil sample analyses were performed by Envirosystems, Inc. of Columbia, Maryland. Chain of Custody form copies are included in Appendix D and copies of original analytical data packages are included in Appendix E. The soil sampling results were validated by Data Validation Services, Inc. of Riparius, New York. A summary of the validation is provided in Appendix F.

2.2.1.2 Monitoring Well Installation

Eleven monitoring wells were installed throughout the Yard to determine Yard-wide hydrogeology and ground-water quality (Plate 2). Eight monitoring wells were installed in Area 1 (Plate 1) to supplement the monitoring wells installed during a previous investigation (Geraghty & Miller, 1986).

The well boreholes were drilled using 6-inch (inside diameter) hollow stem augers, with either the B-61 or B-53 drilling rigs described previously. The monitoring wells were constructed with 4-inch diameter PVC riser casing and 10 feet of 4-inch diameter PVC 20 slot (0.020 inch) well screen. Based on a review of data presented in previous investigations, monitoring wells which were anticipated to penetrate the separate phase petroleum accumulation in Area 1 (MW-13, MW-16, MW-17, MW-19, MW-20, MW-21, and MW-22) were constructed with stainless steel well screens and PVC riser casing, however, no separate phase petroleum was encountered while drilling Monitoring Wells MW-19 and MW-21. The bottom of the well screens in Monitoring Wells MW-16, MW-17, MW-20, and MW-22 were set approximately 8 feet below the depth where separate phase petroleum was encountered during drilling. The bottom of the well screen for Monitoring Well MW-34 was set less than 8 feet below the depth where ground water was encountered during drilling to avoid placing the screen in a low permeability clay layer. The bottom of the well screen for Monitoring Well MW-29 was set more than 8 feet below the depth where ground water was encountered during drilling to accommodate proper well construction procedures, (i.e., gravel pack, bentonite seal, and cement grout), because ground water was encountered at 2 feet below land surface at that location.

The remaining shallow monitoring well screens were set approximately 8 feet below the depth where ground water was encountered during drilling. The bottom of the well screen for Monitoring Well MW-23, the deep well, was set at 36.5 feet below land surface.

2.2.1.3 Ground-Water Sampling

Ground-water samples were collected on January 3, 4, and 7, 1991. The sampling program was designed to determine facility-wide ground-water quality and to determine the impact of the separate phase petroleum on ground water in Area 1. All monitoring wells installed during this RI as well as five monitoring wells installed in Area 1 during a previous site investigation (Geraghty & Miller, 1986) were sampled. In all, 24 monitoring wells were sampled, 11 facility wide and 13 located in Area 1. Bottom loading teflon (PTFE) bailers were used to collect all samples. A detailed description of the ground-water sampling protocol is included in Appendix A, and the water sampling logs are included in Appendix G. A summary of the ground-water quality sampling program is included in Table 3.

All ground-water sample analyses were performed by Envirosystems, Inc. of Columbia, Maryland. Chain of Custody form copies are included in Appendix D and copies of original analytical data packages are included in Appendix E. The ground-water sampling results were validated by Data Validation Services, Inc. of Riparius, New York. A summary of the validation is provided in Appendix F.

2.2.1.4 Water-Level and Product Thickness Measurements

After the installation of the additional monitoring wells, a synoptic round of water-level measurements was obtained on January 15, 1991 from all the wells present at the Yard (Table 4). Four additional rounds of water-level/product-thickness measurements were collected from the monitoring wells located in and around Area 1 on December 22, 1989, April 12 and December 10, 1990 and February 13, 1991. Water levels and product thicknesses in wells containing separate phase petroleum were measured using an Oil Recovery Systems (ORS) Interface Probe, and measurements in the remaining wells were obtained using a steel tape and chalk. This information was used to prepare ground-water elevation and product thickness maps (Plates 3, 4, and 5).

2.2.1.5 Slug Tests

To determine the hydraulic characteristics of the deposits underlying the Yard, Roux Associates conducted a series of slug tests on March 7, 1991. Rising head slug tests were conducted in seven monitoring wells using the Hermit 2000 data logger with a 10 psi pressure transducer. To determine Yard-wide hydraulic conductivities, six shallow monitoring wells with screened zones intersecting the water table were tested. The monitoring well selection was based upon recharge rates observed during monitoring well development. Monitoring Wells MW-27 and MW-33 recharged quickly, MW-31 and MW-32 were intermediate, and MW-19 and MW-28 were slow to recharge (Plates 1 and 2). A slug test was conducted in Monitoring Well MW-23 (Plate 1), which is screened below the water table, to determine the hydraulic characteristics of the deeper deposits. The method used for conducting the slug tests is described in Appendix A. The slug test data are presented in Appendix H.

2.2.2 Task III - Soil Investigation in Areas of Concern

2.2.2.1 Soil Boring and Soil Sampling

Soil quality conditions in Areas of Concern, A-2 through A-16, were investigated during the performance of this task (Plate 2). A total of 52 soil borings were completed. All soil samples were analyzed for PHC. In addition, samples collected near transformer areas were analyzed for TCL PCBs. Geologic logs for the borings are included in Appendix C.

2.2.2.2 Soil Gas Survey

To address the concern of possible migration of subsurface vapors into buildings in or around Area 1, a soil gas survey was conducted to delineate the extent of separate phase PHCs on December 17, 19 and 20, 1990 (Plate 6). The soil gas sampling points were selected by constructing a rectangular sampling grid on 100 foot centers, using the northwest corner of the Engine House as an initial reference point. A 50 foot grid was used to define boundary areas or to further delineate areas with elevated photoionization detector (PID) readings.

Soil vapor probes were inserted into the ground to a depth of approximately 2 feet below land surface to obtain readings in the vadose zone. After a small air pump was used to purge 3 volumes of air from the probe, a photoionization detector (Photovac Microtip 100) was then attached to the probe, and the peak and average reading were recorded and are shown in Table 3. The details of the procedure are outlined in Appendix A.

2.2.3 Modifications to Work Plan

2.2.3.1 Soil Sampling Procedures

These changes pertain to both Task II and III soil sampling programs. All modifications were discussed with, and agreed to, by Mr. James Quinn of the NYSDEC.

1) All soil borings were originally proposed to terminate 5 feet below the water table, as determined by inspection of soil samples. Early in the course of the field investigation, however, it became apparent that many of the boring locations were not accessible to either of the drill rigs. In these cases, the borings were drilled using a tripod-mounted hammer to drive the split-barrel sampler or were dug using hand tools. Most of these borings were unable to be completed to the originally proposed depth. In addition, split barrel sampler and/or auger refusal (i.e., sampler and/or auger was unable to be advanced due to underground

obstructions) was a serious drilling obstacle. To avoid delays, the NYSDEC approved abandonment of borings if four refusals occurred. Soil samples collected up to the depth of refusal were submitted for analysis. If refusal occurred below the water table, the borings were considered completed. Fifty four soil borings and all 18 monitoring well boreholes were completed as proposed. Thirty-five borings were completed less than five feet below the water table. Five of these borings were facility-wide, two were located in Area 1, and 28 were in other areas of concern. One boring, S-18, was not completed due to an accumulation of water in the trackbed which would have resulted in an unrepresentative soil sample. Instead, an additional soil boring, S-25, was drilled on the loop tracks after the original S-25 was abandoned previously.

2) To characterize soil quality conditions in the vadose zone, soil samples were collected and analyzed for total petroleum hydrocarbon compounds (PHCs) in borings where the ground-water level was 7 feet or more below land surface.

3) Because of safety concerns related to the abundance of unmarked and unmapped underground lines and cables, Yard supervisory personnel required that the first 3 feet of all soil borings be advanced by hand. Soil samples in the 0 to 2 feet and 2 to 4 feet intervals were collected by placing the excavated soil on plastic sheeting, homogenizing it, and collecting a representative sample from the interval. The tools used for the excavation (shovel, post hole digger, and hand trowels) were subjected to the same decontamination procedures as the split-barrel samplers (Appendix A).

4) The above procedure was deemed incompatible with sampling for Target Compound List (TCL) volatile organic compounds, since the agitation of the soils would result in volatilization of some of the compounds. As a result, TCL samples were collected from the 2 to 4 feet interval as rapidly as possible with minimal agitation.

5) Samples were collected from the 0 to 2 feet interval in all boreholes located in Area 1 to define soil quality. Since the area is known to contain petroleum hydrocarbons (including separate phase petroleum), no additional deeper samples were submitted for analysis with the exception of one total organic carbon (TOC) and one PCB soil quality sample collected from below the water table. Outside of Area 1, soil samples exhibiting evidence of contamination (such as staining or elevated photoionization detector readings) that were not already assigned an analysis in the Work Plan were collected and submitted for analysis. Samples from transformer areas were analyzed for PCBs, and samples from drum storage areas were analyzed for the complete TCL. Additional samples collected in any other areas of the Yard were analyzed for PHCs (Quinn, 1990).

6) The decontamination procedure described in Appendix A was altered for borings and wells which penetrated the separate phase petroleum located in Area 1. Pesticide-grade hexane was substituted for methanol as a rinse agent for these borings.

7) Five soil borings which were proposed to be drilled in basements of the off-site buildings located to the north of the Yard (Plate 1) were not completed due to coordination difficulties with building owners. These borings are currently scheduled to be drilled during the supplemental investigation (Quinn, 1991a).

8) The soil-quality sample collected in the MW-33 pilot borehole was lost by the overnight carrier while in transit to the analytical laboratory. Since ground-water quality samples were to be collected from the monitoring well, resampling was not required.

9) The TCL sample which was to be collected from S-71 on October 4, 1990 was omitted by the NYSDEC project engineer, who felt the sample collection jars supplied by the laboratory were inadequate for samples being submitted for volatile organic compound analysis. The NYSDEC and the laboratory agreed that these jars were acceptable after discussing the analysis requirements on October 5, 1990.

10) The TCL sample which was to be collected from S-63 was omitted, and replaced with a sample from S-62, because of accessibility problems at the original location of S-63. The TCL sample which was to be collected from S-69 in Area A-7 was omitted and replaced with a sample from S-64 in Area A-6.

2.2.3.2 Ground-Water Sampling Procedures

These changes pertain to the Task II sampling program and were approved by Mr. James Quinn of the NYSDEC.

1) Pesticide-grade hexane was used instead of methanol for decontamination of equipment used in wells in Area 1 that contained separate phase petroleum.

2) Wells containing separate phase petroleum were not purged prior to sampling, and only the petroleum was sampled. This procedure was followed to avoid additional contamination of the well screens, soils, and water below present water-table levels (Quinn, 1991b).

3) With the exception of Monitoring Well MW-22, ground-water samples were not collected from monitoring wells in Area 1 that contained separate phase petroleum due to logistical problems and the likelihood that any data obtained would be of poor quality because of separate phase hydrocarbon interference (Quinn, 1991b).

4) One monitoring well, MW-18, was proposed to be installed in the basement of a building located to the north of the Yard (Plate 1). However, due to coordination difficulties with the building owner, this installation has been rescheduled for the supplemental investigation (Quinn, 1991a).

3.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

The site encompasses approximately 105 acres in western Queens County. The property is bordered to the north by the LIRR freight car storage area and beyond that by Route 25A (Northern Boulevard), to the south by Skillman Avenue, to the east by 43rd Street, and to the west by Thompson Avenue (Plate 2).

The Yard was assembled at the beginning of the century in a reclaimed marshland area. It lies in a basin-like area with ground elevations that range from approximately 10 to 25 feet below the surrounding land surface. Thompson Avenue, Queens Boulevard, Honeywell Street, and 39th Street all cross the Yard from north to south on elevated spans which drain into the Yard below.

3.1 Drainage Pathways

This narrative analysis of drainage pathways is intended to give an overall view of storm water runoff and infiltration patterns in and around the Yard. It includes a facility-wide discussion (Plate 2), and then focuses on areas which were identified in the Work Plan as areas of concern. Understanding the drainage pathways in the Yard is critical to determining possible pathways of contaminant transport, either onto, throughout, or off the site.

The information contained in this section has been collected from field observations, engineering plans of the Yard and site topographic maps, and personal communications with Yard personnel. Previous reports concerning the site and aerial photographs have also been reviewed and the information contained in them incorporated into this narrative.

3.1.1 Drainage Pathways - Facility Wide

The Yard topography generally slopes very gently to the west. The southern topographic/drainage boundary is a steep slope which rises approximately 25 feet to meet Skillman Avenue. To the north, the Yard is bounded predominantly by a vertical bank of concrete (part of a former loading platform) or railroad ties (part of the LIRR freight car storage area).

Yard topography and drainage patterns are strongly influenced by the large number of railroad tracks running throughout the Yard. These tracks are laid upon 0.5 to 3 foot thick beds of very coarse gravel ballast. Surface runoff and ponding occur in the troughs between tracks. These tracks are generally oriented in an east-west or northeast-southwest direction. The LIRR has an east-west right-of-way of eight tracks which lies on an elevated ridge approximately 320 feet north of Skillman Avenue, which is known as the LIRR main line. This ridge rises to a height of approximately 30 feet above the remainder of the Yard, and it forms an effective barrier to north-south drainage patterns.

Approximately 70 percent of the Yard lies to the north of the LIRR main line. This area includes the commissary building complex, the engine house, the metro shop, the running repair/wheel truing complex, the former transformer areas and the main yard tracks 1 through 36. The LIRR main line comprises approximately 10 percent of the Yard and includes transformer substation 44. The remaining 20 percent of the Yard lies to the south of the ridge. Loop Tracks 1 and 2 and the car wash area are located in this area.

Based upon a review of engineering plans, the Yard is underlain by a storm sewer drainage system with catch basins located throughout the Yard. This sitewide system consists of two drainage subsystems. The primary subsystem services approximately 90 percent of the Yard, with catch basins located near all major buildings on the site and throughout the Yard. Stormwater from this subsystem leaves the Yard to the north, approximately 360 feet west of Honeywell Street. The secondary drainage subsystem is located in the southwest corner of the Yard and services 19 catch basins. The stormwater from this subsystem exits the Yard to the south, approximately 360 feet west of the intersection of Skillman and Thompson Avenues.

3.1.2 Drainage Pathways - Area 1

Area 1 is located at the northern border of the Yard, and includes the Engine House, the Metro shop, drum storage areas, a workers locker room and the former diesel fuel storage area (Plate 1). It covers an area of approximately 10 acres.

The land surface in the vicinity of Area 1 is sloped gently from east to west and overall surface drainage is generally to the west. Drainage is locally affected by the railroad track beds which are present throughout the area. These tracks are oriented in an east-west configuration, and act to channel surface water flow to the areas between each set of tracks.

Directly to the north of the Engine House are two tracks designated Pit 3 and Pit 4, so called because of the locomotive service bays which are beneath them. These bays are approximately 90 feet long by 4 feet wide by 3.5 feet deep. Stormwater flowing into these bays is discharged into the storm sewer drainage system.

Area A-6, a drum storage area, is located to the west of the Engine House and is comprised of a storage building and elevated concrete storage platform that was formerly the Oil House. It currently is used to store freight pallets of sand, spare parts, and for drum storage. Approximately 200 drums were stored here during the period of the field investigation, containing cleaning solutions and lubricants used for locomotive service.

Surface soils and ballast in Area 1 are moderately to heavily stained with petroleum hydrocarbons. The most heavily stained soils are located directly east and west of the engine house, on and between Engine House tracks 1 and 2.

According to the Yard engineering plans, there are 13 catch basins in Area 1 which are connected to the primary storm sewer drainage system discussed earlier. Nine catch basins are mapped east of the Engine House and drain the area north of Engine House track 2, north of Pit track 3, and north of Pit track 4. Field reconnaissance found only six of these basins; the other three are assumed to be buried. The effectiveness of some of these catch basins is questionable, since ponding has been observed between the tracks off the northeast corner of the engine house. However, surface runoff from this stained area has been observed flowing into several of these catch basins during periods of precipitation. In addition, an oil/water separator was discovered to the east of the engine house that is connected to the former fuel transfer area. Water from the separator appears to discharge into the storm sewer drainage system. The disposition of the oil is unclear.

Three catch basins are located on the west side of the Engine House (Plate 2), and it appears that surface runoff from the stained soils and pavement in this area flows into these catch basins and from there into the storm sewer drainage system. There is also a catch basin located on the northeast side of the inactive railroad turntable.

Conversations with Yard personnel have revealed that the area east of the Engine House and between Engine House tracks 1 and 2 had been excavated and backfilled with ballast several years ago. Drainage in this area is very poor, due in part to the very shallow water table in the vicinity (less than one foot below land surface) and the lack of topographic relief.

3.1.3 Drainage Pathways - Area A-2 (Material Control Area)

The material control area or receiving area is located in an approximately 90 foot by 90 foot area at the southwest end of the commissary building complex (Plate 2). This area is bordered to the northwest by a gravel road and railroad tie bulkhead which drops approximately 8 feet to the Yard's Inbound Motor track. Track 1 in the Sunnyside main yard serves as the southeast boundary.

Area A-2 is relatively flat and paved with either concrete or a combination of gravel and asphalt. The area is serviced by two catch basins located next to the commissary building. According to Yard personnel, these catch basins are connected to the primary storm sewer drainage system, but the exact location of the connection is unknown. These catch basins appear to drain the area between the radio shop and the commissary building effectively. However, ponding of stormwater has been observed in the gravel roadway.

3.1.4 Drainage Pathways - Area A-12 (Car Washer Area)

Area A-12, the car washer area, is located on the south side of the Yard, in a depression between the LIRR main line to the north and Skillman Avenue to the south. The area is approximately 185 feet by 100 feet. Loop tracks 1 (north) and 2 (south) run through this area in an east-west direction. The only structures in this area are the railroad car wash building and the car wash assembly. The building is a two story structure which houses the pumps and other machinery associated with the car wash. The car wash assembly consists of the sprayers and vertical brushes which clean the cars as they pass.

From Skillman Avenue there is a steep slope down approximately 35 feet to the trackbed. North of the tracks there is a slope upwards approximately 15 feet to a LIRR property road and it is another 15 feet to the top of the LIRR main line.

The car wash is in operation daily, using a combination of a mild acid solution, nylon brushes and rinse water from an adjacent well on passing railroad cars to clean them. The car wash assembly is mounted on concrete pads which are set between and on either side of the two tracks. Wastewater from the washing operation is collected by two catch basins which are connected to the primary storm water drainage system. Because of the large quantity of water used by the system and the placement of the spray arms, some water escapes the catch basins and runs off the concrete to either the ballast area in between the track rails or to the channels between the tracks. Wash water runoff has been observed as far as 350 feet west of the car wash area, contained in the channels on either side of Loop track 2. Ponding has also been observed at the east end of the car wash area, which is not serviced by a catch basin.

There is a spillway from off-site (Skillman Avenue) located approximately 200 feet west of the car wash building. It appears, in part, to be the destination of storm water runoff from the Skillman Avenue storm drains. This spillway is connected via a concrete drainage trench and catch basin to the primary storm sewer drainage system.

3.1.5 Drainage Pathways - Transformer Areas (A-5, A-8A, A-8B, A-8C, A-9, A-10)
As part of the track electrification program, trackside transformer units have been used in several areas in the Yard. These transformer areas are designated A-5, A-8A, A-8B, A-8C, A-9 and A-10 (Plate 2).

Areas A-5 and A-8A, A-8B, A-8C are former trackside transformer locations in the main Yard. The transformer units in these areas were removed during 1988 to 1989. These areas are all located underneath the Honeywell Street Bridge, which spans the Yard from north to south. Area A-5 is an approximately 60 foot by 40 foot area located at the north side of the Yard, between Track 1 and a concrete bridge pier supporting Honeywell Street. The area is prone to flooding because of runoff from the bridge leaking through cracks in the pavement. The land surface in the area slopes gently to the west.

Areas A-8A, A-8B and A-8C lie between tracks 15 and 16, 20 and 21, and 25 and 26, respectively. The areas were originally identified as Area A-8 in the 1987 Work Plan RI/FS, but further investigation revealed three separate transformer areas. Drainage in these areas is to the west, following the ballast pathway created in the track beds.

Area A-9 is located at the south side of the main yard, just north of the LIRR right-of way. Its main feature is Substation 1-A, a two-story brick structure which houses air compressors and transformers. The Yard Lead 4 track runs just to the north of this building. The soils in and around this track are heavily stained with petroleum hydrocarbons and poorly drained. What drainage there is probably occurs to the west. There is a concrete spillway just to the east of the Substation 1-A building which routes storm runoff from the LIRR main line to the Lead 4 Track.

Yard engineering diagrams indicate that the two catch basins located in Area A-9 are connected to the storm sewer drainage system (Plate 2).

Area A-10 is the existing transformer area known as Substation 44. Originally, this area was located under the Honeywell Street bridge, but the transformer in the area was encased in concrete, so with NYSDEC approval this area was relocated. It is now 260 feet north of Skillman Avenue and 580 feet west of the Honeywell Street Bridge on the LIRR main line. There are six small transformers installed here, inside a fenced-in area of approximately 340 feet by 100 feet. Land surface pitches down to the south and west of Area A-10. However, the soils in the area, while stained with petroleum hydrocarbons, are loose and sandy, so most precipitation on this area is prone to infiltration and runoff is minimal.

3.1.6 Drainage Pathways - Remaining Site Areas

According to Yard engineering plans, none of these areas (Areas A-3, A-4, A-11, A-13, A-14, A-15 and A-16) is located in the vicinity of catch basins connected to the storm sewer drainage system.

Area A-3 is located in the 80 foot by 60 foot area between the commissary building and the stores building at the north side of the Yard (Plate 2). There is an underground storage tank and pump in the area used for storing and dispensing gasoline. The area is paved with asphalt over brick, and runoff is to the northwest.

Area A-4 is located on the northeast end of the boiler house (Plate 2). The area measures approximately 80 feet by 60 feet, and is covered with gravel ballast from 3 to 8 inches thick. During the course of the field investigation, it was observed to be used as a temporary drum storage area for the boiler house. This area may receive surface runoff from the surrounding paved areas, but because of the thick ballast cover, drainage is difficult to determine. However, ponding has been observed off the northwest corner of the boiler house, in the gravel road which runs by this area.

Area A-11 is a former storage area approximately 100 feet by 80 feet located south of the wheel truing shop (Plate 2). This is a dismantled track area, and soils are moderately stained with petroleum hydrocarbons and very compacted. While the land surface slopes gently to the west, ponding is evident throughout this area during rain events.

Area A-13 is a former storage area which is now a Consolidated Edison substation (Plate 2). It measures approximately 280 feet by 150 feet. The soils here are loose and sandy with a large infiltrative capacity, resulting in minimal surface runoff.

Areas A-14 and A-15 are former drum storage areas located to the south of Track 36 (Plate 2). These areas measure approximately 130 feet by 60 feet and 70 feet by 50 feet, respectively. As with Area A-11, the soils here are very compacted, and drainage is difficult to determine.

Area A-16 is an underground storage tank area located at the east end of the Yard (Plate 2). The area, approximately 250 feet by 100 feet, is paved with asphalt and concrete, and runoff is to the west. During periods of rain, the east end of the abandoned building in the area is subject to flooding.

3.1.7 Drainage Pathways Evaluation

Based upon a review of the drainage pathways, off-site surface runoff does not occur. Therefore, surface runoff does not appear to be a potential pathway for contaminant migration off site. However, surface runoff from off-site areas onto the Yard has been observed via drainage from the four bridges that span the Yard and from a spillway that apparently channels runoff from Skillman Avenue (Plate 2).

Likewise, within the Yard, surface runoff does not appear to be a pathway for contaminant migration. Precipitation appears to both infiltrate into the ground and to drain into the storm-sewer system, depending on location and topography. Water enters the sewer via the catch basins and is then apparently transported offsite at one of two locations. However, according to Yard personnel, the sewer is approximately 80 years old, has not been repaired or maintained, and its present condition and type of construction is unknown.

In Area 1 and along the northern boundary of the Yard, the sewer is located below the water table (Plate 1). Roux Associates inspected some of the sewer locations on February 13, 1991. Water was found flowing in the sewer along the northern property boundary in Area 1 and to the west even though there had been no measurable precipitation for days. In Area 1, to the east of the Engine House (Plate 1), surface runoff with petroleum hydrocarbon sheens has been observed flowing into the catch basins during periods of precipitation.

3.2 Geology

The evaluation of geologic conditions is based upon the site-specific information developed during the drilling of the soil borings and monitoring well pilot boreholes, a previous investigation (Geraghty & Miller, 1986) and published information (Soren, 1978 and Buxton, et. al., 1981) on the regional and local geology. The geologic logs from the soil borings and monitoring well boreholes are included in Appendix B.

3.2.1 Regional Geology

The Yard is located in the Atlantic Coastal Plain Physiographic Province. The regional subsurface geology consists of unconsolidated sand, silt, clay and gravel deposits approximately 60 to 90 feet thick overlying crystalline bedrock. The strata in the area dip gently to the southeast, following the topography of the bedrock surface (Soren, 1978).

The area is underlain by unconsolidated Upper Pleistocene glacial (ground moraine) deposits of unstratified, poorly sorted mixtures of sand and silt with some gravel and cobbles (Buxton, et. al., 1981) covered by a thin veneer of recent and Holocene deposits. The saturated portion of the Upper Pleistocene deposits form the Upper Glacial aquifer of Long Island.

3.2.2 Site Geology

Geologic information developed during the field investigation indicates that the entire Yard is underlain by a substantial thickness of fill. Fill thicknesses range between 8 feet (MW-30) and 27 feet (MW-24).

Several factors indicate that large volumes of fill were used at the Yard, including early reports identifying the Yard as a reclaimed marshland, the construction of the elevated Long Island Rail Road right-of-way and the several extensive bulkheaded areas throughout the Yard. The predominant surficial unit encountered in the Yard is a fill material comprised of crushed stone and coarse gravel with minor amounts of sand, silt, and cinders (referred to as railroad-bed fill or ballast). This fill unit (ballast unit) is found beneath the existing railroad tracks and also in areas of dismantled tracks and extends from ground surface to a maximum thickness of 3 feet (boring S-54). In all areas where the ballast unit is absent, another fill unit, comprised of unconsolidated sand, silt, gravel and cobbles (sand and gravel unit) is encountered at ground surface. This unit reaches a maximum thickness of approximately 27 feet (MW-24). The transition between this sand and gravel fill unit and underlying glacial deposits is difficult to determine because the sand and gravel fill closely resembles the naturally occurring glacial ground moraine deposits of the area. Where the ballast unit is present, the sand and gravel fill unit is found beneath the ballast.

In the northern portion of the Yard, the fill units are underlain by naturally occurring, poorly sorted deposits of medium to coarse sand and gravel with interbedded thin lenses of fine sand, silt and clay (boring S-1). Locally, in the western and southwestern portions of the Yard, naturally occurring formations were encountered in boring S-32 at 9 feet below land surface and in pilot borehole MW-30 at 8 feet below land surface. These units consisted of interbedded sand, silty clay, and meadow mat with organic clay layers (marshland deposit).

Geologic cross sections were not constructed because in most cases the boreholes did not reach the base of the fill unit.

3.3 Hydrogeology

The evaluation of hydrogeologic conditions is based upon a review of a synoptic round of water-level measurements, slug test results, previous investigations (Geraghty & Miller, 1986) and published information (McClymonds and Franke, 1972 and Franke and Cohen, 1972).

3.3.1 Regional Hydrogeology

Ground water in the area occurs under water-table (unconfined) conditions in the Upper Glacial aquifer. Regional ground-water flow in the area is to the northwest and discharges into the East River located approximately one mile from the Yard (McClymonds and Franke, 1972). The published horizontal hydraulic conductivity of the Upper Glacial aquifer in Queens County ranges from 214 feet per day (ft/day) (McClymonds and Franke, 1972) to 270 ft/day (Franke and Cohen, 1972).

3.3.2 Site Hydrogeology

The water table underlying the Yard occurs within the fill deposits. All water table (shallow) monitoring wells installed at the Yard are screened within the fill. Depth to ground water at the Yard ranges from 1.72 feet (MW-22) to 17.85 feet (MW-24) below land surface. Variability in depth to water at the Yard is a function of surface topography.

A synoptic round of water-level measurements was obtained on January 15, 1991 from all newly installed and all usable, previously installed monitoring wells. These data are summarized in Table 2. Contoured water-level elevations are presented in Plates 3 and 5. Water-level measurements obtained from existing Monitoring Well MW-12 resulted in anomalous water-table elevations and, therefore, were not incorporated into the water-table elevation maps. Monitoring Well MW-23 was also not incorporated into the water-table elevation maps since it a deep monitoring well and is not screened to intersect the water table. This well is screened within the Upper Glacial aquifer.

Water-level measurements collected in the monitoring wells that contained separate phase petroleum were corrected for the density of diesel fuel. The correction assumes the density of separate phase petroleum to be 0.827 grams per milliliter (automotive diesel fuel at 15 degrees Celsius, API, 1989).

As measured in the monitoring wells on January 15, 1991, ground water flows generally toward the northwest beneath the Yard (Plates 3 and 5). Ground-water flow appears to be affected by the heterogeneous nature of the fill material that underlies the Yard, by the preferential drainage pathways created by the railroad track beds and by the deeper building foundations and maintenance pits occurring in Area 1 where ground water is shallow.

Based upon the water-level measurements collected on January 15, 1991, the average horizontal hydraulic gradient for the water table beneath the Yard is 0.0037 feet per foot (Plate 5).

3.3.3 Slug Test Analysis and Results

To determine the hydraulic characteristics of the shallow fill and deeper sand and gravel deposits underlying the Yard, Roux Associates conducted aquifer tests on March 7, 1991. These tests consisted of 12 rising-head slug tests, two performed at each selected shallow monitoring well (MW-19, MW-27, MW-28, MW-31, MW-32, and MW-33). In addition, two rising-head slug tests were performed on Monitoring Well MW-23, which is screened below the water table, to determine the hydraulic characteristics of the deeper deposits. The method used for conducting the slug tests is included in Appendix A and slug test results are presented in Appendix H.

Each rising-head slug test was analyzed for the hydraulic conductivity (permeability) of the water table using the method of Bouwer and Rice (1976). Slug test analysis was facilitated using the Aquifer Test Design and Analysis Computer Software known as AQTESOLV™ by Duffield and Rumbaugh, III (1989).

The average horizontal hydraulic conductivity values obtained from AQTESOLV™'s Bouwer and Rice (1976) slug test analysis for Monitoring Wells MW-19, MW-23, MW-27, MW-28, MW-31, MW-32 and MW-33 are listed below:

Monitoring Well	Formation Screened	Average Horizontal Hydraulic Conductivity
MW-19	Fill	0.59 feet/day
MW-23	Upper Glacial Aquifer	2.13 feet/day
MW-27	Fill	59.83 feet/day
MW-28	Fill	0.48 feet/day
MW-31	Fill	48.19 feet/day
MW-32	Fill	3.42 feet/day
MW-33	Fill	54.78 feet/day

The heterogeneity of the fill units at the Yard (i.e., cobbles, gravel, sand, and silt), in which most of the wells are screened, accounts for the variability in the horizontal hydraulic conductivity values presented above. Thus, the horizontal hydraulic conductivity values that are apparently representative of the shallow fill deposits at the Yard range from a low of 0.48 feet per day (ft/d) (3.6 gallons per day per foot squared [gpd/ft^2]) to a high of 59.83 ft/d (447.5 gpd/ft^2). The average horizontal hydraulic conductivity from the shallow Monitoring Wells MW-19, MW-27, MW-28, MW-31, MW-32 and MW-33 is 27.88 ft/d.

The horizontal hydraulic conductivity value for the deeper monitoring well (MW-23) is two orders of magnitude lower than the range of estimated horizontal hydraulic conductivities of 214 to 270 ft/d for the Upper Glacial Aquifer reported by Franke and Cohen (1972) and Buxton et. al. (1981).

3.3.4 Calculation of Ground-Water Flow Rates

The equation used to calculate the horizontal velocity of ground water through the water table, which is a modified form of the Darcy equation described by Franke and Cohen (1972), follows:

$$v_s = K_s I/n$$

where:

v_s	=	the velocity of ground water along a segment of a flow line (s) [length/time^{-1}];
K_s	=	the horizontal hydraulic conductivity of the aquifer along the segment of flow line (s) [length/time^{-1}];
I	=	the horizontal hydraulic gradient along the segment of the flow line (s) [length/length^{-1}]; and
n	=	the effective porosity of the aquifer [dimensionless].

The horizontal hydraulic gradient was determined from the water-table elevation map for January 15, 1991 (Plate 5). The equipotential lines (i.e., lines of equal water-table elevation) from the January 15, 1991 water-table elevation map indicate that the total head change across the Yard is 11 feet over a distance of approximately 2,963 feet; thus, the horizontal hydraulic gradient is approximately 0.0037 feet per foot (ft/ft).

Using an estimated representative effective porosity of 0.25 (Freeze and Cherry, 1979), the approximate horizontal hydraulic gradient of 0.0037 ft/ft and the approximate average horizontal hydraulic conductivity of 27.88 ft/day, the calculated average horizontal velocity of ground water (in the fill deposits) at the Yard is 0.4126 ft/day.

The separate phase petroleum hydrocarbon accumulation lies above the water table in the fill unit which underlies Area 1. Ground-water flow in this area is to the north-northwest. The flow velocity, if any, of the petroleum will be significantly less than the ground-water velocity due to the greater viscosity of the petroleum (Shepherd, 1983).

4.0 SOIL AND GROUND-WATER QUALITY

To remain consistent with the Work Plan, the following discussion of soil and ground-water quality focuses on:

1) the 16 areas of concern identified in the Work Plan; and

2) the remaining areas (i.e., facility-wide) of the Yard to address overall site conditions.

As required by protocol, the concentrations of the analytical results included within the Phase I RI report are presented in the same units as the laboratory supplied tables. However, to avoid any confusion resulting from conversion errors, all concentrations have also been reported in parts per million (ppm). One milligram per kilogram (mg/kg) and one milligram per liter (mg/L) are equivalent to one ppm. One microgram per kilogram (μg/kg) and one microgram per liter (μg/L) are equivalent to one part per billion (ppb) and one ppm is equal to 1000 ppb.

As reported in the data validation report (DVR) prepared by Data Validation Services, Inc. (Appendix F), a review of the analytical laboratory quality assurance/quality (QA/QC) procedures raised questions as to the usability of some of the soil and water quality analytical data. Based on the NYSDEC review of the analytical data and the DVR, Roux Associates, Inc. was directed by the NYSDEC to prepare a data usability report (DUR) which evaluated the usability of the analytical results and made recommendations on areas that should be resampled and where confirmatory sampling was necessary. The DUR is included as Appendix I.

4.1 Soil Quality

The soil sampling program of Tasks II and III was designed to characterize facility wide soil quality (outside of areas of concern) by examination and analysis of samples from borings S-16 through S-40, and the soil quality of specific areas of concern (Areas 1 through 16) by examination and analysis of samples from boring S-1 through S-10 and borings S-41 through S-95. Due to the many access problems, such as steep slopes, numerous tracks and switches, overhead electric lines and buried utilities, many soil boring locations were relocated. Some of these borings that were intended for facility-wide characterization were relocated to nearby stained or suspect areas, under the direction of Mr. James Quinn, NYSDEC. As a result, selected soil sampling locations and, in turn, soil quality results, were biased toward areas of known or suspected contamination (e.g. stained areas).

Soil samples collected during this investigation were analyzed for the following parameters.

- USEPA Target Compound List (TCL) Analysis
  - TCL VOCs
  - TCL Semivolatiles
  - TCL PCBs
  - TCL Pesticides
  - TCL Lead
  - TCL Metals

- Total Petroleum Hydrocarbons (PHCs)

- Total Organic Carbon (TOC)

A summary of soil sampling locations, analytical parameter and sample depth intervals is included in Table 2.

4.1.1 Suite of Contaminants

VOCs (Table 5), semivolatiles (Table 6), PCBs and pesticides (Table 7), PHCs (Table 8) and metals (Table 9) were detected in the soil-quality samples. A discussion of each suite of compounds detected in soil samples is provided below.

<u>Volatile Organic Compounds</u> - Acetone, carbon disulfide, methylene chloride and toluene are the predominant VOCs detected at the Yard (Table 5). All VOC concentrations were below 350 μg/kg (0.35 ppm). The TCL VOCs detected are as follows.

Parameter	Number of Sampling Locations at which detected	Range in Concentrations (in μg/kg)
Acetone	17	ND - 308 (0.308 ppm)
Carbon Disulfide	6	ND - 19 (0.019 ppm)
Chloroform	1	ND - 3.8J (0.0038 ppm)
Ethylbenzene	1	ND - 67 (0.067 ppm)
Methylene Chloride	10	ND - 302 (0.302 ppm)
Styrene	1	ND - 3.4J (0.0034 ppm)

Parameter	Number of Sampling Locations at which detected	Range in Concentrations (in μg/kg)
Toluene	6	ND - 31 (0.0031 ppm)
Xylenes (total)	2	ND - 137 (0.137 ppm)
NOTE: J - indicates estimated value; only detected concentration for this analyte.		

It should be noted that acetone and methylene chloride are common laboratory contaminants.

Semivolatile Compounds - Of the semivolatile compounds detected (Table 6) bis(2-ethylhexyl) phthalate, benzo (b + k) flouranthenes, fluoranthene and pyrene have the most widespread distribution (Plate 7). Phthalates, which are common laboratory contaminants, were also detected in the laboratory blanks. The semivolatiles detected are as follows:

Parameter	Number of Sampling Locations at Which Detected	Range in Concentrations (in μg/kg)
Acenaphthylene	1	ND - 337J (0.337 ppm)
Anthracene	2	ND - 1,966J (1.966 ppm)
Benzo(a)Anthracene	3	ND - 12,600 (12.6 ppm)
Benzo(a)Pyrene	4	ND - 5,760 (5.76 ppm)
Benzo(b + k) Fluoranthenes	6	ND - 7,400 (7.40 ppm)
Benzo(g,h,i)Perylene	2	ND - 5,800 (5.80 ppm)
Butylbenzyl Phthalate	1	ND - 234J (0.234 ppm)
Chrysene	4	ND - 10,100 (10.1 ppm)
Di-n-butylphthalate	6	ND - 555 (0.555 ppm)
Bis(2-Ethylhexyl)Phthalate	13	ND - 407 (0.407 ppm)
Fluoranthene	6	ND - 19,700 (19.7 ppm)
Indeno(1,2,3-cd)Pyrene	2	ND - 4,640 (4.64 ppm)

Parameter	Number of Sampling Locations at Which Detected	Range in Concentrations (in μg/kg)
Phenanthrene	4	ND - 11,900 (11.9 ppm)
Pyrene	6	ND - 16,500 (16.5 ppm)
NOTE: J indicates estimated value; only detected concentration for this analyte.		

Most of these semivolatiles (i.e., the polynuclear aromatic hydrocarbons) are constituents commonly found in diesel fuel and fuel oils (Kramer et al., 1987; Kostecki, et al., 1989; Testa, et al., 1991; and Environ, 1987). However, these constituents are also commonly associated with fill material containing cinders and/or asphaltic material (including treated railroad ties) such as the fill underlying the Yard. Therefore, the presence of these constituents in soils at the Yard, especially in samples containing low concentrations, may only reflect the composition of the fill material underlying the Yard.

Pesticide Compounds - Pesticide compounds (Table 7) were detected in only one soil boring, S-90, located in a paved parking lot in the former underground storage tank area (A-16). There is a large volume of assorted materials that were dumped illegally (i.e., by parties other than Yard personnel) in and around this part of the Yard. The presence of pesticide compounds in this isolated occurrence suggests that they were derived from an outside source and that pesticides have not impacted soil quality at the Yard. The pesticide compounds detected in soil boring S-90 are as follows.

- heptachlor (485 μg/kg) (0.485 ppm)
- dieldrin (1,521 μg/kg) (1.521 ppm)
- endrin (1,422 μg/kg) (1.422 ppm)

Petroleum Hydrocarbon Compounds - PHC concentrations in areas of concern range from not detected (<10 mg/kg) to 162,860 mg/kg (ppm) in boring S-55 (Table 8). Concentrations of PHCs in non-source area borings range from not detected to 16,270 mg/kg (ppm) in the pilot borehole for MW-31. The distribution of PHC concentrations is shown in Plates 8 (Area 1) and 9 (Facility-wide).

PHC results are used only as qualitative indicators of petroleum hydrocarbon impacts because:

(1) naturally occurring organic substances in soils (e.g. fatty acids, fatty acid esters) will result in detectable concentrations of PHCs (Dragun, et al., 1989);

(2) the presence of silt, clay or other fine grained material in the sample may interfere with the spectrophotometric analysis (Method 418.1) and may create false-positive results (Thomey, Bratberg and Kalise, 1989); and

(3) based upon Roux Associates, Inc. experience, it is not uncommon to achieve PHC concentrations up to 500 mg/kg (ppm) in fill material (almost all Yard samples were from fill material) collected from areas where there is no evidence of contamination (staining, odor, elevated PID readings, detectable VOC or semi-VOC concentrations).

As a result, PHC results were used in conjunction with other data (visual observations, PID readings, organics data) to determine the presence or absence of petroleum hydrocarbon impacts. In general, concentrations in excess of 500 mg/kg (ppm) were considered indicative of a potential petroleum hydrocarbon impact.

Polychlorinated Biphenyls - The only PCB compound detected in fill was Arochlor 1260. PCBs were generally detected at concentrations less than 1 ppm. Only two samples across the entire Yard exceeded 10 ppm PCBs.

In Area 1, PCB concentrations (Table 7) in soil samples collected above the water table in Area 1 (Plate 10) range from not detected to a maximum of 13,652 μg/kg (13.652 ppm) (0 to 0.7 feet) in soil boring S-76. The PCB concentration detected in the saturated zone (below the water table) soil-quality sample MW-16 (10 to 12 feet) was 3,655 μg/kg (3.655 ppm). This sample was collected from within the areal extent of the separate phase petroleum accumulation.

In the remaining areas of concern (Plates 10 and 11), PCB concentrations were in the range from not detected to a maximum of 4,442 μg/kg (4.442 ppm) (0 to 2 feet) in soil boring S-74, in Area A-13, with the exception of soil boring S-53 in Area A-8A, at a concentration of 71,160 μg/kg (71.160 ppm) (0 to 2 feet).

Facility wide (outside or areas of concern), PCB concentrations in soil samples (Plate 11) range from not detected to a maximum of 7,540 μg/kg (7.54 ppm) (0 to 2 feet) in the pilot borehole for MW-31.

Metals

Twenty-three soil-quality samples collected throughout the Yard were analyzed for the complete TAL metals, and ten samples were analyzed for lead content only. The results of these analyses were used to develop facility-wide and area-of-concern metals soil-quality information (Table 9).

To perform an assessment of metals results and delineate any areas which may have been impacted by Yard activities, a determination of site-specific background conditions was required. Background conditions are normally determined by the soil quality results from soil boring or well pilot borehole locations which meet the following criteria:

- the borehole was not drilled in an area of known or suspected contamination (e.g., area of concern);
- the material collected was representative of fill material present throughout the site;
- there was no evidence of contamination at the borehole location, such as stained soils or elevated PID readings; and
- no organic compounds were detected in samples collected from the borehole, including PHCs, PCBs, VOCs, semivolatiles and pesticides.

Only three borings, S-30, S-33, and S-35, most closely meet the above criteria and were therefore used to assist in identifying background conditions in the Yard. The samples consisted of medium to fine sand, which is representative of the fill material that underlies the Yard. Organic compounds were detected in fill samples collected in each of the borings, however, the compounds detected, acetone, methylene chloride and phthalates, are common laboratory contaminants.

The metals analysis results for these three representative borings were used to develop background ranges of metals concentrations at the Yard. These ranges were compared with metals results from the Yard borings (Table 9).

Metals concentrations for Yard soils (fill) that exceeded one order of magnitude above the site-specific background range were considered significant. This approach was used because the limited amount of background data (three samples) cannot provide a confident estimate of the background range of metals concentrations at the Yard.

Facility-Wide

In addition to the three borings already discussed, nine other borings and four monitoring well pilot boreholes located outside of areas of concern were analyzed for either TAL lead (5 samples) or the entire TAL metals list (8 samples) (Plates 12 and 13). A summary of metals concentrations significantly (one order of magnitude) above the Yard background levels follows.

Analyte	Background Range (concentrations in ppm)			Number of Facility-Wide Samples Significantly Above Background	Range of Samples Significantly Above Background (concentrations in ppm)		
Aluminum	3950N	-	4770	0		--	
Antimony	<1.6JN	-	2.4BN	0		--	
Arsenic	<0.68 W	-	<1.2	2	20 (S-17)	-	26 (S-22)
Barium	14BJ	-	32B	0		--	
Beryllium	<0.34	-	<0.36	0		--	
Cadmium	<0.73*	-	<1.1	0		--	
Calcium	1400	-	6850	0		--	
Chromium	7.5JN	-	13N*	0		--	
Cobalt	3.0B	-	3.2BJ	0		--	
Copper	7.8	-	12	3	140 (MW-34)	-	349 (S-22)
Iron	5610	-	11200	0		--	
Lead	3.5	-	8.8N*	7	120 N*(S-17)	-	1290S (MW-31)
Magnesium	1510	-	4260J	0		--	
Manganese	165*	-	224	0		--	
Mercury	<0.1	-	<0.11	0		--	
Nickel	4.7BJ	-	11	0		--	
Potassium	567B	-	861B	0		--	
Selenium	<0.56N	-	<0.59NW	0		--	
Silver	<0.51	-	<0.57	0		--	

Analyte	Background Range (concentrations in ppm)			Number of Facility-Wide Samples Significantly Above Background	Range of Samples Significantly Above Background (concentrations in ppm)
Sodium	88BJ	-	456B	0	--
Thallium	<0.62	-	<0.8	0	--
Vanadium	11B	-	13	0	--
Zinc	18J	-	22	0	--

B - Value >IDL but <CRDL.
N - Matrix spike outside of recovery limits.
< or U - Value <IDL.
* - Duplicate RPD out of control.
W - Post digest spike recovery out of range.
R - Declared unusable during data validation.
-- - Compound not detected, standard not listed.

Of the results shown above, concentrations of arsenic, copper, and lead were significantly (i.e., one order of magnitude) above the upper limit of the Yard background range.

Areas of Concern

Metals analyses were performed on samples from eight areas of concern, including Area 1. A summary of metals concentrations significantly (one order of magnitude) above the Yard background level follows.

Analyte	Background Range (concentrations in ppm)			Number of Area of Concern Samples Significantly Above Background	Range of Samples Significantly Above Background (concentrations in ppm)		
Aluminum	3950N	-	4770	0		--	
Antimony	<1.6JN	-	2.4BN	0		--	
Arsenic	<0.68 W	-	<1.2	0		--	
Barium	14BJ	-	32B	2	418 (S-61)	-	444* (S-43)
Beryllium	<0.34	-	<0.36	0		--	
Cadmium	<0.73*	-	<1.1	0		--	
Calcium	1400	-	6850	0		--	
Chromium	7.5JN	-	13N*	0		--	

Analyte	Background Range (concentrations in ppm)			Number of Area of Concern Samples Significantly Above Background	Range of Samples Significantly Above Background (concentrations in ppm)		
Cobalt	3.0B	-	3.2BJ	0		--	
Copper	7.8	-	12	2	279 (S-64)	-	377 (S-43)
Iron	5610	-	11200	0		--	
Lead	3.5	-	8.8N*	9	129S*N (S-47)	-	1080SN* (S-62)
Magnesium	1510	-	4260J	0		--	
Manganese	165*	-	224	0		--	
Mercury		<0.1		0		--	
Nickel	4.7BJ	-	11	0		--	
Potassium	567B	-	861B	0		--	
Selenium	<0.56N	-	<0.59NW	0		--	
Silver	<0.51	-	<0.57	0		--	
Sodium	88BJ	-	456B	0		--	
Thallium	<0.62	-	<0.8	0		--	
Vanadium	11B	-	13	0		--	
Zinc	18J	-	22	3	270 (S-90)	-	565 (S-43)

B - Value >IDL but <CRDL.
N - Matrix spike outside of recovery limits.
< or U - Value <IDL.
* - Duplicate RPD out of control.
W - Post digest spike recovery out of range.
R - Declared unusable during data validation.
-- - Compound not detected, standard not listed.

Metals concentrations were detected at concentrations significantly above Yard background levels in the following areas of concern: Area 1, Area-2 (Material Control Area); Area-4 (Fuel Tank Area); Area-6 (Drum Storage Area); and Area-16 (Underground Storage Tank Area). The metals detected significantly above Yard background levels were barium, copper, lead, and zinc.

4.1.2 Distribution of Contaminants

Volatile Organic Compounds - The two most prevalent VOCs detected in soil-quality samples facility-wide (outside of areas of concern), acetone and methylene chloride (Table 5), are both commonly introduced laboratory contaminants. If acetone and methylene chloride are excluded, VOCs were detected in only two facility-wide (outside of areas of concern) soil boring/well pilot boreholes. Carbon disulfide and toluene were detected in boring S-22 (0 to 2 feet) at concentrations of 7.7 μg/kg (0.0077 ppm) and 4.8 μg/kg (0.0048 ppm), respectively (Plate 7), and styrene was detected in pilot borehole MW-25 at 3.4 μg/kg (0.0034 ppm).

Fill within the following areas of concern (Plate 7), contain detectable concentrations of VOCs.

- A-2 (Material Control Area)
- A-4 (Fuel Oil Tank Area)
- A-6 (Drum Storage Area)
- A-8A (Transformer Area)
- A-12 (Car Washer Area)
- A-14 (Empty Drum Area)
- A-15 (Empty Drum Area including downgradient Monitoring Well MW-25)
- A-16 (Underground Storage Tank Area)

Only Areas A-2, A-6, A-14, A-15 and A-16 contained VOCs other than acetone and methylene chloride. Styrene was detected in the MW-25 pilot borehole (Plate 7). It is noted that, in accordance with the Work Plan, no samples collected from Area 1 were analyzed for VOCs.

During the course of the investigation, a UST was discovered in Area A-2, Material Control Area (Plate 7). The ethylbenzene and xylenes detected in boring S-41A may be attributable to the UST since both compounds were also detected in the UST contents. In addition, chloroform and xylenes were detected in boring S-43 (Plate 7). A further discussion of the UST is included in Section 4.1.4.

Semivolatile Compounds - The distribution of semivolatile compounds is shown in Plate 7. A number of the semivolatile compounds detected were phthalates, which were also detected in the laboratory blanks. Facility-wide (not including areas of concern), greatest concentrations of semivolatiles are found in MW-34 (0 to 2 feet), S-22 (0 to 2 feet) and S-17 (0 to 2 feet). Excluding phthalates, the facility-wide (not including areas of concern) distribution of semivolatile compounds is primarily confined to these three boreholes (Plate 7).

The following areas of concern have detectable concentrations of semivolatiles, excluding bis(2-ethylhexyl)phthalate or other phthalates detected in laboratory blanks.

- A-2 (Material Control Area)
- A-4 (Fuel Oil Tank Area)
- A-15 (Empty Drum Area)

Polychlorinated Biphenyls - PCBs were not detected in any soil samples collected at the Yard in excess of 10,000 $\mu g/kg$ (10.0 ppm), with the exception of 13,652 $\mu g/kg$ (13.652 ppm) detected at S-76 (Area 1) and 71,160 $\mu g/kg$ (71.16 ppm) detected at S-53 (Area 8A). This contamination is restricted to the 0 to 2 feet depth interval, as evidenced by the low concentration of PCBs (410 $\mu g/kg$) (0.41 ppm) detected in the underlying soils (3.5 to 5.5 feet) at soil boring S-53.

The distribution of PCBs in soils at the Yard, as shown in Plates 10 and 11, indicate that with the exception of Area 1 (Metro Shop Area), A-6 (Former Storage Area), 8A and 8B and 8C (Transformer Areas), A-13 (Former Storage Area), pilot borehole MW-31 and soil borings S-34 and S-78 (located adjacent to a temporary storage area for transformers), PCBs were detected at concentrations less than 1 ppm (1,000 $\mu g/kg$).

Petroleum Hydrocarbon Compounds - It is important to note that most PHC soil sampling locations were biased to known or suspected petroleum source areas (i.e., areas of concern) including facility-wide samples. Facility-wide sampling locations were biased, at times, toward stained areas at the request of the NYSDEC. In these instances, PHC results reflect soil quality at locations where surficial petroleum impacts (e.g. spillage, staining) are clearly evident.

The distribution of PHCs is shown in Plates 8 and 9. The distribution of PHCs across the Yard indicate the following.

- Concentrations of PHCs exceeding 100 mg/kg (ppm) were detected in the majority of soil samples collected at the Yard.

- Concentrations of PHCs exceeding 500 mg/kg (ppm) were primarily found in all areas of concern, with the exception of Area 5 (Transformer Area) and Area 12 (Car Wash Area). With the exception of Area 1, Area 2, Area 4 and a small portion of Area 9 and Area 16, elevated PHC concentrations (i.e., greater than 500 mg/kg) (ppm) are restricted to the 0 to 2 feet interval. Four of these five areas of concern contain underground petroleum storage tanks.

- Highest concentrations of PHCs were detected in Area 1 and Area 9 (Compressor Area).

4.1.3 Soil Gas Survey Results

The soil gas survey was conducted in an attempt to more accurately delineate the extent of the separate phase petroleum accumulation beneath Area 1 (Plate 6). The areal extent of the separate phase petroleum, as currently defined, is based upon apparent petroleum thicknesses measured in the monitoring wells on January 15, 1991 (Plate 3) and February 13, 1991 (Plate 4).

The results of the soil gas survey are inconclusive (Table 10). Most of the sampling locations were situated near or beyond the presumed extent of the petroleum accumulations to delineate its extent. However, most of these sampling locations were in areas of petroleum stained soil. As a result, VOCs were detected with the PID at most of these sampling locations. These elevated PID readings are likely the result of the petroleum stained soil, rather than the presence of a separate phase petroleum accumulations.

4.1.4 Evaluation of Potential Hydrocarbon Source Areas of Concern

Soil-quality data developed for the 16 areas of concern at the Yard were used to evaluate each area's potential as a source of petroleum and/or PCB contamination. A summary of PHC concentrations detected in soil is included in Table 8 and these concentrations are shown on Plate 8 (Area 1) and Plate 9 (facility-wide and remaining areas of concern). A discussion of each area follows.

Area 1 - The area in the vicinity of the Metro Shop and Engine House, referred to as Area 1, encompasses the largest accumulations of hydrocarbons in the Yard (Plate 8). The area contains the former underground fuel storage area, located immediately north of the Metro Shop that consisted of nine 10,000 gallon USTs that were used to store diesel fuel. Also, the diesel refueling area is located in Area 1. These USTs had been in use since the late 1930's, and were abandoned and filled with sand in 1984. The tanks were connected by a series of underground pipelines to the fuel transfer (refueling) area, located between tracks Pit 3 and Pit 4, to the east of the Engine House. At present, the Yard locomotives are fueled on track 1 from a tank truck.

The former USTs and the refueling area are believed to be the principal sources of the separate phase petroleum accumulations that are present north of the Metro Shop (Plate 8). These accumulations have apparently only had a minimal impact on ground water (see Section 4.2).

The range of PCB concentrations detected in soil, ground water and separate phase petroleum in this area are provided below.

Media	Range in Concentrations
soil (above water table)	ND - 13,652 μg/kg (13.652 ppm)
soil (below water table)	3,655 μg/kg (3.655 ppm)
ground water	ND - 8.9 μg/L (0.0089 ppm)
separate phase petroleum	3,600 μg/L (3.6 ppm) - 122,763 μg/L (122.763 ppm)

Area 2 - The Material Control Area or Receiving Area is located at the southwest end of the commissary building (Plate 9). The area is used as a temporary storage area for equipment and supplies delivered to the Yard.

A PID reading of 240 ppm was registered in the 2 to 4 feet interval of S-41 during drilling, and a strong gasoline odor was detected. Field reconnaissance revealed the presence of an UST in this area. Information received from Yard employees indicates that this was once a gasoline storage tank, and may have also been used to store solvents during a painting operation. Laboratory analysis of the contents of this tank revealed that it contains fuel-related hydrocarbons, solvents (2-butanone), and water. An additional boring, designated S-41A, was drilled, and laboratory analysis of soil from this boring detected the presence of acetone, although no 2-butanone was detected. The presence of the gasoline odor in soil near the UST coupled with the presence of a solvent in soil nearby suggests that the UST may have leaked. A Work Plan for the removal of the tank and further investigation to determine the extent of any contamination is currently being prepared. Removal of the UST would be performed as an additional IRM.

Area 3 - Area 3 contains a 22,000 gallon UST and gasoline pump located at the east end of the commissary building (Plate 9). This tank is used to fuel the utility vehicles used in the Yard.

Two soil borings were installed in this area and a monitoring well (MW-28) was installed approximately 30 feet north (downgradient) of the UST. S-45 was drilled in the trackbed of Track 1. S-46 was drilled immediately adjacent to the commissary building, just west of the UST.

PHC analytical results for soil in this area range from not detected (MW-28) to 1,278 mg/kg (ppm) (S-45, 0 to 2 feet). The elevated PHC concentration in the shallow soils collected at S-45 (located on the trackbed and hydraulically upgradient from the UST) may be due to discharges from locomotives or rail cars and unrelated to the UST.

The ground-water sample collected from MW-28 contained a PHC concentration of 13.1 mg/L (ppm). No gasoline-related organics (e.g., benzene, toluene, xylenes, naphthalene) were detected in ground water. No separate phase petroleum was present.

Based upon this information, it appears that the UST and gasoline pump have not impacted underlying soils or ground water.

Area 4 - A-4 is located at the east end of the boiler house, to the west of Honeywell Street (Plate 9). There is a 20,000 gallon UST located here, which supplies number 2 fuel oil to the facility boiler. This tank was installed approximately 30 years ago. This area was also observed to be used for temporary drum storage. An excavation opened by Yard personnel within Area 4 appeared to contain separate phase petroleum. However, leakage found in this particular excavation was the result of a leaking pipe, not the UST.

Three soil borings were drilled in this area. PHC concentrations in the 0 to 2 feet interval range from 2,996 mg/kg (ppm) in S-48 to 28,510 mg/kg (ppm) in S-47. Deeper sample results range from not detected in S-47 to 9,465 mg/kg (ppm) in S-49 (4 to 6 feet). The deeper PHC results suggest that this UST may have leaked. In addition, petroleum hydrocarbon staining was evident in surficial soils and ballast.

PCB concentrations in Area 4 soils were below 1,000 μg/kg (1.0 ppm).

Monitoring well MW-31 was installed approximately 30 feet north of the Fuel Oil Tank Area, immediately north of the site trash compactor and just south of the Inbound Motor track. However, as shown in Plate 5, MW-31 is not located directly downgradient of this UST. The PHC concentration was below the detection limit in the ground-water sample, no separate phase product was present and no organics were detected. These data may indicate that Area 4 has not impacted downgradient ground-water quality at this location. However, the location of this well precludes an assessment of ground-water quality directly downgradient of Area 4. It is noted, however, that the area immediately downgradient of Area 4 is inaccessible for drilling equipment.

Area 5 - Two soil borings were drilled in Transformer Area A-5, located to the north of track 1, underneath Honeywell Street (Plate 9). PHC concentrations in the 0 to 2 feet interval were low, ranging from 178 mg/kg (ppm) in S-51 to not detected in S-50. The deeper sample (12 to 14 feet) in S-51 contained a PHC concentration of 320 mg/kg (ppm). PCB concentrations were all below 500 μg/kg (0.5 ppm). Based upon this information, Area 5 does not appear to be a source of PHC or PCB contamination.

Area 6 - The Oil House (Drum Storage Area A-6) is located to the west of the Engine House (Plate 8). Formerly an enclosed structure, it is now an open air brick and concrete storage pad with a partially enclosed area on its east end. It was used as the receiving area and is currently used to temporarily store drummed petroleum products, spare parts and other substances used for locomotive and rail car service. Based upon information provided by AMTRAK, the Oil House basement was found to be flooded and to contain two empty drums, some debris and a thin film of oil floating on the water. As a result, the Oil House basement was decontaminated, abandoned, and capped with concrete in 1980 or 1981.

Soils immediately north of the Oil House appear heavily stained, while soils to the south appear to be relatively unstained. Five soil borings (S-61 through S-65) were drilled around the drum storage area. PHC results for the 0 to 2 feet interval range from 3,230 mg/kg (ppm) at S-64 to 13,690 mg/kg (ppm) at S-61.

PCB concentrations were below 1,000 μg/kg (1.0 ppm), with the exception of 1,489 μg/kg (1.489 ppm) PCBs detected at S-63, which is located adjacent to an old transformer stored here.

Downgradient monitoring well MW-11 does not contain separate phase product. Dissolved ground-water quality was not determined at this location.

Area 7 - The former trackside and drum storage area A-7 is located to the south of the Oil House and was formerly used to store empty drums. Four soil borings were drilled here. PHC results for the 0 to 2 feet interval were low, ranging from 118 mg/kg (ppm) at S-69 to 442 mg/kg (ppm) at S-68. Based upon these results, this area does not appear to be a source of petroleum hydrocarbon contamination. However, it is noted that geologic logs for S-66, S-68 and S-69 noted the presence of an oily sheen in saturated split-spoon samples (i.e., below the water table).

Areas 8A, 8B, and 8C - Beneath the Honeywell Street Bridge are Areas 8A, 8B and 8C, all former transformer locations (Plate 9). All three of these transformer areas are potential sources of contamination. Area 8A yielded a PCB concentration of 71,160 μg/kg (71.160 ppm) at soil boring S-53 (0 to 2 feet). The deeper samples collected at this location were all below 500 μg/kg (0.5 ppm). PCB concentrations in Areas 8B and 8C were below 2,000 μg/kg (2.0 ppm).

Elevated PHC concentrations (greater than 500 mg/kg) were detected in shallow soil samples collected from both Areas 8B and 8C. However, significantly lower PHC concentrations (i.e., less than 400 mg/kg) were detected in deeper samples.

Area 9 - The surficial soils immediately north of the compressor building (A-9) appeared heavily stained with hydrocarbons (Plate 9). Yard personnel state that the compressors have been leaking for some time, making them the probable source for this release.

Five soil borings were drilled in Area A-9. Three were to the north of the compressor building, and two were to the south, on top of the ridge of fill material that contains the LIRR main line. PHC results for the northside borings in the 0 to 2 feet interval range from 3,890 mg/kg (ppm) in S-56 to 162,860 mg/kg (ppm) in S-55. PHC concentrations decrease significantly with depth. The southside boring PHC results were low, ranging from not detected in S-59 to 360 mg/kg (ppm) in S-58.

One monitoring well, MW-27, was installed approximately 75 feet downgradient (north) of the compressor building, just south of track 36. The PHC concentration in the ground-water sample was 2.2 mg/L (ppm).

Area 10 - The surficial soils in the area around transformer Substation 44 (A-10) appear heavily stained. PHC concentrations for the two borings in this area in the 0 to 2 feet interval ranged from a low concentration of 226 mg/kg (ppm) in S-83 to an elevated concentration of 15,370 mg/kg (ppm) in S-84. PCB concentrations were below 100 μg/kg (0.1 ppm). No monitoring wells are located immediately downgradient of this area.

Area 11 - A-11 is located approximately 200 feet southeast of the Wheel Shop (Plate 9). At the time of this investigation it was being used as an empty drum storage area.

Four borings were drilled around this area and the surficial soils were observed to be moderately stained. This is reflected in PHC concentrations in soil in the 0 to 2 feet interval which range from 1,715 mg/kg (ppm) in S-72 to 3,745 mg/kg (ppm) in S-70. Deeper soil samples (6 to 8 feet) were all below 500 mg/kg (ppm) PHCs.

Monitoring Well MW-33 is located immediately downgradient of Area 11. Ground-water quality data developed for this well do not show the presence of any TCL organics. Based upon this information, Area 11 does not appear to be a source of ground-water contamination, although elevated petroleum hydrocarbon concentrations were detected in shallow soils at this location.

Area 12 - The Car Washer Area (A-12) is located in the south central portion of the Yard adjacent to the LIRR right-of-way. PHC data developed from soil borings S-93 (280 mg/kg [ppm]), S-94 (47 mg/kg [ppm]) and S-95 (494 mg/kg [ppm]) were all below 500 mg/kg (ppm). PCB concentrations were below 500 μg/kg (0.5 ppm).

No organics or PHCs were detected in ground water collected from Monitoring Well MW-26, which is located within Area 12. Based upon this information, Area 12 does not appear to be a source of petroleum or PCB contamination.

Area 13 - A-13 was a former storage area; it is now the location of a Consolidated Edison transformer substation (Plate 9). Three borings were drilled in and around this area.

PHC concentrations in the 0 to 2 feet interval in this area range from not detected in S-77 to 3,090 mg/kg (ppm) in S-75. PCB concentrations between 2,000 μg/kg (2.0 ppm) and 5,000 μg/kg (5.0 ppm) were detected at soil borings S-74 and S-75. No ground-water monitoring wells are located near Area 13.

Area 14 - Area 14 is a former drum storage area located in the northeast corner of the Yard, in the vicinity of R Tower. PHC concentrations in excess of 500 mg/kg (ppm) were detected in both soil samples collected in this area. No PCBs were detected. No monitoring wells are located immediately downgradient of this area.

Area 15 - Area 15 is also a former drum storage area located in the northeast corner of the Yard. Two soil borings (S-81 and S-82) were drilled in this area. Only the shallow (0 to 2 feet) soil sample collected from S-81 (3,480 mg/kg [ppm]) yielded a PHC concentration exceeding 500 mg/kg (ppm). PCB concentrations were less than 1,000 μg/kg (1.0 ppm). The ground-water sample in nearby Monitoring Well MW-25 detected PCB concentrations of 2.85 μg/L (0.00285 ppm).

Area 16 - A-16 is located at the eastern end of the Yard and formerly housed the Railway Express Agency (REA) (Plate 9). The buildings in this area are now abandoned, the several USTs which are located in this area were emptied in 1989.

Eight soil borings and one monitoring well were installed in this area. PHC results for soil samples in the interval just below the pavement range from 30 mg/kg (ppm) in S-87 (0.5 to 2.5 feet) to 690 mg/kg (ppm) in S-86 (0.5 to 2.5 feet). The highest concentration of PHCs in any sample in the area was S-91 (5 to 7 feet), 3,300 mg/kg (ppm). PCBs were detected in soil boring S-90 (1 to 3 feet), at a concentration of 151 μg/kg (0.151 ppm). Only low concentrations of two organics (2.3 μg/L [0.0023 ppm] of tetrachloroethene and 15 μg/L [0.015 ppm] of bis (2-ethylhexyl) phthalate) were detected in ground water collected from Monitoring Well MW-32, located in Area 16. Neither of these compounds are fuel-related.

Based upon the absence of petroleum hydrocarbon or PCB contamination in ground water, Area 16 does not appear to be a source of petroleum or PCB contamination in ground water. However, it is noted that MW-32 is located downgradient of only the eastern half of Area 16 (Plate 5). No monitoring wells are located immediately downgradient of the western half of Area 16.

Other Potential Areas of Concern - The area known as 68 Spur, located west of Area 13 and containing soil borings S-57 and S-60, appears to be a potential source of petroleum hydrocarbon contamination. Rail mounted track repair vehicles are stored, fueled and maintained here.

PHC concentrations in the 0 to 2 feet interval were 2,362 mg/kg (ppm) in S-57, and 4,456 mg/kg (ppm) in S-60. No monitoring wells are located immediately downgradient of this area.

A temporary transformer storage area was identified near the southwest corner of the Wheel House complex approximately 100 feet south of the Engine House. Stained soil samples were observed in areas around the transformers. Consequently, boring S-78 was relocated here and sampled for PHCs and PCBs. The PHC and PCB concentration in the 0 to 2 feet interval was 14,267 mg/kg (ppm) and 1,910 μg/kg (1.91 ppm) respectively. PCBs were not detected below two feet. The transformers have been removed from the Yard.

4.2 Ground-Water Quality

The Task II ground-water sampling program was designed to characterize ground-water quality across the entire Yard and to determine the impact of the separate phase petroleum on Area 1 ground-water quality. With the exception of MW-23, which is screened within the Upper Glacial aquifer, all shallow ground-water quality data represents ground-water quality in the shallow fill deposits.

Ground-water quality samples collected during January 1991 were analyzed for the following parameters.

- USEPA Target Compound List (TCL) Analysis
  - TCL VOCs plus 15 additional peak library search
  - TCL Semivolatiles plus 15 additional peak library search
  - TCL PCBs
  - TCL Pesticides
  - TCL Metals
- Total petroleum hydrocarbons

Separate phase petroleum samples were collected in Area 1 and were analyzed for the following parameters (Table 11).

- TCL PCBs
- Specific gravity
- Kinematic viscosity

Ground-water quality results were compared with the most stringent applicable NYS standards for the compounds detected with published data available. The ground water beneath the Yard is classified as Class GA, and the best usage of Class GA waters is as a source of potable water supply (New York State Codes, Rules and Regulations, Title 6, Chapter X, Part 703.5).

The ground-water standards were taken from a September 25, 1990 NYSDEC memorandum regarding the Division of Water Technical and Operational Guidance Series 1.1.1 (TOGS) Ambient Water Quality Standards and Guidance Values. This document includes all NYSDEC groundwater standards that result from the references in paragraph 703.5(a)(2) to the Subpart 5-1 maximum contaminant levels (MCLs) and Part 170 standards of the NYS Department of Health. The standards for the compounds detected are included on the water-quality data tables.

After the field investigation was completed and the Phase I RI Report was written, but not yet accepted, the NYSDEC provided Water Quality Regulations for Surface Waters and Groundwaters, 6 NYCRR Parts 700-705, Effective September 1, 1991, and Division of Water Technical and Operational Guidance Series (1.1.1) (TOGS) Ambient Water Quality Standards and Guidance Values dated November 15, 1991, and asked that these standards be used/referenced instead of the September 25, 1990 TOGS originally included in the Report.

At the request of the NYSDEC, Roux Associates has compared the most recent standards to the analytical results and standards previously referenced in the Report. Since no additional compounds of concern have been identified (i.e., all compounds previously referred to as being detected at concentrations below the applicable standards are still below the most recent standards) the Report will not be rewritten to incorporate the most recent standards. The standards applicable at the time when the investigation was performed and when the Report was written will remain in the Report. However, the most recent standards will be incorporated into all future investigations performed at the Yard.

VOCs (Table 12), semivolatiles (Table 13), PCBs (Table 14), PHCs (Table 15) and metals (Table 16) were all detected in water quality samples. There were no pesticides (Table 14) detected in any of the ground-water quality samples analyzed. Tentatively identified compounds (TICs) are provided in Appendix E.

4.2.1 Area 1 Shallow Ground-Water Quality

Ground-water quality samples were collected from shallow Monitoring Wells MW-1, MW-3, MW-9, MW-13, MW-19, and MW-21, which are located outside the extent of the separate phase petroleum, and MW-22, which is located just inside the separate phase petroleum accumulation. The small (0.5 inch) accumulation of petroleum in MW-22 was removed during well purging performed prior to sample collection.

There were no TCL VOCs (Table 12) detected in the shallow ground-water quality samples collected in Area 1, with the exception of 2.9 $\mu g/L$ (0.0029 ppm) tetrachloroethene and 2.0 $\mu g/L$ (0.002 ppm) trichloroethene detected at MW-19. Both of these concentrations are below their respective standards (Table 12).

TCL semivolatile compounds (Table 13) were detected in concentrations above the standard in Monitoring Well MW-13 (Plate 14) and consisted of 2-methyl naphthalene at a concentration of 66 $\mu g/L$ (0.066 ppm). All other TCL semivolatile compounds detected in the ground-water quality samples were at concentrations below their respective standards (Table 13).

In Area 1 the ground-water quality samples were analyzed for TCL VOCs and TCL semivolatiles plus 15 additional peak library searches for each of these analyses. The results of these library searches are presented in Appendix E as tentatively identified compounds (TICs). All but one of the estimated concentrations are below 100 parts per billion (ppb). The following TICs were detected in Area 1:

- Alkyl benzene
- Dimethyldihydro indene
- Dimethyl naphthalene
- Methyl dihydro indene
- Methyl naphthalene
- Tetramethyl benzene
- Trimethyl benzene
- Trimethyl naphthalene

In addition, a number of unknown compounds were detected, including hydrocarbons and alkanes.

PCB Arochlors 1254 and 1260 were detected in Area 1 ground water. PCBs were detected at concentrations above the standard of 0.1 μg/L (0.0001 ppm) (Table 14) in Monitoring Wells MW-13 and MW-22 at concentrations of 8.90 μg/L (0.0089 ppm) and 7.50 μg/L (0.0075 ppm), respectively (Plate 14). The detection of PCBs in the ground-water quality sample collected from MW-22 may be attributable to the collection of emulsified separate phase petroleum with the sample. There was approximately a one-half inch petroleum accumulation in the well casing prior to purging the well for sampling, and PCBs were detected in petroleum samples collected from other Area 1 wells.

Metals results (Table 16) indicate that iron, lead, manganese and sodium exceed the standards in most of the shallow monitoring wells sampled in Area 1. These results may reflect the fact that these ground-water samples were collected from the fill deposits. Iron and manganese concentrations may reflect natural ground-water conditions. In addition, barium concentrations exceeded the standards in Monitoring Wells MW-1, MW-9 and MW-13 and zinc exceeded the standard in MW-9.

PHC concentrations in samples collected from all seven of the monitoring wells listed range from not detected (MW-1, MW-9, MW-19) to 14.1 mg/L (ppm) in MW-13. There are no standards for this indicator analysis. The separate phase petroleum samples collected from Monitoring Wells MW-5, MW-7, MW-16, MW-17 and MW-20 (Plate 1) were analyzed for TCL PCBs, specific gravity and kinematic viscosity (Table 11). The PCB concentrations ranged from 3,600 μg/L (3.6 ppm) in MW-5 to 122,763 μg/L (122.763 ppm) in MW-16.

As discussed previously, the chemical quality of ground water immediately underlying the separate phase petroleum accumulation was not determined. However, the Area 1 ground-water quality results for monitoring wells along the perimeter of the separate phase petroleum accumulation indicate that, in general, with the exception of concentrations of PCBs detected in wells MW-13 and MW-22, the shallow ground water has not been impacted (above standards) by organic constituents. Above-standard concentrations of certain metals were detected, however.

4.2.2 Area 1 Deep Ground-Water Quality

Ground-water quality samples were collected from the deep monitoring well, MW-23. The TCL VOCs detected above the standards consisted of ethylbenzene at 8.8 μg/L (0.0088 ppm) and total xylenes at 18 μg/L (0.018 ppm).

Three TCL semivolatile compounds were detected. Bis (2-ethylhexyl) phthalate, 2-methylnaphthalene, and fluorene were detected in MW-23 at concentrations of 32 μg/L (0.032 ppm), 96 μg/L (0.096 ppm), and 9.4 μg/L (0.0094 ppm), respectively. Only one compound, 2-methylnaphthalene, was detected above the NYS guidance value.

Metals results (Table 16) indicate that iron, lead, manganese and sodium were detected at concentrations above the standards in the deep ground-water quality samples collected in Area 1.

4.2.3 Facility-Wide Shallow Ground-Water Quality

Ground-water quality samples were collected from the 11 facility-wide (excluding Area 1) shallow monitoring wells to characterize ground-water quality in the fill deposits underlying the Yard (Plate 15).

In general, ground water in the fill deposits has been minimally impacted. No TCL VOCs were detected in the facility-wide monitoring wells above respective standards. No TCL semivolatile compounds (Table 13) were detected in concentrations above their standards.

PCBs (Table 14) were detected in only one monitoring well (MW-25) facility-wide (Plate 15). The concentration, 2.85 μg/L (0.00285 ppm), was above the standard of 0.1 μg/L (0.0001 ppm). No known PCB source areas are nearby.

Facility wide PHC concentrations range from not detected in 14 monitoring wells to 15 mg/L in MW-33 (Table 15). There are no standards for this indicator analysis.

Metals results (Table 16) indicate that iron, lead, manganese and sodium were detected at concentrations above the standards in most of the facility-wide ground-water quality samples collected. In addition, chromium exceeded the standard in MW-25.

Based upon our review of the facility-wide ground-water quality data, the ground-water quality appears to have been only minimally affected by the separate phase petroleum accumulations in Area 1 and by the facility-wide Yard activities, including Area 2 through Area 16.

5.0 INTERIM REMEDIAL MEASURES

Roux Associates has developed interim remedial measures (IRMs) in conjunction with the RI Work Plan that are designed to recover and contain the separate phase petroleum hydrocarbons present above ground water in Area 1 of the Yard. The IRMs are based upon Roux Associates' review of site-specific hydrogeologic and contaminant information that was developed during a previous investigation (Geraghty & Miller, 1986), and upon information developed while conducting the RI field investigation.

The installation of the IRMs has proceeded in phases. The first phase, as proposed in the Work Plan, installed in early 1990 (system operation commenced on January 31, 1990), is designed to mitigate the flow of separate phase petroleum into the service pit located in the Metro Shop and recover petroleum in the general Metro Shop area. The proposed locations were modified based upon the actual field conditions that were encountered. Three petroleum recovery trenches were installed along the western end of the Metro Shop, one along the southern side and two along the northern side. The trenches are approximately 25, 35 and 40 feet in length. Each trench contains a recovery sump which consists of four-foot diameter perforated concrete rings installed to a depth of 6 feet below land surface (Plate 16). These sumps span the water table allowing separate phase petroleum to accumulate within them. Each sump is outfitted with a filter scavenger, product-only recovery pump which pumps the petroleum to two, 2,000-gallon capacity above-ground tanks for storage. Since February 1990 approximately 1500 gallons of petroleum has been recovered by this system, at an average rate of 25 gallons per week.

During performance of the Phase I RI field investigation, additional data was obtained regarding the extent of the separate phase petroleum accumulation. Based upon a review of this data and the performance of Phase I of the IRM, Roux Associates and AMTRAK decided to institute Phase II of the IRM in an attempt to recover additional separate phase petroleum. Phase II of the IRM is an addition to the IRM proposed in the Work Plan.

Phase II consisted of the installation of three product-only recovery wells in the area immediately to the northeast of the Engine House where the apparent separate phase petroleum thickness is greatest (Plate 16). These recovery wells were constructed of 4-inch diameter stainless steel well screens fitted with small diameter filter scavenger product-only recovery pumps to recover separate phase petroleum. The recovered petroleum is pumped through an underground conduit into one of the above-ground storage tanks. Small diameter recovery wells were chosen instead of large diameter sumps to avoid compromising the integrity of the many railroad tracks in the immediate area.

Phase III, also an addition to the Work Plan, is the proposed installation of a recovery trench to be located along the northern property boundary on LIRR property. Additional investigations indicate that off-site migration of the separate phase petroleum is not occurring at this time and therefore, implementation of the Phase III IRMs has been postponed. A recovery trench will be a remedial option considered as part of the FS.

6.0 SUMMARY OF FINDINGS AND CONCLUSIONS

The results of the Phase I RI for the Sunnyside Yard, Queens, New York indicate the following.

Drainage Pathways

- The Yard encompasses approximately 105 acres and lies in a basin-like area with ground elevations that range from approximately 10 to 25 feet below the surrounding land surface.

- The Yard topography is generally flat and slopes gently to the west.

- The Yard topography and drainage patterns are strongly influenced by the large number of railroad tracks running throughout the Yard.

- Surface runoff does not appear to be a contaminant migration pathway.

- The Yard is underlain by a storm sewer drainage system, consisting of two drainage subsystems that connect catch basins located throughout the Yard. The primary subsystem serves approximately 90 percent of the Yard. Storm water from the primary subsystem leaves the Yard to the north, approximately 360 feet west of Honeywell Street. The secondary drainage subsystem is located in the southwest corner of the Yard and services approximately 10 percent of the Yard. Storm water from the secondary subsystem exits the Yard to the south, approximately 360 feet west of the intersection of Skillman and Thompson Avenues.

- Area 1 discharges surface water and ground water into the primary storm sewer drainage system from the following identified sources;
  - storm water and surface runoff into 13 catch basins located throughout Area 1;
  - water from a oil/water separator located east of the Engine House that is connected to the former fuel transfer area;
  - storm water and/or ground water from service bays Pit 3 and Pit 4 located directly north of the Engine House; and
  - ground water from the service bay located in the Metro Shop.

  Along the northern boundary of Area 1, the storm sewer appears to be located below the water table. Surface runoff with petroleum hydrocarbon sheens has been observed flowing into the storm sewer during periods of precipitation.

Geology

- The regional subsurface geology consists of unconsolidated sand, silt, clay and gravel deposits (Upper Pleistocene deposits), which are covered by a thin veneer of recent and Holocene deposits.

- The Yard is a reclaimed marshland, and is underlain with a layer of fill material which ranges from 8 to 27 feet thick. In most cases, the boreholes did not reach the base of the fill unit.

- Underlying the fill in the northern portion of the Yard are coarse sand and gravel deposits with interbedded thin lenses of fine sand, silt and clay. Locally in the western and southwestern portions of the Yard, lower permeability, interbedded sand, silty clay and meadow mat with organic layers (marshland deposits) were encountered.

Hydrogeology

- Regionally, the saturated portion of the Upper Pleistocene deposits form the Upper Glacial aquifer of Long Island. This is an unconfined (water table) aquifer.

- The water table at the Yard lies within the fill material. In view of the considerable thickness of fill deposits at the Yard (up to 27 feet thick), almost all of the water table (shallow) monitoring wells screen the fill deposits. Only the deeper monitoring well (MW-23) is completely screened within the Upper Glacial aquifer.

- Shallow ground water (in the saturated fill deposits) flows generally toward the northwest beneath the Yard which is the same direction as regional ground-water flow in the Upper Glacial deposits.

- The average hydraulic gradient for the water table beneath the Yard is low, and is in the 1×10^{-3} feet/foot range.

- Hydraulic conductivities (permeability values) reflect the heterogeneous nature of the fill and are low to moderate, ranging from 0.48 feet per day (MW-18) to 59.83 feet per day (MW-27).

- Calculated average horizontal ground-water velocity in the fill deposits underlying the Yard is 0.41 feet per day.

Soil Quality

- Very low concentrations (less than 0.3 mg/kg) of VOCs were detected in shallow soil samples collected at the Yard. Acetone and methylene chloride were the predominant VOCs detected, however, both of these compounds are commonly introduced laboratory contaminants. If acetone and methylene chloride are excluded, VOC constituents were primarily detected in Areas A-2 (Material Control Area), A-4 (Fuel Oil Tank Area), A-6 (Drum Storage Area), A-8A (Transformer Area), A-12 (Car Washer Area), A-14 (Empty Drum Area), A-15 (Empty Drum Area), and A-16 (Underground Storage Tank Area).

- The distribution and concentrations of semivolatile compounds varies throughout the Yard. Semivolatile compounds detected included phthalates (common laboratory contaminants) and polynuclear aromatic hydrocarbons (PAHs) (e.g. naphthalene, anthracene, chrysene, fluoranthene, etc.) that are commonly associated with fill material containing cinders and/or asphaltic material (including treated railroad ties) such as the fill underlying the Yard.

Therefore, the random detections of these compounds (including the highest concentrations found in the 0 to 2 feet samples collected from MW-34, S-17, S-22, and S-43) probably results from the collection of those constituents associated with the fill material during the sampling, rather than from a release.

- Pesticide compounds were only detected in one soil boring sample (S-90).

- Petroleum hydrocarbon compound concentrations ranged from not detected (less than 10 mg/kg [ppm]) to 162,860 mg/kg (ppm). In general, concentrations in excess of 500 mg/kg were considered indicative of a potential petroleum hydrocarbon impact. Concentrations of PHCs exceeding 500 mg/kg (ppm) were primarily found in all areas of concern, with the exception of Area 5 (Transformer Area), Area 7 (Storage Area) and Area 12 (Car Washer Area). With the exception of Area 1, Area 2, Area 4 and a small portion of Area 9 and Area 16, PHC concentrations exceeding 500 mg/kg (ppm) are restricted to the shallow soils (0 to 2 feet interval).

- The only PCB compound detected in soil was Arochlor 1260. PCB concentrations across the entire Yard were generally less than 1,000 μg/kg (1 ppm). Only two samples exceeded 10 ppm.

- Of the 16 areas of concern previously identified at the Yard, soil-quality results indicate that only Area 5 (Transformer Area), Area 7 (Storage Area) and Area 12 (Car Washer Area) do not appear to be source areas for petroleum hydrocarbons (i.e., PHC concentrations are less than 500 ppm).

- Metals concentrations in fill samples detected significantly above site-specific background concentrations (i.e.,one order of magnitude above established Yard background levels) in areas of concern were barium, copper, lead, and zinc. In addition, arsenic, copper and lead were detected in facility wide borings at concentrations significantly above the site-specific background concentrations.

- Two additional potential areas of concern were identified during the field investigation. The first area, known as 68 Spur, is located west of Area 13 and appears to be a potential source area of petroleum hydrocarbons. Rail-mounted track repair vehicles are stored, fueled and maintained here. The second area is a temporary transformer storage area that was identified near the southwest corner of the Wheel House Complex approximately 100 feet south of the Engine House. Elevated PHC and PCB concentrations were detected in the 0 to 2 feet interval within this area.

Ground-Water Quality

- Ground-water quality data developed reflect ground-water quality conditions in the saturated fill deposits. Only the ground-water sample collected from Monitoring Well 23 represents ground-water quality in the underlying Upper Glacial Aquifer.

- Ground-water quality samples collected from the 11 facility-wide (excluding Area 1) shallow monitoring wells indicate:
  - no TCL VOCs or TCL semivolatiles were detected above standards;
  - only a limited number of semivolatile compounds were detected;
  - PCBs were detected in only one monitoring well (MW-25; 2.85 μg/L [0.00285 ppm); and
  - iron, lead, manganese and sodium were detected at concentrations above the standards in most of the facility-wide ground-water quality samples.

- Separate phase petroleum accumulations present in Area 1 extend northward from the Metro Shop to the northern property boundary. Apparent product thicknesses measured in monitoring wells within this area have exceeded 4 feet. PCB concentrations in separate phase petroleum samples collected ranged from 3,600 μg/kg (3.6 ppm) to 122,673 μg/kg (122.673 ppm).

- Despite the presence of the separate phase petroleum accumulations in Area 1, shallow ground water does not appear to be impacted by organic constituents. No TCL VOCs were detected above standards in shallow ground-water quality samples collected along the perimeter of the separate phase petroleum accumulation. In addition, low concentrations of only a limited number of TCL semivolatile compounds were also detected. PCBs, however, were detected in two perimeter monitoring wells.

- Iron, lead, manganese and sodium exceed standards in most of the shallow monitoring wells sampled in Area 1.

- Ground-water quality samples collected from the one deep (Upper Glacial aquifer) monitoring well (MW-23) detected ethylbenzene and total xylenes in concentrations of 8.8 μg/L (0.0088 ppm) and 18 μg/L (0.018 ppm), respectively. In addition, low concentrations of bis(2-ethylhexyl)phthalate and 2-methylnaphthalene were detected. Lead, iron, manganese and sodium were detected in concentrations above standards.

- Based upon the Area 1 and facility-wide ground-water quality data, Yard ground-water quality appears to have been only minimally affected by the separate phase petroleum accumulation in Area 1 and by the facility-wide Yard activities, including activities performed in Area 2 through Area 16.

<u>Interim Remedial Measures</u>

- Interim remedial measures (IRMs) performed to date to mitigate the separate phase petroleum hydrocarbons present above ground water in Area 1 of the Yard include:

  - installation of three oil recovery trenches along the western end of the Metro Shop, one along the side and two along the northern side. Since February 1990 (startup date), approximately 1500 gallons of petroleum has been recovered by this system, at an average rate of 25 gallons per week. These IRMs were designed to mitigate the flow of separate phase petroleum into the service pit located in the Metro Shop.

- the installation of three product-only recovery wells in the area immediately to the northeast of the Engine House where the apparent oil thickness is greatest.

7.0 PROPOSED PHASE II ADDITIONAL INVESTIGATION

The following proposals for the Phase II additional investigation are based upon Roux Associates, Inc.'s review of all environmental and hydrogeological information developed during the Phase I RI and the NYSDEC's requests for additional information.

Health-Based Risk Assessment

Roux Associates, Inc. recommends the performance of a health-based risk assessment to evaluate the potential risks, if any, associated with exposure to chemicals detected in soils underlying the Sunnyside Yard. This Risk Assessment will be based upon available site-specific data. As part of the risk assessment, an exposure assessment will be performed to identify potential receptors, define relevant exposure scenarios, conduct exposure pathway analyses and estimate potential intake, if all conditions of exposure are met. In addition, a risk characterization will be performed to assess the potential human health or environmental impacts associated with chemicals or other constituents in the soils underlying the Yard. The results of the Risk Assessment will be provided in the RI report.

Development of Preliminary Applicable, Relevant and Appropriate Requirements

As required by the NYSDEC, preliminary applicable, relevant and appropriate requirements (ARARs) will be developed as part of the RI report. Preliminary ARARs will include New York State ground-water classifications and quality standards (Part 703). Preliminary ARARs for soil and separate phase petroleum hydrocarbons will be TSCA, PCB spill cleanup policy, RCRA requirements outlined in 40 CFR Part 261 and 6NYCRR Parts 370-373.

The results of the development of the preliminary ARARs for the Sunnyside Yard will be provided in the RI report.

Areas of Concern

Area 1 - Supplemental work proposed for Area 1 includes:

- installation of three additional deep (Upper Glacial aquifer) monitoring wells to characterize ground-water quality in the deeper deposits underlying Area 1 and to determine the hydraulic relationship (e.g., degree of interconnection) between the Upper Glacial aquifer and the overlying shallow fill deposits;

- collection of water samples from the primary storm sewer drainage subsystem at six locations in Area 1; and

- completion of off-site delineation work as proposed in the March 14, 1989 Work Plan for the Remediation Investigation and Feasibility Study (Work Plan).

The installation of the three deeper monitoring wells in Area 1 is recommended to further define the extent of VOCs detected in the deeper deposits (i.e., VOCs were detected in MW-23), and to determine the hydraulic relationship between the shallow fill and the underlying Upper Glacial aquifer. The three additional deeper monitoring wells will be installed adjacent to existing monitoring wells to form well clusters. One deep monitoring well will be located upgradient of the separate phase petroleum accumulations at MW-2. Two downgradient monitoring wells are proposed to be installed adjacent to MW-9 and MW-19. The deeper monitoring wells, in addition to existing monitoring well MW-23, will be sampled and analyzed for TCL VOCs and PCBs. In addition, two rounds of water-level measurements will be collected from these wells to determine vertical gradients and deeper ground-water flow patterns in an effort to assess the hydraulic relationship between the shallow fill deposits and the Upper Glacial aquifer. Additional proposed soil and ground-water sampling locations and analyses for Area 1 are listed in Table 2 and shown in Plate 3 of the DUR (Appendix I).

Sewer sampling is proposed to determine if fluids flowing into the primary drainage subsystem located in Area 1 contain PCBs. Six water samples will be collected from the primary drainage subsystem located in Area 1. Specifically, samples will be collected from the following locations as shown in Plate 3 of the DUR (Appendix I):

- MH-6, the first manhole located downstream of the engine house (located on the west side of the engine house);

- MH-7 and MH-8, the two manholes leaving the Metro Shop (located on the north side of the Metro Shop); and

- MH-3, MH-4, and MH-5, three manhole locations situated along the drainage line that runs parallel with the northern property boundary.

All water samples collected from the sewer system will be analyzed for TCL PCBs.

Additional storm sewer sampling is also proposed for the facility-wide investigation. Facility-wide recommendations follow the discussion of the areas of concern.

Due to delays in receiving access approvals for performing the off-site delineation work this work was performed as part of a supplemental investigation as modified in a June 17, 1991 letter from Roux Associates to the NYSDEC. The field work was completed on October 16, 1991. The findings will be incorporated into the RI Report and, prior to that, an interim report will be submitted to the NYSDEC.

A hand boring soil sample (0 to 2 feet) will be collected from the turntable and analyzed for PCBs.

A sewer sediment sample will be collected from MH-3, MH-6, MH-7, and MH-8 and analyzed for PCBs.

<u>Area 2</u> - As an additional IRM, Roux Associates prepared a work plan to remove the UST located in Area 2 and to perform additional delineation work to further define soil and ground-water quality conditions. The Work Plan for the removal of the UST located at the Receiving Area (Area 2) is included as Appendix J. The field work was completed on November 6, 1991. The findings will be incorporated into the RI Report and, prior to that, an interim report will be submitted to the NYSDEC. Additional proposed soil and ground-water sampling locations and analyses for Area 2 are listed in Table 2 of the DUR (Appendix I).

<u>Area 4</u> - A 20,000 gallon UST is located in Area 4. In view of the elevated PHC concentrations detected in soils adjacent to the UST, Roux Associates recommends the installation of one shallow monitoring well adjacent to the UST within Area 4. Due to anticipated access problems, a downgradient monitoring well may not be feasible. The monitoring well installed in Area 4 will be sampled and the ground water analyzed for fuel related constituents (i.e., TCL VOCs and TCL semivolatiles) and PCBs. A borehole soil sample will be collected from 2 to 4 feet below land surface and analyzed for PCBs.

<u>Area 6</u> - A ground-water sample will be collected from MW-11 and analyzed for the TCL.

<u>Area 7</u> - Area A-7 (Storage Area) directly adjoins the southern edge of Area A-6. Soil borings performed in Area A-7 revealed the presence of an oily sheen in saturated samples (i.e., below the water table), although unsaturated soil samples (i.e., above the water table) did not contain elevated concentrations of PHCs. This information suggests that a potential upgradient source may be impacting ground water underlying Area 7. To evaluate this, a shallow monitoring well will be installed in the immediate vicinity of soil borings S-68 and S-69. The ground-water sample collected from this monitoring well will be analyzed for TCL VOCs, TCL semivolatiles and PCBs. This ground-water quality information will be used to evaluate upgradient ground-water quality conditions in this area. Additional proposed soil sampling location and analysis are listed in Table 2 of the DUR (Appendix I), however, the boring sample will be analyzed for the TCL.

<u>Areas 8A, 8B, and 8C</u> - PCB concentrations exceeding 1,000 μg/kg (1.0 ppm) were detected in surficial soils collected from all three of these former transformer areas. Elevated PCB concentrations were not detected at depth. To determine the approximate lateral extent of surficial PCB contamination, Roux Associates recommends the collection of nine additional soil samples at nine shallow soil boring locations along the perimeter of these areas. Due to anticipated access problems, exact locations of these soil samples will be determined in the field with the NYSDEC present. Each one of these surficial samples will be analyzed for TCL PCBs only.

<u>Area 9</u> - A shallow monitoring well will be installed downgradient of Area 9. A ground water sample will be collected and analyzed for PCBs, VOCs, and SVOCs. A hand boring sample (0 to 2 feet) will be collected from in front of the Compressor Building and analyzed for PCBs.

Additional proposed field work, soil and ground-water sampling locations, and analyses are listed in Table 2 of the DUR (Appendix I).

Area 10 - The proposed hand boring location shown in Table 2 of the DUR (Appendix I) will be moved from adjacent to S-83 to adjacent to S-84 and the soil sample collected will be analyzed for PCBs.

Area 11 - A shallow monitoring well will be installed as close as possible to S-78. A ground-water sample will be collected and analyzed for the TCL.

Area 12 - A ground-water sample will be collected from MW-26 and analyzed for PCBs and SVOCs.

Area 13 - The proposed soil boring sample listed in Table 2 of the DUR (Appendix I) will be analyzed for the TCL.

Area 15 - The detection of PCBs in the ground-water quality sample collected from MW-25 was unanticipated since Area 15, which, based on a review of previous data was anticipated to be located upgradient of this monitoring well, was not a suspected source area for PCBs. Therefore, Roux Associates recommends the resampling of MW-25 to confirm the presence of PCBs in ground water.

A shallow monitoring well will be installed downgradient of Area 15 and Area 14. A ground-water sample will be collected from this well and analyzed for the TCL. Two hand boring soil samples (0 to 2 feet) will be collected and analyzed for PCBs.

Additional proposed ground-water sampling locations and analyses for Area 15 are listed in Table 2 of the DUR (Appendix I).

Area 16 - This area of concern has been eliminated from the RI/FS.

Area 17 - A shallow monitoring well will be installed and a ground-water sample collected and analyzed for the TCL. Two hand boring soil samples (0 to 2 feet) will be collected and analyzed for the TCL.

An additional proposed soil sampling location and analysis for Area 17 is listed in Table 2 of the DUR (Appendix I).

Facility Wide

Roux Associates recommends the following additional work to be performed facility wide:

1. In addition to the collection of water samples from the stormwater drainage system located near Area 1, Roux Associates recommends the collection of two additional water samples, one each from the primary and secondary stormwater drainage subsystems at the manhole locations closest to the point at which the drainage systems exit the Yard. This will be performed to ensure that dissolved PCBs are not leaving the Yard through the stormwater system. One sample will be collected at MH-1, the manhole located south of Thompson Avenue at the point where the secondary stormwater drainage subsystem exits the site. An attempt will be made to collect the second water sample from MH-2, the manhole located immediately south of Northern Boulevard where the primary drainage subsystem exits the site (Plate 2). However, based on previous field reconnaissance efforts, this manhole may be inaccessible. If this is the case, an alternate location will be determined and approved by the NYSDEC. Water samples collected from these manholes will be analyzed for the TCL. A sewer sediment sample will also be collected at MH-2 to be analyzed for PCBs.

   Roux Associates also recommends the collection of one water sample from the spillway (origin of runoff is unknown) located west of the Car Washer Area (Area 12). This sample will be analyzed for the complete TCL, and the results will be used to identify substances or compounds being introduced into the primary stormwater drainage system from off-site sources presumably located along Skillman Avenue.

2. Two comprehensive water level measuring rounds are recommended, one prior to the Site walk and installation of any new monitoring wells, and one after installation.

3. An upgradient well cluster will be installed in the vicinity of S-30. Ground-water samples will be collected from these wells and analyzed for the complete TCL. The results will be used to identify substances or compounds being introduced into the ground-water from off-site sources.

4. A well cluster will be installed in the third building gap northeast of Area 3 (Plate 2) to insure a line of downgradient monitoring wells. Ground-water samples will be collected from these wells and analyzed for the complete TCL.

The results of additional delineation efforts will be submitted in the RI report.

Respectfully Submitted,

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8.0 REFERENCES

American Petroleum Institute. 1989. A Guide to the Assessment and Remediation of Underground Petroleum Releases, API Publication 1628, August 1989.

Bouwer, H. and R.C. Rice. 1976. A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells. Water Resources Research. vol 12. no 3. pp 423 - 428.

Buxton, Herbert T., Julian Soren, Alex Posner and Peter Shernoff. 1981. Reconnaissance of the Ground Water Resources of Kings and Queens Counties New York United States Geological Survey Open File Report 81-1186, 1981.

Dragun, J. and J. Barkack, 1989. Three Common Misconceptions Concerning the Fate and Cleanup of Petroleum Products in Soil and Groundwater. Petroleum Contaminated Soils, Volume 2, pp 149-155.

Duffield, G.M. and J.O. Rumbaugh, III. 1989. AQTESOLV. Geraghty & Miller, Inc. 134 pp.

Environ Corporation, 1987. Analysis of the Potential Hazards Posed by No. 2 Fuel Oil Contained in Underground Storage Tanks. Prepared for the Oil Heating Task Force, a Coalition of Fuel Oil Marketing Associates.

Franke, O.L., and Philip Cohen. 1972. Regional Rates of Ground-Water Movement on Long Island, New York: U.S. Geological Survey Professional Paper 800-C, p. C271-C277.

Freeze, R.A. and J.A. Cherry. 1979. Groundwater. Prentice Hall, New Jersey, 604 pp.

Geraghty & Miller, Inc. 1986. Results of the Hydrogeologic Investigation at the AMTRAK, Sunnyside, Queens New York Train Yard, June 1986.

Kostecki, P.T. and E.J. Calabrese, 1989. Petroleum Contaminated Soils, Volumes 1, 2 and 3. Lewis Publishers, Inc.

Kramer, W.H. and T.J. Hayes, 1987. Water Soluble Phase of Number 2 Fuel Oil: Results of a Laboratory Mixing Experiment. New Jersey Geological Survey Technical Memorandum 87-4.

McClymonds, N.E., and O.L. Franke. 1972. Water Transmitting Properties of Aquifers on Long Island, New York, United States Geological Survey Professional Paper 627-E, 1972.

New York State Department of Environmental Conservation. 1990. Division of Water Technical and Operational Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values (Originator: John Zambrano), September 1990.

Noonan, Robert T. 1989. National Railroad Passenger Corporation. Letter to Michael J. O'Toole, New York State Department of Environmental Conservation, in Response to NYSDEC Order on Consent Index No. W2-0081-87-06 November 22, 1989.

Quinn, J. 1990. Letter to Bhoj Roopnarine, Roux Associates, Inc., October 29, 1990.

Quinn, J. 1991a. Letter to Bhoj Roopnarine, Roux Associates, Inc., February 8, 1991.

Quinn, J. 1991b. Letter to Bhoj Roopnarine, Roux Associates, Inc., January 8, 1991.

Roux Associates, Inc. 1989. Work Plan for the Remedial Investigation and Feasibility Study, Sunnyside Yard, Queens, New York, March 14, 1989.

Shepherd, William D. 1983. Practical Geohydrological Aspects of Ground-Water Contamination. Proceedings of the Third National Symposium on Aquifer Restoration and Ground-Water Monitoring, pp. 365-372. May 1983.

Soren, Julian. 1978. Subsurface Geology and Paleography of Queens County, Long Island, New York, United States Geological Survey Water Resources Investigation 77-34, February 1978.

State of New York Official Compilation of Codes, Rules and Regulations, Title 6, Chapter 10, Article 2, Part 703, 5(a)(2) and (3), "Classes and Quality Standards for Groundwaters" (07/05/85).

State of New York Official Compilation of Codes, Rules and Regulations, Title 10, Chapter 1, Part 5, Drinking Water Supplies, Subpart 5-1, Public Water Supplies (11/20/88).

Testa, S.M. and D.L. Winegardner, 1991. Restoration of Petroleum Contaminated Aquifers. Lewis Publishers, Inc. 269 pp.

Thomey, N., D. Bratberg, and C. Kalise. 1989. A Comparison of Methods for Measuring Total Petroleum Hydrocarbon Compounds in Soil. Proceedings of the Petroleum Hydrocarbon and Organic Chemicals in Ground Water Conference, National Water Well Association, pp. 61-69.

Table 1. Summary of Construction Details for Monitoring Wells, Sunnyside Yard, Queens, New York.

Well Number	Date Installed	Screen Type	Depth of Well (ft below land surface)	Screened Interval (ft below land surface)	Interval Gravel Packed (ft below land surface)	Interval Sealed with Bentonite (ft below land surface)	Interval Sealed with Grout (ft below land surface)	Measuring Point Elevation (ft above mean sea level)
MW-13a	11/6/90	SS	12	2 - 12	1 - 14	0.5 - 1	0 - 0.5	17.20
MW-16	11/7/90	SS	12.5	2.5 - 12.5	2 - 14	1 - 2	0 - 1	20.76
MW-17	11/8/90	SS	12	2 - 12	1.3 - 13	0.5 - 1.3	0 - 0.5	20.69
MW-18	postponed							--
MW-19	12/20/90	SS	14	4 - 14	2 - 15	0.5 - 2	0 - 0.5	21.37
MW-20	12/11/90	SS	12.5	2.5 - 12.5	1.5 - 14	0.5 - 1.5	0 - 0.5	20.27
MW-21	12/6/90	SS	12	2 - 12	1 - 14	0.3 - 1	0 - 0.3	18.62
MW-22	10/20/90	SS	11	1 - 11	0.5 - 12	0 - 0.5	+0.5 - 0 b	17.59
MW-23	12/10/90	PVC	36.5	26.5 - 36.5	22 - 37.5	18 - 22 c	0 - 18	20.40
MW-24	11/28/90	PVC	24	14 - 24	11 - 27	4 - 11	0 - 4	37.06
MW-25	11/17/90	PVC	15.5	5.5 - 15.5	3.5 - 16.5	1.5 - 3.5	0 - 1.5	22.77
MW-26	12/5/90	PVC	21	11 - 21	8 - 22.5	1.5 - 8	0 - 1.5	30.67
MW-27	12/1/90	PVC	18	8 - 18	6 - 19	2 - 6	0 - 2	23.55
MW-28	11/9/90	PVC	16	6 - 16	4 - 17	2 - 4	0 - 2	19.39
MW-29	11/17/90	PVC	11	1 - 11	0.5 - 12	0 - 0.5	0 d	10.78
MW-30	11/30/90	PVC	14	4 - 14	2.5 - 16	1 - 2.5	0 - 1	18.10
MW-31	11/8/90	PVC	12.5	2.5 - 12.5	1.5 - 13	0.5 - 1.5	0 - 0.5	15.05
MW-32	10/4/90	PVC	12.6	2.6 - 12.6	1.5 - 17	0.5 - 1.5	0 - 0.5	27.03
MW-33	11/15/90	PVC	18	8 - 18	6 - 18.5	3 - 6	0 - 3	25.81
MW-34	11/29/90	PVC	17.3	7.3 - 17.3	5 - 19	1.5 - 5	0 - 1.5	31.20

NOTES: All well screens are 4-inch diameter, 20 slot. All riser casings are 4-inch diameter, schedule 40, flush joint PVC.

SS Stainless steel continuous slot.
PVC Polyvinyl chloride schedule 40.
a MW-13 replaced Geraghty & Miller Well No. 13 that had been destroyed.
b Flush mount curb box installed 0.5 ft. above grade.
c Bentonite and formation collapse.
d Cement grout around protective steel casing.

Table 2. Summary of Soil-Quality Sampling, Sunnyside Yard, Queens, New York.

Task Number and Sampling Location	Soil Boring/ Well Borehole Number	Sample Depth Interval (ft below land surface)	Analytes
Task II - Area 1	S-1	0-2	PHC, TCL-PCB
	S-1	2-3	PHC, TCL-PCB
	S-2	0-2	PHC, TCL-PCB, TCL-Pb
	S-3	0-2	PHC, TCL-PCB
	S-3	3-5	TCL-PCB
	S-4	0-2	PHC, TCL-PCB
	S-5	0-2	PHC, TCL-PCB
	S-7	0-2	PHC, TCL-PCB
	S-8	0-2	PHC, TCL-PCB
	S-9	0-2	PHC, TCL-PCB
	S-9	3-4.5	TCL-PCB
	S-10	0-2	PHC, TCL-PCB, TCL-Pb
	S-76	0-0.7	PHC, TCL-PCB
	MW-13	0-2	PHC, TCL-PCB
	MW-16	0-2	PHC, TCL-PCB
	MW-16	6-8	TOC
	MW-16	10-12	TCL-PCB
	MW-17	0-2	PHC, TCL-PCB
	MW-19	0-2	PHC, TCL-PCB, TCL-Pb
	MW-20	0-2	PHC, TCL-PCB, TCL-Pb
	MW-21	0-2	PHC, TCL-PCB, TCL-Pb
	MW-22	0-2	PHC, TCL-PCB
	MW-23	9-11	PHC
Task II - Facility Wide	S-16	0-2	PHC, TCL-PCB
	S-16	10-12	PHC
	S-17	0-2	PHC, TCL
	S-19	0-2	PHC
	S-19	9-11	PHC
	S-20	0-2	PHC
	S-21	0-2	PHC
	S-21	6-8	PHC
	S-22	0-2	PHC, TCL
	S-23	0-2	PHC
	S-23	8-10	PHC

Table 2. Summary of Soil-Quality Sampling, Sunnyside Yard, Queens, New York.

Task Number and Sampling Location	Soil Boring/ Well Borehole Number	Sample Depth Interval (ft below land surface)	Analytes
Task II - Facility Wide	S-24	0-2	PHC
	S-24	9-11	PHC
	S-25	0-2	PHC
	S-25	12-14	PHC
	S-25	19-21	PHC
	S-26	0-2	PHC, TCL-PCB, TCL-Pb
	S-26	4-6	PHC
	S-27	0.5-2.5	PHC
	S-28	0-2	PHC
	S-29	0-2	PHC
	S-30	0-2	PHC, TCL
	S-30	4-6	PHC
	S-31	0-2	PHC, TCL-PCB
	S-32	0-2	PHC, TCL-PCB, TCL-Pb
	S-33	0-2	PHC
	S-33	4-6	TCL
	S-34	0-2	PHC, TCL-PCB, TCL-Pb
	S-35	0-2	PHC
	S-35	8-10	TCL
	S-36	0-2	PHC, TCL-PCB, TCL-Pb
	S-36	6-8	PHC
	S-37	0-2	PHC
	S-37	4-6	TCL
	S-37	8-10	PHC
	S-37	14-16	PHC
	S-38	0-2	PHC
	S-38	2-4	TCL
	S-38	10-12	PHC
	S-38	12-14	PHC
	S-39	0-2	PHC
	S-39	2-4	TCL
	S-39	8-10	PHC
	S-40	0-2	PHC
	MW-24	0-2	PHC
	MW-24	15-17	PHC
	MW-25	0-2	PHC

Table 2. Summary of Soil-Quality Sampling, Sunnyside Yard, Queens, New York.

Task Number and Sampling Location	Soil Boring/ Well Borehole Number	Sample Depth Interval (ft below land surface)	Analytes
Task II - Facility Wide	MW-25	4-6	TCL
	MW-25	6-8	PHC
	MW-26	0-2	PHC
	MW-26	9-11	TCL
	MW-26	12-14	PHC
	MW-27	0-2	PHC
	MW-27	7-9	PHC
	MW-27	14-16	PHC
	MW-28	0-2	PHC
	MW-28	6-8	PHC
	MW-29	0-2	PHC
	MW-30	0-2	PHC, TCL-PCB
	MW-30	6-8	PHC
	MW-30	11-13	PHC
	MW-31	0-2	PHC, TCL-PCB, TCL-Pb
	MW-31	10-12	PHC
	MW-32	0-2	PHC
	MW-34	0-2	PHC, TCL
	MW-34	10-12	PHC
Task III - Areas of Concern			
Area A-2	S-41	0-2	PHC
	S-41	2-4	PHC
	S-41A	3.5-5.5	TCL
	S-42	0-2	PHC
	S-43	0-2	PHC, TCL
	S-44	0-2	PHC
	S-44	4-6	PHC
Area A-3	S-45	0-2	PHC
	S-45	2-4	PHC
	S-46	0-2	PHC
	S-46	7-9	PHC
Area A-4	S-47	0-2	PHC
	S-47	2-4	TCL
	S-47	7-9	PHC
	S-47	11-13	PHC

Table 2. Summary of Soil-Quality Sampling, Sunnyside Yard, Queens, New York.

Task Number and Sampling Location	Soil Boring/ Well Borehole Number	Sample Depth Interval (ft below land surface)	Analytes
Task III - Areas of Concern			
Area A-4	S-48	0-2	PHC
	S-48	2-4	PHC
	S-48	11-13	PHC
	S-49	0-2	PHC
	S-49	2-4	TCL
	S-49	4-6	PHC
	S-49	8-10	PHC
Area A-5	S-50	0-2	PHC, TCL-PCB
	S-51	0-2	PHC, TCL-PCB
	S-51	12-14	PHC
Area A-6	S-61	0-1.1	PHC
	S-61	5-7	TCL
	S-62	0-2	PHC, TCL
	S-63	0-2	PHC, TCL-PCB
	S-64	0-2	PHC
	S-64	2-3	TCL
	S-65	0-2	PHC
Area A-7	S-66	0-2	PHC
	S-66	3-5	TCL-PCB
	S-67	0-2	PHC, TCL-PCB
	S-68	0-2	PHC, TCL-PCB
	S-69	0-2	PHC
Area A-8	S-6	0-2	PHC, TCL-PCB
	S-6	8-9	PHC
	S-52	0-2	PHC, TCL-PCB
	S-52	10-12	PHC
	S-53	0-2	PHC, TCL-PCB
	S-53	3.5-5.5	TCL-PCB
	S-53	5-7	TCL
	S-53	8-10	PHC
Area A-9	S-54	0-2	PHC
	S-54	7-9	PHC
	S-55	0-2	PHC
	S-55	7-9	PHC
	S-56	0-2	PHC
	S-56	7-9	PHC

Table 2. Summary of Soil-Quality Sampling, Sunnyside Yard, Queens, New York.

Task Number and Sampling Location	Soil Boring/ Well Borehole Number	Sample Depth Interval (ft below land surface)	Analytes
Task III - Areas of Concern			
Area A-9	S-58	0-2	PHC
	S-59	0-2	PHC, TCL-PCB
Area A-10	S-83	0-2	PHC, TCL-PCB
	S-84	0-2	PHC, TCL-PCB
Area A-11	S-70	0-2	PHC
	S-70	6-8	PHC
	S-71	0-2	PHC
	S-71	6-8	PHC
	S-72	0-2	PHC
	S-72	6-8	PHC
	S-73	0-2	PHC
Area A-12	S-93	0-2	PHC
	S-93	18-20	PHC
	S-94	0-2	PHC
	S-94	2-3	TCL-PCB
	S-95	0-2	PHC
Area A-13	S-74	0-2	PHC, TCL-PCB
	S-74	6-8	PHC
	S-74	12-14	PHC
	S-75	0-2	PHC, TCL-PCB
	S-77	0-2	PHC, TCL-PCB
	S-77	13-15	PHC
Area A-14	S-79	0-2	PHC
	S-80	0-2	PHC
	S-80	2-4	TCL
Area A-15	S-81	0-2	PHC
	S-82	0-2	PHC, TCL
	S-82	6-8	PHC
Area A-16	S-85	1-3	PHC
	S-86	0.5-2.5	PHC
	S-87	0.5-2.5	PHC
	S-88	5-7	PHC
	S-89	1-3	PHC
	S-90	1-3	PHC, TCL
	S-91	5-7	PHC
	S-92	3-5	PHC

Table 2. Summary of Soil-Quality Sampling, Sunnyside Yard, Queens, New York.

Task Number and Sampling Location	Soil Boring/ Well Borehole Number	Sample Depth Interval (ft below land surface)	Analytes
Additional Areas	S-57	0-2	PHC
	S-60	0-2	PHC
	S-60	4-6	TCL
	S-78	0-2	PHC, TCL-PCB
	S-78	8-9	TCL-PCB

NOTES:

PHC - Total Petroleum Hydrocarbons.
TCL - Target Compound List, complete analysis consists of Volatile Organic Compounds, Semivolatile Organic Compounds, Pesticides, PCBs, and Metals.
TCL-PCB - TCL Polychlorinated Biphenyls.
TCL-Pb - TCL Lead.
TOC - Total Organic Carbon.

Table 3. Summary of Ground-Water Quality Sampling, Sunnyside Yard, Queens, New York.

Monitoring Well Number	PHC	TCL PCB	Complete TCL	TCL Pb	TCL PCB SG/KV
Area-1*					
MW-1	X	--	X	--	NA
MW-3	X	X	NA	NA	NA
MW-5	NA	NA	NA	NA	X
MW-7	NA	NA	NA	NA	X
MW-9	X	--	X	--	NA
MW-13	X	--	X	--	NA
MW-16	NA	NA	NA	NA	X
MW-17	NA	NA	NA	NA	X
MW-19	X	--	X	--	NA
MW-20	NA	NA	NA	NA	X
MW-21	X	X	NA	NA	NA
MW-22	X	X	NA	NA	NA
MW-23	X	--	X	--	NA
Facility Wide					
MW-24	X	X	NA	NA	NA
MW-25	X	--	X	--	NA
MW-26	X	--	X	--	NA
MW-27	X	X	NA	NA	NA
MW-28	X	--	X	--	NA
MW-29	X	--	X	--	NA
MW-30	X	X	NA	NA	NA
MW-31	X	X	NA	NA	NA
MW-32	X	--	X	--	NA
MW-33	X	--	X	--	NA
MW-34	X	X	NA	NA	NA

NOTES:

PHC - Total Petroleum Hydrocarbons.
PCB - Polychlorinated Biphenyls.
TCL - Target Compound List.
Complete TCL - Consists of Volatile Organic Compounds, Semi-Volatile Organic Compounds, Pesticides, PCBs, and Metals Analysis.
Pb - Lead.
PCB/SG/KV - Polychlorinated Biphenyls/Specific Gravity/Kinematic Viscosity. Analyses were performed only on separate phase petroleum samples collected in Area 1.
* - TCL samples in Area 1 included VOC and Semivolatile +15 additional peak library searches.
X - Analysis performed.
-- - Analysis included in Complete TCL.
NA - Not analyzed.

Table 4. Summary of Water-Level and Petroleum Product-Thickness Measurements, Sunnyside Yard, Queens, New York.

		December 22, 1989			
Well Designation	Measuring Point Elevation (ft above mean sea level)	Depth to Product (ft below measuring point)	Depth to Water (ft below measuring point)	Product Thickness (ft)	Ground-Water Elevation* (ft relative to mean sea level)
MW-1	22.20	--	6.50	--	15.70
MW-2	20.72	--	4.87	--	15.85
MW-3	20.61	--	5.11	--	15.50
MW-5	20.66	4.95	6.41	1.46	15.46
MW-7	20.50	5.03	6.97	1.94	15.13
MW-8**	21.60	NR	NR	NR	NR
MW-9	20.77	--	6.86	--	13.91
MW-10	19.44	--	4.33	--	15.11
MW-11	19.48	--	5.67	--	13.81
MW-12	17.81	--	3.50	--	14.31
MW-15	22.13	6.53	7.45	0.92	15.44

Table 4. Summary of Water-Level and Petroleum Product-Thickness Measurements, Sunnyside Yard, Queens, New York.

		April 12, 1990			
Well Designation	Measuring Point Elevation (ft above mean sea level)	Depth to Product (ft below measuring point)	Depth to Water (ft below measuring point)	Product Thickness (ft)	Ground-Water Elevation* (ft relative to mean sea level)
MW-1	22.20	--	6.26	--	15.94
MW-2	20.72	--	4.65	--	16.07
MW-3	20.61	--	4.87	--	15.74
MW-5	20.66	4.69	6.02	1.33	15.74
MW-7	20.50	4.59	8.20	3.61	15.29
MW-8**	21.60	NR	NR	NR	NR
MW-9	20.77	--	6.31	--	14.46
MW-10	19.44	--	4.03	--	15.41
MW-12	17.81	--	3.19	--	14.62
MW-15	22.13	6.31	7.92	1.61	15.54

Table 4. Summary of Water-Level and Petroleum Product-Thickness Measurements, Sunnyside Yard, Queens, New York.

		December 10, 1990			
Well Designation	Measuring Point Elevation (ft above mean sea level)	Depth to Product (ft below measuring point)	Depth to Water (ft below measuring point)	Product Thickness (ft)	Ground-Water Elevation* (ft relative to mean sea level)
MW-1	22.20	--	6.16	--	16.04
MW-3	20.61	--	4.84	--	15.77
MW-5	20.66	4.36	6.91	2.55	15.86
MW-7	20.50	4.51	8.82	4.32	15.25
MW-8**	21.60	6.12	11.41	5.29	14.56
MW-9	20.77	--	6.56	--	14.21
MW-10	19.44	--	4.09	--	15.35
MW-11	19.48	--	5.56	--	13.92
MW-12	17.81	--	4.19	--	13.62
MW-15	22.13	6.27	7.74	1.47	15.61

Table 4. Summary of Water-Level and Petroleum Product-Thickness Measurements, Sunnyside Yard, Queens, New York.

Well Designation	Measuring Point Elevation (ft above mean sea level)	January 15, 1991 Depth to Product (ft below measuring point)	Depth to Water (ft below measuring point)	Product Thickness (ft)	Ground-Water Elevation* (ft relative to mean sea level)
MW-1	22.20	--	5.96	--	16.24
MW-2	20.72	--	4.35	--	16.37
MW-3	20.61	--	4.59	--	16.02
MW-5	20.66	4.33	5.47	1.14	16.13
MW-7	20.50	4.31	8.72	4.41	15.43
MW-8**	21.60	6.00	10.97	4.97	14.74
MW-9	20.77	--	6.22	--	14.55
MW-10	19.44	--	3.83	--	15.61
MW-11	19.48	--	5.35	--	14.13
MW-12	17.81	--	4.09	--	13.72
MW-13	17.20	--	2.16	--	15.04
MW-15	22.13	6.03	7.87	1.84	15.78
MW-16	20.76	4.73	9.11	4.38	15.27
MW-17	20.69	4.59	7.58	2.99	15.58
MW-19	21.37	--	7.06	--	14.31
MW-20	20.27	4.46	4.71	0.25	15.77
MW-21	18.62	--	2.97	--	15.65
MW-22	17.59	1.53	1.72	0.19	16.03
MW-23	20.40	--	4.82	--	15.58
MW-24	37.06	--	17.85	--	19.21
MW-25	22.77	--	5.74	--	17.03
MW-26	30.67	--	13.23	--	17.44
MW-27	23.55	--	10.80	--	12.75
MW-28	19.39	--	7.66	--	11.73
MW-29	13.43	--	3.91	--	9.52
MW-30	18.10	--	7.43	--	10.67
MW-31	15.05	--	3.88	--	11.17
MW-32	27.03	--	3.64	--	23.39
MW-33	25.81	--	8.68	--	17.13
MW-34	31.20	--	14.59	--	16.61

Table 4. Summary of Water-Level and Petroleum Product-Thickness Measurements, Sunnyside Yard, Queens, New York.

		February 13, 1991			
Well Designation	Measuring Point Elevation (ft above mean sea level)	Depth to Product (ft below measuring point)	Depth to Water (ft below measuring point)	Product Thickness (ft)	Ground-Water Elevation* (ft relative to mean sea level)
MW-1	22.20	--	6.27	--	15.93
MW-2	20.72	--	4.62	--	16.10
MW-3	20.61	--	4.86	--	15.75
MW-5	20.66	4.55	6.74	2.19	15.73
MW-7	20.50	4.68	7.78	3.10	15.28
MW-8**	21.60	6.16	11.17	5.01	14.57
MW-9	20.77	--	6.89	--	13.88
MW-10	19.44	--	4.21	--	15.23
MW-11	19.48	--	5.76	--	13.72
MW-12	17.81	--	4.37	--	13.44
MW-13	17.20	NR	NR	NR	NR
MW-15	22.13	6.25	7.62	1.37	15.64
MW-16	20.76	4.86	8.90	4.04	15.20
MW-17	20.69	4.76	7.30	2.54	15.49
MW-19	21.37	--	7.42	--	13.95
MW-20	20.27	4.63	5.07	0.44	15.56
MW-21	18.62	NR	NR	NR	NR
MW-22	17.59	NR	NR	NR	NR
MW-23	20.40	--	5.06	--	15.34

-- No measurable product.
* Ground-water elevations corrected for presence of separate phase product. Correction for product assumes density of 0.827 (automotive diesel fuel at 15 degrees celsius, API, 1989).
** Measuring point for MW-8 is the top of the steel protective casing.
NR Not recorded.

NOTE: Wells MW-4, MW-6 and MW-14 were destroyed.

Table 5. Summary of Volatile Organic Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-17	S-22	S-30	S-33	S-35	S-37	S-38
Sample Depth (ft):	0-2	0-2	0-2	4-6	8-10	4-6	2-4
Sample Date:	10/19/90	10/17/90	10/16/90	12/13/90	11/30/90	12/1/90	11/29/90
Volatile Organic Compounds (Concentrations in ug/kg)							
Acetone	35	12 U	33	49	15	16	12 U
Benzene	7 U	6 U	6 U	5 U	6 U	5 U	6 U
Bromodichloromethane	7 U	6 U	6 U	5 U	6 U	5 U	6 U
Bromoform	7 U	6 U	6 U	5 U	6 U	5 U	6 U
Bromomethane	14 U	12 U	11 U	11 U	11 U	11 U	12 U
2-Butanone	14 U	12 U	11 U	11 U	11 U	11 U	12 U
Carbon Disulfide	7 U	7.7	6 U	5 U	6 U	5 U	6 U
Carbon Tetrachloride	7 U	6 U	6 U	5 U	6 U	5 U	6 U
Chlorobenzene	7 U	6 U	6 U	5 U	6 U	5 U	6 U
Chloroethane	14 U	12 U	11 U	11 U	11 U	11 U	12 U
2-Chloroethylvinylether	14 U	12 U	11 U	11 U	11 U	11 U	12 U
Chloroform	7 U	6 U	6 U	5 U	6 U	5 U	6 U
Chloromethane	14 U	12 U	11 U	11 U	11 U	11 U	12 U
Dibromochloromethane	7 U	6 U	6 U	5 U	6 U	5 U	6 U
1,3-Dichlorobenzene	7 U	6 U	6 U	5 U	6 U	5 U	6 U
1,2-Dichlorobenzene	7 U	6 U	6 U	5 U	6 U	5 U	6 U
1,4-Dichlorobenzene	7 U	6 U	6 U	5 U	6 U	5 U	6 U
1,2-Dichloroethane	7 U	6 U	6 U	5 U	6 U	5 U	6 U
1,1-Dichloroethane	7 U	6 U	6 U	5 U	6 U	5 U	6 U
1,1-Dichloroethene	7 U	6 U	6 U	5 U	6 U	5 U	6 U
1,2-Dichloroethene (total)	7 U	6 U	6 U	5 U	6 U	5 U	6 U
1,2-Dichloropropane	7 U	6 U	6 U	5 U	6 U	5 U	6 U
cis-1,3-Dichloropropene	7 U	6 U	6 U	5 U	6 U	5 U	6 U
Ethylbenzene	7 U	6 U	6 U	5 U	6 U	5 U	6 U
2-Hexanone	14 U	12 U	11 U	11 U	11 U	11 U	12 U
4-Methyl-2-Pentanone	14 U	12 U	11 U	11 U	11 U	11 U	12 U
Methylene Chloride	7 U	32	6 U	77	6 U	5 U	6 U
Styrene	7 U	6 U	6 U	5 U	6 U	5 U	6 U
1,1,2,2-Tetrachloroethane	7 U	6 U	6 U	5 U	6 U	5 U	6 U
Tetrachloroethene	7 U	6 U	6 U	5 U	6 U	5 U	6 U
Toluene	7 U	4.8 J	6 U	5 U	6 U	5 U	6 U
Trans-1,3-Dichloropropene	7 U	6 U	6 U	5 U	6 U	5 U	6 U
1,1,1-Trichloroethane	7 U	6 U	6 U	5 U	6 U	5 U	6 U
1,1,2-Trichloroethane	7 U	6 U	6 U	5 U	6 U	5 U	6 U
Trichloroethene	7 U	6 U	6 U	5 U	6 U	5 U	6 U
Trichlorofluoromethane	7 U	6 U	6 U	5 U	6 U	5 U	6 U
Vinyl Acetate	14 U	12 U	11 U	11 U	11 U	11 U	12 U
Vinyl Chloride	14 U	12 U	11 U	11 U	11 U	11 U	12 U
Xylenes (total)	7 U	6 U	6 U	5 U	6 U	5 U	6 U

Table 5. Summary of Volatile Organic Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-39	S-41A	S-43	S-47	S-49	S-53	S-60
Sample Depth (ft):	2-4	3.5-5.5	0-2	2-4	2-4	5-7	4-6
Sample Date:	11/29/90	11/7/90	11/5/90	10/19/90	10/19/90	11/18/90	12/12/90
Volatile Organic Compounds (Concentrations in ug/kg)							
Acetone	11 U	293	11 U	11 U	20	38	20
Benzene	5 U	29 U	6 U	5 U	5 U	5 U	5 U
Bromodichloromethane	5 U	29 U	6 U	5 U	5 U	5 U	5 U
Bromoform	5 U	29 U	6 U	5 U	5 U	5 U	5 U
Bromomethane	11 U	58 U	11 U	11 U	11 U	10 U	10 U
2-Butanone	11 U	58 U	11 U	11 U	11 U	10 U	10 U
Carbon Disulfide	5 U	29 U	6 U	5 U	5 U	5 U	5 U
Carbon Tetrachloride	5 U	29 U	6 U	5 U	5 U	5 U	5 U
Chlorobenzene	5 U	29 U	6 U	5 U	5 U	5 U	5 U
Chloroethane	11 U	58 U	11 U	11 U	11 U	10 U	10 U
2-Chloroethylvinylether	11 U	58 U	11 U	11 U	11 U	10 U	10 U
Chloroform	5 U	29 U	3.8 J	5 U	5 U	5 U	5 U
Chloromethane	11 U	58 U	11 U	11 U	11 U	10 U	10 U
Dibromochloromethane	5 U	29 U	6 U	5 U	5 U	5 U	5 U
1,3-Dichlorobenzene	5 U	29 U	6 U	5 U	5 U	5 U	5 U
1,2-Dichlorobenzene	5 U	29 U	6 U	5 U	5 U	5 U	5 U
1,4-Dichlorobenzene	5 U	29 U	6 U	5 U	5 U	5 U	5 U
1,2-Dichloroethane	5 U	29 U	6 U	5 U	5 U	5 U	5 U
1,1-Dichloroethane	5 U	29 U	6 U	5 U	5 U	5 U	5 U
1,1-Dichloroethene	5 U	29 U	6 U	5 U	5 U	5 U	5 U
1,2-Dichloroethene (total)	5 U	29 U	6 U	5 U	5 U	5 U	5 U
1,2-Dichloropropane	5 U	29 U	6 U	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene	5 U	29 U	6 U	5 U	5 U	5 U	5 U
Ethylbenzene	5 U	67	6 U	5 U	5 U	5 U	5 U
2-Hexanone	11 U	58 U	11 U	11 U	11 U	10 U	10 U
4-Methyl-2-Pentanone	11 U	58 U	11 U	11 U	11 U	10 U	10 U
Methylene Chloride	5 U	29 U	6 U	5 U	3.6 J	4.3 J	29
Styrene	5 U	29 U	6 U	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	5 U	29 U	6 U	5 U	5 U	5 U	5 U
Tetrachloroethene	5 U	29 U	6 U	5 U	5 U	5 U	5 U
Toluene	5 U	29 U	6 U	5 U	5 U	5 U	5 U
Trans-1,3-Dichloropropene	5 U	29 U	6 U	5 U	5 U	5 U	5 U
1,1,1-Trichloroethane	5 U	29 U	6 U	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane	5 U	29 U	6 U	5 U	5 U	5 U	5 U
Trichloroethene	5 U	29 U	6 U	5 U	5 U	5 U	5 U
Trichlorofluoromethane	5 U	29 U	6 U	5 U	5 U	5 U	5 U
Vinyl Acetate	11 U	58 U	11 U	11 U	11 U	10 U	10 U
Vinyl Chloride	11 U	58 U	11 U	11 U	11 U	10 U	10 U
Xylenes (total)	5 U	137	4.4 J	5 U	5 U	5 U	5 U

Table 5. Summary of Volatile Organic Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-61	S-62	S-64	S-80	S-80+	S-82	S-82+
Sample Depth (ft):	5-7	0-2	2-3	2-4	2-4	0-2	0-2
Sample Date:	10/24/90	10/24/90	10/18/90	10/3/90	10/3/90	10/16/90	10/16/90
Volatile Organic Compounds (Concentrations in ug/kg)							
Acetone	53	24	15	229	308	29	20
Benzene	6 U	6 U	6 U	10 U	10 U	6 U	6 U
Bromodichloromethane	6 U	6 U	6 U	10 U	10 U	6 U	6 U
Bromoform	6 U	6 U	6 U	10 U	10 U	6 U	6 U
Bromomethane	11 U	11 U	12 U	21 U	21 U	11 U	11 U
2-Butanone	11 U	11 U	12 U	21 U	21 U	11 U	11 U
Carbon Disulfide	10	11	6 U	19	17	7.1	4.4 J
Carbon Tetrachloride	6 U	6 U	6 U	10 U	10 U	6 U	6 U
Chlorobenzene	6 U	6 U	6 U	10 U	10 U	6 U	6 U
Chloroethane	11 U	11 U	12 U	21 U	21 U	11 U	11 U
2-Chloroethylvinylether	11 U	11 U	12 U	21 U	21 U	11 U	11 U
Chloroform	6 U	6 U	6 U	10 U	10 U	6 U	6 U
Chloromethane	11 U	11 U	12 U	21 U	21 U	11 U	11 U
Dibromochloromethane	6 U	6 U	6 U	10 U	10 U	6 U	6 U
1,3-Dichlorobenzene	6 U	6 U	6 U	10 U	10 U	6 U	6 U
1,2-Dichlorobenzene	6 U	6 U	6 U	10 U	10 U	6 U	6 U
1,4-Dichlorobenzene	6 U	6 U	6 U	10 U	10 U	6 U	6 U
1,2-Dichloroethane	6 U	6 U	6 U	10 U	10 U	6 U	6 U
1,1-Dichloroethane	6 U	6 U	6 U	10 U	10 U	6 U	6 U
1,1-Dichloroethene	6 U	6 U	6 U	10 U	10 U	6 U	6 U
1,2-Dichloroethene (total)	6 U	6 U	6 U	10 U	10 U	6 U	6 U
1,2-Dichloropropane	6 U	6 U	6 U	10 U	10 U	6 U	6 U
cis-1,3-Dichloropropene	6 U	6 U	6 U	10 U	10 U	6 U	6 U
Ethylbenzene	6 U	6 U	6 U	10 U	10 U	6 U	6 U
2-Hexanone	11 U	11 U	12 U	21 U	21 U	11 U	11 U
4-Methyl-2-Pentanone	11 U	11 U	12 U	21 U	21 U	11 U	11 U
Methylene Chloride	14	14	6 U	302	258	26	21
Styrene	6 U	6 U	6 U	10 U	10 U	6 U	6 U
1,1,2,2-Tetrachloroethane	6 U	6 U	6 U	10 U	10 U	6 U	6 U
Tetrachloroethene	6 U	6 U	6 U	10 U	10 U	6 U	6 U
Toluene	7.6	11	6 U	30 J	31	4.8 J	6 U
Trans-1,3-Dichloropropene	6 U	6 U	6 U	10 U	10 U	6 U	6 U
1,1,1-Trichloroethane	6 U	6 U	6 U	10 U	10 U	6 U	6 U
1,1,2-Trichloroethane	6 U	6 U	6 U	10 U	10 U	6 U	6 U
Trichloroethene	6 U	6 U	6 U	10 U	10 U	6 U	6 U
Trichlorofluoromethane	6 U	6 U	6 U	10 U	10 U	6 U	6 U
Vinyl Acetate	11 U	11 U	12 U	21 U	21 U	11 U	11 U
Vinyl Chloride	11 U	11 U	12 U	21 U	21 U	11 U	11 U
Xylenes (total)	6 U	6 U	6 U	10 U	10 U	6 U	6 U

Table 5. Summary of Volatile Organic Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-90	MW-25	MW-26	MW-34
Sample Depth (ft):	1-3	4-6	9-11	0-2
Sample Date:	10/1/90	11/17/90	12/5/90	11/29/90
Volatile Organic Compounds (Concentrations in ug/kg)				
Acetone	80	18	11	11 U
Benzene	5 U	5 U	5 U	5 U
Bromodichloromethane	5 U	5 U	5 U	5 U
Bromoform	5 U	5 U	5 U	5 U
Bromomethane	11 U	11 U	10 U	11 U
2-Butanone	11 U	11 U	10 U	11 U
Carbon Disulfide	5.1 J	5 U	5 U	5 U
Carbon Tetrachloride	5 U	5 U	5 U	5 U
Chlorobenzene	5 U	5 U	5 U	5 U
Chloroethane	11 U	11 U	10 U	11 U
2-Chloroethylvinylether	11 U	11 U	10 U	11 U
Chloroform	5 U	5 U	5 U	5 U
Chloromethane	11 U	11 U	10 U	11 U
Dibromochloromethane	5 U	5 U	5 U	5 U
1,3-Dichlorobenzene	5 U	5 U	5 U	5 U
1,2-Dichlorobenzene	5 U	5 U	5 U	5 U
1,4-Dichlorobenzene	5 U	5 U	5 U	5 U
1,2-Dichloroethane	5 U	5 U	5 U	5 U
1,1-Dichloroethane	5 U	5 U	5 U	5 U
1,1-Dichloroethene	5 U	5 U	5 U	5 U
1,2-Dichloroethene (total)	5 U	5 U	5 U	5 U
1,2-Dichloropropane	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene	5 U	5 U	5 U	5 U
Ethylbenzene	5 U	5 U	5 U	5 U
2-Hexanone	11 U	11 U	10 U	11 U
4-Methyl-2-Pentanone	11 U	11 U	10 U	11 U
Methylene Chloride	26	5 U	5 U	5 U
Styrene	5 U	3.4 J	5 U	5 U
1,1,2,2-Tetrachloroethane	5 U	5 U	5 U	5 U
Tetrachloroethene	5 U	5 U	5 U	5 U
Toluene	13 J	5 U	5 U	5 U
Trans-1,3-Dichloropropene	5 U	5 U	5 U	5 U
1,1,1-Trichloroethane	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane	5 U	5 U	5 U	5 U
Trichloroethene	5 U	5 U	5 U	5 U
Trichlorofluoromethane	5 U	5 U	5 U	5 U
Vinyl Acetate	11 U	11 U	10 U	11 U
Vinyl Chloride	11 U	11 U	10 U	11 U
Xylenes (total)	5 U	5 U	5 U	5 U

B - Detected in laboratory blank.
U - Below reported quantitation level.
J - Estimated level.
NA - Not analyzed.
\+ - Reanalyzed.
ug/kg - Micrograms per kilogram.

Table 6. Summary of Semivolatile Organic Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-17	S-17+	S-22	S-22+	S-30	S-33	S-35
Sample Depth (ft):	0-2	0-2	0-2	0-2	0-2	4-6	8-10
Sample Date:	10/19/90	10/19/90	10/17/90	10/17/90	10/16/90	12/13/90	11/30/90
Semi-Volatile Organic Compounds (Concentrations in ug/kg)							
Acenaphthene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Acenaphthylene	480 U	2390 U	337 J	2010 U	370 U	355 U	380 U
Anthracene	480 U	2390 U	307 J	2010 U	370 U	355 U	380 U
Benzidine	870 U	4350 U	730 U	3660 U	670 U	645 U	690 U
Benzo (a) Anthracene	480 U	2390 U	404 JV	2010 U	370 U	355 U	380 U
Benzo (a) Pyrene	480 U	2390 U	699 JV	2010 U	370 U	355 U	380 U
Benzo (b+k) fluoranthenes	416 J	2390 U	2427 JV	5617 JV	370 U	355 U	380 U
Benzo (g,h,i) Perylene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Benzoic Acid	2320 U	11600 U	1950 U	9760 U	1780 U	1720 U	1840 U
Benzyl Alcohol	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
4-Bromophenyl-phenylether	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Butylbenzyl phthalate	480 U	2390 U	234 J	2010 U	370 U	355 U	380 U
4-Chloro-3-Methylphenol	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
4-Chloroaniline	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Bis (2-Chloroethoxy) Methane	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Bis (2-Chloroethyl) Ether	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Bis (2-Chloroisopropyl) Ether	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
2-Chloronaphthalene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
2-Chlorophenol	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
4-Chlorophenyl-phenylether	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Chrysene	342 J	2390 U	913 JV	2010 U	370 U	355 U	380 U
Di-n-Butylphthalate	462 J	2390 U	898 JV	2010 U	555	355 U	380 U
Di-n-Octyl Phthalate	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Dibenzo (a,h) Anthracene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Dibenzofuran	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
1,2-Dichlorobenzene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
1,3-Dichlorobenzene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
1,4-Dichlorobenzene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
3,3'-Dichlorobenzidine	960 U	4780 U	805 U	4020 U	730 U	710 U	760 U
2,4-Dichlorophenol	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Diethylphthalate	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Dimethyl Phthalate	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
2,4-Dimethylphenol	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
4,6-Dinitro-2-Methylphenol	2320 U	11600 U	1950 U	9760 U	1780 U	1720 U	1840 U
2,4-Dinitrophenol	2320 U	11600 U	1950 U	9760 U	1780 U	1720 U	1840 U
2,4-Dinitrotoluene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
2,6-Dinitrotoluene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Bis (2-Ethylhexyl) Phthalate	810 JV	1340 J	1048 JV	1500 BJ	407	355 U	203 BJ
Fluoranthene	628 JV	2390 U	1878 JV	2585 JV	370 U	355 U	380 U
Fluorene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Hexachlorobenzene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Hexachlorobutadiene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Hexachlorocyclopentadiene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Hexachloroethane	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Indeno (1,2,3-cd) pyrene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Isophorone	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
2-Methylnaphthalene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
4-Methylphenol	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
2-Methylphenol	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
N-Nitroso-Di-n-Propylamine	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
N-Nitrosodimethylamine	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
N-Nitrosodiphenylamine (1)	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Naphthalene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
2-Nitroaniline	2320 U	11600 U	1950 U	9760 U	1780 U	1720 U	1840 U
4-Nitroaniline	2320 U	11600 U	1950 U	9760 U	1780 U	1720 U	1840 U
3-Nitroaniline	2320 U	11600 U	1950 U	9760 U	1780 U	1720 U	1840 U
Nitrobenzene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
4-Nitrophenol	2320 U	11600 U	1950 U	9760 U	1780 U	1720 U	1840 U
2-Nitrophenol	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Pentachlorophenol	2320 U	11600 U	1950 U	9760 U	1780 U	1720 U	1840 U
Phenanthrene	480 U	2390 U	406 JV	2010 U	370 U	355 U	380 U
Phenol	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
Pyrene	329 J	2390 U	1011 JV	1270 J	370 U	355 U	380 U
1,2,4-Trichlorobenzene	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U
2,4,5-Trichlorophenol	2320 U	11600 U	1950 U	9760 U	1780 U	1720 U	1840 U
2,4,6-Trichlorophenol	480 U	2390 U	400 U	2010 U	370 U	355 U	380 U

Table 6. Summary of Semivolatile Organic Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation: Sample Depth (ft): Sample Date:	S-37 4-6 12/1/90	S-38 2-4 11/29/90	S-39 2-4 11/29/90	S-41A 3.5-5.5 11/7/90	S-43 0-2 11/5/90	S-47 2-4 10/19/90	S-47+ 2-4 10/19/90
Semi-Volatile Organic Compounds (Concentrations in ug/kg)							
Acenaphthene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Acenaphthylene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Anthracene	350 U	390 U	350 U	3840 U	1966 J	355 U	3550 U
Benzidine	640 U	705 U	630 U	6980 U	6749 U	645 U	6450 U
Benzo (a) Anthracene	350 U	390 U	350 U	3840 U	12600	355 U	3550 U
Benzo (a) Pyrene	350 U	390 U	350 U	3840 U	5760	355 U	3550 U
Benzo (b+k) fluoranthenes	350 U	390 U	350 U	3840 U	7400	257 J	3550 U
Benzo (g,h,i) Perylene	350 U	390 U	350 U	3840 U	5800	355 U	3550 U
Benzoic Acid	1700 U	1880 U	1680 U	18600 U	18000 U	1720 U	17200 U
Benzyl Alcohol	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
4-Bromophenyl-phenylether	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Butylbenzyl phthalate	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
4-Chloro-3-Methylphenol	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
4-Chloroaniline	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Bis (2-Chloroethoxy) Methane	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Bis (2-Chloroethyl) Ether	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Bis (2-Chloroisopropyl) Ether	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
2-Chloronaphthalene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
2-Chlorophenol	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
4-Chlorophenyl-phenylether	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Chrysene	350 U	390 U	350 U	3840 U	10100	355 U	3550 U
Di-n-Butylphthalate	350 U	390 U	350 U	3840 U	3710 U	263 J	3550 U
Di-n-Octyl Phthalate	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Dibenzo (a,h) Anthracene	350 U	390 U	350 U	3840 U	2090 J	355 U	3550 U
Dibenzofuran	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
1,2-Dichlorobenzene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
1,3-Dichlorobenzene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
1,4-Dichlorobenzene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
3,3'-Dichlorobenzidine	700 U	780 U	695 U	7670 U	7420 U	710 U	7100 U
2,4-Dichlorophenol	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Diethylphthalate	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Dimethyl Phthalate	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
2,4-Dimethylphenol	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
4,6-Dinitro-2-Methylphenol	1700 U	1880 U	1680 U	18600 U	18000 U	1720 U	17200 U
2,4-Dinitrophenol	1700 U	1880 U	1680 U	18600 U	18000 U	1720 U	17200 U
2,4-Dinitrotoluene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
2,6-Dinitrotoluene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Bis (2-Ethylhexyl) Phthalate	217 BJ	390 U	197 BJ	3840 U	3710 U	284 J	3550 U
Fluoranthene	350 U	390 U	350 U	3840 U	19700	394 JV	3550 U
Fluorene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Hexachlorobenzene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Hexachlorobutadiene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Hexachlorocyclopentadiene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Hexachloroethane	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Indeno (1,2,3-cd) pyrene	350 U	390 U	350 U	3840 U	4640	355 U	3550 U
Isophorone	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
2-Methylnaphthalene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
4-Methylphenol	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
2-Methylphenol	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
N-Nitroso-Di-n-Propylamine	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
N-Nitrosodimethylamine	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
N-Nitrosodiphenylamine (1)	350 U	390 U	350 U	3840 U	3710 UV	355 U	3550 U
Naphthalene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
2-Nitroaniline	1700 U	1880 U	1680 U	18600 U	18000 U	1720 U	17200 U
4-Nitroaniline	1700 U	1880 U	1680 U	18600 U	18000 U	1720 U	17200 U
3-Nitroaniline	1700 U	1880 U	1680 U	18600 U	18000 U	1720 U	17200 U
Nitrobenzene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
4-Nitrophenol	1700 U	1880 U	1680 U	18600 U	18000 U	1720 U	17200 U
2-Nitrophenol	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Pentachlorophenol	1700 U	1880 U	1680 U	18600 U	18000 U	1720 U	17200 U
Phenanthrene	350 U	390 U	350 U	3840 U	11900	271 J	3550 U
Phenol	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
Pyrene	350 U	390 U	350 U	3840 U	16500	296 J	3550 U
1,2,4-Trichlorobenzene	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U
2,4,5-Trichlorophenol	1700 U	1880 U	1680 U	18600 U	18000 U	1720 U	17200 U
2,4,6-Trichlorophenol	350 U	390 U	350 U	3840 U	3710 U	355 U	3550 U

Table 6. Summary of Semivolatile Organic Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-49	S-49+	S-53	S-60	S-61	S-62	S-64
Sample Depth (ft):	2-4	2-4	5-7	4-6	5-7	0-2	2-3
Sample Date:	10/19/90	10/19/90	11/18/90	12/12/90	10/24/90	10/24/90	10/18/90
Semi-Volatile Organic Compounds (Concentrations in ug/kg)							
Acenaphthene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Acenaphthylene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Anthracene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Benzidine	640 U	640 U	625 U	620 U	6829 U	6670 U	7140 U
Benzo (a) Anthracene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Benzo (a) Pyrene	415 JV	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Benzo (b+k) fluoranthenes	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Benzo (g,h,i) Perylene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Benzoic Acid	1700 U	17000 U	1670 U	1650 U	18200 U	17800 U	19000 U
Benzyl Alcohol	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
4-Bromophenyl-phenylether	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Butylbenzyl phthalate	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
4-Chloro-3-Methylphenol	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
4-Chloroaniline	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Bis (2-Chloroethoxy) Methane	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Bis (2-Chloroethyl) Ether	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Bis (2-Chloroisopropyl) Ether	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
2-Chloronaphthalene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
2-Chlorophenol	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
4-Chlorophenyl-phenylether	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Chrysene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Di-n-Butylphthalate	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Di-n-Octyl Phthalate	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Dibenzo (a,h) Anthracene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Dibenzofuran	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
1,2-Dichlorobenzene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
1,3-Dichlorobenzene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
1,4-Dichlorobenzene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
3,3'-Dichlorobenzidine	700 U	7020 U	690 U	680 U	6500 U	7330 U	7860 U
2,4-Dichlorophenol	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Diethylphthalate	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Dimethyl Phthalate	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
2,4-Dimethylphenol	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
4,6-Dinitro-2-Methylphenol	1700 U	17000 U	1670 U	1650 U	18200 U	17800 U	19000 U
2,4-Dinitrophenol	1700 U	17000 U	1670 U	1650 U	18200 U	17800 U	19000 U
2,4-Dinitrotoluene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
2,6-Dinitrotoluene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Bis (2-Ethylhexyl) Phthalate	485 JV	3510 U	461 B	340 U	3750 U	3670 U	3930 U
Fluoranthene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Fluorene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Hexachlorobenzene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Hexachlorobutadiene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Hexachlorocyclopentadiene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Hexachloroethane	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Indeno (1,2,3-cd) pyrene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Isophorone	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
2-Methylnaphthalene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
4-Methylphenol	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
2-Methylphenol	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
N-Nitroso-Di-n-Propylamine	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
N-Nitrosodimethylamine	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
N-Nitrosodiphenylamine (1)	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Naphthalene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
2-Nitroaniline	1700 U	17000 U	1670 U	1650 U	18200 U	17800 U	19000 U
4-Nitroaniline	1700 U	17000 U	1670 U	1650 U	18200 U	17800 U	19000 U
3-Nitroaniline	1700 U	17000 U	1670 U	1650 U	18200 U	17800 U	19000 U
Nitrobenzene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
4-Nitrophenol	1700 U	17000 U	1670 U	1650 U	18200 U	17800 U	19000 U
2-Nitrophenol	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Pentachlorophenol	1700 U	17000 U	1670 U	1650 U	18200 U	17800 U	19000 U
Phenanthrene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Phenol	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
Pyrene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
1,2,4-Trichlorobenzene	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U
2,4,5-Trichlorophenol	1700 U	17000 U	1670 U	1650 U	18200 U	17800 U	19000 U
2,4,6-Trichlorophenol	350 U	3510 U	340 U	340 U	3750 U	3670 U	3930 U

Table 6. Summary of Semivolatile Organic Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-80	S-82	S-90	MW-25	MW-26	MW-26+	MW-34
Sample Depth (ft):	2-4	0-2	1-3	4-6	9-11	9-11	0-2
Sample Date:	10/3/90	10/16/90	10/1/90	11/17/90	12/5/90	12/5/90	11/29/90
Semi-Volatile Organic Compounds (Concentrations in ug/kg)							
Acenaphthene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Acenaphthylene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Anthracene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Benzidine	3130 U	3330 U	3230 UJV	650 U	625 UR	625 UR	645 U
Benzo (a) Anthracene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	441
Benzo (a) Pyrene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	292 J
Benzo (b+k) fluoranthenes	1720 U	1233 J	1770 UJV	360 U	340 UR	340 UR	1000
Benzo (g,h,i) Perylene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	272 J
Benzoic Acid	8330 U	8890 U	8600 UJV	1740 U	1670 UR	1670 UR	1720 U
Benzyl Alcohol	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
4-Bromophenyl-phenylether	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Butylbenzyl phthalate	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
4-Chloro-3-Methylphenol	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
4-Chloroaniline	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Bis (2-Chloroethoxy) Methane	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Bis (2-Chloroethyl) Ether	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Bis (2-Chloroisopropyl) Ether	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
2-Chloronaphthalene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
2-Chlorophenol	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
4-Chlorophenyl-phenylether	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Chrysene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	538
Di-n-Butylphthalate	875 BJ	1830 U	1770 UJV	360 U	340 UR	340 UR	198 J
Di-n-Octyl Phthalate	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Dibenzo (a,h) Anthracene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Dibenzofuran	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
1,2-Dichlorobenzene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
1,3-Dichlorobenzene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
1,4-Dichlorobenzene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
3,3'-Dichlorobenzidine	3440 U	3670 U	3550 UJV	720 U	690 UR	690 UR	710 U
2,4-Dichlorophenol	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Diethylphthalate	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Dimethyl Phthalate	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
2,4-Dimethylphenol	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
4,6-Dinitro-2-Methylphenol	8330 U	8890 U	8600 UJV	1740 U	1670 UR	1670 UR	1720 U
2,4-Dinitrophenol	8330 U	8890 U	8600 UJV	1740 U	1670 UR	1670 UR	1720 U
2,4-Dinitrotoluene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
2,6-Dinitrotoluene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Bis (2-Ethylhexyl) Phthalate	1720 U	1830 U	1770 UJV	680 B	306 BJR	829 BR	404 B
Fluoranthene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	716
Fluorene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Hexachlorobenzene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Hexachlorobutadiene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Hexachlorocyclopentadiene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Hexachloroethane	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Indeno (1,2,3-cd) pyrene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	227 J
Isophorone	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
2-Methylnaphthalene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
4-Methylphenol	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
2-Methylphenol	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
N-Nitroso-Di-n-Propylamine	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
N-Nitrosodimethylamine	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
N-Nitrosodiphenylamine (1)	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Naphthalene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
2-Nitroaniline	8330 U	8890 U	8600 UJV	1740 U	1670 UR	1670 UR	1720 U
4-Nitroaniline	8330 U	8890 U	8600 UJV	1740 U	1670 UR	1670 UR	1720 U
3-Nitroaniline	8330 U	8890 U	8600 UJV	1740 U	1670 UR	1670 UR	1720 U
Nitrobenzene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
4-Nitrophenol	8330 U	8890 U	8600 UJV	1740 U	1670 UR	1670 UR	1720 U
2-Nitrophenol	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Pentachlorophenol	8330 U	8890 U	8600 UJV	1740 U	1670 UR	1670 UR	1720 U
Phenanthrene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	234 J
Phenol	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
Pyrene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	523
1,2,4-Trichlorobenzene	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U
2,4,5-Trichlorophenol	8330 U	8890 U	8600 UJV	1740 U	1670 UR	1670 UR	1720 U
2,4,6-Trichlorophenol	1720 U	1830 U	1770 UJV	360 U	340 UR	340 UR	355 U

Table 6. Summary of Semivolatile Organic Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

B - Detected in laboratory blank.
U - Below reported quantitation level.
V - Qualifier added and/or altered during data validation.
J - Estimated level.
+ - Reanalyzed.
R - Declared unusable during data validation.
ug/kg - Micrograms per kilogram.

Table 7. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-1	S-1	S-2	S-3	S-3	S-4	S-5	S-6
Sample Depth (ft):	0-2	2-3	0-2	0-2	3-5	0-2	0-2	0-2
Sample Date:	10/26/90	10/26/90	10/24/90	10/10/90	10/10/90	10/10/90	10/26/90	11/11/90
Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/kg)								
Pesticides								
alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfate	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA
alpha-chlordane	NA	NA	NA	NA	NA	NA	NA	NA
gamma-chlordane	NA	NA	NA	NA	NA	NA	NA	NA
Toxaphene	NA	NA	NA	NA	NA	NA	NA	NA
PCBs								
Arochlor-1016	1000 UR	100 UR	910 U	900 U	1700 U	870 U	880 UR	930 U
Arochlor-1221	1000 UR	100 UR	910 U	900 U	1700 U	870 U	880 UR	930 U
Arochlor-1232	1000 UR	100 UR	910 U	900 U	1700 U	870 U	880 UR	930 U
Arochlor-1242	1000 UR	100 UR	910 U	900 U	1700 U	870 U	880 UR	930 U
Arochlor-1248	1000 UR	100 UR	910 U	900 U	1700 U	870 U	880 UR	930 U
Arochlor-1254	1000 UR	100 UR	910 U	900 U	1700 U	870 U	880 UR	930 U
Arochlor-1260	3010 RB	590 JBR	7877 JV	9324 JV	1700 U	2541 JV	8150 BR	1810 JV

Table 7. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-7	S-8	S-9	S-9	S-10	S-16	S-17	S-22
Sample Depth (ft):	0-2	0-2	0-2	3-4.5	0-2	0-2	0-2	0-2
Sample Date:	10/25/90	10/25/90	10/10/90	10/10/90	10/16/90	11/11/90	10/19/90	10/17/90
Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/kg)								
Pesticides								
alpha-BHC	NA	NA	NA	NA	NA	NA	12 U	10 U
beta-BHC	NA	NA	NA	NA	NA	NA	12 U	10 U
delta-BHC	NA	NA	NA	NA	NA	NA	12 U	10 U
gamma-BHC (Lindane)	NA	NA	NA	NA	NA	NA	12 U	10 U
Heptachlor	NA	NA	NA	NA	NA	NA	12 U	10 U
Aldrin	NA	NA	NA	NA	NA	NA	12 U	10 U
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	12 U	10 U
Endosulfan I	NA	NA	NA	NA	NA	NA	12 U	10 U
Dieldrin	NA	NA	NA	NA	NA	NA	23 U	20 U
4,4'-DDE	NA	NA	NA	NA	NA	NA	23 UIV	20 UIV
Endrin	NA	NA	NA	NA	NA	NA	23 U	20 U
Endosulfan II	NA	NA	NA	NA	NA	NA	23 U	20 U
4,4'-DDD	NA	NA	NA	NA	NA	NA	23 U	20 U
Endosulfate	NA	NA	NA	NA	NA	NA	23 U	20 U
4,4'-DDT	NA	NA	NA	NA	NA	NA	23 UIV	20 UIV
Endrin ketone	NA	NA	NA	NA	NA	NA	23 U	20 U
Methoxychlor	NA	NA	NA	NA	NA	NA	115 U	100 U
alpha-chlordane	NA	NA	NA	NA	NA	NA	12 U	10 U
gamma-chlordane	NA	NA	NA	NA	NA	NA	12 U	10 U
Toxaphene	NA	NA	NA	NA	NA	NA	230 U	200 U
PCBs								
Arochlor-1016	90 U	90 U	860 U	950 U	80 U	90 U	115 U	100 U
Arochlor-1221	90 U	90 U	860 U	950 U	80 U	90 U	115 U	100 U
Arochlor-1232	90 U	90 U	860 U	950 U	80 U	90 U	115 U	100 U
Arochlor-1242	90 U	90 U	860 U	950 U	80 U	90 U	115 U	100 U
Arochlor-1248	90 U	90 U	860 U	950 U	80 U	90 U	115 U	100 U
Arochlor-1254	90 U	90 U	860 U	950 U	80 U	90 U	115 U	100 U
Arochlor-1260	955 JV	1089 JV	1724 JV	935 JV	96 JV	150 JV	604 JV	435 JV

Table 7. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-26	S-30	S-31	S-32	S-33	S-34	S-35	S-36
Sample Depth (ft):	0-2	0-2	0-2	0-2	4-6	0-2	8-10	0-2
Sample Date:	11/17/90	10/16/90	10/17/90	12/1/90	12/13/90	11/17/90	11/30/90	12/1/90
Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/kg)								
Pesticides								
alpha-BHC	NA	9 U	NA	NA	9 U	NA	9 U	NA
beta-BHC	NA	9 U	NA	NA	9 U	NA	9 U	NA
delta-BHC	NA	9 U	NA	NA	9 U	NA	9 U	NA
gamma-BHC (Lindane)	NA	9 U	NA	NA	9 U	NA	9 U	NA
Heptachlor	NA	9 U	NA	NA	9 U	NA	9 U	NA
Aldrin	NA	9 U	NA	NA	9 U	NA	9 U	NA
Heptachlor epoxide	NA	9 U	NA	NA	9 U	NA	9 U	NA
Endosulfan I	NA	9 U	NA	NA	9 U	NA	9 U	NA
Dieldrin	NA	18 U	NA	NA	17 U	NA	18 U	NA
4,4'-DDE	NA	18 U	NA	NA	17 U	NA	18 U	NA
Endrin	NA	18 U	NA	NA	17 U	NA	18 U	NA
Endosulfan II	NA	18 U	NA	NA	17 U	NA	18 U	NA
4,4'-DDD	NA	18 U	NA	NA	17 U	NA	18 U	NA
Endosulfate	NA	18 U	NA	NA	17 U	NA	18 U	NA
4,4'-DDT	NA	18 U	NA	NA	17 U	NA	18 U	NA
Endrin ketone	NA	18 U	NA	NA	17 U	NA	18 U	NA
Methoxychlor	NA	90 U	NA	NA	85 U	NA	90 U	NA
alpha-chlordane	NA	9 U	NA	NA	9 U	NA	9 U	NA
gamma-chlordane	NA	9 U	NA	NA	9 U	NA	9 U	NA
Toxaphene	NA	180 U	NA	NA	170 U	NA	185 U	NA
PCBs								
Arochlor-1016	90 U	90 U	85 U	100 U	85 U	940 U	90 U	90 U
Arochlor-1221	90 U	90 U	85 U	100 U	85 U	940 U	90 U	90 U
Arochlor-1232	90 U	90 U	85 U	100 U	85 U	940 U	90 U	90 U
Arochlor-1242	90 U	90 U	85 U	100 U	85 U	940 U	90 U	90 U
Arochlor-1248	90 U	90 U	85 U	100 U	85 U	940 U	90 U	90 U
Arochlor-1254	90 U	90 U	85 U	100 U	85 U	940 U	90 U	90 U
Arochlor-1260	90 U	90 U	570 JV	592 JV	85 U	4449 JV	90 U	120 JV

Table 7. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-37	S-38	S-39	S-41A	S-43	S-47	S-49	S-50
Sample Depth (ft):	4-6	2-4	2-4	3.5-5.5	0-2	2-4	2-4	0-2
Sample Date:	12/1/90	11/29/90	11/29/90	11/7/90	11/5/90	10/19/90	10/19/90	11/10/90
Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/kg)								
Pesticides								
alpha-BHC	9 U	9 U	8 U	95 U	90 U	85 U	9 U	NA
beta-BHC	9 U	9 U	8 U	95 U	90 U	85 U	9 U	NA
delta-BHC	9 U	9 U	8 U	95 U	90 U	85 U	9 U	NA
gamma-BHC (Lindane)	9 U	9 U	8 U	95 U	90 U	85 U	9 U	NA
Heptachlor	9 U	9 U	8 U	95 U	90 U	85 U	9 U	NA
Aldrin	9 U	9 U	8 U	95 U	90 U	85 U	9 U	NA
Heptachlor epoxide	9 U	9 U	8 U	95 U	90 U	85 U	9 U	NA
Endosulfan I	9 U	9 U	8 U	95 U	90 U	85 U	9 U	NA
Dieldrin	17 U	19 UIV	17 U	190 U	180 U	170 U	17 U	NA
4,4'-DDE	17 U	19 U	17 U	190 U	180 U	170 UIV	17 UIV	NA
Endrin	17 U	19 U	17 U	190 U	180 U	170 U	17 U	NA
Endosulfan II	17 U	19 U	17 U	190 U	180 U	170 U	17 U	NA
4,4'-DDD	17 U	19 U	17 U	190 U	180 U	170 U	17 U	NA
Endosulfate	17 U	19 UIV	17 U	190 U	180 U	170 UIV	17 UIV	NA
4,4'-DDT	17 U	19 U	17 U	190 U	180 U	170 U	17 U	NA
Endrin ketone	17 U	19 U	17 U	190 U	180 U	170 U	17 U	NA
Methoxychlor	85 U	95 U	85 U	930 U	900 U	860 U	85 U	NA
alpha-chlordane	9 U	9 U	8 U	95 U	90 U	85 U	9 U	NA
gamma-chlordane	9 U	9 U	8 U	95 U	90 U	85 U	9 U	NA
Toxaphene	170 U	190 U	170 U	1860 U	1800 U	1720 U	170 U	NA
PCBs								
Arochlor-1016	85 U	95 U	85 U	930 U	900 U	860 U	85 U	90 U
Arochlor-1221	85 U	95 U	85 U	930 U	900 U	860 U	85 U	90 U
Arochlor-1232	85 U	95 U	85 U	930 U	900 U	860 U	85 U	90 U
Arochlor-1242	85 U	95 U	85 U	930 U	900 U	860 U	85 U	90 U
Arochlor-1248	85 U	95 U	85 U	930 U	900 U	860 U	85 U	90 U
Arochlor-1254	85 U	95 U	85 U	930 U	900 U	860 U	85 U	90 U
Arochlor-1260	85 U	108 JV	85 U	930 U	900 U	934 JV	710 JV	470 JV

Table 7. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-51	S-52	S-53	S-53	S-53	S-59	S-60	S-61
Sample Depth (ft):	0-2	0-2	0-2	3.5-5.5	5-7	0-2	4-6	5-7
Sample Date:	11/10/90	11/10/90	11/18/90	11/18/90	11/18/90	10/17/90	12/12/90	10/24/90
Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/kg)								
Pesticides								
alpha-BHC	NA	NA	NA	NA	8 U	NA	8 U	9 U
beta-BHC	NA	NA	NA	NA	8 U	NA	8 U	9 U
delta-BHC	NA	NA	NA	NA	8 U	NA	8 U	9 U
gamma-BHC (Lindane)	NA	NA	NA	NA	8 U	NA	8 U	9 U
Heptachlor	NA	NA	NA	NA	8 U	NA	8 U	9 U
Aldrin	NA	NA	NA	NA	8 U	NA	8 U	9 U
Heptachlor epoxide	NA	NA	NA	NA	8 U	NA	8 U	9 U
Endosulfan I	NA	NA	NA	NA	8 U	NA	8 U	9 U
Dieldrin	NA	NA	NA	NA	17 U	NA	16 U	18 U
4,4'-DDE	NA	NA	NA	NA	17 UIV	NA	16 U	18 U
Endrin	NA	NA	NA	NA	17 U	NA	16 U	18 U
Endosulfan II	NA	NA	NA	NA	17 U	NA	16 U	18 U
4,4'-DDD	NA	NA	NA	NA	17 U	NA	16 U	18 U
Endosulfate	NA	NA	NA	NA	17 U	NA	16 U	18 U
4,4'-DDT	NA	NA	NA	NA	17 UIV	NA	16 U	18 U
Endrin ketone	NA	NA	NA	NA	17 U	NA	16 U	18 U
Methoxychlor	NA	NA	NA	NA	85 U	NA	80 U	90 U
alpha-chlordane	NA	NA	NA	NA	8 U	NA	8 U	9 U
gamma-chlordane	NA	NA	NA	NA	8 U	NA	8 U	9 U
Toxaphene	NA	NA	NA	NA	165 U	NA	165 U	180 U
PCBs								
Arochlor-1016	90 U	800 U	4350 U	80 U	85 U	85 U	80 U	90 U
Arochlor-1221	90 U	800 U	4350 U	80 U	85 U	85 U	80 U	90 U
Arochlor-1232	90 U	800 U	4350 U	80 U	85 U	85 U	80 U	90 U
Arochlor-1242	90 U	800 U	4350 U	80 U	85 U	85 U	80 U	90 U
Arochlor-1248	90 U	800 U	4350 U	80 U	85 U	85 U	80 U	90 U
Arochlor-1254	90 U	800 U	4350 U	80 U	85 U	85 U	80 U	90 U
Arochlor-1260	191 JV	1040 JV	71160 JV	410 JV	161 JV	85 U	80 U	90 U

Table 7. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-62	S-63	S-64	S-66	S-67	S-68	S-74	S-75
Sample Depth (ft):	0-2	0-2	2-3	3-5	0-2	0-2	0-2	0-2
Sample Date:	10/24/90	10/25/90	10/18/90	10/10/90	10/27/90	10/27/90	10/8/90	10/8/90
Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/kg)								
Pesticides								
alpha-BHC	9 U	NA	10 U	NA	NA	NA	NA	NA
beta-BHC	9 U	NA	10 U	NA	NA	NA	NA	NA
delta-BHC	9 U	NA	10 U	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	9 U	NA	10 U	NA	NA	NA	NA	NA
Heptachlor	9 U	NA	10 U	NA	NA	NA	NA	NA
Aldrin	9 U	NA	10 U	NA	NA	NA	NA	NA
Heptachlor epoxide	9 U	NA	10 U	NA	NA	NA	NA	NA
Endosulfan I	9 U	NA	10 U	NA	NA	NA	NA	NA
Dieldrin	18 U	NA	19 U	NA	NA	NA	NA	NA
4,4'-DDE	18 U	NA	19 UIV	NA	NA	NA	NA	NA
Endrin	18 U	NA	19 U	NA	NA	NA	NA	NA
Endosulfan II	18 U	NA	19 U	NA	NA	NA	NA	NA
4,4'-DDD	18 U	NA	19 U	NA	NA	NA	NA	NA
Endosulfate	18 U	NA	19 U	NA	NA	NA	NA	NA
4,4'-DDT	18 U	NA	19 UIV	NA	NA	NA	NA	NA
Endrin ketone	18 U	NA	19 U	NA	NA	NA	NA	NA
Methoxychlor	90 U	NA	95 U	NA	NA	NA	NA	NA
alpha-chlordane	9 U	NA	10 U	NA	NA	NA	NA	NA
gamma-chlordane	9 U	NA	10 U	NA	NA	NA	NA	NA
Toxaphene	180 U	NA	190 U	NA	NA	NA	NA	NA
PCBs								
Arochlor-1016	90 U	95 U	95 U	90 U	90 UR	90 UR	910 U	900 U
Arochlor-1221	90 U	95 U	95 U	90 U	90 UR	90 UR	910 U	900 U
Arochlor-1232	90 U	95 U	95 U	90 U	90 UR	90 UR	910 U	900 U
Arochlor-1242	90 U	95 U	95 U	90 U	90 UR	90 UR	910 U	900 U
Arochlor-1248	90 U	95 U	95 U	90 U	90 UR	90 UR	910 U	900 U
Arochlor-1254	90 U	95 U	95 U	90 U	90 UR	90 UR	910 U	900 U
Arochlor-1260	90 U	1489 JV	979 JV	90 U	290 R	270 R	4442 JV	2785 JV

Table 7. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-76	S-77	S-78	S-78	S-80	S-82	S-83	S-84
Sample Depth (ft):	0-0.7	0-2	0-2	8-9	2-4	0-2	0-2	0-2
Sample Date:	10/25/90	10/8/90	11/26/90	12/12/90	10/3/90	10/16/90	10/17/90	10/17/90
Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/kg)								
Pesticides								
alpha-BHC	NA	NA	NA	NA	8 U	9 U	NA	NA
beta-BHC	NA	NA	NA	NA	8 U	9 U	NA	NA
delta-BHC	NA	NA	NA	NA	8 U	9 U	NA	NA
gamma-BHC (Lindane)	NA	NA	NA	NA	8 U	9 U	NA	NA
Heptachlor	NA	NA	NA	NA	8 U	9 U	NA	NA
Aldrin	NA	NA	NA	NA	8 U	9 U	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	8 U	9 U	NA	NA
Endosulfan I	NA	NA	NA	NA	8 U	9 U	NA	NA
Dieldrin	NA	NA	NA	NA	17 U	18 U	NA	NA
4,4'-DDE	NA	NA	NA	NA	17 U	18 U	NA	NA
Endrin	NA	NA	NA	NA	17 U	18 UIV	NA	NA
Endosulfan II	NA	NA	NA	NA	17 U	18 U	NA	NA
4,4'-DDD	NA	NA	NA	NA	17 U	18 U	NA	NA
Endosulfate	NA	NA	NA	NA	17 U	18 U	NA	NA
4,4'-DDT	NA	NA	NA	NA	17 U	18 U	NA	NA
Endrin ketone	NA	NA	NA	NA	17 U	18 UIV	NA	NA
Methoxychlor	NA	NA	NA	NA	85 U	90 U	NA	NA
alpha-chlordane	NA	NA	NA	NA	8 U	9 U	NA	NA
gamma-chlordane	NA	NA	NA	NA	8 U	9 U	NA	NA
Toxaphene	NA	NA	NA	NA	170 U	180 U	NA	NA
PCBs								
Arochlor-1016	900 U	80 U	95 U	85 U	85 U	90 U	100 U	90 U
Arochlor-1221	900 U	80 U	95 U	85 U	85 U	90 U	100 U	90 U
Arochlor-1232	900 U	80 U	95 U	85 U	85 U	90 U	100 U	90 U
Arochlor-1242	900 U	80 U	95 U	85 U	85 U	90 U	100 U	90 U
Arochlor-1248	900 U	80 U	95 U	85 U	85 U	90 U	100 U	90 U
Arochlor-1254	900 U	80 U	95 U	85 U	85 U	90 U	100 U	90 UI
Arochlor-1260	13652 JV	85 JV	1910 JV	85 U	85 U	851 JV	87 JV	90 U

Table 7. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-90	S-94	MW-13	MW-16	MW-16	MW-17	MW-19	MW-20
Sample Depth (ft):	1-3	2-3	0-2	0-2	10-12	0-2	0-2	0-2
Sample Date:	10/1/90	10/18/90	10/20/90	11/7/90	11/7/90	10/26/90	12/7/90	12/11/90
Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/kg)								
<u>Pesticides</u>								
alpha-BHC	9 U	NA	NA	NA	NA	NA	NA	NA
beta-BHC	9 U	NA	NA	NA	NA	NA	NA	NA
delta-BHC	9 U	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	9 U	NA	NA	NA	NA	NA	NA	NA
Heptachlor	485	NA	NA	NA	NA	NA	NA	NA
Aldrin	9 U	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	9 U	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	9 U	NA	NA	NA	NA	NA	NA	NA
Dieldrin	1521	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	17 UIV	NA	NA	NA	NA	NA	NA	NA
Endrin	1422	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	17 U	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	17 U	NA	NA	NA	NA	NA	NA	NA
Endosulfate	17 U	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	17 UIV	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	17 U	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	85 U	NA	NA	NA	NA	NA	NA	NA
alpha-chlordane	9 U	NA	NA	NA	NA	NA	NA	NA
gamma-chlordane	9 U	NA	NA	NA	NA	NA	NA	NA
Toxaphene	170 U	NA	NA	NA	NA	NA	NA	NA
<u>PCBs</u>								
Arochlor-1016	85 U	90 U	930 U	980 U	930 U	90 UR	110 U	100 U
Arochlor-1221	85 U	90 U	930 U	980 U	930 U	90 UR	110 U	100 U
Arochlor-1232	85 U	90 U	930 U	980 U	930 U	90 UR	110 U	100 U
Arochlor-1242	85 U	90 U	930 U	980 U	930 U	90 UR	110 U	100 U
Arochlor-1248	85 U	90 U	930 U	980 U	930 U	90 UR	110 U	100 U
Arochlor-1254	85 U	90 U	930 U	980 U	930 U	90 UR	110 U	100 U
Arochlor-1260	151 JV	230 JV	4350 JV	1210 JV	3655 JV	670 BR	52 JV	60 JV

Table 7. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	MW-21	MW-22	MW-25	MW-26	MW-30	MW-31	MW-34
Sample Depth (ft):	0-2	0-2	4-6	9-11	0-2	0-2	0-2
Sample Date:	12/6/90	10/20/90	11/17/90	12/5/90	11/30/90	11/8/90	11/29/90
Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/kg)							
<u>Pesticides</u>							
alpha-BHC	NA	NA	9 U	8 U	NA	NA	9 U
beta-BHC	NA	NA	9 U	8 U	NA	NA	9 U
delta-BHC	NA	NA	9 U	8 U	NA	NA	9 U
gamma-BHC (Lindane)	NA	NA	9 U	8 U	NA	NA	9 U
Heptachlor	NA	NA	9 U	8 U	NA	NA	9 U
Aldrin	NA	NA	9 U	8 U	NA	NA	9 U
Heptachlor epoxide	NA	NA	9 U	8 U	NA	NA	9 U
Endosulfan I	NA	NA	9 U	8 U	NA	NA	9 U
Dieldrin	NA	NA	17 U	17 U	NA	NA	17 U
4,4'-DDE	NA	NA	17 UIV	17 U	NA	NA	17 UIV
Endrin	NA	NA	17 U	17 U	NA	NA	17 U
Endosulfan II	NA	NA	17 U	17 U	NA	NA	17 U
4,4'-DDD	NA	NA	17 U	17 U	NA	NA	17 U
Endosulfate	NA	NA	17 U	17 U	NA	NA	17 U
4,4'-DDT	NA	NA	17 UIV	17 U	NA	NA	17 UIV
Endrin ketone	NA	NA	17 U	17 U	NA	NA	17 U
Methoxychlor	NA	NA	85 U	85 U	NA	NA	85 U
alpha-chlordane	NA	NA	9 U	8 U	NA	NA	9 U
gamma-chlordane	NA	NA	9 U	8 U	NA	NA	9 U
Toxaphene	NA	NA	175 U	170 U	NA	NA	170 U
<u>PCBs</u>							
Arochlor-1016	90 U	1010 U	85 U	85 U	90 U	1030 U	85 U
Arochlor-1221	90 U	1010 U	85 U	85 U	90 U	1030 U	85 U
Arochlor-1232	90 U	1010 U	85 U	85 U	90 U	1030 U	85 U
Arochlor-1242	90 U	1010 U	85 U	85 U	90 U	1030 U	85 U
Arochlor-1248	90 U	1010 U	85 U	85 U	90 U	1030 U	85 U
Arochlor-1254	90 U	1010 U	85 U	85 U	90 U	1030 U	85 U
Arochlor-1260	320 JV	790 JV	443 JV	85 U	290 JV	7540 JV	643 JV

B - Detected in laboratory blank.
U - Below reported quantitation level.
V - Qualifier added and/or value altered during data validation.
I - Result declared inconclusive during data validation.
J - Estimated level.
NA - Not analyzed.
R - Result declared unusable during data validation.
ug/kg - Micrograms per kilogram.

Table 8. Summary of Total Petroleum Hydrocarbon Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation	Sample Depth (in feet)	Sample Date	Total Petroleum Hydrocarbons (mg/kg)
S-1	0-2	10/27/90	32,750
S-1	2-3	10/26/90	5,570
S-2	0-2	10/24/90	44,110
S-3	0-2	10/10/90	4,210
S-4	0-2	10/10/90	12,120
S-5	0-2	10/26/90	9,710
S-6	0-2	11/11/90	1,565
S-6	8-9	11/11/90	<12
S-7	0-2	10/25/90	2,962
S-8	0-2	10/25/90	1,015
S-9	0-2	10/10/90	31,630
S-10	0-2	10/16/90	510
S-16	0-2	11/11/90	960
S-16	10-12	11/11/90	<11
S-17	0-2	10/19/90	210
S-19	0-2	12/4/90	444
S-19	9-11	12/4/90	<10
S-20	0-2	11/11/90	2,574
S-21	0-2	10/5/90	410
S-21	6-8	10/5/90	142
S-22	0-2	10/17/90	1,145
S-23	0-2	10/5/90	1,395
S-23	8-10	10/5/90	<11
S-24	0-2	10/8/90	2,120
S-24	9-11	10/8/90	238

Table 8. Summary of Total Petroleum Hydrocarbon Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation	Sample Depth (in feet)	Sample Date	Total Petroleum Hydrocarbons (mg/kg)
S-25	0-2	12/5/90	<11
S-25	12-14	12/5/90	<10
S-25	19-21	12/5/90	<11
S-26	0-2	11/17/90	1,335
S-26	4-6	11/17/90	22
S-27	0.5-2.5	10/2/90	62
S-28	0-2	10/9/90	102
S-29	0-2	10/3/90	9,470
S-30	0-2	10/16/90	88
S-30	4-6	10/16/90	<11
S-31	0-2	10/17/90	7,730
S-32	0-2	12/4/90	<12
S-33	0-2	12/13/90	<11
S-34	0-2	11/17/90	<12
S-35	0-2	12/1/90	28
S-36	0-2	12/1/90	61
S-36	6-8	12/1/90	35
S-37	0-2	12/1/90	682
S-37	8-10	12/1/90	<11
S-37	14-16	12/1/90	<12
S-38	0-2	11/29/90	112
S-38	10-12	11/29/90	41
S-38	12-14	11/29/90	377
S-39	0-2	11/29/90	218
S-39	8-10	11/29/90	198
S-40	0-2	10/17/90	562
S-41	0-2	11/5/90	144
S-41	2-4	11/5/90	216V

Table 8. Summary of Total Petroleum Hydrocarbon Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation	Sample Depth (in feet)	Sample Date	Total Petroleum Hydrocarbons (mg/kg)
S-42	0-2	11/5/90	384V
S-43	0-2	11/5/90	837
S-44	0-2	11/5/90	650
S-44	4-6	11/5/90	10,140
S-45	0-2	10/27/90	1,278
S-45	2-4	10/27/90	72V
S-46	0-2	11/8/90	658
S-46	7-9	11/8/90	90
S-47	0-2	10/19/90	28,510
S-47	7-9	10/19/90	<11
S-47	11-13	10/19/90	<12
S-48	0-2	10/19/90	2,996
S-48	2-4	10/19/90	3,170
S-48	11-13	10/19/90	6,700
S-49	0-2	10/19/90	4,460
S-49	4-6	10/19/90	9,465
S-49	8-10	10/19/90	5,644
S-50	0-2	11/10/90	<11
S-51	0-2	11/10/90	178
S-51	12-14	11/10/90	320
S-52	0-2	11/10/90	2,482
S-52	10-12	11/10/90	354
S-53	0-2	11/18/90	216
S-53	8-10	11/18/90	12
S-54	0-2	10/12/90	4,350
S-54	7-9	10/12/90	120
S-55	0-2	10/12/90	162,860
S-55	7-9	10/12/90	554
S-56	0-2	10/12/90	3,890
S-56	7-9	10/12/90	43

Table 8. Summary of Total Petroleum Hydrocarbon Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation	Sample Depth (in feet)	Sample Date	Total Petroleum Hydrocarbons (mg/kg)
S-57	0-2	11/26/90	2,362
S-58	0-2	10/17/90	360
S-59	0-2	10/17/90	<11
S-60	0-2	11/26/90	4,456
S-61	0-1.1	10/24/90	13,690
S-62	0-2	10/24/90	4,820
S-63	0-2	10/25/90	7,520
S-64	0-2	10/18/90	3,230V
S-65	0-2	10/24/90	4,940V
S-66	0-2	10/10/90	141
S-67	0-2	10/27/90	124
S-68	0-2	10/27/90	442
S-69	0-2	10/10/90	118
S-70	0-2	10/4/90	3,745
S-70	6-8	10/4/90	280
S-71	0-2	10/4/90	3,395
S-71	6-8	10/4/90	220
S-72	0-2	10/4/90	1,715
S-72	6-8	10/4/90	360
S-73	0-2	10/4/90	2,390
S-74	0-2	10/8/90	2,280
S-74	6-8	10/8/90	296
S-74	12-14	10/8/90	<10
S-75	0-2	10/8/90	3,090
S-76	0-0.7	10/25/90	25,940

Table 8. Summary of Total Petroleum Hydrocarbon Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation	Sample Depth (in feet)	Sample Date	Total Petroleum Hydrocarbons (mg/kg)
S-77	0-2	10/8/90	<10
S-77	13-15	10/8/90	<10
S-78	0-2	11/26/90	14,267V
S-79	0-2	10/3/90	3,340
S-80	0-2	10/3/90	750
S-81	0-2	10/9/90	3,480
S-82	0-2	10/16/90	297V
S-82	6-8	10/16/90	200
S-83	0-2	10/17/90	226
S-84	0-2	10/17/90	15,370
S-85	1-3	10/2/90	282V
S-86	0.5-2.5	10/2/90	690
S-87	0.5-2.5	10/1/90	30
S-88	5-7	10/1/90	312
S-89	1-3	10/1/90	278
S-90	1-3	10/1/90	175
S-91	5-7	10/2/90	3,300
S-92	3-5	10/2/90	201
S-93	0-2	10/18/90	280
S-93	18-20	10/18/90	117
S-94	0-2	10/18/90	47
S-95	0-2	10/18/90	494
MW-13	0-2	10/20/90	494
MW-16	0-2	11/7/90	17,840

Table 8. Summary of Total Petroleum Hydrocarbon Compound Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation	Sample Depth (in feet)	Sample Date	Total Petroleum Hydrocarbons (mg/kg)
MW-17	0-2	10/26/90	2,138
MW-19	0-2	12/7/90	8,612
MW-20	0-2	12/11/90	1,158
MW-21	0-2	12/6/90	93
MW-22	0-2	10/20/90	18,220
MW-23	9-11	11/16/90	48,290
MW-24	0-2	11/27/90	178
MW-24	15-17	11/28/90	179
MW-25	0-2	11/17/90	331
MW-25	6-8	11/17/90	12
MW-26	0-2	12/5/90	<12
MW-26	12-14	12/5/90	<11
MW-27	0-2	12/1/90	1,244
MW-27	7-9	12/1/90	<11
MW-27	14-16	12/1/90	<12
MW-28	0-2	11/9/90	<11
MW-28	6-8	11/9/90	<11
MW-29	0-2	11/17/90	183
MW-30	0-2	11/30/90	970
MW-30	6-8	11/30/90	96
MW-30	11-13	11/30/90	91
MW-31	0-2	11/8/90	16,270
MW-31	10-12	11/8/90	233
MW-32	0-2	10/4/90	436
MW-34	0-2	11/29/90	91
MW-34	10-12	11/29/90	11

mg/kg - Milligrams per kilogram.
V - Value altered during data validation.

Table 9. Summary of Metal Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-2	S-10	S-17	S-22	S-26	S-30
Sample Depth (ft):	0-2	0-2	0-2	0-2	0-2	0-2
Sample Date:	10/26/90	10/18/90	10/20/90	10/18/90	11/19/90	10/18/90
Metals (Concentrations in mg/kg)						
Aluminum	NA	NA	4430 N	2220 N	NA	3950 N
Antimony	NA	NA	<2.2 N	3.5 BN	NA	2.4 BN
Arsenic	NA	NA	20	26	NA	<1.2
Barium	NA	NA	85 *	81 *	NA	23 B*
Beryllium	NA	NA	0.57 B	<0.37	NA	<0.36
Cadmium	NA	NA	<0.94 *	<0.77 *	NA	<0.73 *
Calcium	NA	NA	1030 B	468 B	NA	6850
Chromium	NA	NA	36 N*	17 N*	NA	13 N*
Cobalt	NA	NA	<2.0	2.3 B	NA	3.1 B
Copper	NA	NA	244	349	NA	7.8
Iron	NA	NA	28600	27000	NA	5610
Lead	332 N*	149 N*	120 N*	162 N*	201 S	8.8 N*
Magnesium	NA	NA	1330 B	610 B	NA	1510
Manganese	NA	NA	175 *	142 *	NA	165 *
Mercury	NA	NA	0.9 N	0.38 N	NA	<0.11 N
Nickel	NA	NA	17	17	NA	5.6 B
Potassium	NA	NA	391 B	350 B	NA	567 B
Selenium	NA	NA	<0.74 N	<0.61 NW	NA	<0.58 NW
Silver	NA	NA	<0.66 W	0.56 B	NA	<0.51
Sodium	NA	NA	394 B	301 B	NA	231 B
Thallium	NA	NA	<0.8	<0.65	NA	<0.62
Vanadium	NA	NA	97	75	NA	11 B
Zinc	NA	NA	95	61	NA	22

Table 9. Summary of Metal Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-32	S-33	S-34	S-35	S-36	S-37
Sample Depth (ft):	0-2	4-6	0-2	8-10	0-2	4-6
Sample Date:	12/6/90	12/14/90	11/19/90	12/1/90	12/3/90	12/3/90
Metals (Concentrations in mg/kg)						
Aluminum	NA	4580 J	NA	4770	NA	3330
Antimony	NA	<1.6 JN	NA	<1.7 N	NA	<1.7 N
Arsenic	NA	0.73 BJ	NA	<0.68 W	NA	<0.66
Barium	NA	14 BJ	NA	32 B	NA	33 B
Beryllium	NA	<0.34	NA	<0.36	NA	<0.35
Cadmium	NA	<1.1	NA	<1.1	NA	<1.1
Calcium	NA	4920 J	NA	1400	NA	4170
Chromium	NA	7.5 JN	NA	8.2 N	NA	8.0 N
Cobalt	NA	3.2 BJ	NA	3.0 B	NA	5.0 B
Copper	NA	10 J	NA	12	NA	12
Iron	NA	8190 J	NA	11200	NA	8440
Lead	339	4.0 J	177 S	3.5	80 S	3.3
Magnesium	NA	4260 J	NA	2510	NA	3470
Manganese	NA	199 J	NA	224	NA	181
Mercury	NA	<0.1	NA	<0.11	NA	<0.1
Nickel	NA	4.7 BJ	NA	11	NA	9
Potassium	NA	636 BJ	NA	861 B	NA	1060 B
Selenium	NA	<0.56 N	NA	<0.59 NW	NA	<0.57 NW
Silver	NA	<0.54 J	NA	<0.57	NA	<0.55
Sodium	NA	88 BJ	NA	456 B	NA	188 B
Thallium	NA	<0.75 J	NA	<0.8	NA	<0.76
Vanadium	NA	13 J	NA	13	NA	14
Zinc	NA	18 J	NA	20	NA	18

Table 9. Summary of Metal Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-38	S-39	S-41A	S-43	S-47	S-49
Sample Depth (ft):	2-4	2-4	3.5-5.5	0-2	2-4	2-4
Sample Date:	11/30/90	11/30/90	11/9/90	11/5/90	10/20/90	10/20/90
Metals (Concentrations in mg/kg)						
Aluminum	11100	2840	4740 N	6170 N	4470 N	4620 N
Antimony	<1.8 N	<1.6 N	<1.7 N	3.5 BN	<1.6 N	<1.6 N
Arsenic	1.1 BW	1.6 B	2.6	7.1	11	2.7
Barium	44 B	31 B	37 B*	444 *	70 *	31 B*
Beryllium	<0.38	<0.34	<0.37	0.44 B	0.43 B	<0.34
Cadmium	<1.2	<1.1	<1.1 *	<1.1 *	<0.71 *	<0.71 *
Calcium	442 B	1250	1040 B	6260	18100	2170
Chromium	1.6 R	6.4 SN	18 N*	42 N*	9.4 N*	9.6 N*
Cobalt	11 B	3.4 B	4.4 B	13	4.7 B	5.4 B
Copper	54	42	22	377	41	27
Iron	18900	7320	7400 N	58500 N	11200	9570
Lead	20 S	9.9	52 *	605 *	129 S*N	52 S*N
Magnesium	2570	1820	1660	3810	4280	2170
Manganese	342	249	93 *	471 *	241 *	274 *
Mercury	<0.11	<0.1	<0.11 N	<0.11 N	0.49 N	0.22 N
Nickel	15	8.3 B	7.3 B	54	10	12
Potassium	760 B	566 B	711 B	843 B	802 B	762 B
Selenium	<0.61 NW	<0.56 NW	<0.60 WN	<0.57 WN	<0.56 N	<0.56 N
Silver	<0.59 W	<0.53 W	<0.57 W	<0.60 BW	<0.5 W	<0.49 W
Sodium	324 B	184 B	229 B	1770	448 B	319 B
Thallium	<0.82	<0.75	<0.80	<0.77	<0.6	<0.6
Vanadium	25	12	14 M	28	20	13
Zinc	39	40	144	565	65	94

Table 9. Summary of Metal Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-53	S-60	S-61	S-62	S-64	S-80
Sample Depth (ft):	5-7	4-6	5-7	0-2	2-3	2-4
Sample Date:	11/21/90	12/13/90	10/26/90	10/26/90	10/19/90	10/5/90
Metals (Concentrations in mg/kg)						
Aluminum	6490	4580 J	4970 N	4090 N	3000 N	5300 N
Antimony	<1.5 N	<1.6 JN	<1.7 N	<1.7 N	4.8 BN	<1.6 N
Arsenic	<0.6	<0.62 J	2.6	3.1	8.1	2.7
Barium	16 B	28 BJ	418 *	43 B*	97 *	41 B*
Beryllium	<0.32	<0.33	0.46 B	<0.36	<0.38	<0.33
Cadmium	<1.0	1.2 BJ	<0.76 *	<0.74 *	2.1 *	<0.68 *
Calcium	2660	1590 J	772 B	751 B	1610	1200
Chromium	5.6 N	53 JN	10 N*S	14 N*	19 N*	15 N*
Cobalt	2.6 B	5.4 BJ	6.4 B	2.5 B	3.1 B	5.8 B
Copper	4.8 B	53 J	96	76	279	40
Iron	5680	7820 J	13000	10100	38700	11300
Lead	1.4	4.6 J	44 S*N	1080 NS*	212 N*	45 NS*
Magnesium	2430	2260 J	2150	1630	1420	3040
Manganese	151	333 J	82 *	314 *	445 *	251 *
Mercury	<0.1 R	0.31	0.17 N	0.31 N	0.29 N	<0.1 N
Nickel	6.0 B	<4.6	14	10	23	9.8
Potassium	318 B	674 BJ	832 B	466 B	412 B	710 B
Selenium	<0.52 NW	<0.54 N	<0.6 N	<0.58	<0.62 NW	<0.54 NW
Silver	<0.5	<0.52 J	<0.53	<0.52 W	0.79 BW	<0.48
Sodium	88 B	210 BJ	328 B	607 B	433 B	336 B
Thallium	<0.7	<0.73 J	<0.64	<0.63	<0.67	<0.58
Vanadium	5.2 B	13 J	32	13	37	20
Zinc	27	22 J	100	58	303	34

Table 9. Summary of Metal Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	S-82	S-90	MW-19	MW-20	MW-21	MW-25
Sample Depth (ft):	0-2	1-3	0-2	0-2	0-2	4-6
Sample Date:	10/18/90	10/3/90	12/8/90	12/13/90	12/8/90	11/19/90
Metals (Concentrations in mg/kg)						
Aluminum	3410 N	4530 N	NA	NA	NA	3140 N
Antimony	<1.7 N	<1.7 N	NA	NA	NA	<1.6
Arsenic	6.9	3.3	NA	NA	NA	<0.63
Barium	47 *	296 *	NA	NA	NA	21 B*
Beryllium	<0.35	<0.35	NA	NA	NA	<0.34
Cadmium	<0.73 *	1.3 *M	NA	NA	NA	<1.1 *
Calcium	954 B	1890	NA	NA	NA	425 B
Chromium	16 N*	12 N*	NA	NA	NA	10 N*
Cobalt	4.0 B	4.8 B	NA	NA	NA	4.4 B
Copper	73	57	NA	NA	NA	25
Iron	17800	10600	NA	NA	NA	8680 N
Lead	73 N*	372 NS*	498 J	415 J	<0.4	3.7 S*
Magnesium	1500	1670	NA	NA	NA	1550
Manganese	198 *	276 *	NA	NA	NA	131 *
Mercury	0.23 N	0.98 N	NA	NA	NA	<0.1 N
Nickel	12	11	NA	NA	NA	5.3 B
Potassium	476 B	604 B	NA	NA	NA	474 B
Selenium	<0.58 NW	<0.57 WN	NA	NA	NA	<0.55 WN
Silver	<0.51	0.59	NA	NA	NA	<0.53 W
Sodium	270 B	306 B	NA	NA	NA	235 B
Thallium	<0.62	<0.61	NA	NA	NA	<0.74
Vanadium	15	14	NA	NA	NA	9.7 B
Zinc	37	270	NA	NA	NA	27

Table 9. Summary of Metal Concentrations Detected in Soil Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	MW-26	MW-31	MW-34
Sample Depth (ft):	9-11	0-2	0-2
Sample Date:	12/6/90	11/9/90	11/30/90
Metals (Concentrations in mg/kg)			
Aluminum	3010	NA	2990
Antimony	<1.6 N	NA	1.9 BN
Arsenic	<0.6	NA	7.7 S
Barium	16 B	NA	43
Beryllium	<0.34	NA	<0.34
Cadmium	<1.1	NA	1.3
Calcium	772 B	NA	702 B
Chromium	6.5 SN	NA	14 N
Cobalt	1.9 B	NA	5.8 B
Copper	8.2	NA	140
Iron	5990	NA	14100
Lead	2.3	1290 S	137
Magnesium	1360	NA	1280
Manganese	148	NA	130
Mercury	<0.1	NA	<0.1
Nickel	6.7 B	NA	8.1 B
Potassium	416 B	NA	448 B
Selenium	<0.55 NW	NA	<0.55 NW
Silver	<0.53	NA	<0.53 W
Sodium	113 B	NA	258 B
Thallium	<0.74	NA	<0.75
Vanadium	7.6 B	NA	47
Zinc	16	NA	149

B - Value >IDL but <CRDL.
< or U - Value < IDL.
NA - Not analyzed.
S - Value determined by method of standard addition.
* - Duplicate RPD out of control.
N - Matrix spike outside of recovery limits.
W - Post digest spike recovery out of range.
R - Declared unusable during data validation.
J - Estimated value or detection limit due to non-compliance with protocol.
M - Duplicate injection precision not met.
mg/kg - Milligrams per kilogram.
ppm - Parts per million

Table 10. Soil Gas Survey Results, Sunnyside Yard, Queens, New York.

Grid Location	Depth (ft below land surface)	PID Reading Peak/Average (ppm)	Date	Time
A-2	1.5	15.7 / 11.1	12/17/90	1015
A-3	1.0	0	12/17/90	1030
A-4	1.0	0	12/17/90	1040
B-1	2.0	0	12/17/90	1055
B-2	1.5	22.5 / 13.3	12/17/90	1105
B-5	1.5	33.6 / 32.0	12/17/90	1120
B-5.5	1.5	13.1 / 12.8	12/19/90	1420
B-6	1.5	0	12/17/90	1135
B.5-5.5	2.0	23.1 / 23.0	12/19/90	1430
C-W1	2.0	2.5 / 1.7	12/20/90	1740
C-W.5	2.0	4.4 / 2.0	12/20/90	1410
C-1	2.5	0	12/17/90	1240
C-2	2.0	0	12/17/90	1230
C-3	2.0	15.3 / 14.9	12/17/90	1205
C-5.5	2.0	7.6 / 7.2	12/17/90	1440
C-6	2.0	32.6 / 30.5	12/17/90	1150
C-6.5	2.0	5.5 / 4.0	12/17/90	1210
C-7	3.0	0	12/17/90	1145
C.5-W1	2.0	5.1 / 3.8	12/20/90	1700
C.5-W.5	2.0	1.9 / 1.7	12/20/90	1422
C.5-0	1.5	0	12/19/90	0945
C.5-.5	0.5	9.5 / 9.2	12/19/90	0935
C.5-1	0.5	10 / 9.4	12/19/90	1505
C.5-2	0.5	14.9 / 14.0	12/19/90	1455
C.5-6	2.5	0	12/19/90	1150
D-W1	2.0	13.8 / 9.0	12/20/90	1640
D-W.5	2.0	65.4 / 62.5	12/19/90	1025
D-0	2.3	24.5 / 23.0	12/19/90	1010
D-.5	2.5	15.5 / 13.0	12/19/90	1000
D-1	3.0	10.3 / 6.1	12/17/90	1300
D-2	3.0	24.1 / 13.2	12/17/90	1315
D-5	3.0	8.3 / 8.3	12/17/90	1330
D-5.5	2.5	0	12/19/90	1135
D-6	3.0	0	12/17/90	1340
E-1	3.0	2.0 / 1.9	12/17/90	1415
E-2	3.0	19.1 / 17.0	12/17/90	1400
E-3	2.5	125 / 122	12/19/90	1110

PID - Photoionization detector (Photovac Microtip 100).

Table 11. Summary of Polychlorinated Biphenyl (PCB) Compound Concentrations, Specific Gravity and Kinematic Viscosity Detected in Separate Phase Petroleum Samples, Sunnyside Yard, Queens, New York.

Sample Designation:	MW-5	MW-7	MW-16	MW-17	MW-20
Sample Date:	1/7/91	1/7/91	1/7/91	1/7/91	1/7/91
Parameter					
PCBs (Concentrations in ug/L)					
Arochlor-1016	1600 UV	16000 UV	16000 UV	1600 UV	1600 UV
Arochlor-1221	1600 UV	16000 UV	16000 UV	1600 UV	1600 UV
Arochlor-1232	1600 UV	16000 UV	16000 UV	1600 UV	1600 UV
Arochlor-1242	1600 UV	16000 UV	16000 UV	1600 UV	1600 UV
Arochlor-1248	1600 UV	16000 UV	16000 UV	1600 UV	1600 UV
Arochlor-1254	1600 UV	16000 UV	16000 UV	1600 UV	1600 UV
Arochlor-1260	3600 JV	65000 JV	122763 JV	6716 JV	7624 JV
Specific Gravity (no units)	0.8390	0.8238	0.8386	0.8230	0.8377
Kinematic Viscosity (Concentrations in centistokes at 100 degrees C)	1.45	1.33	1.65	1.35	1.33

U - Below reported quantitation level.
V - Qualifier added and/or value altered during data validation.
J - Estimated level.
ug/L - Micrograms per liter.

Table 12. Summary of Volatile Organic Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Sample Designation:		MW-1	MW-9	MW-13	MW-13+	MW-19	MW-23	MW-25
Sample Date:		1/7/91	1/7/91	1/7/91	1/7/91	1/4/91	1/7/91	1/4/91
Volatile Organic Compounds (Concentrations in ug/L)	NYS Standard 1)							
Acetone	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Benzene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
2-Butanone	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Carbon Disulfide	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Tetrachloride	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Chloroform	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloromethane	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Dibromochloromethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethene (total)	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,3-Dichloropropene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	8.8	5.0 U
2-Hexanone	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
4-Methyl-2-pentanone	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Methylene Chloride	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	5	5.0 U	5.0 U	5.0 U	5.0 U	2.9 J	5.0 U	5.0 U
Toluene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trans-1,3-Dichloropropene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,1-Trichloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichloroethene	5	5.0 U	5.0 U	5.0 U	5.0 U	2.0 J	5.0 U	5.0 U
Vinyl Acetate	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Vinyl Chloride	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Xylenes (total)	15	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	18	5.0 U

Table 12. Summary of Volatile Organic Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Sample Designation:		MW-26	MW-28	MW-29	MW-32	MW-33	MW-33*	FB-1
Sample Date:		1/3/91	1/3/91	1/3/91	1/3/91	1/4/91	1/4/91	1/3/91
Volatile Organic Compounds (Concentrations in ug/L)	NYS Standard 1)							
Acetone	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Benzene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
2-Butanone	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Carbon Disulfide	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Tetrachloride	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Chloroform	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloromethane	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Dibromochloromethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethene (total)	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,3-Dichloropropene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
4-Methyl-2-pentanone	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Methylene Chloride	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	5	5.0 U	5.0 U	5.0 U	2.3 J	5.0 U	5.0 U	5.0 U
Toluene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trans-1,3-Dichloropropene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,1-Trichloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichloroethene	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Vinyl Acetate	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Vinyl Chloride	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Xylenes (total)	15	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

Table 12. Summary of Volatile Organic Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Sample Designation:		FB-2	FB-3	TB-1	TB-2	TB-3
Sample Date:		1/4/91	1/7/91	1/3/91	1/4/91	1/7/91
Volatile Organic Compounds (Concentrations in ug/L)	NYS Standard 1)					
Acetone	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Benzene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
2-Butanone	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Carbon Disulfide	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Tetrachloride	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Chloroform	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloromethane	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Dibromochloromethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethene (total)	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,3-Dichloropropene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
4-Methyl-2-pentanone	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Methylene Chloride	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trans-1,3-Dichloropropene	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,1-Trichloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichloroethene	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Vinyl Acetate	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Vinyl Chloride	--	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Xylenes (total)	15	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

B - Detected in laboratory blank.
U - Below reported quantitation level.
J - Estimated level.
* - Replicate sample.
ug/L - Micrograms per liter.
FB - Field blank.
TB - Trip blank.
-- Compound not detected, standard not listed.
+ - Reanalyzed.

1) Standards listed are the most stringent of the standards found in either the New York State Official Compilation of Codes, Rules and Regulations (10 NYCRR Subpart 5.1 MCL or 6NYCRR 703 Standard) or in the New York State Department of Environmental Concervation Division of Water Technical and Operational Guidance Series (1.1.1.), Ambient Water Quality Standards and Guidance Values. Standards are only provided for those compounds for which concentrations were detected.

Table 13. Summary of Semivolatile Organic Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Semi-Volatile Organic Compound (Concentrations in ug/L)	NYS Standard 1)	MW-1 1/7/91	MW-9 1/7/91	MW-9+ 1/7/91	MW-13 1/7/91	MW-19 1/4/91	MW-23 1/7/91
Acenaphthene	50	10 U	10 UR	10 UJV	9.8 J	10 U	10 U
Acenaphthylene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Anthracene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Benzidine	--	50 U	50 UR	50 UJV	50 U	50 U	50 U
Benzo (a) Anthracene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Benzo (a) Pyrene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Benzo (b+k) Fluoranthenes	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Benzo (g,h,i) Perylene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Benzoic Acid	--	50 U	50 UR	50 UJV	50 U	50 U	50 UIV
Benzyl Alcohol	--	10 U	10 UR	10 UJV	10 U	10 U	10 UIV
4-Bromophenyl-phenylether	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Butylbenzyl phthalate	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
4-Chloro-3-Methylphenol	--	10 U	10 UR	10 UJV	10 U	10 U	10 UIV
4-Chloroaniline	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Bis (2-Chloroethoxy) Methane	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Bis (2-Chloroethyl) Ether	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Bis (2-Chloroisopropyl) Ether	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
2-Chloronaphthalene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
2-Chlorophenol	--	10 U	10 UR	10 UJV	10 U	10 U	10 UIV
4-Chlorophenyl-phenylether	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Chrysene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Di-n-Butylphthalate	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Di-n-Octyl Phthalate	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Dibenz (a,h) Anthracene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Dibenzofuran	50	10 U	10 UR	10 UJV	13	10 U	10 U
1,2-Dichlorobenzene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
1,3-Dichlorobenzene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
1,4-Dichlorobenzene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
3,3'-Dichlorobenzidine	--	20 U	20 UR	20 UJV	20 U	20 U	20 U
2,4-Dichlorophenol	--	10 U	10 UR	10 UJV	10 U	10 U	10 UIV
Diethylphthalate	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Dimethyl phthalate	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
2,4-Dimethylphenol	--	10 U	10 UR	10 UJV	10 U	10 U	10 UIV
4,6-Dinitro-2-Methylphenol	--	50 U	50 UR	50 UJV	50 U	50 U	50 UIV
2,4-Dinitrophenol	--	50 U	50 UR	50 UJV	50 U	50 U	50 UIV
2,4-Dinitrotoluene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
2,6-Dinitrotoluene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Bis (2-Ethylhexyl) Phthalate	50	10 U	10 UR	10 UJV	12	10 U	32
Fluoranthene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Fluorene	50	10 U	10 UR	10 UJV	14	10 U	9.4 J
Hexachlorobenzene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Hexachlorobutadiene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Hexachlorocyclopentadiene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Hexachloroethane	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Indeno (1,2,3-cd) Pyrene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Isophorone	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
2-Methylnaphthalene	50	10 U	10 UR	10 UJV	66	10 U	96
4-Methylphenol	--	10 U	10 UR	10 UJV	10 U	10 U	10 UIV
2-Methylphenol	--	10 U	10 UR	10 UJV	10 U	10 U	10 UIV
N-Nitroso-Di-n-Propylamine	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
N-Nitrosodimethylamine	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
N-Nitrosodiphenylamine (1)	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
Naphthalene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
2-Nitroaniline	--	50 U	50 UR	50 UJV	50 U	50 U	50 U
4-Nitroaniline	--	50 U	50 UR	50 UJV	50 U	50 U	50 U
3-Nitroaniline	--	50 U	50 UR	50 UJV	50 U	50 U	50 U
Nitrobenzene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
4-Nitrophenol	--	50 U	50 UR	50 UJV	50 U	50 U	50 UIV
2-Nitrophenol	--	10 U	10 UR	10 UJV	10 U	10 U	10 UIV
Pentachlorophenol	--	50 U	50 UR	50 UJV	50 U	50 U	50 UIV
Phenanthrene	50	10 U	10 UR	10 UJV	11	10 U	10 U
Phenol	--	10 U	10 UR	10 UJV	10 U	10 U	10 UIV
Pyrene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
1,2,4-Trichlorobenzene	--	10 U	10 UR	10 UJV	10 U	10 U	10 U
2,4,5-Trichlorophenol	--	50 U	50 UR	50 UJV	50 U	50 U	50 UIV
2,4,6-Trichlorophenol	--	10 U	10 UR	10 UJV	10 U	10 U	10 UIV

Table 13. Summary of Semivolatile Organic Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Semi-Volatile Organic Compound (Concentrations in ug/L)	Sample Designation: Sample Date: NYS Standard 1)	MW-23+ 1/7/91	MW-25 1/4/91	MW-26 1/3/91	MW-26+ 1/3/91	MW-28 1/3/91	MW-29 1/3/91
Acenaphthene	50	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Acenaphthylene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Anthracene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Benzidine	--	50 UJV	50 U	50 UR	50 UJV	50 U	50 UR
Benzo (a) Anthracene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Benzo (a) Pyrene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Benzo (b+k) Fluoranthenes	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Benzo (g,h,i) Perylene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Benzoic Acid	--	50 UIV	50 U	50 UR	50 UJV	50 U	50 UR
Benzyl Alcohol	--	10 UIV	10 U	10 UR	10 UJV	10 U	10 UR
4-Bromophenyl-phenylether	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Butylbenzyl phthalate	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
4-Chloro-3-Methylphenol	--	10 UIV	10 U	10 UR	10 UJV	10 U	10 UR
4-Chloroaniline	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Bis (2-Chloroethoxy) Methane	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Bis (2-Chloroethyl) Ether	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Bis (2-Chloroisopropyl) Ether	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
2-Chloronaphthalene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
2-Chlorophenol	--	10 UIV	10 U	10 UR	10 UJV	10 U	10 UR
4-Chlorophenyl-phenylether	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Chrysene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Di-n-Butylphthalate	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Di-n-Octyl Phthalate	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Dibenz (a,h) Anthracene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Dibenzofuran	50	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
1,2-Dichlorobenzene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
1,3-Dichlorobenzene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
1,4-Dichlorobenzene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
3,3'-Dichlorobenzidine	--	20 UJV	20 U	20 UR	20 UJV	20 U	20 UR
2,4-Dichlorophenol	--	10 UIV	10 U	10 UR	10 UJV	10 U	10 UR
Diethylphthalate	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Dimethyl phthalate	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
2,4-Dimethylphenol	--	10 UIV	10 U	10 UR	10 UJV	10 U	10 UR
4,6-Dinitro-2-Methylphenol	--	50 UIV	50 U	50 UR	50 UJV	50 U	50 UR
2,4-Dinitrophenol	--	50 UIV	50 U	50 UR	50 UJV	50 U	50 UR
2,4-Dinitrotoluene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
2,6-Dinitrotoluene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Bis (2-Ethylhexyl) Phthalate	50	9.3 UJV	10 B	10 UR	10 UJV	19 B	9.7 BJR
Fluoranthene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Fluorene	50	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Hexachlorobenzene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Hexachlorobutadiene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Hexachlorocyclopentadiene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Hexachloroethane	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Indeno (1,2,3-cd) Pyrene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Isophorone	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
2-Methylnaphthalene	50	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
4-Methylphenol	--	10 UIV	10 U	10 UR	10 UJV	10 U	10 UR
2-Methylphenol	--	10 UIV	10 U	10 UR	10 UJV	10 U	10 UR
N-Nitroso-Di-n-Propylamine	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
N-Nitrosodimethylamine	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
N-Nitrosodiphenylamine (1)	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Naphthalene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
2-Nitroaniline	--	50 UJV	50 U	50 UR	50 UJV	50 U	50 UR
4-Nitroaniline	--	50 UJV	50 U	50 UR	50 UJV	50 U	50 UR
3-Nitroaniline	--	50 UJV	50 U	50 UR	50 UJV	50 U	50 UR
Nitrobenzene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
4-Nitrophenol	--	50 UIV	50 U	50 UR	50 UJV	50 U	50 UR
2-Nitrophenol	--	10 UIV	10 U	10 UR	10 UJV	10 U	10 UR
Pentachlorophenol	--	50 UIV	50 U	50 UR	50 UJV	50 U	50 UR
Phenanthrene	50	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
Phenol	--	10 UIV	10 U	10 UR	10 UJV	10 U	10 UR
Pyrene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
1,2,4-Trichlorobenzene	--	10 UJV	10 U	10 UR	10 UJV	10 U	10 UR
2,4,5-Trichlorophenol	--	50 UIV	50 U	50 UR	50 UJV	50 U	50 UR
2,4,6-Trichlorophenol	--	10 UIV	10 U	10 UR	10 UJV	10 U	10 UR

Table 13. Summary of Semivolatile Organic Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Semi-Volatile Organic Compound (Concentrations in ug/L)	NYS Standard 1)	Sample Designation: MW-29+ Sample Date: 1/3/91	MW-32 1/3/91	MW-33 1/4/91	MW-33* 1/4/91	FB-1 1/3/91	FB-2 1/4/91
Acenaphthene	50	10 UJV	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Anthracene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Benzidine	--	50 UJV	50 U	50 U	50 U	50 U	50 U
Benzo (a) Anthracene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Benzo (a) Pyrene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Benzo (b+k) Fluoranthenes	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Benzo (g,h,i) Perylene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Benzoic Acid	--	50 UJV	50 U	50 U	50 U	50 U	50 U
Benzyl Alcohol	--	10 UJV	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Butylbenzyl phthalate	--	10 UJV	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-Methylphenol	--	10 UJV	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Bis (2-Chloroethoxy) Methane	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Bis (2-Chloroethyl) Ether	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Bis (2-Chloroisopropyl) Ether	--	10 UJV	10 U	10 U	10 U	10 U	10 U
2-Chloronaphthalene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	--	10 UJV	10 U	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Chrysene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Di-n-Butylphthalate	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Di-n-Octyl Phthalate	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Dibenz (a,h) Anthracene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Dibenzofuran	50	10 UJV	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	--	20 UJV	20 U	20 U	20 U	20 U	20 U
2,4-Dichlorophenol	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Dimethyl phthalate	--	10 UJV	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	--	10 UJV	10 U	10 U	10 U	10 U	10 U
4,6-Dinitro-2-Methylphenol	--	50 UJV	50 U	50 U	50 U	50 U	50 U
2,4-Dinitrophenol	--	50 UJV	50 U	50 U	50 U	50 U	50 U
2,4-Dinitrotoluene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Bis (2-Ethylhexyl) Phthalate	50	10 UJV	15 B	10 U	10 U	10 U	10 U
Fluoranthene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Fluorene	50	10 UJV	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Indeno (1,2,3-cd) Pyrene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Isophorone	--	10 UJV	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	50	10 UJV	10 U	10 U	10 U	10 U	10 U
4-Methylphenol	--	10 UJV	10 U	10 U	10 U	10 U	10 U
2-Methylphenol	--	10 UJV	10 U	10 U	10 U	10 U	10 U
N-Nitroso-Di-n-Propylamine	--	10 UJV	10 U	10 U	10 U	10 U	10 U
N-Nitrosodimethylamine	--	10 UJV	10 U	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine (1)	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Naphthalene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	--	50 UJV	50 U	50 U	50 U	50 U	50 U
4-Nitroaniline	--	50 UJV	50 U	50 U	50 U	50 U	50 U
3-Nitroaniline	--	50 UJV	50 U	50 U	50 U	50 U	50 U
Nitrobenzene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
4-Nitrophenol	--	50 UJV	50 U	50 U	50 U	50 U	50 U
2-Nitrophenol	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	--	50 UJV	50 U	50 U	50 U	50 U	50 U
Phenanthrene	50	10 UJV	10 U	10 U	10 U	10 U	10 U
Phenol	--	10 UJV	10 U	10 U	10 U	10 U	10 U
Pyrene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	--	10 UJV	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	--	50 UJV	50 U	50 U	50 U	50 U	50 U
2,4,6-Trichlorophenol	--	10 UJV	10 U	10 U	10 U	10 U	10 U

Table 13. Summary of Semivolatile Organic Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Sample Designation: / Sample Date:		FB-3 1/7/91	FB-3+ 1/7/91	TB-1 1/3/91	TB-2 1/4/91	TB-3 1/7/91
Semi-Volatile Organic Compound (Concentrations in ug/L)	NYS Standard 1)					
Acenaphthene	50	10 UR	10 UJV	10 U	10 U	10 U
Acenaphthylene	--	10 UR	10 UJV	10 U	10 U	10 U
Anthracene	--	10 UR	10 UJV	10 U	10 U	10 U
Benzidine	--	50 UR	50 UJV	50 U	50 U	50 U
Benzo (a) Anthracene	--	10 UR	10 UJV	10 U	10 U	10 U
Benzo (a) Pyrene	--	10 UR	10 UJV	10 U	10 U	10 U
Benzo (b+k) Fluoranthenes	--	10 UR	10 UJV	10 U	10 U	10 U
Benzo (g,h,i) Perylene	--	10 UR	10 UJV	10 U	10 U	10 U
Benzoic Acid	--	50 UR	50 UJV	50 U	50 U	50 U
Benzyl Alcohol	--	10 UR	10 UJV	10 U	10 U	10 U
4-Bromophenyl-phenylether	--	10 UR	10 UJV	10 U	10 U	10 U
Butylbenzyl phthalate	--	10 UR	10 UJV	10 U	10 U	10 U
4-Chloro-3-Methylphenol	--	10 UR	10 UJV	10 U	10 U	10 U
4-Chloroaniline	--	10 UR	10 UJV	10 U	10 U	10 U
Bis (2-Chloroethoxy) Methane	--	10 UR	10 UJV	10 U	10 U	10 U
Bis (2-Chloroethyl) Ether	--	10 UR	10 UJV	10 U	10 U	10 U
Bis (2-Chloroisopropyl) Ether	--	10 UR	10 UJV	10 U	10 U	10 U
2-Chloronaphthalene	--	10 UR	10 UJV	10 U	10 U	10 U
2-Chlorophenol	--	10 UR	10 UJV	10 U	10 U	10 U
4-Chlorophenyl-phenylether	--	10 UR	10 UJV	10 U	10 U	10 U
Chrysene	--	10 UR	10 UJV	10 U	10 U	10 U
Di-n-Butylphthalate	--	10 UR	10 UJV	10 U	10 U	10 U
Di-n-Octyl Phthalate	--	10 UR	10 UJV	10 U	10 U	10 U
Dibenz (a,h) Anthracene	--	10 UR	10 UJV	10 U	10 U	10 U
Dibenzofuran	50	10 UR	10 UJV	10 U	10 U	10 U
1,2-Dichlorobenzene	--	10 UR	10 UJV	10 U	10 U	10 U
1,3-Dichlorobenzene	--	10 UR	10 UJV	10 U	10 U	10 U
1,4-Dichlorobenzene	--	10 UR	10 UJV	10 U	10 U	10 U
3,3'-Dichlorobenzidine	--	20 UR	20 UJV	20 U	20 U	20 U
2,4-Dichlorophenol	--	10 UR	10 UJV	10 U	10 U	10 U
Diethylphthalate	--	10 UR	10 UJV	10 U	10 U	10 U
Dimethyl phthalate	--	10 UR	10 UJV	10 U	10 U	10 U
2,4-Dimethylphenol	--	10 UR	10 UJV	10 U	10 U	10 U
4,6-Dinitro-2-Methylphenol	--	50 UR	50 UJV	50 U	50 U	50 U
2,4-Dinitrophenol	--	50 UR	50 UJV	50 U	50 U	50 U
2,4-Dinitrotoluene	--	10 UR	10 UJV	10 U	10 U	10 U
2,6-Dinitrotoluene	--	10 UR	10 UJV	10 U	10 U	10 U
Bis (2-Ethylhexyl) Phthalate	50	10 UR	10 UJV	8.8 BJ	8.8 BJ	10 U
Fluoranthene	--	10 UR	10 UJV	10 U	10 U	10 U
Fluorene	50	10 UR	10 UJV	10 U	10 U	10 U
Hexachlorobenzene	--	10 UR	10 UJV	10 U	10 U	10 U
Hexachlorobutadiene	--	10 UR	10 UJV	10 U	10 U	10 U
Hexachlorocyclopentadiene	--	10 UR	10 UJV	10 U	10 U	10 U
Hexachloroethane	--	10 UR	10 UJV	10 U	10 U	10 U
Indeno (1,2,3-cd) Pyrene	--	10 UR	10 UJV	10 U	10 U	10 U
Isophorone	--	10 UR	10 UJV	10 U	10 U	10 U
2-Methylnaphthalene	50	10 UR	10 UJV	10 U	10 U	10 U
4-Methylphenol	--	10 UR	10 UJV	10 U	10 U	10 U
2-Methylphenol	--	10 UR	10 UJV	10 U	10 U	10 U
N-Nitroso-Di-n-Propylamine	--	10 UR	10 UJV	10 U	10 U	10 U
N-Nitrosodimethylamine	--	10 UR	10 UJV	10 U	10 U	10 U
N-Nitrosodiphenylamine (1)	--	10 UR	10 UJV	10 U	10 U	10 U
Naphthalene	--	10 UR	10 UJV	10 U	10 U	10 U
2-Nitroaniline	--	50 UR	50 UJV	50 U	50 U	50 U
4-Nitroaniline	--	50 UR	50 UJV	50 U	50 U	50 U
3-Nitroaniline	--	50 UR	50 UJV	50 U	50 U	50 U
Nitrobenzene	--	10 UR	10 UJV	10 U	10 U	10 U
4-Nitrophenol	--	50 UR	50 UJV	50 U	50 U	50 U
2-Nitrophenol	--	10 UR	10 UJV	10 U	10 U	10 U
Pentachlorophenol	--	50 UR	50 UJV	50 U	50 U	50 U
Phenanthrene	50	10 UR	10 UJV	10 U	10 U	10 U
Phenol	--	10 UR	10 UJV	10 U	10 U	10 U
Pyrene	--	10 UR	10 UJV	10 U	10 U	10 U
1,2,4-Trichlorobenzene	--	10 UR	10 UJV	10 U	10 U	10 U
2,4,5-Trichlorophenol	--	50 UR	50 UJV	50 U	50 U	50 U
2,4,6-Trichlorophenol	--	10 UR	10 UJV	10 U	10 U	10 U

Table 13. Summary of Semivolatile Organic Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

B - Detected in laboratory blank.
U - Below reported quantitation level.
V - Qualifier added and/or value altered during data validation.
I - Result declared inconclusive during data validation.
J - Estimated level.
R - Result declared unusable during data validation.
FB - Field blank.
TB - Trip blank.
* - Replicate sample.
ug/L - Micrograms per liter.
-- Compound not detected, standard not listed.
+ - Reanalyzed.

1) Standards listed are the most stringent of the standards or guidance values found in either the New York State Official Compilation of Codes, Rules and Regulations (10 NYCRR Subpart 5.1 MCL or 6NYCRR 703 Standard) or in the New York State Department of Environmental Concervation Division of Water Technical and Operational Guidance Series (1.1.1.), Ambient Water Quality Standards and Guidance Values. Standards are only provided for those compounds for which concentrations were detected.

Table 14. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Sample Designation: / Sample Date:		MW-1 1/7/91	MW-3 2/21/91	MW-9 1/7/91	MW-13 1/7/91	MW-19 1/4/91	MW-21 1/4/91	MW-21* 1/4/91
Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/L)	NYS Standard 1)							
Pesticides								
alpha-BHC	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	NA	NA
beta-BHC	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	NA	NA
delta-BHC	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	NA	NA
gamma-BHC (Lindane)	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	NA	NA
Heptachlor	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	NA	NA
Aldrin	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	NA	NA
Heptachlor Epoxide	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	NA	NA
Endosulfan I	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	NA	NA
Dieldrin	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	NA	NA
4,4'-DDE	--	0.10 U	NA	0.10 U	0.10 UIV	0.10 U	NA	NA
Endrin	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	NA	NA
Endosulfan II	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	NA	NA
4,4'-DDD	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	NA	NA
Endosulfate	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	NA	NA
4,4'-DDT	--	0.10 U	NA	0.10 U	0.10 UIV	0.10 U	NA	NA
Endrin Ketone	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	NA	NA
Methoxychlor	--	0.50 U	NA	0.50 U	0.50 U	0.50 U	NA	NA
alpha-chlordane	--	0.50 U	NA	0.50 U	0.50 U	0.50 U	NA	NA
gamma-chlordane	--	0.50 U	NA	0.50 U	0.50 U	0.50 U	NA	NA
Toxaphene	--	1.00 U	NA	1.00 U	1.00 U	1.00 U	NA	NA
PCBs								
Arochlor-1016	--	0.50 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1221	--	0.50 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1232	--	0.50 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1242	--	0.50 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1248	--	0.50 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1254	0.1	1.00 U	1.0 U	1.00 U	5.70 JV	1.00 U	1.00 U	1.00 U
Arochlor-1260	0.1	1.00 U	1.0 U	1.00 U	3.20 JV	1.00 U	1.00 U	1.00 U

Table 14. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Sample Designation: / Sample Date:		MW-22 1/7/91	MW-23 1/7/91	MW-23* 1/7/91	MW-24 1/3/91	MW-25 1/4/91	MW-26 1/3/91	MW-27 1/4/91
Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/L)	NYS Standard 1)							
Pesticides								
alpha-BHC	--	NA	0.05 U	NA	NA	0.05 U	0.05 U	NA
beta-BHC	--	NA	0.05 U	NA	NA	0.05 U	0.05 U	NA
delta-BHC	--	NA	0.05 U	NA	NA	0.05 U	0.05 U	NA
gamma-BHC (Lindane)	--	NA	0.05 U	NA	NA	0.05 U	0.05 U	NA
Heptachlor	--	NA	0.05 U	NA	NA	0.05 U	0.05 U	NA
Aldrin	--	NA	0.05 U	NA	NA	0.05 U	0.05 U	NA
Heptachlor Epoxide	--	NA	0.05 U	NA	NA	0.05 U	0.05 U	NA
Endosulfan I	--	NA	0.05 U	NA	NA	0.05 U	0.05 U	NA
Dieldrin	--	NA	0.10 U	NA	NA	0.10 U	0.10 U	NA
4,4'-DDE	--	NA	0.10 U	NA	NA	0.10 UIV	0.10 U	NA
Endrin	--	NA	0.10 U	NA	NA	0.10 U	0.10 U	NA
Endosulfan II	--	NA	0.10 U	NA	NA	0.10 U	0.10 U	NA
4,4'-DDD	--	NA	0.10 U	NA	NA	0.10 U	0.10 U	NA
Endosulfate	--	NA	0.10 U	NA	NA	0.10 U	0.10 U	NA
4,4'-DDT	--	NA	0.10 U	NA	NA	0.10 UIV	0.10 U	NA
Endrin Ketone	--	NA	0.10 U	NA	NA	0.10 U	0.10 U	NA
Methoxychlor	--	NA	0.50 U	NA	NA	0.50 U	0.50 U	NA
alpha-chlordane	--	NA	0.50 U	NA	NA	0.50 U	0.50 U	NA
gamma-chlordane	--	NA	0.50 U	NA	NA	0.50 U	0.50 U	NA
Toxaphene	--	NA	1.00 U	NA	NA	1.00 U	1.00 U	NA
PCBs								
Arochlor-1016	--	80 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1221	--	80 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1232	--	80 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1242	--	80 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1248	--	80 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1254	0.1	2.10 JV	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Arochlor-1260	0.1	5.40 JV	1.00 U	1.00 U	1.00 U	2.85 JV	1.00 U	1.00 U

Table 14. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Sample Designation: / Sample Date: Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/L)	NYS Standard 1)	MW-27* 1/4/91	MW-28 1/3/91	MW-29 1/3/91	MW-30 1/3/91	MW-31 1/4/91	MW-32 1/3/91	MW-33 1/4/91
<u>Pesticides</u>								
alpha-BHC	--	NA	0.05 U	0.05 U	NA	NA	0.05 U	0.05 U
beta-BHC	--	NA	0.05 U	0.05 U	NA	NA	0.05 U	0.05 U
delta-BHC	--	NA	0.05 U	0.05 U	NA	NA	0.05 U	0.05 U
gamma-BHC (Lindane)	--	NA	0.05 U	0.05 U	NA	NA	0.05 U	0.05 U
Heptachlor	--	NA	0.05 U	0.05 U	NA	NA	0.05 U	0.05 U
Aldrin	--	NA	0.05 U	0.05 U	NA	NA	0.05 U	0.05 U
Heptachlor Epoxide	--	NA	0.05 U	0.05 U	NA	NA	0.05 U	0.05 U
Endosulfan I	--	NA	0.05 U	0.05 U	NA	NA	0.05 U	0.05 U
Dieldrin	--	NA	0.10 U	0.10 U	NA	NA	0.10 U	0.10 U
4,4'-DDE	--	NA	0.10 U	0.10 U	NA	NA	0.10 U	0.10 U
Endrin	--	NA	0.10 U	0.10 U	NA	NA	0.10 U	0.10 U
Endosulfan II	--	NA	0.10 U	0.10 U	NA	NA	0.10 U	0.10 U
4,4'-DDD	--	NA	0.10 U	0.10 U	NA	NA	0.10 U	0.10 U
Endosulfate	--	NA	0.10 U	0.10 U	NA	NA	0.10 U	0.10 U
4,4'-DDT	--	NA	0.10 U	0.10 U	NA	NA	0.10 U	0.10 U
Endrin Ketone	--	NA	0.10 U	0.10 U	NA	NA	0.10 U	0.10 U
Methoxychlor	--	NA	0.50 U	0.50 U	NA	NA	0.50 U	0.50 U
alpha-chlordane	--	NA	0.50 U	0.50 U	NA	NA	0.50 U	0.50 U
gamma-chlordane	--	NA	0.50 U	0.50 U	NA	NA	0.50 U	0.50 U
Toxaphene	--	NA	1.00 U	1.00 U	NA	NA	1.00 U	1.00 U
<u>PCBs</u>								
Arochlor-1016	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1221	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1232	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1242	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1248	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1254	0.1	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Arochlor-1260	0.1	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

Table 14. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/L)	Sample Designation: / Sample Date: NYS Standard 1)	MW-33* 1/4/91	MW-34 1/3/91	FB-1 1/3/91	FB-2 1/4/91	FB-3 1/7/91	TB-1 1/3/91	TB-2 1/4/91
Pesticides								
alpha-BHC	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
beta-BHC	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC (Lindane)	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Aldrin	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor Epoxide	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan I	--	0.05 U	NA	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dieldrin	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDE	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan II	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfate	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin Ketone	--	0.10 U	NA	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Methoxychlor	--	0.50 U	NA	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
alpha-chlordane	--	0.50 U	NA	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
gamma-chlordane	--	0.50 U	NA	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Toxaphene	--	1.00 U	NA	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
PCBs								
Arochlor-1016	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1221	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1232	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1242	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1248	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Arochlor-1254	0.1	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Arochlor-1260	0.1	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

Table 14. Summary of Pesticide and Polychlorinated Biphenyl (PCB) Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Pesticide and Polychlorinated Biphenyl (PCB) Compounds (Concentrations in ug/L)	Sample Designation: / Sample Date: NYS Standard 1)	TB-3 1/7/91
Pesticides		
alpha-BHC	--	0.05 U
beta-BHC	--	0.05 U
delta-BHC	--	0.05 U
gamma-BHC (Lindane)	--	0.05 U
Heptachlor	--	0.05 U
Aldrin	--	0.05 U
Heptachlor Epoxide	--	0.05 U
Endosulfan I	--	0.05 U
Dieldrin	--	0.10 U
4,4'-DDE	--	0.10 U
Endrin	--	0.10 U
Endosulfan II	--	0.10 U
4,4'-DDD	--	0.10 U
Endosulfate	--	0.10 U
4,4'-DDT	--	0.10 U
Endrin Ketone	--	0.10 U
Methoxychlor	--	0.50 U
alpha-chlordane	--	0.50 U
gamma-chlordane	--	0.50 U
Toxaphene	--	1.00 U
PCBs		
Arochlor-1016	--	0.50 U
Arochlor-1221	--	0.50 U
Arochlor-1232	--	0.50 U
Arochlor-1242	--	0.50 U
Arochlor-1248	--	0.50 U
Arochlor-1254	0.1	1.00 U
Arochlor-1260	0.1	1.00 U

B - Detected in laboratory blank.
U - Below reported quantitation level.
V - Qualifier added and/or altered during data validation.
I - Results declared inconclusive during data validation.
J - Estimated level.
NA - Not analyzed.
FB - Field blank.
TB - Trip blank.
* - Replicate sample.
ug/L - Micrograms per liter.
-- Compound not detected, standard not listed.

1) Standards listed are the most stringent of the standards found in either the New York State Official Compilation of Codes, Rules and Regulations (10 NYCRR Subpart 5.1 MCL or 6NYCRR 703 Standard) or in the New York State Department of Environmental Concervation Division of Water Technical and Operational Guidance Series (1.1.1.), Ambient Water Quality Standards and Guidance Values. Standards are only provided for those compounds for which concentrations were detected.

Table 15. Summary of Total Petroleum Hydrocarbon Compound Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Sample Designation	Sample Date	Total Petroleum Hydrocarbons (mg/L)
MW-1	1/7/91	<0.9
MW-3	2/21/91	11.5
MW-9	1/7/91	<0.9
MW-13	1/7/91	14.1
MW-19	1/4/91	<0.9
MW-21	1/4/91	11.0
MW-21*	1/4/91	12.3
MW-22	1/7/91	8.0
MW-23	1/7/91	6.1
MW-23*	1/7/91	4.5
MW-24	1/3/91	<0.9
MW-25	1/4/91	1.2
MW-26	1/3/91	<0.9
MW-27	1/4/91	<0.9
MW-27*	1/4/91	2.2
MW-28	1/3/91	13.1
MW-29	1/3/91	<0.9
MW-30	1/3/91	<0.9
MW-31	1/4/91	<0.9
MW-32	1/3/91	<0.9
MW-33	1/4/91	15.0
MW-34	1/3/91	<0.9
FB-1	1/3/91	<0.9
FB-2	1/4/91	<0.9
FB-3	1/7/91	<0.9
TB-1	1/3/91	<0.9
TB-2	1/4/91	<0.9
TB-3	1/7/91	<0.9

* Indicates replicate sample.
mg/L - Milligrams per liter.

Table 16. Summary of Metal Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Metals (Concentrations in ug/L)	Sample Designation: Sample Date: NYS Standard 1)	MW-1 1/8/91	MW-9 1/8/91	MW-13 1/8/91	MW-19 1/5/91	MW-23 1/8/91	MW-25 1/5/91
Aluminum	NS	3320 N*V	1800 N*V	14200 N*V	1710 N*V	887 N*V	22600 N*V
Antimony	NS	<7.6	<7.6	<7.6 WV	<7.6	<7.6	<7.6
Arsenic	25	<3.0	8.4 B	5.0 B	<3.0	<3.0	<3.0
Barium	1,000	107 B	160 B	132 B	89 B	532	247
Beryllium	3	<1.6	<1.6	<1.6	<1.6	<1.6	2.0 B
Cadmium	10	<5.0	<5.0	<5.0	<5.0	<5.0	7.0
Calcium	NS	72200	33100	12900	49300	70300 V	16500
Chromium	50	19	21	27	6.7 BWV	9.0 B	81
Cobalt	NS	<8.7	<8.7	<8.7	<8.7	<8.7	35 B
Copper	200	24 B	99	61	17 B	31	101
Iron	300	7120	6820	24100	2710	14000	63000
Lead	25	47 N*V	95 N*V	89 N*V	50 N*V	31 N*V	93 N*V
Magnesium	35,000	26800	9510	5780	6290	15900	11300
Manganese	300	557 NV	803 N	1060 NV	2340 NV	2940 NV	3490 NV
Mercury	2	<0.2	<0.2	0.5	0.5	0.7	<0.2
Nickel	NS	<22	32 B	26 B	<22	<22	71
Potassium	NS	3240 B	5840	3830	5820	5460	5370
Selenium	10	<3.3 N*WV	<3.3 N*WV	<3.3 N*WV	<3.3 N*V	<3.3 N*V	<3.3 N*WV
Silver	50	<2.5 WV	<2.5 WV	<2.5	<2.8	<2.5	<2.8
Sodium	20,000	6460	24900	90000	40700	209000	4470
Thallium	4	<3.5 WNV	<3.5 WNV	<3.5 WNV	<3.5 WNV	<3.5 WNV	<3.5 NV
Vanadium	NS	22 B	18 B	32 B	<9.2	<9.2	79
Zinc	300	36	505	98	32	28	228

Table 16. Summary of Metal Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

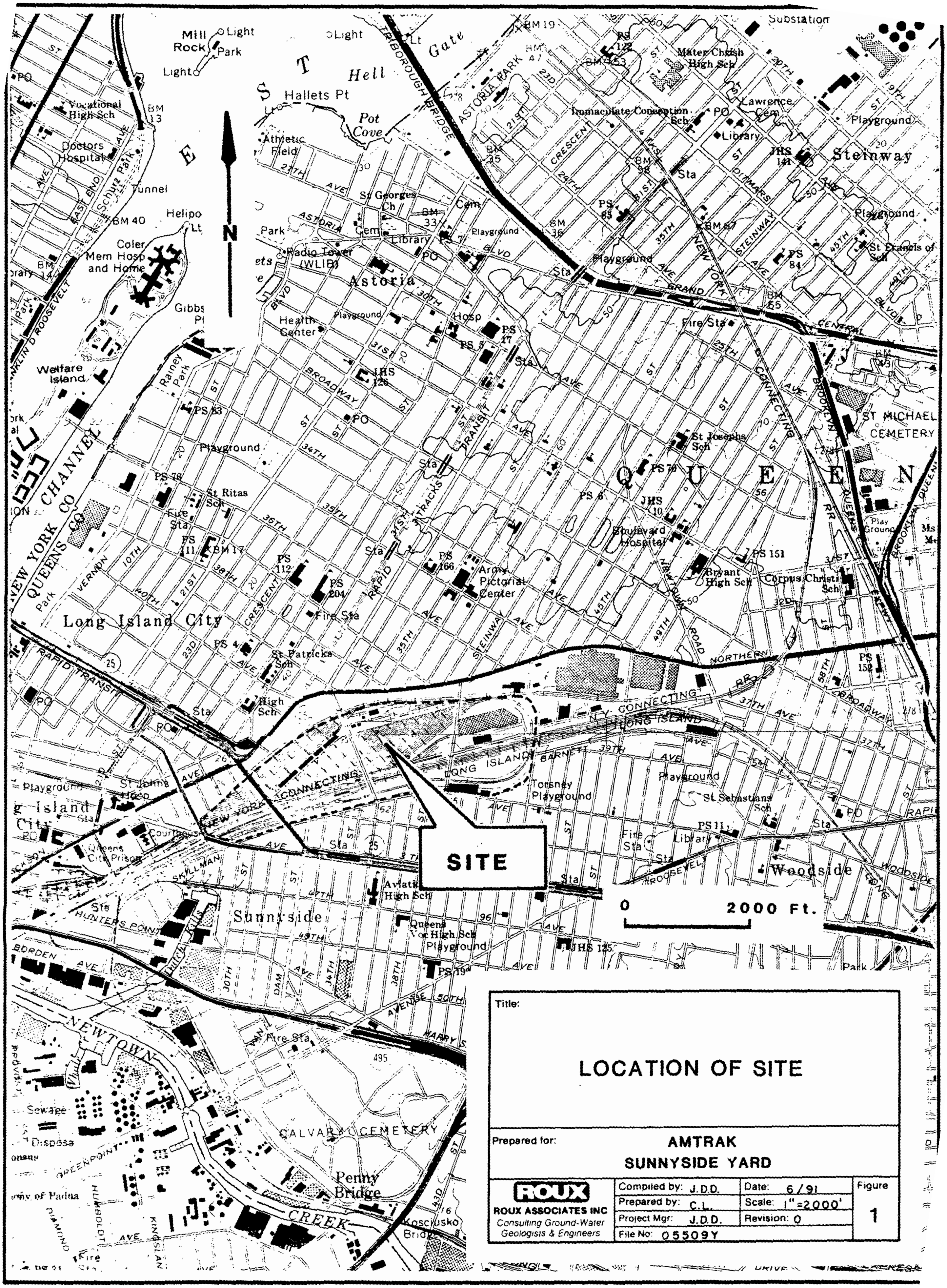
Metals (Concentrations in ug/L)	Sample Designation: Sample Date: NYS Standard 1)	MW-26 1/4/91	MW-28 1/8/91	MW-29 1/4/91	MW-32 1/4/91	MW-33 1/5/91	MW-33+ 1/5/91
Aluminum	NS	15300 N*V	1760 N*V	294 N*V	869 N*V	4460 N*	3150 N*V
Antimony	NS	<7.6	<7.6	<7.6	<7.6	<7.6	<7.6
Arsenic	25	3.3 B	<3.0	5.9 B	<3.0	<3.0	<3.0
Barium	1,000	318	47 B	152 B	28 B	95 B	105
Beryllium	3	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
Cadmium	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Calcium	NS	75200	24200	64500	31900	28700	30400
Chromium	50	43	5.2 B	<2.2	5.5 B	15	13
Cobalt	NS	23 B	<8.7	<8.7	<8.7	12 B	19
Copper	200	62	<11	<11	18 B	<11	12
Iron	300	28700	1790	21400	1430	7450	4940
Lead	25	67 N*V	40 N*V	38 N*V	49 N*V	17 N*	53 N*V
Magnesium	35,000	23400	4260 B	21200	11500	8860	8250
Manganese	300	3720 NV	1090 N	2750 NV	229 NV	484 N	442 NV
Mercury	2	0.2	0.5	0.2	0.2	<0.2	<0.2
Nickel	NS	38 B	26	<22	<22	27 B	<22
Potassium	NS	5800	5020	7070	3640 B	4470 B	4180
Selenium	10	<3.3 N*WV	<3.3 N*WV	<3.3 N*WV	<3.3 N*V	10.1 R	<3.3 N*WV
Silver	50	<2.8	<2.8	<2.8 WV	<2.8	<2.8	<2.8 WV
Sodium	20,000	12700	134000	169000	93400	43900	44800
Thallium	4	<3.5 WNV	<3.5 WNV	<3.5 WNV	<3.5 NV	<3.5 WNV	<3.5 WNV
Vanadium	NS	30 B	<9.2	<9.2	<9.2	<9.2	<9.2
Zinc	300	73	20	13 B	31	92	71

Table 16. Summary of Metal Concentrations Detected in Ground-Water Samples, Sunnyside Yard, Queens, New York.

Sample Designation:		FB-1	FB-2	FB-3	TB-1	TB-2	TB-3
Sample Date:		1/4/91	1/5/91	1/8/91	1/4/91	1/5/91	1/8/91
Metals (Concentrations in ug/L)	NYS Standard 1)						
Aluminum	NS	<97 N*V	100 BN*V	168 BN*V	<97 N*V	<97 N*V	119 BN*V
Antimony	NS	<7.6	<7.6	<7.6	<7.6	<7.6	<7.6
Arsenic	25	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Barium	1,000	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
Beryllium	3	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
Cadmium	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Calcium	NS	403 B	568 B	381 B	523 B	210 B	496 B
Chromium	50	2.7 B	<2.2	7.4 B	<2.2 WV	<2.2	8.2 B
Cobalt	NS	<8.7	<8.7	<8.7	<8.7	<8.7	<8.7
Copper	200	<11	<11	12 B	<11	<11	<11
Iron	300	69 B	140	81 B	71	79 B	64 B
Lead	25	41 N*V	12 N*V	9.1 WN*V	11 N*V	9.2 N*V	43 N*V
Magnesium	35,000	<71	80 B	176 B	<71	<71	144 B
Manganese	300	<3.4 N	<3.4 N	<3.4 N	<3.2 NV	<3.4 NV	<3.4 NV
Mercury	2	0.7	0.3	0.2	<0.2	<0.2	0.6
Nickel	NS	<22	<22	<22	<22	<22	<22
Potassium	NS	<34	<34	140 B	<34	<34	250 B
Selenium	10	<3.3 N*V	<3.3 N*WV	<3.3 N*WV	<3.3 N*V	<3.3 N*V	<3.3 N*WV
Silver	50	<2.8 WV	<2.8	<2.5 W	<2.8	<2.8	<2.5
Sodium	20,000	720 B	800 B	230 B	660 B	530 B	480 B
Thallium	4	<3.5 NV	<3.5 NV	<3.5 N	<3.5 NV	<3.5 N	<3.5 N
Vanadium	NS	<9.2	<9.2	16 B	<9.2	<9.2	12 B
Zinc	300	11 B	28	9.0 B	13 B	8.0 B	6.0 B

B - Value >IDL but <CRDL.
N - Matrix spike outside of recovery limits.
< or U - Value <IDL.
* - Duplicate RPD out of control.
W - Post digest spike recovery out of range.
V - Qualifier added and/or value altered during data validation.
R - Declared unusable during data validation.
+ - Replicate sample.
ug/L - Micrograms per liter.
FB - Field blank.
TB - Trip blank.

1) Standards listed are the most stringent of the standards or guidance values found in either the New York State Official Compilation of Codes, Rules and Regulations (10 NYCRR Subpart 5.1 MCL or 6NYCRR 703 Standard) or in Guidance Series (1.1.1.), Ambient Water Quality Standards and Guidance Values. Standards are only provided for those compounds for which concentrations were detected.



Title:

LOCATION OF SITE

Prepared for: **AMTRAK**
SUNNYSIDE YARD

ROUX
ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: J.D.D.	Date: 6/91	Figure
Prepared by: C.L.	Scale: 1"=2000'	1
Project Mgr: J.D.D.	Revision: 0	
File No: 05509Y		

EXPLANATION

MW-22	EXISTING MONITORING WELL LOCATION AND DESIGNATION
S-3	EXISTING SOIL BORING LOCATION AND DESIGNATION
MW-18	PROPOSED MONITORING WELL LOCATION AND DESIGNATION
S-12	PROPOSED SOIL BORING LOCATION AND DESIGNATION
RW-2	PROPOSED RECOVERY WELL (INTERIM REMEDIAL MEASURE) LOCATION AND DESIGNATION
MW-4 *	FORMER WELL LOCATION AND DESIGNATION (DESTROYED)
	INFERRED LOCATIONS OF CATCH BASINS TAKEN FROM ENGINEERING DIAGRAMS. UNABLE TO VERIFY BY FIELD INVESTIGATION
	AREAS OF CONCERN
	CATCH BASIN LOCATION
	MANHOLE LOCATION
	RECOVERY SYSTEM LOCATION
	APPROXIMATE LOCATION OF SEWER, TAKEN FROM ENGINEERING DIAGRAMS
42"	APPROXIMATE DIAMETER OF SEWER, TAKEN FROM ENGINEERING DIAGRAMS

0 40 80 FEET

Title: AREA 1 SITE MAP

Prepared For: AMTRAK SUNNYSIDE YARD

ROUX
ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: H.G.	Date: 2/91	Plate
Prepared by: C.L.	Scale: SHOWN	
Project Mgr: J.D.D.	Revision:	1
File No: AM509B12		

EXPLANATION

MW–27	MONITORING WELL LOCATION AND DESIGNATION
S–25	SOIL BORING LOCATION AND DESIGNATION
	AREAS OF CONCERN
	APPROXIMATE PROPERTY BOUNDARY
12"	APPROXIMATE LOCATION OF SEWER, TAKEN FROM ENGINEERING DRAWINGS APPROXIMATE DIAMETER OF SEWER
□	CATCH BASIN
○	MANHOLE

0 200 400 FEET

Title:

SUNNYSIDE YARD SITE MAP

Prepared For:

AMTRAK
SUNNYSIDE YARD

ROUX
ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: B.W.	Date: 2/91	PLATE
Prepared by: C.L.	Scale: SHOWN	2
Project Mgr: J.D.D.	Revision: 0	
File No: 05509BM4		

EXPLANATION

MW-22	EXISTING MONITORING WELL LOCATION AND DESIGNATION
S-3	EXISTING SOIL BORING LOCATION AND DESIGNATION
MW-18	PROPOSED MONITORING WELL LOCATION AND DESIGNATION
S-12	PROPOSED SOIL BORING LOCATION AND DESIGNATION
RW-2	PROPOSED RECOVERY WELL (INTERIM REMEDIAL MEASURE) LOCATION AND DESIGNATION
MW-4 *	FORMER WELL LOCATION AND DESIGNATION (DESTROYED)
	AREAS OF CONCERN
MW-7 15.43	WATER-TABLE ELEVATION, IN FEET RELATIVE TO MEAN SEA LEVEL
4.41	APPARENT THICKNESS OF SEPARATE PHASE PETROLEUM, IN FEET
15.5	LINE OF EQUAL GROUND-WATER ELEVATION, DASHED WHERE INFERRED
	APPROXIMATE DIRECTION OF GROUND-WATER FLOW
4	LINE OF EQUAL SEPARATE PHASE PETROLEUM THICKNESS

0 40 80 FEET

NOTES:

1) GROUND-WATER ELEVATIONS CORRECTED FOR PRESENCE OF SEPARATE PHASE PETROLEUM
2) MONITORING WELL MW-23 WAS OMITTED BECAUSE SCREEN ZONE DOES NOT INTERSECT WATER TABLE
3) PREVIOUSLY INSTALLED MONITORING WELL MW-12 OMITTED DUE TO ANOMALOUS READINGS
4) (N.P.) INDICATES NO MEASURABLE PRODUCT WAS DETECTED

Title: AREA 1

WATER-TABLE ELEVATIONS AND EXTENT OF SEPARATE PHASE PETROLEUM

JANUARY 15, 1991

Prepared For: AMTRAK SUNNYSIDE YARD

ROUX ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers	Compiled by: H.G.	Date: 2/91	Plate
	Prepared by: C.L.	Scale: SHOWN	3
	Project Mgr: J.D.D.	Revision:	
	File No: AM509C04		

EXPLANATION

MW-22	EXISTING MONITORING WELL LOCATION AND DESIGNATION
S-3	EXISTING SOIL BORING LOCATION AND DESIGNATION
MW-18	PROPOSED MONITORING WELL LOCATION AND DESIGNATION
S-12	PROPOSED SOIL BORING LOCATION AND DESIGNATION
RW-2	PROPOSED RECOVERY WELL (INTERIM REMEDIAL MEASURE) LOCATION AND DESIGNATION
MW-4 *	FORMER WELL LOCATION AND DESIGNATION (DESTROYED)
	AREAS OF CONCERN
MW-7 15.26 3.10	WATER-TABLE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL; APPARENT THICKNESS OF SEPARATE PHASE PETROLEUM IN FEET
15.5	LINE OF EQUAL GROUND-WATER ELEVATION, DASHED WHERE INFERRED
	APPROXIMATE DIRECTION OF GROUND-WATER FLOW
4	LINE OF EQUAL SEPARATE PHASE PETROLEUM THICKNESS

0 40 80 FEET

NOTES:

1) GROUND-WATER ELEVATIONS CORRECTED FOR PRESENCE OF SEPARATE PHASE PETROLEUM
2) MONITORING WELL MW-23 WAS OMITTED BECAUSE SCREEN ZONE DOES NOT INTERSECT WATER TABLE
3) PREVIOUSLY INSTALLED MONITORING WELL MW-12 OMITTED DUE TO ANOMALOUS READINGS
4) (N.P.) INDICATES NO MEASURABLE PRODUCT WAS DETECTED
5) (N.R.) NOT RECORDED

Title:

AREA 1

WATER-TABLE ELEVATIONS AND EXTENT OF SEPARATE PHASE PETROLEUM

FEBRUARY 13, 1991

Prepared For: AMTRAK SUNNYSIDE YARD

ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers

Compiled by: H.G.	Date: 2/91	Plate
Prepared by: C.L.	Scale: SHOWN	4
Project Mgr: J.D.D.	Revision:	
File No: AM509B12		

EXPLANATION

- MW-27 — EXISTING MONITORING WELL LOCATION AND DESIGNATION
- S-25 — EXISTING SOIL BORING LOCATION AND DESIGNATION
- AREAS OF CONCERN
- APPROXIMATE PROPERTY BOUNDARY
- MW-27 12.75 — WATER-TABLE ELEVATION, IN FEET RELATIVE, TO MEAN SEA LEVEL
- 20 — LINE OF EQUAL GROUND-WATER ELEVATION, DASHED WHERE INFERRED
- APPROXIMATE DIRECTION OF GROUND-WATER FLOW
- APPROXIMATE EXTENT OF SEPARATE PHASE PETROLEUM

0 200 400 FEET

Title:

WATER-TABLE ELEVATIONS

JANUARY 15, 1991

Prepared For:

AMTRAK
SUNNYSIDE YARD

ROUX
ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: B.W.	Date: 2/91	PLATE
Prepared by: C.L.	Scale: SHOWN	5
Project Mgr: J.D.D.	Revision: 0	
File No: 05509BM4		

EXPLANATION

B-5 — SAMPLE LOCATION AND DESIGNATION
33.6 — PEAK PHOTOIONIZATION DETECTOR READING (ppm)

AREAS OF CONCERN

APPROXIMATE PROPERTY BOUNDARY

APPROXIMATE EXTENT OF SEPARATE PHASE PETROLEUM, AS DETERMINED FROM SEPARATE PHASE PETROLEUM THICKNESS MEASUREMENTS ON JANUARY 15, 1991

0 40 80 FEET

Title:

AREA 1
SOIL GAS SURVEY RESULTS
JANUARY 1991

Prepared For:
AMTRAK
SUNNYSIDE YARD

ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers	Compiled by: H.G.	Date: 2/91	Plate 6
	Prepared by: C.L.	Scale: SHOWN	
	Project Mgr: J.D.D.	Revision:	
	File No: AM509C04		

EXPLANATION

VOLATILES	
CARBON DISULFIDE	7.7
METHYLENE CHLORIDE	32
TOLUENE	4.8J
SEMIVOLATILES	
ACENAPHTHYLENE	337J
ANTHRACENE	307J
BENZO(a)ANTHRACENE	404JV
BENZO(a)PYRENE	699JV
BENZO(b+k)FLUORANTHENES	5617JV
BUTYLBENZYL PHTHALATE	234J
CHRYSENE	913JV
DI-N-BUTYLPHTHALATE	898JV
BIS(2-ETHYLHEXYL)PHTHALATE	1500BJ
FLUORANTHENE	2585JV
PHENANTHRENE	406JV
PYRENE	1270J
DEPTH	0-2

VOLATILE ORGANIC COMPOUND CONCENTRATIONS DETECTED IN SOIL SAMPLES, CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (ug /kg)

SEMIVOLATILE ORGANIC COMPOUND CONCENTRATIONS DETECTED IN SOIL SAMPLES, CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (ug /kg)

SAMPLE DEPTH, IN FEET BELOW LAND SURFACE

J - ESTIMATED VALUE
ND - NOT DETECTED
B - DETECTED IN LABORATORY BLANK
R - UNUSABLE DATA
V - QUALIFIER ADDED AND/OR VALUE ALTERED DURING DATA VALIDATION

MW-27 EXISTING MONITORING WELL LOCATION AND DESIGNATION

S-25 EXISTING SOIL BORING LOCATION AND DESIGNATION

AREAS OF CONCERN

APPROXIMATE PROPERTY BOUNDARY

0 200 400 FEET

Title:

CONCENTRATIONS OF VOCs AND SEMIVOLATILES DETECTED IN SOIL

Prepared For:

AMTRAK
SUNNYSIDE YARD

ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers	Compiled by: B.W.	Date: 2/91	PLATE 7
	Prepared by: C.L.	Scale: SHOWN	
	Project Mgr: J.D.D.	Revision: 0	
	File No: AM509C10		

EXPLANATION

MW-22 — EXISTING MONITORING WELL LOCATION AND DESIGNATION

S-3 — EXISTING SOIL BORING LOCATION AND DESIGNATION

MW-18 — PROPOSED MONITORING WELL LOCATION AND DESIGNATION

S-12 — PROPOSED SOIL BORING LOCATION AND DESIGNATON

RW-2 — PROPOSED RECOVERY WELL (INTERIM REMEDIAL MEASURE) LOCATION AND DESIGNATION

MW-4 * — FORMER WELL LOCATION AND DESIGNATION (DESTROYED)

AREAS OF CONCERN

MW-22 | 18,220 | 0 - 2

CONCENTRATIONS OF TOTAL PETROLEUM HYDROCARBONS DETECTED IN SOIL SAMPLES
CONCENTRATIONS IN MILLIGRAMS PER KILOGRAM (mg/kg)

SAMPLE DEPTH, IN FEET BELOW LAND SURFACE

V — QUALIFIER ADDED AND/OR VALUE ALTERED DURING DATA VALIDATION

0 40 80 FEET

Title: AREA 1

CONCENTRATIONS OF PHCs DETECTED IN SOIL

Prepared For: AMTRAK SUNNYSIDE YARD

ROUX — ROUX ASSOCIATES INC — Consulting Ground-Water Geologists & Engineers

Compiled by: H.G.	Date: 2/91	Plate
Prepared by: C.L.	Scale: SHOWN	8
Project Mgr: J.D.D.	Revision:	
File No: AM509B13		

EXPLANATION

MW-27 — EXISTING MONITORING WELL LOCATION AND DESIGNATION

S-25 — EXISTING SOIL BORING LOCATION AND DESIGNATION

AREAS OF CONCERN

APPROXIMATE PROPERTY BOUNDARY

98	0 - 2
36	2 - 4
328	8 - 10

DEPTH OF SAMPLE IN FEET BELOW LAND SURFACE

TOTAL PETROLEUM HYDROCARBONS IN MILLIGRAMS PER KILOGRAM (mg/kg)

NOTE: ALL SOIL BORING AND MONITORING WELL LOCATIONS WERE ANALYZED FOR TOTAL PETROLEUM HYDROCARBONS

NON DETECTS WERE OMITTED

MW-33 DATA NOT AVAILABLE

V QUALIFIER ADDED AND / OR VALUE ALTERED DURING DATA VALIDATION

0 200 400 FEET

Title:

CONCENTRATIONS OF PHCs DETECTED IN SOIL

Prepared For:

AMTRAK
SUNNYSIDE YARD

ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: B.W.	Date: 2/91	PLATE
Prepared by: C.L.	Scale: SHOWN	9
Project Mgr: J.D.D.	Revision: 0	
File No: 05509BM4		

EXPLANATION

MW-22	EXISTING MONITORING WELL LOCATION AND DESIGNATION
S-3	EXISTING SOIL BORING LOCATION AND DESIGNATION
MW-18	PROPOSED MONITORING WELL LOCATION AND DESIGNATION
S-12	PROPOSED SOIL BORING LOCATION AND DESIGNATION
RW-2	PROPOSED RECOVERY WELL (INTERIM REMEDIAL MEASURE) LOCATION AND DESIGNATION
MW-4 *	FORMER WELL LOCATION AND DESIGNATION (DESTROYED)
	AREAS OF CONCERN

MW-22 790JV 0 - 2

CONCENTRATION OF PCBs DETECTED IN SOIL SAMPLES, CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (ug/kg)

SAMPLE DEPTH, IN FEET BELOW LAND SURFACE

ND	NOT DETECTED
J	ESTIMATED VALUE
R	UNUSABLE DATA
V	QUALIFIER ADDED AND/OR VALUE ALTERED DURING DATA VALIDATION

0 40 80 FEET

Title: AREA 1

CONCENTRATIONS OF PCBs DETECTED IN SOIL

Prepared For: AMTRAK SUNNYSIDE YARD

ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers

Compiled by: H.G.	Date: 2/91	Plate
Prepared by: C.L.	Scale: SHOWN	
Project Mgr: J.D.D.	Revision:	10
File No: AM509B13		

EXPLANATION

MW-27 EXISTING MONITORING WELL LOCATION AND DESIGNATION

S-25 EXISTING SOIL BORING LOCATION AND DESIGNATION

AREAS OF CONCERN

APPROXIMATE PROPERTY BOUNDARY

263JV	0 - 2

SAMPLE DEPTH, IN FEET BELOW LAND SURFACE

CONCENTRATIONS OF PCBs DETECTED IN SOIL SAMPLES, CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (ug/kg)

ND - NOT DETECTED
J - ESTIMATED VALUE
V - QUALIFIER ADDED AND/OR VALUE ALTERED DURING DATA VALIDATION

0 200 400 FEET

Title:

CONCENTRATIONS OF PCBs DETECTED IN SOIL

Prepared For:

AMTRAK SUNNYSIDE YARD

ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: B.W.	Date: 2/91	PLATE
Prepared by: C.L.	Scale: SHOWN	11
Project Mgr: J.D.D.	Revision: 0	
File No: 05509BM4		

ALUMINUM	4970N
ARSENIC	2.6
BARIUM	418*
BERYLLIUM	0.46B
CALCIUM	772B
CHROMIUM	10N*S
COBALT	6.4B
COPPER	96
IRON	13000
LEAD	44S*N
MAGNESIUM	2150
MANGANESE	82*
MERCURY	0.17N
NICKEL	14
POTASSIUM	832B
SODIUM	328B
VANADIUM	32
ZINC	100

ALUMINUM	3000N
ANTIMONY	4.8BN
ARSENIC	8.1
BARIUM	97*
CADMIUM	2.1*
CALCIUM	1610
CHROMIUM	19N*
COBALT	3.1B
COPPER	279
IRON	38700
LEAD	212N*
MAGNESIUM	1420
MANGANESE	445*
MERCURY	0.29N
NICKEL	23
POTASSIUM	412B
SILVER	0.79BW
SODIUM	433B
VANADIUM	37
ZINC	303

ALUMINUM	4090N
ARSENIC	3.1
BARIUM	43B*
CALCIUM	751B
CHROMIUM	14N*
COBALT	2.5B
COPPER	76
IRON	10100
LEAD	1080NS*
MAGNESIUM	1630
MANGANESE	314*
MERCURY	0.31N
NICKEL	10
POTASSIUM	466B
SODIUM	607B
VANADIUM	13
ZINC	58

EXPLANATION

MW-22 EXISTING MONITORING WELL LOCATION AND DESIGNATION

S-3 EXISTING SOIL BORING LOCATION AND DESIGNATION

MW-18 PROPOSED MONITORING WELL LOCATION AND DESIGNATION

S-12 PROPOSED SOIL BORING LOCATION AND DESIGNATION

RW-2 PROPOSED RECOVERY WELL (INTERIM REMEDIAL MEASURE) LOCATION AND DESIGNATION

MW-4 * FORMER WELL LOCATION AND DESIGNATION (DESTROYED)

AREAS OF CONCERN

METAL ANALYTE

METAL CONCENTRATIONS IN MILLIGRAMS PER KILOGRAM (mg/kg)

ALUMINUM	4970N
ARSENIC	2.6
BARIUM	418*
BERYLLIUM	0.46B
CALCIUM	772B
CHROMIUM	10N*S
COBALT	6.4B
COPPER	96
IRON	13000
LEAD	44S*N
MAGNESIUM	2150
MANGANESE	82*
MERCURY	0.17N
NICKEL	14
POTASSIUM	832B
SODIUM	328B
VANADIUM	32
ZINC	100

DATA QUALIFIERS

B – VALUE >IDL BUT <CRDL

S – VALUE DETERMINED BY METHOD OF STANDARD ADDITION

* – DUPLICATE RPD OUT OF CONTROL

N – MATRIX SPIKE OUTSIDE RECOVERY LIMITS

W – POST DIGEST SPIKE OUTSIDE RECOVERY LIMITS

J – ESTIMATED VALUE OR DETECTION LIMIT DUE TO NON-COMPLIANCE WITH PROTOCOL

M – DUPLICATE INJECTION PRECISION NOT MET

0 40 80 FEET

Title:

AREA 1

CONCENTRATION OF METALS DETECTED IN SOIL SAMPLES

Prepared For: AMTRAK SUNNYSIDE YARD

ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: H.G.	Date: 2/91	Plate 12
Prepared by: C.L.	Scale: SHOWN	
Project Mgr: J.D.D.	Revision:	
File No: AM509C15		

ALUMINUM	4620N
ARSENIC	2.7
BARIUM	31B*
CALCIUM	2170
CHROMIUM	9.6N*
COBALT	5.4B
COPPER	27
IRON	9570
LEAD	52S*N
MAGNESIUM	2170
MANGANESE	274*
MERCURY	0.22N
NICKEL	12
POTASSIUM	762B
SODIUM	319B
VANADIUM	13
ZINC	94
DEPTH	2–4

ALUMINUM	4470
ARSENIC	11
BARIUM	70*
BERYLLIUM	0.43B
CALCIUM	18100
CHROMIUM	9.4N*
COBALT	4.7B
COPPER	41
IRON	11200
LEAD	129SN*
MAGNESIUM	4280
MANGANESE	241*
MERCURY	0.49N
NICKEL	10
POTASSIUM	802B
SODIUM	488B
VANADIUM	20
ZINC	65
DEPTH	2–4

ALUMINUM	5300N
ARSENIC	2.7
BARIUM	41B*
CALCIUM	1200
CHROMIUM	15N*
COBALT	5.8B
COPPER	40
IRON	11300
LEAD	45S*N
MAGNESIUM	3040
MANGANESE	251*
NICKEL	9.8
POTASSIUM	710B
SODIUM	336B
VANADIUM	20
ZINC	34
DEPTH	2–4

ALUMINUM	3140N
BARIUM	21B*
CALCIUM	425B
CHROMIUM	10N*
COBALT	4.4B
COPPER	25
IRON	8680N
LEAD	3.7S*
MAGNESIUM	1550
MANGANESE	131*
NICKEL	5.3B
POTASSIUM	474B
SODIUM	235B
VANADIUM	9.7B
ZINC	27
DEPTH	0–2

LEAD	201S
DEPTH	0–2

ALUMINUM	3410N
ARSENIC	6.9
BARIUM	47*
CALCIUM	954B
CHROMIUM	16N*
COBALT	4.0B
COPPER	73*
IRON	17800
LEAD	73N*
MAGNESIUM	1500
MANGANESE	198*
MERCURY	0.23N
NICKEL	12
POTASSIUM	476B
SODIUM	270B
VANADIUM	15
ZINC	37
DEPTH	0–2

ALUMINUM	3950N
ANTIMONY	2.4BN
BARIUM	23B*
CALCIUM	6850
CHROMIUM	13N*
COBALT	3.1B
COPPER	7.8
IRON	5610
LEAD	8.8N*
MAGNESIUM	1510
MANGANESE	165*
NICKEL	5.6B
POTASSIUM	567B
SODIUM	231B
VANADIUM	11B
ZINC	22
DEPTH	0–2

LEAD	1290S
DEPTH	0–2

ALUMINUM	4740N
ARSENIC	2.6
BARIUM	37B*
CALCIUM	1040B
CHROMIUM	18N*
COBALT	4.4B
COPPER	22
IRON	7400N
LEAD	52*
MAGNESIUM	1660
MANGANESE	93*
NICKEL	7.3B
POTASSIUM	711B
SODIUM	229B
VANADIUM	14M
ZINC	144
DEPTH	3.5–5.5

ALUMINUM	6170N
ANTIMONY	3.5BN
ARSENIC	7.1
BARIUM	444*
BERYLLIUM	0.44B
CALCIUM	6260
CHROMIUM	42N*
COBALT	13
COPPER	377
IRON	58500N
LEAD	605*
MAGNESIUM	3810
MANGANESE	471*
NICKEL	54
POTASSIUM	843B
SODIUM	1770
VANADIUM	28
ZINC	565
DEPTH	0–2

ALUMINUM	4580J
ARSENIC	0.73BJ
BARIUM	14BJ
CALCIUM	4920J
CHROMIUM	7.5JN
COBALT	3.2BJ
COPPER	10J
IRON	8190J
LEAD	4.0J
MAGNESIUM	4260J
MANGANESE	199J
NICKEL	4.7BJ
POTASSIUM	636BJ
SODIUM	88BJ
VANADIUM	13J
ZINC	18J
DEPTH	4–6

ALUMINUM	6490
BARIUM	16B
CALCIUM	2660
CHROMIUM	5.6N
COBALT	2.6B
COPPER	4.8B
IRON	5680
LEAD	1.4
MAGNESIUM	2430
MANGANESE	151
NICKEL	6.0B
POTASSIUM	318B
SODIUM	88B
VANADIUM	5.2B
ZINC	27
DEPTH	5–7

LEAD	80S
DEPTH	0–2

ALUMINUM	3330
BARIUM	33B
CALCIUM	4170
CHROMIUM	8.0N
COBALT	5.0B
COPPER	12
IRON	8440
LEAD	3.3
MAGNESIUM	3470
MANGANESE	181
NICKEL	9
POTASSIUM	1060B
SODIUM	188B
VANADIUM	14
ZINC	18
DEPTH	4–6

ALUMINUM	2220N
ANTIMONY	3.5BN
ARSENIC	26
BARIUM	81*
CALCIUM	468B
CHROMIUM	17N*
COBALT	2.3B
COPPER	349
IRON	27000
LEAD	162N*
MAGNESIUM	610B
MANGANESE	142*
MERCURY	0.38N
NICKEL	17
POTASSIUM	350B
SODIUM	301B
SILVER	0.56B
VANADIUM	75
ZINC	61
DEPTH	0–2

ALUMINUM	3010
BARIUM	16B
CALCIUM	772B
CHROMIUM	6.5SN
COBALT	1.9B
COPPER	8.2
IRON	5990
LEAD	2.3
MAGNESIUM	1360
MANGANESE	148
NICKEL	6.7B
POTASSIUM	416B
SODIUM	113B
VANADIUM	7.6B
ZINC	16
DEPTH	9–11

ALUMINUM	4580J
BARIUM	28BJ
CADMIUM	1.2BJ
CALCIUM	1590J
CHROMIUM	53JN
COBALT	5.4BJ
COPPER	53J
IRON	7820J
LEAD	4.6J
MAGNESIUM	2260J
MANGANESE	333J
MERCURY	0.31
POTASSIUM	674BJ
SODIUM	210BJ
VANADIUM	13J
ZINC	22J
DEPTH	4–6

ALUMINUM	4530N
ARSENIC	3.3
BARIUM	296*
CADMIUM	1.3M*
CALCIUM	1890
CHROMIUM	12N*
COBALT	4.8B
COPPER	57
IRON	10600
LEAD	372NS*
MAGNESIUM	1670
MANGANESE	276*
MERCURY	0.98N
NICKEL	11
POTASSIUM	604B
SILVER	0.59
SODIUM	306B
VANADIUM	14
ZINC	270
DEPTH	1–3

LEAD	177S
DEPTH	0–2

LEAD	339
DEPTH	0–2

ALUMINUM	4770
BARIUM	32B
CALCIUM	1400
CHROMIUM	8.2N
COBALT	3.0B
COPPER	12
IRON	11200
LEAD	3.5
MAGNESIUM	2510
MANGANESE	224
NICKEL	11
POTASSIUM	861B
SODIUM	456B
VANADIUM	13
ZINC	20
DEPTH	8–10

ALUMINUM	11100
ARSENIC	1.1BW
BARIUM	44B
CALCIUM	442B
CHROMIUM	R
COBALT	11B
COPPER	54
IRON	18900
LEAD	20S
MAGNESIUM	2570
MANGANESE	342
NICKEL	15
POTASSIUM	760B
SODIUM	324B
VANADIUM	25
ZINC	39
DEPTH	2–4

ALUMINUM	2840
ARSENIC	1.6B
BARIUM	31B
CALCIUM	1250
CHROMIUM	6.4SN
COBALT	3.4B
COPPER	42
IRON	7320
LEAD	9.9
MAGNESIUM	1820
MANGANESE	249
NICKEL	8.3B
POTASSIUM	566B
SODIUM	184B
VANADIUM	12
ZINC	40
DEPTH	2–4

ALUMINUM	2990
ANTIMONY	1.9BN
ARSENIC	7.7S
BARIUM	43
CADMIUM	1.3
CALCIUM	702B
CHROMIUM	14N
COBALT	5.8B
COPPER	140
IRON	14100
LEAD	137
MAGNESIUM	1280
MANGANESE	130
NICKEL	8.1B
POTASSIUM	448B
SODIUM	258B
VANADIUM	47
ZINC	149
DEPTH	0–2

ALUMINUIM	4430N
ARSENIC	20
BARIUM	85*
BERYLLIUM	0.57B
CALCIUM	1030B
CHROMIUM	36N*
COPPER	244
IRON	28600
LEAD	120N*
MAGNESIUM	1330B
MANGANESE	175*
MERCURY	0.9N
NICKEL	17
POTASSIUM	391B
SODIUM	394B
VANADIUM	97
ZINC	95
DEPTH	0–2

EXPLANATION

MW-27 ⊕ MONITORING WELL LOCATION AND DESIGNATION

S-25 • SOIL BORING LOCATION AND DESIGNATION

AREAS OF CONCERN

— — — APPROXIMATE PROPERTY BOUNDARY

METAL ANALYTE

METAL CONCENTRATIONS IN MILLIGRAMS PER KILOGRAM (mg/kg)

ALUMINUM	4580J
ARSENIC	0.73BJ
BARIUM	14BJ
CALCIUM	4920J
CHROMIUM	7.5N
COBALT	3.2BJ
COPPER	10J
IRON	8190J
LEAD	4J
MAGNESIUM	4260J
MANGANESE	199J
NICKEL	4.7BJ
POTASSIUM	636BJ
SODIUM	88BJ
VANADIUM	13J
ZINC	18J
DEPTH	4–6

DATA QUALIFIERS
B – VALUE >IDL BUT <CRDL
S – VALUE DETERMINED BY METHOD OF STANDARD ADDITION
* – DUPLICATE RPD OUT OF CONTROL
N – MATRIX SPIKE–OUTSIDE OF RECOVERY LIMITS
W – POST DIGEST SPIKE OUTSIDE RECOVERY LIMITS
R – UNUSABLE DATA
J – ESTIMATED VALUE OR DETECTION LIMIT DUE TO NON–COMPLIANCE WITH PROTOCOL
M – DUPLICATE INJECTION PRECISION NOT MET

NOTE: NON–DETECTED METALS WERE NOT INCLUDED

0 200 400 FEET

Title:

CONCENTRATIONS OF METALS DETECTED IN SOIL SAMPLES

Prepared For:

AMTRAK
SUNNYSIDE YARD

ROUX
ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: B.W.	Date: 2/91	PLATE	
Prepared by: C.L.	Scale: SHOWN	13	
Project Mgr: J.D.D.	Revision: 0		
File No: AM509A08			

EXPLANATION

VOLATILES	
ETHYLBENZENE XYLENES (TOTAL)	8.8 18
SEMIVOLATILES	
BIS(2-ETHYLHEXYL)PHTHALATE FLUORENE 2-METHYLNAPHTHALENE	32 9.4J 96
PCBs	ND

VOLATILE ORGANIC COMPOUND CONCENTRATIONS DETECTED IN GROUND WATER, CONCENTRATIONS IN MICROGRAMS PER LITER (ug/L)

SEMIVOLATILE ORGANIC COMPOUND CONCENTRATIONS DETECTED IN GROUND WATER, CONCENTRATIONS IN MICROGRAMS PER LITER (ug/L)

POLYCHLORINATED BIPHENYLS (PCBs) CONCENTRATIONS DETECTED IN GROUND WATER, CONCENTRATIONS IN MICROGRAMS PER LITER (ug/L)

J — ESTIMATED VALUE

ND — NOT DETECTED

NA — NOT ANALYZED

V — QUALIFIER ADDED AND/OR VALUE ALTERED DURING VALIDATION

ALL SAMPLES COLLECTED BETWEEN JANUARY 4 AND JANUARY 7, 1991

MW-22 EXISTING MONITORING WELL LOCATION AND DESIGNATION

S-3 EXISTING SOIL BORING LOCATION AND DESIGNATION

MW-18 PROPOSED MONITORING WELL LOCATION AND DESIGNATION

S-12 PROPOSED SOIL BORING LOCATION AND DESIGNATION

RW-2 PROPOSED RECOVERY WELL (INTERIM REMEDIAL MEASURE) LOCATION AND DESIGNATION

MW-4 * FORMER WELL LOCATION AND DESIGNATION (DESTROYED)

AREAS OF CONCERN

0 40 80 FEET

Title:

AREA 1

CONCENTRATIONS OF VOCs, PCBs AND SEMIVOLATILES DETECTED IN GROUND WATER

Prepared For: AMTRAK SUNNYSIDE YARD

ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: H.G.	Date: 2/91	Plate
Prepared by: C.L.	Scale: SHOWN	14
Project Mgr: J.D.D.	Revision:	
File No: AM509C04		

EXPLANATION

MW-27 EXISTING MONITORING WELL LOCATION AND DESIGNATION

S-25 EXISTING SOIL BORING LOCATION AND DESIGNATION

AREAS OF CONCERN

MW-26	
VOLATILES	N D
SEMIVOLATILES	N D, JV
PCBs	N D

VOLATILE ORGANIC COMPOUNDS DETECTED IN GROUND WATER, CONCENTRATIONS IN MICROGRAMS PER LITER (ug/L)

SEMIVOLATILE ORGANIC COMPOUNDS DETECTED IN GROUND WATER, CONCENTRATIONS IN MICROGRAMS PER LITER (ug/L)

POLYCHLORINATED BIPHENYLS (PCBs) CONCENTRATIONS DETECTED IN GROUND WATER, CONCENTRATIONS IN MICROGRAMS PER LITER (ug/L)

B DETECTED IN LABORATORY BLANK
J — ESTIMATED VALUE
ND — NOT DETECTED
NA — NOT ANALYZED
V — QUALIFIER ADDED AND/OR VALUE ALTERED DURING DATA VALIDATION

0 200 400 FEET

Title:

CONCENTRATIONS OF VOCs, PCBs AND SEMIVOLATILES DETECTED IN GROUND WATER

Prepared For:

AMTRAK
SUNNYSIDE YARD

ROUX
ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: B.W.	Date: 2/91	PLATE
Prepared by: C.L.	Scale: SHOWN	15
Project Mgr: J.D.D.	Revision: 0	
File No: 05509BM4		

EXPLANATION

RW-2 ■ PROPOSED RECOVERY WELL (INTERIM REMEDIAL MEASURE) LOCATION AND DESIGNATION

▬ INFERRED LOCATIONS OF CATCH BASINS TAKEN FROM ENGINEERING DIAGRAMS. UNABLE TO VERIFY BY FIELD INVESTIGATION

AREAS OF CONCERN

□ CATCH BASIN LOCATION

○ MANHOLE LOCATION

RECOVERY SYSTEM LOCATION

APPROXIMATE LOCATION OF SEWER, TAKEN FROM ENGINEERING DIAGRAMS

14" APPROXIMATE DIAMETER OF SEWER, TAKEN FROM ENGINEERING DIAGRAMS

4 LINE OF EQUAL SEPARATE PHASE PETROLEUM THICKNESS, JANUARY 15, 1991

EXTENT OF SEPARATE PHASE PETROLEUM, JANUARY 15, 1991

0 40 80 FEET

Title: AREA 1

INTERIM REMEDIAL MEASURES

Prepared For: AMTRAK SUNNYSIDE YARD

ROUX

ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: H.G.	Date: 2/91	Plate
Prepared by: C.L.	Scale: SHOWN	16
Project Mgr: J.D.D.	Revision:	
File No: AM509B12		