Environmental Site Assessment and Consulting Services

Former Remington-Rand Facility

Middletown
Connecticut

Prepared for **Municipal Development Office**
Middletown, Connecticut

Prepared by ***VHB*/Vanasse Hangen Brustlin, Inc.**
Middletown, Connecticut

January 1999

Environmental Site Assessment

Former Remington-Rand Facility
Middletown, Connecticut

Prepared for **Municipal Development Office**
Middletown, Connecticut

Prepared by **VHB/Vanasse Hangen Brustlin, Inc.**
Transportation, Land Development, Environmental Services
Middletown, Connecticut 06457

Senior Environmental Scientist

Deborah Wojcicki, L.E.P.

Project Manager

Michael Libertine

Table of Contents

Figures

Figure No.	Title
1	Site Location Map
2	Site Plan
3	Sampling Locations Map
4	Impacted Areas Map

Appendices

Appendix	Description
A	Limitations
B	Phase III Laboratory Analytical Summary Tables
C	Laboratory Analytical Results
D	Test Pit and Soil Boring Logs

1

Introduction

At the request of the City of Middletown (City) acting through the Economic Development Committee, Vanasse Hangen Brustlin, Inc. (VHB) provided Phase III environmental assessment and consulting services for the Former Remington Rand facility located at 180 Johnson Street in Middletown, Connecticut (Site). This report was prepared on behalf of the City and is subject to the terms and conditions of the Agreement between the City and VHB and the Limitations provided in Appendix A.

Site Location and Description

The Site is located at 180 Johnson Street in Middletown, Connecticut in an area zoned for industrial redevelopment. The Site is bordered by the Middletown Landfill to the north, undeveloped wetlands and the Mattabasset River to the east, railroad right-of-way and E.I.S. Division of Standard Motor Products to the south, and the Hubert E. Butler Construction Company and the Coginchaug River to the west.

The Site consists of approximately 10.5 acres with roughly 119,000 square feet of building area. The majority of the Site buildings were constructed from 1897 to 1934. Currently, the Site is serviced by City water, sanitary sewer, natural gas, telephone, and electric utilities. A Phase I Environmental Site Assessment report, prepared by others, indicated that a portion of the Site may be connected to an on-site septic system located in the eastern part of the site (in the vicinity of the Right-of-Way Disposal Area). The existence of this septic system has not been confirmed during these investigations.

The Site topography is fairly flat with surface elevations generally sloping towards the Mattabasset River to the northeast. The Site is located within the Mattabasset and Coginchaug River drainage basin which are tributaries to the Connecticut River located roughly 1200 feet to the east. Groundwater beneath the site is classified by the CTDEP as GB, indicating groundwater within highly urbanized areas or areas of intense industrial activity and where public water supply service is available. GB classified groundwater may not be suitable for direct human consumption due to waste discharges, spills or leaks of chemicals or land use impacts. The State's goal is to avoid further degradation by preventing any additional discharges which would cause irreversible contamination. Figure 1, taken from the USGS Middletown, Connecticut 7.5 minute topographic quadrangle, depicts the site location.

Report Format

The remainder of this report documents the activities associated with the Phase III Assessment, its findings, and potential regulatory requirements. Preliminary remediation alternatives and cost estimates are also discussed herein. Section 2.0, Background, outlines the scope and objectives of the Phase III Assessment and summarizes previous investigations conducted at the site. Section 3.0, Investigative Methodology, documents field activities and laboratory analyses conducted during the Phase III Assessment. Section 4.0 of this report discusses the results of the investigation. Each area of concern previously identified at the site, and further investigated during Phase III activities, is described with respect to specific contamination issues and potential remedial options. Preliminary cost estimates are also provided for remediation activities. Section 5.0 includes a Summary of Findings at the site, incorporating both Phase II and Phase III results to present a "global" perspective on site conditions, and to assist the City in determining a future course of action.

2 Background

Scope and Objectives of Phase III Site Assessment

VHB undertook a Phase II Environmental Site Assessment at this property in 1997 in accordance with the Connecticut Department of Environmental Protection's (CTDEP's) Connecticut Transfer Act Site Assessment Guidance Document to support the City's due diligence activities related to the prospective property acquisition. The purpose of the Phase III, conducted in August and September of 1998, was to further delineate areas of environmental concern identified during the Phase II and to refine potential site remediation costs. Eight previously identified release areas were further investigated during the Phase III through the excavation of test pits, the advancement of soil borings and installation of groundwater monitoring wells in a subset of those borings, and through groundwater sampling and analysis across the Site. Specifically, the investigation was designed to determine: the nature, extent and degree of soil contamination; the extent, degree and migration rate of groundwater contamination; and the existence/potential for surface water impacts from contamination originating at the Site.

Due to restrictions imposed by the Site access agreement, three modifications were made to the Phase III scope-of-work prior to beginning the subsurface investigation. Specifically, three additional monitoring wells (MW-13, MW-14 and MW-15) were installed along the eastern property border, adjacent to the neighboring municipal landfill property. These wells were installed in order to assess the impact, if any, of landfill operations on soil and groundwater quality at the subject property.

Additionally, indoor air quality sampling recommended in the original Phase III scope-of-work was not conducted due to the potential for sample contamination caused by routine operations of Site occupants. The indoor air-quality issue is further expanded in the UST 4 Area discussion in Section 4.0 of this report.

The third modification to the work plan involved the addition of surficial soil sampling and analysis for polychlorinated biphenyls in suspect UST 2 Area. Historic map information reviewed prior to initiation of the Phase III field work revealed a former electrical transformer switching station in the area where a large concrete pad had been

discovered (during Phase II investigations). This issue is discussed further in Section 4.0 of this report (suspect UST 2 Area).

Applicable Soil and Groundwater Criteria

In order to determine if response actions are necessary for any portion of the Site, soil and groundwater analytical results obtained during Phase II and Phase III investigations have been compared to the Connecticut Remediation Standard Regulations (RSRs - Section 22a-133k).

DEP Residential Direct Exposure Criteria (Residential DEC), Industrial/Commercial Direct Exposure Criteria (Industrial/Commercial DEC), and Pollutant Mobility Criteria for GB Areas (GB PMC) apply to the Site's soil. Residential DEC for soil also apply to the Site since the RSRs require, whenever feasible, a reduction in residual soil contaminant concentrations to levels that pose no significant human health risk. Under circumstances where remediation activities are prohibitively expensive or technically infeasible, the Site owner has the option to institute an Environmental Land Use Restriction (ELUR; ref. RSR Section 22a-133q-1) limiting future Site use solely for industrial/commercial purposes.

DEP Surface Water Protection Criteria (SWPC), Residential Volatilization Criteria (Residential VC), and Industrial/Commercial Volatilization Criteria (Industrial/Commercial VC) apply to the Site's Class GB groundwater. Groundwater analytical results have been compared to Residential VC for reasons similar to those noted above.

Additionally, although not required by the RSRs, in certain instances where neither a SWPC nor a VC is established for a detected analyte, concentrations were compared to the Groundwater Protection Criteria (GWPC). The GWPC is applied to all Class GA groundwater and Class GB groundwater that is used for drinking water or other domestic purposes. As the groundwater beneath and downgradient of the Site is not used for these purposes, the standard does not directly apply, but has been used in a limited manner as a reference (primarily for total petroleum hydrocarbons [TPH] concentrations).

Compliance issues will be further discussed in Section 3. Soil and groundwater analytical results obtained during Phase III were compared to the above-listed criteria, as applicable.

Summary of Previous Site Investigations

Soil Science and Environmental Services of Cheshire, Connecticut prepared a Phase I Environmental Site Assessment report, dated April 6, 1993 (Phase I Report). The following environmental concerns were summarized in the report:

- Four suspect existing or former underground storage tank locations;

- Two aboveground storage tanks;
- Five electrical transformers;
- Waste disposal area within a Northeast Utilities (NU) electrical right-of-way;
- Interior floor drains and inlet structures;
- Miscellaneous containers of hazardous and special wastes;
- Suspect asbestos and lead-based paint;
- Suspect polychlorinated biphenyl-containing equipment; and
- Surficial stained soils and stressed vegetation.

Reportedly, past industrial activities at the Site included the manufacturing of bicycles, automobiles, typewriters, and metal goods. Industrial wastes, including ink, carbon, wax, oil, detergents, acetone, dye, and nickel, have been historically discharged to the Mattabasset River and the City sewer system.

VHB Undertook a Phase II Environmental Site Assessment of the property in 1997. The Phase II investigation was conducted to determine if contamination was present at the site, assess subsurface conditions associated with suspect contaminant sources, identify regulated building components, inventory miscellaneous containers of hazardous and special wastes, and develop preliminary estimates of potential remediation costs.

Based on the results of the Phase II subsurface investigation, localized areas of residual soil and groundwater contamination were identified at the Site in the vicinity of known and suspect contaminant sources. Laboratory analytical testing confirmed contaminant concentrations that exceeded applicable DEP soil and groundwater standards in seven release areas at the site, including three underground storage tank (UST) areas, one aboveground storage tank (AST) area, two areas of surficial staining and two waste disposal areas. Contaminants identified included total petroleum hydrocarbons (TPH), various heavy metals, volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs).

Also identified during the Phase II Assessment were regulated building components and miscellaneous containers of hazardous and special waste. These included asbestos, lead-based paint, polychlorinated biphenyl (PCB)-containing electrical equipment, mercury-containing fluorescent tubes and vapor lamps and residual heavy-metal dust within buildings 4, 5 and 10. These wastes were quantified and abatement/disposal costs were provided in VHB's Phase II report.

A Supplemental Groundwater Monitoring Well Installations report was prepared by VHB later in 1997 as an addendum to the Phase II investigation. The purpose of conducting the supplemental installations was to determine if the presence of chlorinated solvents in groundwater at the Site was due to past on-site practices or potentially from off-site, upgradient sources. The results of the investigation indicated that the solvent

source appeared to be located on the subject property, perhaps centrally located beneath the main building.

Summary of Known Releases

The following release areas and associated sources of contamination were identified at the Site during Phase II activities and were the primary focus of Phase III activities:

- Two Fill/Disposal Areas
  - ➤ *Right-Of-Way Waste Disposal Area:* Residual TPH, arsenic, copper, and lead in soil/fill.
  - ➤ *Railroad Spur Waste Disposal Area:* Residual TPH, SVOCs, and arsenic in soil/fill; and, copper and zinc in groundwater.
- Three Underground Storage Tank (UST) Areas
  - ➤ *Suspect UST 2 Area:* Residual TPH in soil.
  - ➤ *UST 4 Gasoline/Solvent Release Area:* Residual TPH in soil; and, VOCs and zinc in groundwater.
  - ➤ *Suspect UST 5 Area:* Residual TPH in subsurface soil.
- One Aboveground Storage Tank (AST) Area
  - ➤ *AST 2 Area:* Residual TPH and arsenic in subsurface soil.
- Two Areas of Surficial Staining
  - ➤ *Surficial Stained Soil Areas 1 and 2:* Residual TPH and SVOCs from surface releases/railroad tie storage.

The relative locations of each of these release areas are depicted on Figure 2.

3

Investigation Methodology

VHB conducted subsurface investigations to obtain additional information about known and suspect contaminant sources and residual concentrations of oil and hazardous materials (OHM) in soil and groundwater at the Site. The approach for conducting Phase III activities involved using a combination of test pits and soil borings to delineate the horizontal and vertical extent of soil contamination, and to identify, where practicable, contaminant sources (i.e., USTs, etc). Monitoring wells were also installed at each release area to assess associated impacts to groundwater. Additional monitoring wells were also installed to assist both in confirmation of groundwater flow patterns and to determine groundwater chemical quality at the Site.

Phase III Subsurface Investigation

This phase of the investigation included the excavation of 39 test pits using a backhoe, and the advancement of 41 soil borings and installation of 10 new monitoring wells using a GeoProbe™ drill rig. Soil samples were collected using two-inch diameter stainless steel core barrels with dedicated acetate sleeve liners. Soil samples were collected to characterize existing soil conditions during each boring advancement. Test pitting was conducted from August 10, 1998 through August 13, 1998 by Earth Technology, LLC of North Haven, Connecticut. Geoprobe operations were conducted by Columbia Drilling of Columbia, Connecticut from August 18, 1998 through August 25, 1998. VHB directed all excavation and drilling activities, observed soil conditions, screened and collected soil samples, and collected groundwater samples from 22 existing Site monitoring wells. Test pit, soil boring and monitoring well locations are depicted on the Site Plan, Figure 3.

Various soil samples were field screened using a photoionization detector (PID) calibrated to an isobutylene standard. Samples were field screened using a standard methodology for the jar headspace analytical screening procedure which measures total volatile organic compounds (TVOCs). Field screening results are summarized in the attached soil boring reports. Soil samples submitted for laboratory analyses were collected from depth intervals that indicated elevated headspace readings, marked changes in soil strata, or in the absence of overt evidence of oil or hazardous material

(OHM) contamination, proximity to the apparent water table. Contaminated drill cuttings were drummed for subsequent disposal.

In general, native soil at the Site consists of a light brown fine to medium sand with varying amounts of silt to a depth of 10 to 12 feet. A light brown silty clay layer was observed throughout the Site at a depth of 12 feet and greater.

Following sample collection and preservation on ice, soil samples were submitted to a Connecticut-certified laboratory and analyzed for selected target analytes. Soil samples were collected for analysis of parameters specific to individual release areas. Additionally, with the exception of the Right-of-Way Disposal Area, one impacted sample was collected from each release area for analysis of disposal parameters. These parameters were chosen based on prior knowledge of the site and of the general requirements of most recycling, reuse or disposal facilities.

Groundwater monitoring wells were installed in select soil borings and were constructed of 1-inch diameter PVC well screen (0.010" slot) and riser. Silica sand was used to fill the annular space between the borehole and the well materials. The sand pack was installed to a depth of approximately one foot above the top of the well screen, and a layer of bentonite was added to prevent the migration of surface water along the borehole. Natural material was used, as needed, as backfill above the bentonite. Each well was completed with either a concrete-secured flush-mounted roadbox or stand-up steel pipe with locking cap.

Groundwater samples were collected from each monitoring well by VHB personnel at least seven days after well installation to allow for equilibration of subsurface conditions. Three-to-five well volumes were purged from each well prior to collecting groundwater samples using dedicated bailers. All purgewater was drummed for subsequent disposal. Samples were collected in pre-cleaned glassware provided by the laboratory, and kept chilled until delivery to the laboratory under a chain-of-custody.

Select soil and groundwater samples were analyzed for the following parameters.

- Total Petroleum Hydrocarbons (TPH) by EPA Method 418.1
- Volatile Organic Compounds (VOCs) by EPA Method 602/8021B
- VOCs by EPA Method 8260B
- Semi-Volatile Organic Compounds (SVOCs) by EPA Method 8270C
- Polychlorinated Biphenyls (PCBs) by EPA Method 8080
- Inorganics (metals and cyanide) by mass analysis (EPA Method 3050)
- Metals by Synthetic Precipitation Leaching Potential
- Metals by Toxicity Characteristics Leaching Procedures (EPA Method 1311)
- Flashpoint
- pH
- Reactive Sulfide
- Reactive Cyanide

4

Investigation Results for Areas of Environmental Concern

This section summarizes the soil and groundwater analytical results related to subsurface investigation activities at the Site and provides a discussion of preliminary remedial options and estimated costs associated with each area of concern. Soil and groundwater laboratory analytical results were compared to applicable standards established by the Connecticut Department of Environmental Protection Remediation Standard Regulations (RSRs), Section 22a-133k to help assess regulatory compliance issues for the Site.

Soil analytical results obtained during both the Phase II and Phase III investigations are summarized in tabular form for each area of concern (with the exception of the two areas of surficial staining). Appendix B contains a collective summary of soil analytical results of the Phase III investigation. Applicable RSR Residential DEC, Industrial/Commercial DEC, and GB PMC are listed in the tables. Groundwater analytical results are summarized in the table provided at the end of this section. Laboratory analytical reports are included in Appendix C. Sample locations discussed herein are depicted on Figure 3. Approximate areas of defined contamination are presented on Figure 4.

Fill/Disposal Areas

Right-of-Way Disposal Area

The Phase II investigation identified the presence of widespread fill consisting of three characteristically different material mixes – coal ash, slag-like melted metal/glass, and variable layered plastic resin/darkly stained soil – within the Northeast Utilities overhead electric right-of-way (ROW). A series of test pits (TP-1 through TP-19) were excavated on August 10 and 11, 1998 as part of the Phase III investigation to further document the nature and extent of fill material previously identified in this area of the Site. Test pits were excavated to various depths, with most penetrating the existing fill material to the interface with the underlying natural soil layer. The nineteen test pits were excavated within the ROW and vicinity to depths ranging from two to ten feet below existing grade. The location of each of

these test pits is shown on the Sample Location Map, Figure 3. The previously excavated eleven test pits (Phase II, 1997) are also depicted on the Site Plan as ROW/TP-1 through ROW/TP-11. Test pit logs are included in Appendix D.

No borings were advanced in this area as part of the Phase III investigation, however, groundwater from existing monitoring well MW-3 was collected and analyzed to further assess potential impacts to groundwater. Given the unstable nature of fill material and the dense overgrowth in the periphery of this area, additional borings/monitoring wells were not advanced/installed. Monitoring well MW-3, located centrally within the ROW, is considered a representative location for groundwater collection.

Fill materials are highly variable across the ROW portion of the Site. In general, the fill includes ash, cinders, glass, automotive parts, metal scraps, ceramic pieces, construction materials (brick, wood, tile), and plastic. The overall character of the fill appears of industrial origin, with no domestic or residential waste observed, and generally consistent with known historic tenant uses at the Site. As could be expected with the nature of historic intermittent disposal activities, some overlap exists in waste character across the ROW. The central and southeastern portions of the ROW contain a mixture of the fill materials described above (TP-1 to TP-4, TP-10, TP-12, TP-13, and TP-19). Automotive wastes (rusted vehicle bodies and buried automotive parts) were observed in the eastern corner of the property (surficially in TP-4 and in TP-5), and higher percentages of ash, laboratory glassware, and brightly colored polymer-like materials were noted in the northwestern portion of the ROW (TP-6 through TP-9 and TP-16). The western edge of this disposal area overlaps with the petroleum release area associated with UST 4 (TP-14 to TP-16). TP-17 exhibited limited fill characteristics, and consisted of fine sand with pieces of glass and wood. TP-11 and TP-18 exhibited none of the fill characteristics of the other test pits nor were there any visual or olfactory signs of contamination noted. Similar industrial wastes are also located along the eastern edge of the property, in the Railroad Spur Waste Disposal Area (further described below). Fill observed in specific areas of the ROW is described as follows:

TP-1 through TP-4, TP-10, TP-12, TP-13, and TP-19 – Fill in these test pits generally consists of ash, cinders, glass, metal scraps, and limited construction and landscaping materials (brick, wood, tile). The bottom of the fill layer was encountered at depths ranging from two to seven feet. Soils below the fill consist of reddish-brown silty soil with some clay.

TP-4 (surficial) and TP-5 – This area contains automotive debris. No buried automotive wastes were observed in TP-4, however, rusted vehicle bodies (no engine or fluids) were removed from the surface in preparation of excavation for TP-4. Buried automotive wastes (rags, filters and miscellaneous parts) were observed in TP-5 to a depth of approximately seven feet. The northern sidewall of this test pit represents the edge of the fill in that direction.

TP-6 to TP-9 and TP-16 – Fill in these test pits consisted of ash, laboratory glassware, and brightly colored polymer-like materials (plastic resin), with some metal or other miscellaneous scrap. A partially crushed 55-gallon drum was discovered while excavating TP-9. The drum contained a hydrocarbon sludge/mineral spirit mixture that was removed by an emergency response contractor on August 10, 1998. This drum was partially buried and appears to be of more recent vintage than the subsurface fill material. Fill in this portion of the site extends to a depth of two to five and one half feet. Gray or brown silty sand underlies the fill.

TP-14 to TP-16 – These test pits exhibited visual and or olfactory evidence of hydrocarbon contamination, attributable to the UST 4 Release Area immediately to the west. Fill extends to a depth of approximately five to nine feet and is underlain by fine to medium sand.

The extent of fill material to the northeast and southeast can be visually identified by the presence of a steep slope. To the northwest the fill is delineated by TP-17 (limited, shallow glass and wood debris) and to the southwest by TP-11. Relying on visual field observations, approximately 13,000 cubic yards of disposal/fill are estimated to be present in this area. No additional borings were advanced within the ROW during Phase III. However, borings were advanced to the northwest and southwest of the ROW to further assess the hydrocarbon impact associated with UST 4. Boring B-68 (MW-20) did not contain any recognizable fill material and is considered to be the outer (western) limit of ROW waste. Physical Site limitations prevented access to the southern portion of this area. However, visual observations suggest that the ROW disposal area and the Railroad Spur disposal area are likely associated and physically connected. Boring logs are provided in Appendix D.

Although no soil samples were analyzed as part of Phase III activities in this area, eleven soil samples were submitted for analysis for various target analytes during Phase II. Test pits ROW/TP-6 through TP-9 identified slag-like materials with concentrations of TPH, arsenic, copper, and lead above applicable RSR standards (GB PMC and/or Industrial/Commercial DEC). Test pit ROW/TP-10 and Boring B-4 identified variable layered plastic resins and impacted soil containing residual TPH concentrations in soil above the corresponding RSR standard.

Lead, measured by the Synthetic Precipitation Leaching Procedure (SPLP), was the only one of the 13 priority pollutant metals that exceeded the applicable GB PMC (ROW/TP-6). No corresponding groundwater impacts of lead above applicable RSR standards were identified at nearby monitoring well MW-3 during the Phase II investigation. A summary of soil analytical results obtained from the Right-of-Way disposal area is presented in the following table

Table 1
Analytical Results
Right-of-Way Area
Remington Rand

Analyte	Sample ID								CTRSRs		
	ROW TP-1[1]	ROW TP-3[1]	ROW TP-6[1]	ROW TP-7[1]	ROW TP-9[1]	ROW TP-10[1]	ROW TP-11[1]	B-8[1] (8'-10')	GB PMC	R DEC	I/C DEC
Total Petroleum Hydrocarbons (mg/Kg)											
TPH	ns	ns	ns	38,200	3,000	7,450	35.2	4,920	2500	500	2500
Semivolatile Organic Compounds (mg/Kg)											
Bis(2-ethylhexyl)phthalate	BDL	BDL	BDL	BDL	BDL	3.6	BDL	BDL	11	44	410
Phenanthrene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.27	40	1000	2500
Metals and Inorganics											
Antimony (total) -mg/Kg	ns	ns	6.23	BDL	ns	BDL	ns	ns	no std	27	8200
Arsenic (total) - mg/Kg	BDL	ns	36.1	28.6	ns	ns	ns	BDL	no std	10	10
Arsenic (SPLP) - mg/L	ns	ns	ns	ns	ns	BDL	ns	ns	0.06	no std	no std
Beryllium (total) - mg/Kg	0.33	ns	0.25	0.25	ns	0.44	ns	0.55	no std	2	2
Cadmium (total) - mg/Kg	2.54	ns	17.1	7.9	ns	0.14	ns	0.07	no std	34	1,000
Chromium (total) mg/Kg	36.6	ns	272	188	ns	14.1	ns	13.9	no std	3,900	51,000
Copper (total) - mg/Kg	180	ns	1,420	29500 (R)	ns	24.4	ns	13.4	no std	2,500	76,000
Copper (SPLP) - mg/L	BDL	ns	BDL	0.09	ns	BDL	ns	BDL	13	no std	no std
Lead (total) - mg/Kg	163	ns	9,130	1,240	ns	7.44	ns	8.54	no std	500	1,000
Lead (SPLP) - mg/L	BDL	ns	0.31	BDL	ns	BDL	ns	BDL	0.15	no std	no std
Mercury (total) mg/Kg	0.082	ns	BDL	0.059	ns	BDL	ns	ns	no std	20	610
Nickel (total) - mg/Kg	14.4	ns	434	179	ns	38.3	ns	10.9	no std	1,400	41,000
Nickel (SPLP) - mg/L	BDL	ns	BDL	0.28	ns	0.08	ns	BDL	1	no std	no std
Selenium (total) - mg/Kg	BDL	ns	5.77	15.2	ns	BDL	ns	5.5	no std	340	10,000
Silver (total) - mg/Kg	34.3	ns	1.93	BDL	ns	BDL	ns	ns	no std	340	10,000
Thallium (total) - mg/Kg	BDL	ns	BDL	BDL	ns	BDL	ns	ns	no std	5.4	160
Thallium (SPLP) - mg/L	ns	ns	ns	ns	ns	ns	ns	ns	0.05	no std	no std
Zinc (total) - mg/Kg	905	ns	1,400	17,800	ns	237	ns	26.5	no std	20,000	610,000
Zinc (SPLP) - mg/L	0.19	ns	0.3	5.45	ns	0.3	ns	0.35	50	no std	no std
Cyanide (total) - mg/Kg	ns	1.2	ns	ns	ns	ns	ns	ns	no std	1,400	41,000
Cyanide (SPLP) - mg/L	ns	ns	ns	ns	ns	ns	ns	ns	2	no std	no std

Notes:

Shaded values indicate concentrations in exceedance of applicable criteria.

No Std = No remediation standard has been established by CTDEP (in some cases, a specific criteria would not be applicable).

SPLP = Synthetic precipitation leading potential.

(R) indicates exceedance of Residential DEC only.

ns = Not Sampled.

ND = Not detected.**

BDL = Below detetion limit.**

** These terms are used interchangeably by the laboratory and have been maintained in this table to correspond with laboratory reports.

[1] Sample data collected during the Phase II Investigation.

mg/kg = Milligrams per kilograms, roughly equivalent to parts per million.

mg/L = Milligrams per liter, roughly equivalent to parts per million.

Groundwater was collected from monitoring well MW-3 on September 3, 1998 and analyzed for VOCs, TPH, copper, nickel and zinc. The results of these analyses indicate that although slightly elevated concentrations of TPH were detected in groundwater in the central portion of the ROW (776 ppm), only zinc was present in a concentration that exceeded an established SWPC (910 ppm). Zinc, however, was detected in groundwater across the Site, in upgradient and cross-gradient wells, indicating that the ROW fill material is not a likely source of this contaminant. No SWPC currently exists for TPH. The use of the term "slightly elevated" with respect to the TPH concentration is relative to the GWPC of 500 ppm (which, as previously noted, is used herein for reference only).

Remedial Options

Based upon current information, three compliance options have been identified for management of ROW fill materials containing soil contaminant concentrations above applicable RSRs. The first option includes soil excavation and off-site disposal of TPH, arsenic, copper and lead-contaminated soil above Residential DEC and GB PMC at a Subtitle C RCRA landfill or similar facility. Removing the contaminated fill in this fashion would eliminate all applicable exceedances of RSRs, resulting in unrestricted future use of the ROW area. The estimated cost of this first option is $225,000 to $450,000 and consists of the excavation and disposal of approximately 1,500 cubic yards of contaminated soil and the importing of clean fill for restoration. The high concentration of total lead (found at concentrations up to 9,130 ppm during the Phase II investigation) is dictating the cost of soil remediation. A range of costs are provided because costs vary depending on which facility is used for treatment/disposal. A preliminary assessment of remedial action alternatives indicates that lower costs may be obtained by exporting the soil to a facility in Canada for treatment, rather than handling it domestically. Segregation of soil according to contaminant concentrations during excavation could also decrease the disposal costs associated with this option. The cost assumes that much of the non-contaminated fill/debris buried in the ROW will be allowed to remain in-place.

The second option includes pursuit of a variance from the DEP under exemptions provided for Widespread Polluted Fill or Engineered Control of Polluted Soil under RSR Sections 2(f)(1) and 2(f)(2), respectively. This approach will require the City to restrict access to the impacted area (e.g., by fencing the impacted area), or limit direct human contact with the area containing contaminated soil (e.g., by paving the area). RSR provisions will require the City to institute an Environmental Land Use Restriction (ELUR) on the ROW area, representing an encumbrance on the Site. The Widespread Polluted Fill variance may be granted if:

- Geographically extensive polluted fill is present at the subject parcel and at other parcels in the vicinity of the subject parcel;
- the fill is not contaminated with VOCs;
- the fill does not threaten an existing or potential public water supply or an existing private water supply;

- the requirements of the DEC are adhered to (i.e. compliance with standards and/or controlled access to the soil with an Environmental Land Use Restriction);
- the placement of the fill was not prohibited by law at the time of placement;
- and the person requesting the variance did not place the fill on the property.

These requirements have substantially been met by the location, extent and character of the Site and associated fill material. The Engineered Control of Polluted Soil variance may be granted under circumstances where:

- "...the cost of remediating the polluted soil at such release area is significantly greater than the cost of installing and maintaining an engineered control for such soil and conducting ground-water monitoring at such release area [in accordance with the groundwater remediation standards], and ...that the significantly greater cost outweighs the risk to the environment and human health if the engineered control fails to prevent the mobilization of a substance in the soil or human exposure to such substance."

The first part of this requirement is certainly true about the Site (remediation costs significantly outweighing the cost of engineering controls), particularly since engineering controls would likely only include capping or paving the ROW area (institution of ELUR and capping of approximately 12,000 square feet of area; estimated cost approximately $100,000). Given the above-described engineering controls, failure would increase accessibility to the soil from a direct exposure standpoint, however, as the projected Site use is to remain industrial/commercial, an argument can be made that the incremental increase in risk to adult workers is minimal, if any.

A third option is to determine if the area can be classified by CTDEP as a solid waste unit. This option would eliminate significant excavation and removal of the fill materials, and, although future use of the area could be somewhat limited, institution of an ELUR would not likely be required. There would be engineering and on-going maintenance costs associated with this option, potentially including the addition of a few feet of clean fill and vegetative (or other) cover and groundwater monitoring, at a minimum. Estimated costs are in the $75,000 to $100,000 range under this remedial alternative.

The fourth option would include a combination of the above-described methods, involving only limited excavation with the institution of an ELUR and capping of the remaining ROW areas. Associated costs would be expected to fall somewhere between $100,000 and $250,000.

The estimated cost of remediation of the Right-of-Way area ranges from approximately $75,000 to $450,000, depending on the alternative or combination of alternatives chosen.

Railroad Spur Disposal Area

The Railroad Spur Disposal Area was further characterized through the excavation of eleven test pits, advancement of two borings and construction of one additional monitoring well during Phase III activities. Monitoring well MW-19 was sampled during this phase of investigation, as was existing monitoring well MW-4, to assist in determining potential groundwater impacts from this disposal area. As previously noted, the Railroad Spur Disposal Area is part of a solid waste disposal corridor that extends northward from the southern property fence line to the Right-of-Way Disposal Area, along the eastern property border. Test pits indicated that the fill in this area is primarily limited to areas east of the railroad spur line, extending approximately ten to fifteen feet to the east, beyond the existing fence line. The edge of the fill is distinguishable by a steep slope, with various fill materials eroding out of certain portions of the embankment. No test pits were excavated beyond the fence line to the east.

The fill in the southern part of the property (TP-26, 30, 31, and B-59) consists mainly of fine to medium sand with varying amounts of asphalt (some pieces of tar, and macadam layers). It appears that a roadbed was present in this area in the past. To the north of this area (TP-27, 28 and 29), the fill begins to contain more slag, brick, rebar, ceramic pieces, metal scraps and what appear to be grinding wheels. Further to the north (B-60), the fill becomes a mixture of sand and cinders. Still further to the north (TP-36 and TP-37), the fill contains asphalt, asphalt fabric, typewriter parts, metal scrap, piping, brick, wire and metal slag. Cinder fill predominates to the north (TP-38, TP-39 and AST 2 Area). Visual field observations indicate approximately 5,000 cubic yards of disposal material and fill exist within this area.

Soil analytical results obtained from the Railroad Spur Line Disposal Area during Phase III activities are as follows:

- TP-31 – Exhibited various RSR SVOC exceedances. This is likely due to the presence of tar and similar materials in soil in that area.
- TP-38 - Exhibited a TPH exceedance of all applicable RSRs, however, this sample location appears to overlap a nearby area of surficial drainage. Due to the location of this test pit and the depth of the sample (less than three feet), the source of TPH in this sample is attributed to Surficial Stained Soil Area 1 and not the Railroad Spur disposal area
- TP-27, TP-28, TP-31 and TP-38 – Exhibited various DEC exceedances for arsenic, copper, lead and nickel. However, only one sample (TP-28) exceeded the GB PMC for nickel.
- B-60 – Soil from this boring exhibited lead and nickel concentrations that exceeded both the GB PMC and the Residential and Industrial/Commercial DECs. Samples from this boring were also analyzed for disposal parameters, including TCLP lead. The lead result indicates that, if excavated, soil from this area would be considered a hazardous waste for disposal purposes. However, lead was not detected in groundwater at this location (MW-19).

The presence of the lead in soil at hazardous concentrations appears to be localized.

A summary of soil analytical results obtained from the Railroad Spur Line Disposal Area is presented in the table below.

Groundwater samples were collected from monitoring wells MW-4 and MW-19 for analysis of VOCs, SVOCs, TPH, arsenic, copper, lead, nickel, thallium, zinc and cyanide. Five SVOC constituents were present in the sample collected from MW-4; the SWPC was exceeded in MW-4 for acenaphthylene and phenanthrene. No SVOCs were present in MW-19. SWPC were also exceeded for copper and zinc in MW-4 and for nickel and zinc in MW-19.

Copper and zinc were present in several groundwater samples across the Site, including those collected from upgradient monitoring wells, suggesting that their presence in groundwater in this area may, at least in part, be indicative of contributions from background conditions.

Remedial Options

Remedial options for this area are similar to those previously discussed for the ROW disposal area. These two disposal areas are related as they appear to be contiguous. Although, with the exception of the ash, the specific materials disposed therein are different, it would seem reasonable to deal with both areas as one collective unit. From a regulatory compliance standpoint, the most favorable alternative would be to have the entire area (including the ROW Disposal Area) evaluated by CTDEP for classification on a solid waste unit, as discussed in the previous sub-section. Similarly, as with the ROW Disposal Area, a variance from the DEP under exemptions provided for Widespread Polluted Fill or Engineered Control of Polluted Soil under RSR Sections 2(f)(1) and 2(f)(2), respectively, could be pursued. This approach would require the City to restrict access to the impacted area (e.g., by fencing the impacted area), or limit direct human contact with contaminated soil (e.g., by paving the area). RSR provisions will require the City to institute an Environmental Land Use Restriction (ELUR) on this area, representing an encumbrance on the Site.

Excavation and landfill disposal of approximately 400 cubic yards of fill material would be required to meet residential soil cleanup criteria for future unrestricted use of this area. Alternately, the institution of an ELUR and capping of approximately 2,400 square feet of fill area would negate excavation and disposal costs, but will limit future use options. As with the adjacent ROW disposal area, a combination limited excavation/disposal of "hotspots" and institution of a less restrictive ELUR may present a more favorable option to the City by reducing Site redevelopment costs. Excavation and disposal options assume a combination of asphalt batching or thermal treatment and stabilization and off-site disposal for hazardous waste (lead in soil).

The estimated cost of remediation in this area (solely) is approximately $25,000 to $120,000, depending on the alternative chosen.

Table 2
Analytical Results
Rail Road Spur Area
Remington Rand

Analyte	Sample ID						CT RSRs		
	B-10[1] (6'-7')	B-60[1] (8'-12')	TP-27	TP-28	TP-31	TP38	GB PMC	R DEC	I/C DEC
Total Petroleum Hydrocarbons (mg/Kg)									
TPH	10,400	ND<25	33	68	96	10,240	2500	500	2500
Semivolatile Organic Compounds (mg/Kg)									
2,4-Dimethylphenol	210	ns	ns	ns	ns	ns	no std	no std	no std
2-Methylnaphthalene	1000	ns	ns	ns	ns	ns	no std	no std	no std
2-Methylphenol (o-cresol)	122	ns	ns	ns	ns	ns	no std	no std	no std
3-&-4-Methylphenol (m&p-cresol)	92	ns	ns	ns	ns	ns	no std	no std	no std
Acenaphthene	528	BDL@0.1	BDL@0.1	BDL@0.1	0.624	BDL@0.1	no std	no std	no std
Acenaphthylene	556	BDL@0.1	BDL@0.1	BDL@0.1	0.587	BDL@0.1	84	1000	2500
Anthracene	1500	BDL@0.1	BDL@0.1	BDL@0.1	2.44	BDL@0.1	400	1000	2500
Benzo(a)anthracene	1560	BDL@0.1	BDL@0.1	0.214	12.44	BDL@0.1	1	1	7.8
Benzo(a)pyrene	1380	BDL@0.1	BDL@0.1	0.195	7.25	BDL@0.1	1	1	1
Benzo(b)fluoranthene	1200	BDL@0.1	BDL@0.1	0.163	8.13	BDL@0.1	1	1	7.8
Benzo(g,h,i)perylene	BDL	BDL@0.5	BDL@0.5	BDL@0.5	2.87	BDL@0.5	no std	no std	no std
Benzo(k)fluoranthene	830	BDL@0.1	BDL@0.1	BDL@0.1	4.93	BDL@0.1	1	8.4	78
Chrysene	1590	BDL@0.1	BDL@0.1	0.235	12.14	BDL@0.1	no std	no std	no std
Di-n-butylphthalate	11.2	ns	ns	ns	ns	ns	140	1000	2500
Dibenzo(a,h)anthracene	184	ns	ns	ns	ns	ns	no std	no std	no std
Dibenzofuran	1000	ns	ns	ns	ns	ns	no std	no std	no std
Fluoranthene	4680	BDL@0.1	BDL@0.1	0.447	24.22	BDL@0.1	56	1000	2500
Fluorene	1640	BDL@0.1	BDL@0.1	BDL@0.1	0.795	BDL@0.1	56	1000	2500
Indeno(1,2,3-cd)pyrene	684	BDL@0.5	BDL@0.5	BDL@0.5	3.68	BDL@0.5	no std	no std	no std
Naphthalene	3700	BDL@0.1	BDL@0.1	BDL@0.1	0.249	BDL@0.1	56	1000	2500
Phenanthrene	6540	BDL@0.1	BDL@0.1	BDL@0.1	BDL@0.1	BDL@0.1	40	1000	2500
Phenol	68.7	BDL@0.5	BDL@0.5	BDL@0.5	BDL@0.5	BDL@0.5	800	1000	2500
Pyrene	3440	BDL@0.1	BDL@0.1	0.384	13.30	BDL@0.1	40	1000	2500
1,2,4-Trichlorobenzene	ns	BDL@0.1	BDL@0.1	0.401	24.17	BDL@0.1	no std	no std	no std
Metals and Inorganics									
Arsenic (total) - mg/Kg	11.7	9.7	20.1	52	10.5	28	no std	10	10
Arsenic (SPLP) - mg/L	ns	ND<0.05	ND < 0.05	ND < 0.05	ND < 0.05	ND < 0.05	0.5	no std	no std
Cadmium (total) - mg/Kg	2.82	ns	ns	ns	ns	ns	no std	34	100
Cadmium (SPLP) - mg/L	ns	ns	ns	ns	ns	ns	0.05	no std	no std
Chromium (total) mg/Kg	18.2	ns	ns	ns	ns	ns	no std	3,900	51,000
Copper (total) - mg/Kg	69.4	730	58	29,000 (R)	679	284	no std	2,500	76,000
Copper (SPLP) - mg/L	0.26	4.17	0.02	0.15	0.02	0.02	13	no std	no std
Lead (total) - mg/Kg	296	1,200	128	221	132	501(R)	no std	500	1,000
Lead (SPLP) - mg/L	1.37	13.8	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	0.15	no std	no std
Nickel (total) - mg/Kg	39.8	8,800	7.4	23,400	229	84	no std	1,400	7,500
Nickel (SPLP) - mg/L	0.16	6.86	ND < 0.05	4.05	0.49	ND < 0.05	1	no std	no std
Thallium (total) - mg/Kg	ns	ND<10	ND<10	ND<10	ND<10	ND<10	no std	5	160
Thallium (SPLP) - mg/L	ns	ND<0.002	ND < 0.002	ND < 0.002	ND < 0.002	ND < 0.002	0.05	no std	no std
Zinc (total) - mg/Kg	1,300	650	24.2	6,800	177	155	no std	20,000	610,000
Zinc (SPLP) - mg/L	6.55	7.36	0.31	2.56	0.12	0.07	50	no std	no std
Cyanide (total) - mg/Kg	ns	1.6	ND<1.0	3.8	ND<1.0	3.1	no std	1,400	41,000
Cyanide (SPLP) - mg/L	ns	ND<0.05	ND < 0.05	ND < 0.05	ND < 0.05	ND < 0.05	2	no std	no std

Notes:

Shaded values indicate concentrations in exceedance of applicable criteria.

No Std = No remediation standard has been established by CTDEP (in some cases, a specific criteria would not be applicable).

SPLP = Synthetic precipitation leading potential.

(R) indicates exceedance of Residential DEC only.

ns = Not Sampled.

ND = Not detected.**

BDL = Below detection limit.**

** These terms are used interchangeably by the laboratory and have been maintained in this table to correspond with laboratory reports.

[1] Sample data collected during the Phase II Investigation.

mg/kg = Milligrams per kilograms, roughly equivalent to parts per million.

mg/L = Milligrams per liter, roughly equivalent to parts per million.

Underground Storage Tanks Investigation

To further investigate for the presence of, and impact from, USTs, additional test pits, soil borings and monitoring well installations were undertaken at the three UST Release Areas previously identified (Suspect UST 2, UST 4 and Suspect UST 5). The presence of one UST was confirmed at the Site during Phase II assessment activities (UST 4); suspect USTs 2 and 5 were not found during the Phase III investigation, suggesting they may have been previously removed. Two additional USTs were identified during Phase III activities. The first "new" tank to be found is identified herein as UST 6, which is located in the same general vicinity as UST 4 and is considered to be part of this release area. The second newly discovered UST is identified as abandoned UST 7, which is located in the vicinity of the AST Release Area (AST 2), and is considered to be at least a contributing source (prior to its abandonment) of hydrocarbon contamination in that area (UST 7 is further discussed with the aboveground storage tank investigation discussion below).

Suspect UST 2 Area

The Phase II investigation identified evidence of historic releases of petroleum in this area that impacted soil at concentrations in excess of all applicable soil RSRs (however, no groundwater impacts were identified). The Phase I report reported a UST in this area but, a concrete pad and subsurface piping prevented access to further investigate for the presence of this UST during Phase II. Sanborn insurance maps (Sanborns) also depict an historic crude oil tank in this area. Subsequent to the Phase II investigation, the concrete pad located centrally in this area was identified (based on Sanborn information) as a former transformer switching station.

Three test pits (TP-33, 34 and 35) were excavated in the vicinity of suspect UST 2, adjacent to the existing concrete slab (see Figure 2). As the concrete slab has been identified as the location of a former transformer switching station, soil samples were collected for PCB analysis, as well as TPH. Site constraints, including subsurface utilities, limited the areas that could be assessed using a backhoe. However, the backhoe investigation was useful in exposing subgrade materials around the concrete pad and allowed for the collection of PCB samples. TPH was identified in concentrations exceeding the Residential DEC (500 ppm) in each test pit; the sample collected from TP-33 also exceeded the Industrial/Commercial DEC and the GB PMC for TPH. PCBs were not detected in any of the surficial test pit samples.

Five soil borings (B-61 through B-65) were advanced to delineate the extent of the apparent petroleum contamination associated with Suspect UST 2. Soil samples analyzed from these five borings indicated TPH exceedances of the Residential DEC in three borings (B-61, 62 and 64), with the B-62 sample also exceeding the Industrial/Commercial DEC and the GB PMC. Pyrene was also detected in B-61 in excess of the GB PMC. Neither B-63 nor B-65 exhibited detectable concentrations of TPH. Soil data collected from this area is summarized in the table below.

Table 3
Soil Analytical Results
Suspect UST 2 Area
Remington Rand

Analyte	Sample ID								CTRSRs		
	UST 2	B-5[1]	B-6[1]	B-61	B-62	B-63	B-64	B-65	GB PMC	R DEC	I/C DEC
	TP-1	(6'-8')	(10'-11')	(4'-8')	(4'-8')	(8'-12')	(4'-8')	(8'-12')			
Volatile Organic Compounds (mg/Kg)											
Ethylbenzene	0.41	ns	ns	ns	ns	ns	ns	ns	10.1	500	1,000
Xylene	0.574	ns	ns	ns	ns	ns	ns	ns	19.5	500	1,000
Total Petroleum Hydrocarbons (mg/Kg)											
TPH	9,380	4490[2]	46.2[2]	2,300 (R)	7,380	ND<25	916 (R)	ND<25	2,500	500	2,500
Semivolatile Organic Compounds (mg/Kg)											
Pyrene	ns	ns	ns	0.222	ns	ns	ns	ns	40	1,000	2,500

Notes:

Shaded values indicate concentrations in exceedance of applicable criteria.

No Std = No remediation standard has been established by CTDEP (in some cases, a specific criteria would not be applicable).

SPLP = Synthetic precipitation leading potential.

(R) indicates exceedance of Residential DEC only.

ns = Not Sampled.

ND = Not detected.**

BDL = Below detetion limit.**

** These terms are used interchangeably by the laboratory and have been maintained in this table to correspond with laboratory reports.

[1] Sample data collected during the Phase II Investigation.

mg/kg = Milligrams per kilograms, roughly equivalent to parts per million.

mg/L = Milligrams per liter, roughly equivalent to parts per million.

Monitoring well MW-2, installed during Phase II and associated with this area of concern (located immediately downgradient), was sampled during the Phase III UST 2 investigation. No VOCs or TPH were detected in groundwater at this location.

No USTs were identified during the investigation of the Suspect UST 2 Release Area. However, during the advancement of B-62, the drill point was deflected by a subsurface structure, possibly a utility line or UST.

Remedial Options

Based upon currently available information, excavation and recycling of petroleum-impacted soil, as well as removal and disposal of UST 2 (if encountered during remediation), to meet applicable RSR Residential DEC would avoid the need to institute an ELUR in the Suspect UST 2 Area and provide unrestricted future uses in this area. Alternatively, soil remediation activities may be restricted to excavation of contaminated soil to levels below applicable RSR standards, with implementation of an ELUR, to help reduce Site redevelopment costs. No groundwater impacts were identified associated with UST 2, and therefore, groundwater does not appear to be impacted by residual TPH concentrations in soil.

Remedial options for this area include the excavation and treatment of approximately 1,000 cubic yards of TPH contaminated soil to meet the Residential DEC. The least expensive soil recycling methods include asphalt batching and low-temperature thermal desorption. In-situ treatment of this soil is not considered a cost-effective option due to the limited amount of soil to be treated. The estimated cost of remediation to residential DEC is approximately $60,000. The application of an ELUR and remediation to the Industrial/Commercial DEC would decrease soil volumes to roughly 550 cubic yards and excavation/disposal costs to approximately $33,000.

UST 4 Gasoline/Solvent Release Area

UST 4, a 500-gallon, single-walled steel UST, is located on the east side of the main building. The presence of UST 4 was confirmed during the Phase II. Evidence of both gasoline and solvent contamination was identified in this area during the Phase II assessment. Although commingled, the presence of solvents and hydrocarbons in soil and groundwater in this area are likely from two separate release events. During the Phase III investigation, four soil borings were advanced and one monitoring well installed outside (downgradient) of the main building to delineate the extent of soil contamination previously identified in this area. Additionally, six soil borings and two monitoring wells were installed through the floor inside the building. These interior sampling locations were chosen in an attempt to locate and define the source area of solvent contamination previously detected in groundwater (at monitoring well MW-1). The Phase II investigation yielded no detectable solvent contamination in soil or groundwater to the west (upgradient) of the building (MW-10, MW-11 and MW-12), suggesting the source may be located beneath the structure.

Samples from each of the borings were submitted for analytical testing for VOCs and TPH. Additionally, a subset of these samples were analyzed for SVOCs, cadmium, nickel, zinc or cyanide, and for disposal parameters. TPH was present in three of the exterior borings exceeding RSRs (GB PMC and Industrial/Commercial DEC). Low concentrations of VOCs were also detected in soil in this area, however at concentrations below applicable RSRs or for parameters without established RSRs.

Groundwater results from the four monitoring wells present (MW-1, MW-20, MW-21 and MW-22) indicate RSR exceedances in MW-1 (outside) and MW-21 (inside). Zinc was present in both wells in exceedance of the SWPC (however, it is not present in groundwater downgradient of these wells [in MW-20] above the SWPC, and has also been detected at several well locations throughout the Site, including upgradient locations). Chlorinated VOCs (vinyl chloride, 1,1-dichloroethylene and trichloroethylene) were detected in MW-21 at concentrations in excess of both the Residential and Industrial/Commercial VC RSRs.

Solvent contamination in this area appears to originate from a source (or former source) upgradient of the two USTs, beneath the main building, and extends downgradient and overlaps the hydrocarbon contamination in the direction of the Quonset building. The most likely solvent source is considered to be the floor drains centrally located in the building. Soil borings B-72 and B-73 were advanced through these drains. Chlorinated compounds were detected in soil analyzed from boring B-73, although at very low levels and well below corresponding RSRs. Evidence of a discontinued source includes the apparent decrease of solvent concentrations in groundwater in this area from 1997 to 1998. A summary of Phase II and Phase III chlorinated compound concentrations in MW-1 is provided below.

Table 4
Groundwater Analytical Date
UST 4 Area (Monitoring Well MW-1)

Analyte	May 1997 Results (ppb)	September 1998 Results (ppb)	GB PMC (ppb)	RDEC (ppb)	I/C DEC (ppb)
Vinyl Chloride	17.9	BDL @ 1	15,750	2	2
1,1-DCE	3.1 (R)	2 (R)	96	1	6
Trans-1,2-DCE	1.2	BDL @ 1	NS	NS	NS
Cis-1,2-DCE	71.6	22	14,100	287	710
Trichloroethylene	275 (R)	81	2,340	219	540

DCE = Dichloroethylene
RDEC = Residential Direct Exposure Criteria
ppb = Parts per billion
GB PMC = Pollutant Mobility Criteria (GB Area)
I/C DEC = Industrial/Commercial Direct Exposure Criteria
NS = No standard established
BDL = Below Laboratory Detection Limits
(R) = Exceedance of Residential DEC only
Shading indicates exceedance of at least one applicable RSR

From the two sampling events, it is not clear how much of this apparent decrease in concentrations is due to seasonal fluctuation of groundwater and/or how much is due to actual degradation of contaminants. Additional periodic sampling may indicate a pattern of degradation over time due to natural attenuation.

Although the source of chlorinated solvents in groundwater collected from monitoring wells MW-1, MW-21 and MW-22 is considered likely to be the floor drains located in the main building, it should be noted that chlorinated compounds were detected below actionable levels in groundwater in many parts of the Site. The presence of these compounds in thirteen of the twenty-two on-site monitoring wells appears to be indicative of general poor housekeeping practices by past/current tenants at the Site and not of an on-going source(s). Historical disposal of wastes via the floor drains in the main portion of the building is also consistent with this random approach to waste management. Of the thirteen monitoring wells exhibiting detectable chlorinated compound concentrations, only groundwater (sample from monitoring well MW-21) currently exhibits chlorinated concentrations in excess of an applicable RSR.

During reconnaissance for Phase III field work, a previously unknown UST (UST-6) was discovered adjacent to the main building, approximately 45 feet to the northwest of UST 4. This tank was accessed and a sample collected. The tank, although unlikely still in use based on the level of effort required to access the tank, appears to contain waste motor oil. A preliminary assessment indicates that the tank is likely of 550- or 1,000 gallon capacity, containing approximately 500 to 1,000 gallons of liquid (water and oil). This tank may be a contributing source of hydrocarbon contamination in this area. Boring B-70, advanced immediately downgradient of UST 6, exhibited evidence of hydrocarbon contamination in the 4'-8' depth interval (TPH at 9,900 ppm).

The petroleum-related contamination zone, based on field observations and soil analysis, occurs at the water table interval (in this case, approximately 8 feet). The aerial extent of the gasoline/hydrocarbon contamination is defined upgradient by the USTs (UST 4 and UST 6). The plume extends downgradient to the east, under the Quonset building and towards the ROW Disposal Area. Groundwater samples collected from associated monitoring wells indicate the presence of TPH in one location (MW-20), the most downgradient well with respect to USTs 4 and 6. Soil analytical data associated with this area of concern is summarized in Table 5.

Remedial Options

Based upon currently available information, excavation and recycling of approximately 3,000 cubic yards of contaminated soil, as well as removal and disposal of USTs 4 and 6, to meet applicable RSR Residential DEC would avoid the need to institute an ELUR in the UST 4 Area. The estimated cost of remediation in this manner is approximately $180,000. The least expensive soil recycling methods include asphalt batching and low-temperature thermal desorption. No appreciable cost savings would be realized by remediating hydrocarbon contaminated soil to Industrial/Commercial DECs.

Table 5
Soil Analytical Data
UST 4 /Solvent Release Area
Remington Rand

Analyte	UST 4 Area														CTRSRs		
	UST 4 TP-1	B-2[(1)] (10'-12')	B-3[(1)] (10'-12')	B-55 (5'-9')	B-66 (4'-8')	B-67 (4'-8')	B-68 (4'-8')	B-69 (4'-8')	B-70 (4'-8')	B-71 (0-4')	B-72 (8'-12')	B-73 (4'-8')	B-74 (8'-12')	B-75 (8'-12')	GB PMC	R DEC	I/C DEC
Volatile Organic Compounds (mg/Kg)																	
Benzene	**0.089**	ND	ND	ns	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	0.2	21	200
1,1-Dichloroethane	ND	ND	ND	ns	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	**0.013**	BDL@0.01	BDL@0.01	1.4	500	1,000
cis-1,2-Dichloroethylene	ND	ND	ND	ns	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	**0.023**	BDL@0.01	BDL@0.01	14	500	1,000
Trichloroethylene	ND	ND	**0.029**	ns	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	**0.022**	BDL@0.01	1	56	520
Chlorobenzene	ND	ND	ND	ns	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	**0.189**	BDL@0.01	BDL@0.01	20	500	1,000
Ethylbenzene	**3.59**	ND	ND	ns	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	10.1	500	1,000
Toluene	**0.349**	ND	ND	ns	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	67	500	1,000
Xylene	**3.53**	ND	ND	ns	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	19.5	500	1,000
Isopropylbenzene	ND	ND	ND	ns	BDL@0.01	BDL@0.01	**0.016**	**0.57**	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	no std	no std	no std
n-Propylbenzene	ND	ND	ND	ns	BDL@0.01	BDL@0.01	**0.043**	**0.102**	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	no std	no std	no std
1,3,5-Trimethylbenzene	ND	ND	ND	ns	BDL@0.01	BDL@0.01	BDL@0.01	**0.644**	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	no std	no std	no std
tert-Butylbenzene	ND	ND	ND	ns	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	**0.02**	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	no std	no std	no std
1,2,4-Trimethylbenzene	ND	ND	ND	ns	BDL@0.01	BDL@0.01	**0.064**	**0.229**	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	no std	no std	no std
sec-Butylbenzene	ND	ND	ND	ns	BDL@0.01	BDL@0.01	**0.126**	**0.071**	**0.047**	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	no std	no std	no std
1,2-Dichlorobenzene	**0.159**	ND	ND	ns	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	**0.035**	BDL@0.01	BDL@0.01	3.1	500	1,000
n-Butylbenzene	ND	ND	ND	ns	BDL@0.01	BDL@0.01	**0.147**	**0.035**	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	no std	no std	no std
MTBE	ND	ND	ND	ns	**0.013**	BDL@0.01	**0.049**	BDL@0.01	**0.052**	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	BDL@0.01	20	500	1,000
Total Petroleum Hydrocarbons (mg/Kg)																	
TPH	**37,700**	BDL[(2)]	**47.6**[(2)]	ND<25	ND<25	ND<25	**6,600**	**2,860**	**9,900**	ND<25	**152**	**76**	ND<25	ND<25	2,500	500	2,500
Polychlorinated Biphenyls (ppm)																	
PCBs	ns	ns	ns	ns	ns	ns	ns	ND<1	ns	ns	ns	ns	ns	ns	0.005	1	10
Semivolatile Organic Compounds (mg/Kg)																	
Anthracene	ns	ns	ns	ns	ns	ns	ns	**0.229**	ns	ns	ns	BDL@0.1	ns	ns	BDL@0.1	400	1,000	2,500
Fluorene	ns	ns	ns	ns	ns	ns	ns	**0.139**	ns	ns	ns	BDL@0.1	ns	ns	BDL@0.1	56	1,000	2,500
Metals and Inorgnics																	
Nickel (total) - mg/Kg	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	**36.9**	**16.4**	**8.2**	**11.4**	1	1,400	7,500
Zinc (total) - mg/Kg	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	**28**	**58**	**18.2**	**25**	50	20,000	610,000

Notes:
Shaded values indicate concentrations in exceedance of applicable criteria.
No Std = No remediation standard has been established by CTDEP (in some cases, a specific criteria would not be applicable).
SPLP = Synthetic precipitation leading potential.
(R) indicates exceedance of Residential DEC only.
ns = Not Sampled.
ND = Not detected.**
BDL = Below detetion limit.**
** These terms are used interchangeably by the laboratory and have been maintained in this table to correspond with laboratory reports.
(1) Sample data collected during the Phase II Investigation.
mg/kg = Milligrams per kilograms, roughly equivalent to parts per million.
mg/L = Milligrams per liter, roughly equivalent to parts per million.

In-situ treatment of this soil is considered a potentially cost-effective option and may decrease remedial costs, but will increase the length of time necessary to reach completion. Pilot tests are necessary to evaluate site-specific conditions relative to the various in-situ treatment technologies. The estimated cost of remediation in this manner is approximately $80,000 to $100,000.

The Phase III investigation did not confirm the presence of an on-going source of solvent contamination beneath the building; instead it appears possible that the solvent source may be related to historic releases to floor drains located centrally within the structure. An analysis of indoor air quality is necessary to determine if chlorinated solvent concentrations in groundwater are adversely impacting indoor air. Although initially included within the Phase III work plan, the collection of air samples to evaluate potential impacts was not conducted within the building because it was not vacant and existing tenants are currently conducting various mechanical activities and store small quantities of chemicals for business use (specifically, various automotive-related businesses) in that vicinity which may have adversely affected test results. With existing conditions, it would be difficult, if not impossible, to differentiate between on-going commercial activities and potential off-gassing from groundwater. Although both groundwater VCs have been exceeded, if there are no corresponding adverse impacts to indoor air quality, no further remedial requirement exists. Periodic collection and analysis of groundwater samples at the Site will likely establish that dissolved solvent concentrations are actually decreasing over time due to natural attenuation and indoor air quality sampling may not be necessary.

Currently, the 1,1-DCE concentration in MW-1 (2 ppb) exceeds the Residential VC (1 ppb), however, does not exceed the Industrial/Commercial VC. No exceedance of either VC was detected in monitoring well MW-20 (BDL @ 1 ppb). Given their locations relative to the Quonset building, it is unlikely that groundwater beneath the structure exceeds the Residential VC. Based on the extremely low concentration detected in groundwater in MW-1, remediation of this area alone is not practical. Periodic monitoring and sampling of groundwater in this area will likely establish a pattern of natural attenuation, decreasing 1,1-DCE concentrations to below Residential VCs within a very short period of time.

Suspect UST 5 Area

The Phase II investigation yielded evidence of a petroleum release in this portion of the Site. Six test pits, eight soil borings and one monitoring well were advanced/installed during Phase III to assist in delineating the extent of gasoline contamination in this area. One additional monitoring well (MW-6) was previously installed in this area and was also sampled during Phase III. The test pitting program defined the downgradient extent of contamination and was used in an attempt to locate a UST source. A magnetometer survey conducted during Phase II indicated a likely location for Suspect UST 5 was approximately 25 feet to the north of the closest building corner. Test pits were excavated to determine whether a UST currently exists in this area. No tanks were found. A dense layer of what appeared to be metallic chips was found, which may have been what was identified by the

magnetometer survey. Additionally, test pits were excavated on both sides of the driveway to locate the suspected UST. Although no UST was found, sandy fill material and two 10-inch metal ports (possibly from previous tanks) were found. A strong possibility exists that any tank(s) present in this area have already been removed and that only residual hydrocarbon contamination remains.

Soil borings were advanced to further delineate the extent of the plume. TPH was detected in soils in excess of the GB PMC and the Residential and Industrial/Commercial DECs. The extent of the plume has been delineated in both up- and downgradient directions. However, as the exact location of Suspect UST 5 is unknown, it cannot be determined at this time how much of the plume has spread due to the presence of past or present underground piping potentially associated with this UST. From the data obtained, the upgradient portion of the plume abuts or slightly underlies the building wing closest to the release. Figure 3 illustrates the approximate extent of the plume. An inspection of the inside of the building adjacent to the release area did not provide any evidence of a tank being located under the floor of the structure. A photoionization detector (PID) was used to preliminarily assess indoor air quality and monitor floor drains. No evidence of hydrocarbon impact to air quality within the building was identified. A summary of soil analytical results is presented in Table 6.

Groundwater from two monitoring wells (MW-6 and MW-18) was analyzed for VOCs, TPH, copper and zinc. Of these analytes, only zinc in monitoring well MW-18 was detected at a concentration in excess of the SWPC. Vinyl chloride exceeds the volatilization criteria in the sample collected from MW-6. TPH concentrations in both wells were relatively low, with 27 ppm detected in MW-6 and 17 ppm detected in MW-18. Although not required, a comparison of these TPH concentrations to the Groundwater Protection Criteria (GWPC) yields no exceedances. The GWPC applies to groundwater used for drinking purposes and does not directly apply here, however, as there are no SWPC or VCs for TPH, the fact that TPH concentrations are below a generally stricter standard is further affirmation that groundwater remediation for hydrocarbon impact in this area would not be warranted.

Table 6
Analytical Results
Suspect UST 5 Area
Remington Rand

Analyte	Sample ID										CTRSRs		
	TP-21	TP-23	TP-24	B-16[1] (5'-6')	B-18[1] (5'-7')	B-50 (4'-8')	B-51 (4'-8')	B-52 (4'-8')	B-53 (4'-8')	B-57 (8'-12')	GB PMC	R DEC	I/C DEC
Volatile Organic Compounds (mg/Kg)													
Vinyl Chloride	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	no std	0.32	3
1,1-Dichloroethylene	ns	ns	ns	ns	ns	ns	BDL @ 0.025	ns	ns	ns	14	1	9.5
1,1-Dichloroethane	ns	ns	ns	ns	ns	ns	BDL @ 0.025	ns	ns	ns	14	500	1000
cis-1,2-Dichloroethylene	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	14	500	1000
Trichloroethylene	ns	ns	ns	ns	BDL	ns	ns	ns	ns	ns	1	56	520
Xylene	BDL @ 0.025	ns	ns	ns	BDL	ns	BDL @ 0.025	ns	ns	ns	19.5	500	1000
Isopropylbenzene	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	no std	no std	no std
sec-Butylbenzene	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	no std	no std	no std
1,2-Dichlorobenzene	BDL @ 0.025	ns	ns	ns	ns	ns	BDL @ 0.025	ns	ns	ns	3.1	500	1000
n-Butylbenzene	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	no std	no std	no std
Total Petroleum Hydrocarbons (mg/Kg)													
TPH	80	23,400	4,800	29	5,200	4,332	20,700	ND<25	17,856	ND<25	2500	500	2500
Polychlorinated Biphenyls (ppm)													
PCBs	ns	ns	ns	ns	ns	ns	ND<1	ns	ns	ns	0.005	1	10
Semivolatile Organic Compounds (mg/Kg)													
Anthracene	BDL@0.1	ns	ns	BDL@0.1	BDL	ns	0.126	ns	ns	ns	400	1000	2500
Fluorene	BDL@0.1	ns	ns	BDL@0.1	2.11	ns	BDL@0.1	ns	ns	ns	56	1000	2500
Phenanthrene	BDL@0.1	ns	ns	BDL@0.1	2.17	ns	BDL@0.1	ns	ns	ns	40	1000	2500
Metals and Inorganics													
Beryllium	ns	ns	ns	ns	0.42	ns	ns	ns	ns	ns	no std	2	2
Cadmium	ns	ns	ns	ns	0.06	ns	ns	ns	ns	ns	no std	34	1,000
Chromium	ns	ns	ns	ns	10.9	ns	ns	ns	ns	ns	no std	3,900	51,000
Copper	ns	ns	ns	ns	13	ns	ns	ns	ns	ns	no std	2,500	76,000
Lead	ns	ns	ns	ns	7.51	ns	ns	ns	ns	ns	no std	500	1,000
Nickel	ns	ns	ns	ns	12.5	ns	ns	ns	ns	ns	no std	1,400	7,500
Selenium	ns	ns	ns	ns	6.07	ns	ns	ns	ns	ns	no std	340	10,000
Zinc (dissolved) - mg/Kg	ns	ns	ns	ns	27.5	ns	ns	ns	ns	ns	no std	20,000	610,000

Notes:

Shaded values indicate concentrations in exceedance of applicable criteria.

No Std = No remediation standard has been established by CTDEP (in some cases, a specific criteria would not be applicable).

SPLP = Synthetic precipitation leading potential.

(R) indicates exceedance of Residential DEC only.

ns = Not Sampled.

ND = Not detected.**

BDL = Below detetion limit.**

** These terms are used interchangeably by the laboratory and have been maintained in this table to correspond with laboratory reports.

[1] Sample data collected during the Phase II Investigation.

mg/kg = Milligrams per kilograms, roughly equivalent to parts per million.

mg/L = Milligrams per liter, roughly equivalent to parts per million.

Remedial Options

Based on the available data, removal of approximately 1,500 to 2,000 cubic yards of soil contaminated with TPH above GB PMC and Industrial/Commercial DEC would be required. The least expensive soil recycling methods include asphalt batching and low-temperature thermal desorption. In-situ treatment of this soil is considered a potential cost effective option and may decrease remedial costs, but will increase the length of time necessary to reach completion. Pilot tests are necessary to evaluate site-specific conditions relative to the various in-situ treatment technologies. The estimated cost of soil remediation in this area is approximately $80,000 to $120,000. Although the zinc concentration in groundwater collected from monitoring well MW-18 exceeds the SWPC for that contaminant, groundwater remediation is not recommended due to its irregular appearance across the Site. Similarly, the presence of vinyl chloride in excess of applicable RSRs (volatilization criteria) may warrant monitoring, but no structures are currently located in this area. Further, it is unlikely that future site redevelopment would include a structure in this area, because it provides vehicular access.

Aboveground Storage Tank Area Investigation

AST 2 Area

Evidence of an apparent fuel oil release was identified immediately north of AST 2 during the Phase II investigation. During the Phase III assessment, in order to delineate the impact and identify its source(s), eight soil borings and two monitoring wells were advanced/installed in the vicinity of AST 2. The petroleum-impacted zone appears to be limited to the north of AST 2 and is located roughly 8' to 12' below grade, indicating that a surface release is likely not the source of contamination. During reconnaissance of this area, a previously unidentified UST (UST 7) was found, located generally to the southwest and upgradient of the AST 2 release area. Upon inspection of the UST, it was found to be abandoned in-place and filled with cement. The previous contents of the tank are unknown. A boring advanced immediately downgradient of the UST (B-49) exhibited TPH concentrations in excess of the Residential DEC. This former tank is likely, at the least, a contributor to subsurface contamination in this general area.

Two other borings (B-37 and B-38) advanced to the north of AST 2 exhibited TPH concentrations in excess of applicable RSRs at 8 to 12 feet in depth. These TPH concentrations are higher than those adjacent to UST 7 (B-49) as well as boring B-42 (no detectable concentrations of TPH), which is located between UST 7 and the higher TPH concentrations in B-37 and B-38. Based on this data, contamination to the north of AST 2 is likely due to a source other than UST 7. AST 2 would not appear to be the primary source due to the depth of contamination. Contributing sources may be underground piping or another UST/subsurface source. Given the depth interval

of the contamination (primarily 8'-12') and its aerial extent, the source would not appear to be related directly to the fill material present in this area.

Arsenic was also detected in soils north of AST 2 during Phase III activities. Borings B-36, B-37 and B-38 all exhibited arsenic concentrations in excess of the Residential and Industrial/Commercial DECs. The GB PMC was not exceeded. These borings were advanced into fill material, which extends roughly from the Right-of-Way Disposal Area to the southwestern-most end of the Railroad Spur Disposal Area. The fill along this corridor is highly variable, exhibiting characteristics of different industrial activities documented at the Site, representing separate time periods. The three borings with the arsenic exceedances are located in close proximity to each other, and were all advanced through cinder fill. As only two of these borings exhibited TPH concentrations (B-36 was non-detect for TPH), it is likely that the arsenic present is due to the fill material and not associated with a petroleum release. Boring B-9, advanced during Phase II in close proximity to B-37, also exhibited TPH and arsenic concentrations above the aforementioned RSRs.

The following table summarizes soil analytical data obtained from the AST 2 Area of concern.

Groundwater samples collected from monitoring wells MW-16 and MW-17 were analyzed for VOCs, TPH and arsenic to characterize groundwater quality in this area. Additionally, MW-17 was analyzed for SVOCs. No TPH, arsenic, or SVOCs were detected in these samples. Methyl-tertiary-butyl-ether (MTBE) was present in both samples at very low concentrations (6 ppb and 7 ppb, respectively). In addition, trichloroethylene was present in MW-17 (at 4 ppb). No RSRs were exceeded in groundwater downgradient of the AST 2/UST 7 Area.

Remedial Options

Remedial options for this area include the excavation and treatment of approximately 950 cubic yards of TPH and arsenic contaminated soil. Reuse, recycling or disposal options will likely be determined based on arsenic concentrations (arsenic concentrations exceed normally permitted levels for asphalt batching or low-temperature thermal desorption). However, the soils are not characteristically hazardous. In-situ treatment of this soil is not considered a cost-effective option due to the relatively small volume of soil requiring treatment and the presence of the arsenic.

Table 7
Analytical Results
AST 2 Area
Remington Rand

Analyte	Sample ID								CTRSRs		
	B-9[1] (8'-12')	B-36 (8'-12')	B-37 (8'-12')	B-38 (8'-12')	B-39 (15'-18')	B-40 (8'-12')	B-42 (8'-12')	B-43 (8'-12')	GB PMC	R DEC	I/C DEC
Total Petroleum Hydrocarbons (mg/Kg)											
TPH	**62,500**	ND<25	**7,880**	**6,760**	ND<25	**38**	ND<25	**144**	2500	500	2500
Semivolatile Organic Compounds (mg/Kg)											
2-Methylnaphthalene	**10.7**	ns	ns	ns	ns	ns	ns	ns	no std	no std	no std
Metals and Inorgnics											
Arsenic (total) - mg/Kg	**42.9**	**15.7**	**38.4**	**96.1**	**4.4**	**1.5**	**2.3**	**4.2**	no std	10	10
Arsenic (SPLP) - mg/L	ns	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05	0.5	no std	no std
Beryllium (total) - mg/kg	**0.15**	ns	ns	ns	ns	ns	ns	ns	no std	2	2
Cadmium (total) - mg/Kg	**0.26**	ns	ns	ns	ns	ns	ns	ns	no std	34	1,000
Cadmium (SPLP) - mg/L	ns	ns	ns	ns	ns	ns	ns	ns	0.05	no std	no std
Chromium* (total) - mg/Kg	**4.42**	ns	ns	ns	ns	ns	ns	ns	na	3,900	51,000
Copper (total) - mg/Kg	**75.8**	**669**	**26.3**	**149**	**95.1**	**14.3**	**7.1**	**2,240**	na	2,500	76,000
Copper (SPLP) - mg/L	**0.26**	**0.01**	ND<0.01	0.03	ND<0.01	ND<0.01	0.04	ND<0.01	13	no std	no std
Lead (total) - mg/Kg	**44.4**	**20.2**	**11.8**	**43**	**27.9**	**15.8**	**13.2**	**325**	no std	500	1,000
Lead (SPLP) - mg/L	ns	ND<0.005	ND<0.005	ND<0.005	ND<0.005	ND<0.005	0.01	ND<0.005	0.015	no std	no std
Mercury (total) - mg/Kg	**0.044**	ns	ns	ns	ns	ns	ns	ns	no std	20	610
Nickel (total) - mg/Kg	**11.6**	**10.7**	**10**	**17.6**	**20.9**	**12.6**	**10.9**	**321**	no std	1,400	7,500
Nickel (SPLP) - mg/L	ns	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05	1	no std	no std
Thallium (total) - mg/Kg	ns	ND<5	ND<5	ND<5	ND<5	ND<5	ND<5	ND<5	no std	5.4	160
Thallium (SPLP) - mg/L	ns	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05	0.05	no std	no std
Selenium (total) - mg/Kg	**8.8**	ns	ns	ns	ns	ns	ns	ns	no std	340	10,000
Zinc (total) - mg/Kg	**21.2**	**39.6**	**36.8**	**48.9**	**59**	**35.7**	**32.2**	**187**	no std	20,000	610,000
Zinc (SPLP) - mg/L	**0.26**	ND<0.05	**0.07**	**0.09**	ND<0.05	ND<0.05	**0.1**	**1.42**	50	no std	no std
Cyanide (total) - mg/Kg	ns	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	na	1,400	41,000
Cyanide (SPLP) - mg/L	ns	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05	2	no std	no std

Notes:

Shaded values indicate concentrations in exceedance of applicable criteria.

No Std = No remediation standard has been established by CTDEP (in some cases, a specific criteria would not be applicable).

SPLP = Synthetic precipitation leading potential.

(R) indicates exceedance of Residential DEC only.

ns = Not Sampled.

ND = Not detected.**

BDL = Below detetion limit.**

** These terms are used interchangeably by the laboratory and have been maintained in this table to correspond with laboratory reports.

[1] Sample data collected during the Phase II Investigation.

mg/kg = Milligrams per kilograms, roughly equivalent to parts per million.

mg/L = Milligrams per liter, roughly equivalent to parts per million.

Excavation and off-site disposal of contaminated soil to meet applicable RSR standards would prevent further migration of the No. 4/No. 6 fuel oil release and avoid the need to institute an ELUR in the AST 2 Area. By excavating the impacted soil, including a limited area of separate-phase product identified during Phase II in B-9, groundwater remediation will likely not be necessary. The estimated cost of soil excavation and disposal is approximately $60,000.

Surficial Stained Soil Areas

Two surficial stained soil areas with stressed vegetation were identified during the previous investigations. Further delineation of these areas was accomplished by the advancement of five soil borings in Stained Soil Area 1 and one additional hand boring in Stained Soil Area 2. This information, combined with the data obtained during Phase II activities allowed for the delineation and characterization of these two areas.

Surficial Stained Soil Area 1

Borings in Area 1 were advanced to depths of two to three feet, the apparent depth of surficial impact. Contamination was visually identified to depths ranging from 1.3 feet to 2.2 feet throughout the area. Analysis of stained soils indicated RSR exceedances of several SVOCs and both the Residential and Industrial/Commercial DECs for arsenic. Test pit TP-38, which was excavated to assist in delineating the Railroad Spur Line Disposal Area, also exhibited a surficial TPH concentration in excess of the GB PMC and the Residential and Industrial/Commercial DECs. Given the total arsenic concentrations detected, it is mathematically possible that the GB PMC is also exceeded in these soils, although this parameter was not specifically measured. However, neither downgradient monitoring well MW-17 nor MW-19 exhibited detectable arsenic concentrations in groundwater. The TPH/SVOC contamination is likely attributable to the use and storage of oil-filled equipment and miscellaneous historic spill occurrences in this area. The arsenic, however, was only detected at elevated concentrations in borings B-44 and B-48. These borings were advanced in an area where scrap railroad ties are stored. Arsenic in soil in this area may be partially attributable to the presence of creosote on the railroad ties.

The closest monitoring well to Surficial Stained Soil Area 1, although installed as part of the Railroad Spur Disposal Area investigation, is MW-19 (located downgradient of the release area). Neither of the soil contaminants detected in the release area in excess of applicable RSRs (arsenic and SVOCs) were detected in groundwater in MW-19. As such, the impact to groundwater detected in this well (nickel and zinc) is considered to be from a source other than Surficial Stained Soil Area 1.

Surficial Stained Soil Area 2

The boring in Area 2 was advanced to a depth of 1 foot, and visible staining stopped at 0.7'. Previous investigations indicated that the depth of contamination in this area was up to two feet. A sample of this stained material was collected for analysis and its extent of impact to soil was visually identified. With the possible exception of lead, none of the RSRs were exceeded for the parameters analyzed. However, lead was detected in the disposal sample above the GB PMC when analyzed by the Toxicity Characteristic Leaching Procedure (TCLP). However, it is likely that a reanalysis of this material by the Synthetic Precipitation Leaching Procedure (SPLP), as allowed under the RSRs, will yield a lower concentration. Previously analyzed samples from this area detected arsenic and SVOCs above the Residential and Industrial/Commercial DECs, with benzo(a)pyrene also exceeding the GB PMC. As the SVOC and arsenic concentrations are the remedial regulatory drivers, reanalysis of the sample for SPLP lead was not considered necessary during the Phase III.

The closest monitoring well to Surficial Stained Soil Area 2 is MW-4, installed as part of the Phase II Railroad Spur Disposal Area investigation. Located downgradient of the release area, MW-4 exhibits SVOC concentrations (acenaphthylene and phenanthrene) in excess of the RSRs. However, SVOC concentrations in soil in the immediate vicinity of MW-4 contain significantly higher SVOC concentrations at a greater depth than those detected in Surfical Stained Soil Area 2. Additionally, no arsenic was detected in groundwater collected from MW-4. As such, constituents detected in groundwater collected from this well appear to be associated with a source other than Surficial Stained Soil Area 2.

Remedial Options

The most effective remedial option for both of the stained soil areas appears to be limited excavation and recycling or disposal of approximately 165 cubic yards of surficial contaminated soil. As soil contamination is shallow (less than two feet), excavation is the quickest and least expensive remedial option available. Accomplishing this limited removal would achieve compliance with applicable RSR Residential DEC and would avoid the need to institute an ELUR in these areas. As many of the exceedances are of both the Residential and Industrial/Commercial DECs, as well as the GB PMC, no additional costs are incurred by remediating soils to the level of the residential standards. It is estimated that the remediation, through excavation and disposal of soil combined from both areas, will cost approximately $10,000.

Other Sampling Locations

As a condition of the site access agreement, three additional monitoring wells (MW-13, MW-14 and MW-15) were installed along the northeastern property border in order to verify groundwater flow directions and monitor groundwater quality relative to the adjacent municipal landfill. These wells were installed on August 17 and 18, 1998. Analysis of groundwater samples collected from these wells on September 2 and 3, 1998 for VOCs and TPH detected no exceedances of the RSRs.

Groundwater monitoring and sampling data from these wells, in conjunction with data obtained from monitoring well MW-5R and landfill monitoring well MW-1, confirm previous information, indicating a generally easterly groundwater flow across the Site. Groundwater flow/leachate from the landfill does not appear to be impacting the environmental quality of the Site.

Previously installed upgradient monitoring wells MW-8, MW-9, MW-10, MW-11 and MW-12 were also resampled during Phase III, as were cross-gradient wells MW-5 and MW-7. With the exception of zinc which was present in MW-5R, MW-7 and MW-11 at concentrations in excess of the SWPC, none of the RSRs were exceeded in groundwater in the vicinity of these monitoring wells.

In order to estimate potential future Site remediation costs, and also to dispose of Phase III investigation-derived wastes, soil samples collected from each area of concern, and soil and water samples collected from drummed investigatory wastes, were analyzed for predetermined disposal parameters. The disposal analyses conducted were the same for each sample/area, and are consistent with most requirements for facilities potentially receiving the types of wastes generated at the Site. The purpose of the analyses was to determine the chemical and physical characteristics of Site soil and groundwater in support of cost-effective disposal. Analyses conducted include VOCs (including halogenated compounds), PCBs, pH, reactivity, RCRA 8 metals (total and TCLP), flash point and cyanide.

As expected, some RSR exceedances were identified during disposal analysis in several areas of concern, however, these results are consistent with the Site characterization and delineation analyses also conducted across the Site. Some metals detected in soil (particularly arsenic) were present in concentrations that affect available recycling, reuse and disposal options, but would not be expected to significantly impact potential future remediation costs. The one exception to this was the disposal sample collected from the Railroad Spur Disposal Area. This sample exhibited TCLP lead concentrations in excess of the federal standard, making soil in that area, if disposed off-site, a characteristically hazardous waste due to toxicity. The extent of the material exhibiting the TCLP lead exceedance appears to be isolated to a small area of the Railroad Spur Disposal Area (near MW-19). A similar localized area of lead at characteristically hazardous concentrations was found during the Phase II assessment within the ROW Disposal Area.

As previously noted, investigation-derived wastes (soil and water) were also analyzed and determined to be non-hazardous. American Environmental Technologies, Inc. shipped drummed material to United Recycling in Meriden, Connecticut.

All other sampling locations at the Site were associated with specific areas of concern.

Groundwater Elevations and Flow Directions

In September 1998, the casings for all newly installed monitoring wells and three existing monitoring wells located on the adjacent landfill property were surveyed for location and elevation, and tied into previous survey data from the Phase II study. This data, along with depth to groundwater measurements, were used to develop groundwater contours for the Site. Monitoring well information was used to determine groundwater flow across the Site, as well as between the Site and the adjacent Municipal landfill. The twenty-two on-site monitoring wells and Landfill monitoring well MW-1 were ultimately used to develop groundwater flow directions. Landfill monitoring wells MW-2 and MW-3 were considered too far away from the Site to be effectively connected to the contour grid for triangulation. Apparent water table elevations vary from approximately three to seventeen feet below ground surface across the Site. The groundwater flow directions evaluated during Phase III activities are similar to those developed during the Phase II Investigation; semi-radial flow, fanning from the northeast in the vicinity of MW-5R to the east in the vicinity of the Railroad Spur Line Disposal Area. Groundwater elevations were collected from all wells on September 15, 1998 and are included below.

Site Groundwater Conditions

Groundwater at the Site, in general, exhibits minimal contamination from the areas of concerns identified. Although detected in several of the wells, petroleum-related impacts are all well below applicable RSRs. No directly applicable groundwater standards currently exist for TPH. Detected concentrations of TPH were present in six samples collected during the Phase III Assessment. Concentrations ranged from 2.5 ppb to 776 ppb (in MW-3). Monitoring well MW-3 is located within the Right of Way Disposal Area, where many of the highest TPH concentrations in soil were detected (during Phase II activities). The level of 776 ppb slightly exceeds the GA-GPC of 500 ppb; this standard applies to groundwater used for drinking purposes and is not directly applicable to the Site (given its GB-classified groundwater location). However, because there are no established SWPC or VCs, a comparison to this more stringent criteria is provided for a general reference. Concentrations of TPH in MW-3 have dropped significantly since June 1997 (present at 8930 ppb). In fact, a comparison of the six wells installed as part of the Phase II Assessment (sampled initially in June 1997) that were resampled as part of the Phase III investigation reveals a decline of TPH concentrations in all of these wells.

Monitoring Well	Top of Casing Elevation (feet)	Groundwater Elevation from Top of Casing (feet)
MW-1	96.19	89.39
MW-2	99.08	88.77
MW-3	95.31	85.43
MW-4	98.84	85.63
MW-5R	98.54	85.89
MW-6	95.45	90.38
MW-7	97.19	91.83
MW-8	97.59	93.64
MW-9	97.11	93.76
MW-10	96.96	92.21
MW-11	96.30	91.40
MW-12	96.69	90.24
MW-13	99.73	90.18
MW-14	95.50	85.17
MW-15	98.78	85.81
MW-16	103.68	86.29
MW-17	102.16	87.46
MW-18	96.01	90.66
MW-19	100.25	86.69
MW-20	94.82	86.22
MW-21	97.65	91.50
MW-22	96.83	90.83
MW-LF-1	81.86	77.26
MW-LF-2	78.43	73.13
MW-LF-3	84.46	80.01

Note: Assumed datum of 100.00 feet at utility pole #8400, located near the Johnson Street entrance.

Chlorinated solvents have been present in Site groundwater since the initial round of sampling in May 1997. Trichloroethylene (TCE) and associated chemical breakdown constituents (1,1 Dichloroethylene, trans- and cis- Dichloroethylene) appear in several monitoring wells across the Site. During the Phase III Assessment, TCE was present in 11 of the 22 monitoring wells, including one upgradient well (MW-12). Concentrations ranged from 2 parts per billion (ppb) to 1,079 ppb (in MW-21). Aside from the elevated concentration detected in MW-21 (UST4 Gasoline/Solvent Area), all levels detected were well below all applicable RSRs.

The elevated reading in MW-21 exceeds the Residential and Industrial/Commercial VCs. It appears that the source of TCE in groundwater in this area of the Site (UST4 Area) is associated with the floor drains as previously discussed. Associated soil

analytical data suggests that a significant ongoing source is not located beneath the building. It seems as if groundwater impacts are related to historic discharges, as evidenced by decreasing concentrations of solvents over the past year.

No SWPC were met or exceeded for volatile organic compounds (including solvents and petroleum-related constituents) or TPH. One monitoring well (MW-4), located within the Railroad Spur Line Disposal Area, exhibited an exceedance of the SWPC for two semi-volatile organics ([SVOCs]Acenapthylene and Phenanthrene).

Copper, zinc and/or nickel SWPC exceedances were detected in nine of the wells. At least one of these metal constituents were present in five additional wells, at concentrations below the SWPC. Copper and zinc appear to be ubiquitous to the Site. Comparative data from the six wells originally installed as part of the Phase II Assessment (MW-1 through MW-6) indicates generally consistent levels of copper and zinc. During Phase III sampling and analysis, these metals were also found in upgradient wells on the Site; zinc exceeded SWPC in two of the six upgradient wells. Dissolved nickel in groundwater is most apparent in the Railroad Spur Line Disposal Area (MW-4 and MW-19). Nickel concentrations were almost at or above the SWPC in these two wells, respectively. Nickel was also present in nearby monitoring well MW-2 (below criteria). Table 8 summarizes groundwater analytical data collected during Phase III activities.

Table 8
Groundwater Analytical Results
Remington Rand - Phase III
Collected September 2 through 10, 1998

Analyte	Sample ID																					CTRSRs		
	MW-1	MW-2	MW-3	MW-4	MW-5R	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	MW-16	MW-17	MW-18	MW-19	MW-20	MW-21	MW-22	SWPC	R VC	I/C VC
Volatile Organic Compounds (ug/L)																									
Chloromethane	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	204	BDL@1	no std	no std	no std
Vinyl Chloride	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	40	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	17	BDL@1	15,750	2	2
Chloroethane	BDL@1	BDL@1	BDL@1	BDL@1	31	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	no std	no std	no std
1,1-Dichloroethylene	2	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	39	BDL@1	96	1	6
trans-1,2-Dichloroethylene	BDL@1	BDL@1	BDL@1	BDL@1	1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	4	BDL@1	no std	no std	no std
cis-1,2-Dichloroethylene	22	BDL@1	BDL@1	BDL@1	2	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	14	24	BDL@1	BDL@1	BDL@1	1	2	386	BDL@1	no std	no std	no std
Chloroform	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	2	BDL@1	BDL@1	BDL@1	BDL@1	5	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	14,100	287	710
Benzene	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	4	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	710	215	530
Trichloroethylene	81	BDL@1	BDL@1	29	29	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	1	BDL@1	97	97	BDL@1	4	2	6	BDL@1	1,079	4	2,340	219	540
Chlorobenzene	BDL@1	BDL@1	BDL@1	BDL@1	3	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	420,000	1,800	6,150
Isopropylbenzene	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	1	BDL@1	BDL@1	BDL@1	BDL@1	no std	no std	no std
1,3,5-Trimethylbenzene	BDL@1	BDL@1	BDL@1	2	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	no std	no std	no std
1,2,4-Trimethylbenzene	BDL@1	BDL@1	BDL@1	2	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	no std	no std	no std
sec-Butylbenzene	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	1	BDL@1	BDL@1	BDL@1	BDL@1	no std	no std	no std
n-Butylbenzene	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	2	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	no std	no std	no std
Naphthalene	BDL@10	BDL@10	BDL@10	18	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	BDL@10	no std	no std	no std
MTBE	9	BDL@1	BDL@1	1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	BDL@1	138	6	7	BDL@1	BDL@1	88	NA	2	no std	50,000	50,000
Total Petroleum Hydrocarbons (mg/L)																									
TPH	ND<0.5	ND<5	776	ND<5	ND<0.5	27	ND<5	ND<5	8	ND<0.5	ND<0.5	ND<0.5	ND<0.5	2.5	ND<0.5	ND<5	ND<5	17	ND<5	11	ND<0.5	ND<5	no std	no std	no std
Polychlorinated Biphenyls (ppm)																									
PCBs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5	no std	no std
Semivolatile Organic Compounds (ug/L))																									
Acenaphthene	NA	NA	NA	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL<5	NA	BDL<5	NA	NA	BDL<5	no std	no std	no std
Acenaphthylene	NA	NA	NA	4.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL<0.3	NA	BDL<0.3	NA	NA	BDL<0.3	0.3	no std	no std
Fluorene	NA	NA	NA	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL<5	NA	BDL<5	NA	NA	BDL<5	140,000	no std	no std
Naphthalene	NA	NA	NA	99	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL<5	NA	BDL<5	NA	NA	BDL<5	no std	no std	no std
Phenanthrene	NA	NA	NA	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BDL<0.07	NA	BDL<0.07	NA	NA	BDL<0.07	0.077	no std	no std
Metals and Inorganics (ug/L)																									
Arsenic (dissolved)	ns	ns	ns	ND<4	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ND<4	ND<4	ns	ND<4	ns	ns	ns	4	no std	no std
Cadmium (dissolved)	ND<5	ns	ns	ns	ND<5	ns	ND<5	ND<5	ND<5	ND<5	ND<5	ND<5	ns	ns	ns	ns	ns	ns	ns	ND<5	ND<5	ND<5	6	no std	no std
Copper (dissolved)	ns	ns	ND<10	70	ND<10	20	20	ND<10	ND<10	ND<10	40	ND<10	ND<10	ns	ns	ns	ns	ND<10	ND<20	ns	ns	ns	48	no std	no std
Lead (dissolved)	ns	ns	ns	ND<5	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ND<5	ns	ns	ns	13	no std	no std
Nickel (dissolved)	ND<50	70	ND<50	870	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	3,080	ND<50	ND<50	ND<50	880	no std	no std
Thallium (dissolved)	ns	ns	ns	ND<2	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ND<2	ns	ns	ns	63	no std	no std
Zinc (dissolved)	740	ND<50	910	310	250	ND<50	150	ND<50	ND<50	ND<50	340	60	80	ns	ns	ns	ns	150	1,820	90	320	ND<50	123	no std	no std
Cyanide (total)	ns	ns	ns	ND<50	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ND<50	ns	ns	ns	52	no std	no std

Notes:
ND = Compound analyzed for but not detected.*
BDL = Below detection limit.*
* These terms are used interchangeably by the laboratory and have been used herein to correspond to laboratory reports.
ns = Not sampled
mg/L = milligrams per liter, roughly equivalent to parts per million
ug/L = micrograms per liter, roughly equivalent to parts per billion
no std = no numerical standard has been established.
Only those constituents present in Sample (s) are shown in table.

5

Summary of Findings

A Phase II Environmental Site Assessment (ESA) was initiated in 1997 to determine if contamination was present at the Site in association with the generation, storage, and use of oil and hazardous materials. Phase III ESA activities were subsequently conducted in 1998 to identify the nature and extent of contamination identified during Phase II activities. The Phase III ESA included an investigation to help evaluate subsurface conditions in the immediate vicinity of previously identified areas of environmental concern, including former and existing UST locations, existing AST locations, surficially stained areas, and fill disposal areas.

Based on the results of the investigations, localized areas of residual soil and groundwater contamination exist at the Site in association with previously and newly identified contaminant sources. Laboratory analytical testing confirmed contaminant concentrations that exceed applicable RSR soil and groundwater standards in the following areas associated with USTs, ASTs, and waste disposal sites.

	RSRs Applicable to Soil			RSRs Applicable to Groundwater		
Area of Concern	R DEC	I/C DEC	GB PMC	R VC	I/C VC	SWPC
ROW Disposal Area	X	X	X			X
Railroad Spur Line Disposal Area	X	X	X			X
Suspect UST 2 Area	X	X	X			
UST 4/Solvent Release Area	X	X	X	X	X	X
Suspect UST 5 Area	X	X	X			X
AST 2 Area	X	X	X			
Stained Soil Area 1	X	X	X			
Stained Soil Area 2	X	X	X			

Specific constituents found at concentrations exceeding RSRs in each area of concern are summarized below. The specific RSRs that were exceeded for each constituent are provided in parenthesis.

- *Right-Of-Way Waste Disposal Area*: TPH, lead and nickel (R DEC,I/C DEC, and GB PMC), arsenic and lead (R DEC and I/C DEC), and copper (R DEC) in soil/fill; and, zinc in excess of SWPC in groundwater.

- *Railroad Spur Waste Disposal Area*: TPH, SVOCs and lead (R DEC, I/C DEC, GB PMC), arsenic (R DEC and I/C DEC), and copper (R DEC) in soils/fill; and, copper and zinc (SWPC) in groundwater.
- *Suspect UST 2 Area*: TPH (R DEC, I/C DEC, and GB PMC) in soil; no regulatory exceedances in groundwater at this location (MW-2).
- *UST 4/Solvent Release Area*: TPH (R DEC, I/C DEC and GB PMC) in soil; and VOCs (R VC and I/C VC) and zinc (SWPC) in groundwater.
- *Suspect UST 5 Area*: TPH (R DEC, I/C DEC and GB PMC) in soil; and, zinc (SWPC) and vinyl chloride (R VC and I/C VC) in groundwater.
- *AST 2 Area:* TPH (R DEC, I/C DEC and GB PMC) and arsenic (R DEC and I/C DEC) in soil; no regulatory exceedances in groundwater at this location (MW-16 and MW-17).
- *Surficial Stained Soil Areas 1 and* 2: TPH and SVOCs (R DEC, I/C DEC and GB PMC) in surface soils; no regulatory exceedances in groundwater at this location.

The areas of impact potentially requiring remediation are not significantly different from those identified during the Phase II. The volume of impacted material, with the exception of the UST 4 Area, has not increased enough to significantly change the initial estimates. The portion of the UST 4 Area impacted from petroleum sources is larger than estimated during the Phase II. The character of the material has been substantially refined during Phase III. In addition, the preliminary remedial options available to the City, as discussed herein, have also been modified.

6

Conclusions

The results of the Phase II and Phase III Assessments document localized areas of the Site where residual contamination in surface and subsurface soils will require remediation. Laboratory analytical testing confirms contaminant concentrations exceeding applicable RSR soil standards. The RSRs do allow for some flexibility with addressing the existing environmental conditions through contaminated soil excavation, on-site treatment and reuse, and/or the institution of ELURs where soil cleanup activities would be prohibitively expensive or technically infeasible. It is likely that a combination of these options will be implemented for redevelopment of the Site.

Groundwater at the Site also exhibits evidence of contamination above applicable RSRs. However, based on the Site's location within a GB-groundwater area and non-potable uses of groundwater in the vicinity, it appears that groundwater remediation will not be required by CTDEP.

Key findings of particular importance to the City's North End redevelopment plans include:

The adjacent Municipal Landfill does not appear to impose any adverse environmental impacts at the Site. Groundwater flow direction was recalculated, incorporating newly installed Site monitoring wells and the nearest landfill monitoring well. This data confirms previous information that groundwater flows in a generally northeasterly direction towards the landfill and wetland areas bordering the Site.

Two historic disposal areas (ROW and Railroad Spur Line) contain mixed wastes and fill. These areas appear to be contiguous and extend approximately along the existing fence line in the eastern and northern portions of the Site. One localized area within this disposal corridor exhibited concentrations of lead that would be considered hazardous, based on disposal parameters (i.e., TCLP lead). No lead was detected in groundwater samples collected in this area.

Copper, nickel and zinc concentrations in groundwater exceed surface water protection criteria. Copper and zinc were found in numerous locations, including upgradient wells, suggesting that background conditions may be, in part, contributing to these impacts. The nickel in groundwater is limited to the eastern portion of the Site near the Railroad Spur Line Disposal Area. Nickel concentrations were detected in soil in this area, but only one sample exceeded the GB groundwater protection criteria.

Solvents (primarily trichloroethylene and associated breakdown products) were present in several groundwater samples. Exceedances of applicable RSRs occurred in a newly installed well (MW-21) located within the main building. A nearby well (MW-1) immediately outside the building, which had exhibited elevated concentrations of solvents during Phase II, had significant decreases in these concentrations. Although data is limited to two sampling rounds, initial indications are that no significant ongoing source of contamination exists and that dissolved solvent concentrations in groundwater may be decreasing over time as a result of natural attenuation.

Contaminated soil in the underground storage tank (UST) areas will require remedial action. The two known tanks located immediately to the north of the main building (UST4 and UST 6) are no longer currently used. The tanks and their associated underground piping systems should be excavated and removed from the Site. Petroleum-impacted subsurface soils in at least two of these areas may be of sufficient volume to evaluate the potential for in-situ treatments. This option, if determined technically feasible, would eliminate excavation and disposal costs. However, the length of time necessary to achieve remediation objectives may not fit the City's future Site redevelopment timelines. In addition, significant costs would still be incurred as a result of pilot tests, engineering, implementation, maintenance and monitoring. Excavation and disposal of contaminated soils may be determined to be the most practical solution for the UST release areas, depending upon the outcome of the evaluation and the City's plans for redevelopment.

Impacted soils in the AST2 Area also exhibit concentrations of constituents above RSR criteria. This area is located within the disposal corridor. At a minimum, the tank and associated underground piping system(s) will need to be removed.

- Regulated building components and miscellaneous containers of hazardous waste were identified during the Phase II Assessment. Current operations at the Site, observed during Phase III, confirmed the storage and use of hazardous materials. These materials require proper handling and offsite disposal and are the responsibility of the Site tenants.

Our preliminary estimate of probable remediation costs (provided in the Phase II report) has been refined herein, based on all data collected at the Site to date. Although not formally a part our scope of work, VHB conducted a preliminary evaluation of remedial options as part of this Phase III Assessment to assist in estimating probable future remediation costs. Site data, in general, does not indicate any significant threats to groundwater or surface waters. In addition, soil data suggests that no major or ongoing sources of contamination exist. Although some extensive areas of impacted soils have been delineated, areas requiring soil remediation appear manageable. The final costs associated with remediation of contaminated soils are dependent upon several factors, including CTDEP determinations, redevelopment considerations and the remedial options selected. The table below summarizes preliminary remediation options and their associated cost estimates.

Table 9
Remedial Estimates for Remington Rand

Source Area	Remedial Action Alternative	Volume of Soil	Estimated Cost	Comments/Assumptions
ROW Waste Disposal Area (Mixed Wastes)	Soil Excavation & Offsite (Landfill) Disposal and Restoration	1,500 cy	$225,000 to $450,000	This option provides unrestricted future uses in this area. Range provided because costs will vary depending upon specific facility used for treatment/disposal
	CTDEP Variance for Exemption	13,000 cy	$100,000	Requires ELUR which restricts future uses. Costs include design and construction of liner/capping material, operations and maintenance
	CTDEP Solid Waste Classification	12,000 sf	$75,000 to $100,000	CTDEP Solid Waste Unit determination. Some restrictions to future uses. Less costly and less restrictive than variance option.
Railroad Spur Waste Disposal Area (PAHs, As, Cu, Pb, Ni, TPH)	Soil Excavation & Landfill Disposal	400 cy	$120,000	Assumes a combination of asphalt batching or thermal treatment and stabilization off-site for hazardous waste.
	CTDEP Variance for Exemption	5,000 cy	$50,000	ELUR required, restricting future uses. Costs for capping, maintenance, etc.
	CTDEP Solid Waste Classification	2,400 sf	$25,000	CTDEP Solid Waste Unit determination. Less costly and less restrictive than Variance option.
SUSPECT UST 2 Area (TPH, PAHs)	Excavation and Asphalt Batching or Thermal Desorption	1,000 cy	$60,000	Insitu treatment may not be cost effective due to the limited amount of soil to be treated.
UST 4 Area (Including part of ROW contaminated with TPH)	Excavation and Asphalt Batching or Thermal Desorption	3,000 cy	$180,000	Assumes no groundwater treatment necessary.
	In-situ treatment		$80,000	Bioventing or other in-situ treatment may cost less, but will have to be evaluated relative to site-specific conditions (i.e. soil type, etc). On-going monitoring and maintenance will be required.
SUSPECT UST 5 Area (TPH)	Excavation and Asphalt Batching or Thermal Desorption	2,000 cy	$120,000	
	In-situ treatment		$80,000	In-situ treatment is a less expensive option, but will require a pilot test to determine if soil conditions are conducive to a particular methodology. On-going monitoring and maintenance will be required.
AST 2 Release Area (TPH, Arsenic)	Excavation and Asphalt Batching or Thermal Desorption	950 cy	$60,000	Insitu treatment may not be cost effective due to the limited amount of soil to be treated.
Electrical Transformers	Appropriate Method TBD	unknown	No cost to City	Remediation is the responsibility of transformer owners (Northeast Utilities).
Surficial Stained Soil Areas	Excavation & Asphalt Batching or Thermal Desorption	165 cu. yds.	$10,000	
UST Removals	Tank removal & Disposal (4 USTs)	NA	$20,000	Additional tanks may be present on the Site.
AST Removals	Tank removal & Disposal (2 ASTs)	NA	$14,000	
Asbestos Abatement	Removal & Off-Site Disposal	NA	$42,000	Most conservative estimate presented herein.
Lead-Based Paint	Removal & Off-Site Disposal	NA	$18,000	
Containers of OHM	Consolidation & Off-Site Disposal	NA	*$20,000**	OHM disposal should be made the responsibility of current owner/tenants.
Analytical Allowance	NA	NA	$50,000	Confirmation soil analyses and post-remediation groundwater analyses
Engineering Allowance		NA	$75,000	Remedial Action Plan, plans & spec/bid documents, remediation oversight, confirmation sampling, post-remediation groundwater sampling.

Estimated Remedial Cost Range = $761,250 to $1,523,750 (Includes 25% Contingency)

** This figure is not included in estimated remedial cost range.*

Note: the contingencies included herein are for operational costs, uncertainty in equipment sizing, to account for estimated soil volumes, and to provide a cushion for budgeting purposes. Further refinement of these costs will be possible during preparation of the Remedial Action Plan.

ctmid\projects\40203\sheets\remedial cost summary.xls

The costs estimated in this report are based on a limited review of available remediation technologies, equipment, and treatment/disposal facility fees, which are subject to change. Cost savings and/or premiums associated with future Site remediation and redevelopment activities will be identified during the preparation of the Remedial Action Plan. This process includes a close scrutiny of the current costs of treatment/disposal options, equipment and services required for successful remediation.

Preparation of a Remedial Action Plan (RAP) will be required for the Site. The RAP will use the data collected from the Phase II and III Assessments to develop a more detailed evaluation and selection of remedial technologies based on technical feasibility, implementability, effectiveness and cost. In general, the lowest cost alternative that is feasible and effective will be selected. The purpose of the RAP is to outline the work to meet the City's redevelopment objectives, to allow CTDEP concurrence, and also to allow the City to solicit bids for the work. Key components of the RAP include:

- Summary of site analytical and geologic data
- Remedial goals and objectives
- Cleanup criteria
- Detailed plans and specifications delineating areas proposed for remediation along with quantity estimates
- Evaluation and justification of a selected remedial alternative
- Regulatory compliance and Site restriction issues
- Soil and erosion control requirements
- Permitting requirements
- Confirmation soil sampling and analysis
- Disposal/treatment requirements
- Site restoration requirements
- Health and safety requirements
- Project schedule
- Groundwater monitoring plan

Remedial cost estimates range from approximately $760,000 to $1.55 million, depending upon the remedial actions undertaken. The lower end of this estimate assumes no excavation/disposal of fill material associated with the disposal corridor. The high end represents a conservative number to allow for treatment/disposal of these fill/wastes and soil remediation to residential RSRs in the UST release areas (for unrestricted future uses). The estimated costs, in general, assume: no groundwater remediation requirements at the Site; removal of all contained oil and hazardous materials on the Site by current owners/tenants (at no cost to the City); future lead-paint and asbestos

abatement within the building for renovations; engineering fees associated with the RAP and remediation oversight (including analytical fees for confirmation sampling and analysis); post-remedial groundwater monitoring (2 years assumed); and, a 25% contingency for operation costs and the uncertainties involved in equipment sizing, soil volume estimates, and future remedial requirements.

References

Phase I Environmental Site Assessment, Former Remington Rand Facility, Soil Science and Environmental Services, Inc., April 1993.

Phase II Environmental Site Assessment, Former Remington Rand Facility, Vanasse Hangen Brustlin, Inc., June 1997.

City of Middletown, Request for Proposal #9697-049.

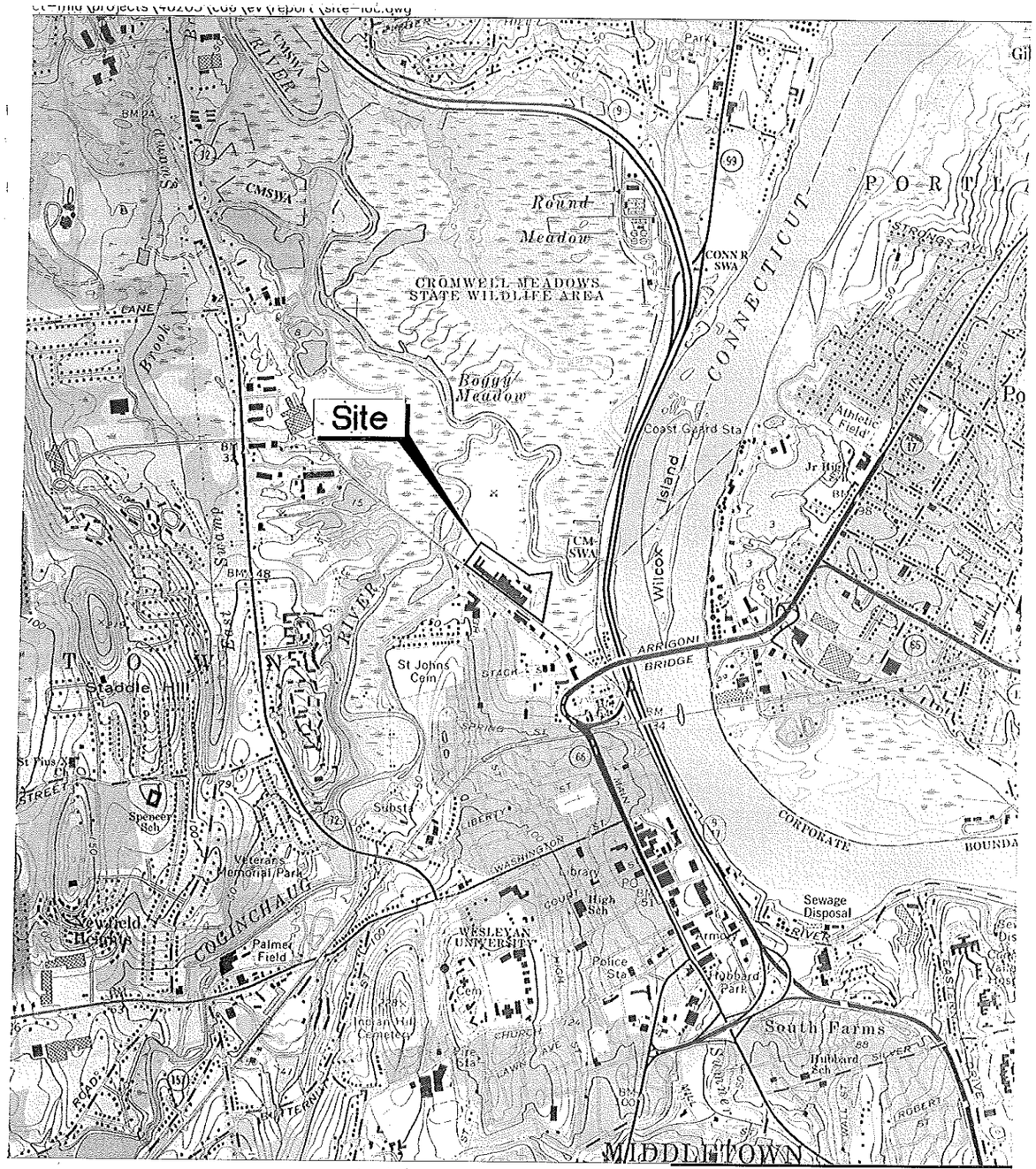
City of Middletown, Topographic Map with drainage Systems and Inland Wetlands Superimposed, Scale 1"=100', April 17, 1980.

Sanborn Fire Insurance Map, Middletown, Connecticut, 1924.

State of Connecticut Regulation of Department of Environmental Protection concerning Remediation Standard.

United States Department of the Interior Geological Survey Quadrangle, Middletown, Connecticut, 1965, Revised 1992.

Figures

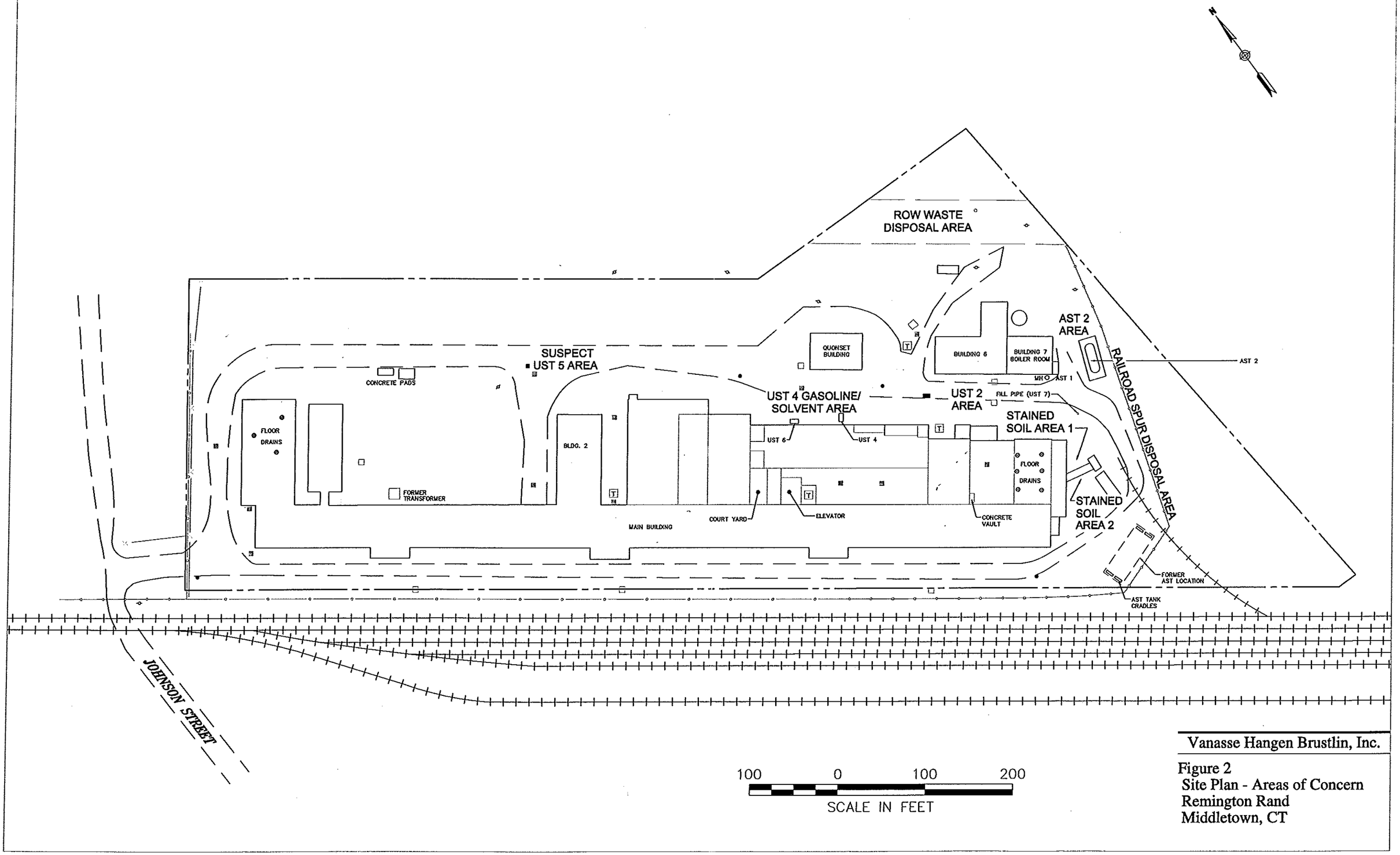


Source: U.S.G.S. Quandrangle Middletown, CT (1992)

Vanasse Hangen Brustlin, Inc.

Figure 1
Site Location Map
Remington Rand
Middletown, CT

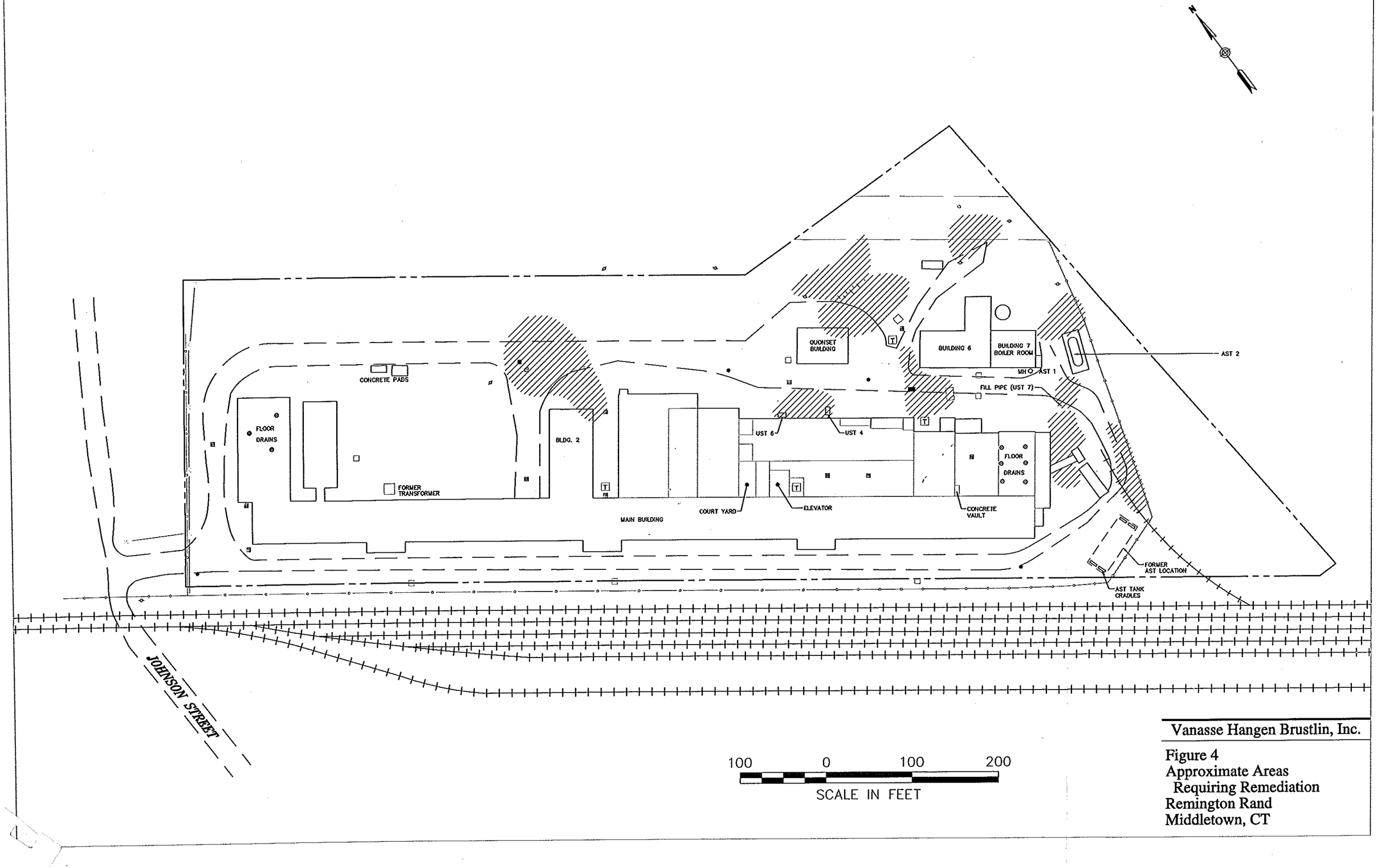
ct-mid\projects\40203\cad\ev\report\40203sp.dwg



Vanasse Hangen Brustlin, Inc.

Figure 2
Site Plan - Areas of Concern
Remington Rand
Middletown, CT

ct-mid\projects\40203\cad\ev\report\40203im.dwg



Vanasse Hangen Brustlin, Inc.

Figure 4
Approximate Areas
Requiring Remediation
Remington Rand
Middletown, CT