Standard Mots -

HW 241016

IT CORPORATION
A Member of The IT Group

Project Work Plan
For
Remedial Investigation/Feasibility Study
Standard Motor Products Site

Site Code 2-43-014
37-18 Northern Boulevard
Long Island City, New York 11101

FINAL

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Table of Contents

List of Tables

List of Figures

List of Appendices

List of Acronyms

ARAR	Applicable and Relevant and Appropriate Requirements
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
DCA	Dichloroethane
DCE	Dichloroethene
DQO	Data Quality Objective
FID	Flame Ionization Detector
FOL	Field Operations Leader
FSP	Field Sampling Plan
GRO	Gasoline-Range Organics
HASP	Health and Safety Plan
IT	IT Corporation
LUST	Leaking Underground Storage Tank
MTA	Metropolitan Transit Authority
MtBE	Methyl Tertiary-Butyl Ether
NCP	National Contingency Plan
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OU	Operable Unit
OVA	Organic Vapor Analyzer
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PID	Photoionization Detector
POC	Principal Organic Compound
PRAP	Proposed Remedial Action Plan
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision

List of Acronyms (continued)

SAP	Sampling and Analysis Plan
SMP	Standard Motor Products
SVOC	Semi-volatile Organic Compound
TAL	Target Analyte List
TAGM	Technical and Administrative Guidance Memorandums
TCA	Trichloroethane
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TOGS	Technical and Operational Guidance Series
TPH	Total Petroleum Hydrocarbon
TSD	Treatment, Storage, and Disposal
USEPA	Unites States Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound

1.0 Introduction

IT Corporation (IT) is submitting this Work Plan in accordance with the March 30, 1998 Order on Consent between the New York State Department of Environmental Conservation (NYSDEC) and Standard Motor Products, Inc. (SMP). This Order on Consent stipulates requirements for the development and implementation of a Remedial Investigation/Feasibility Study (RI/FS) for the SMP site. This Work Plan presents IT's technical scope of work for the performance of an RI/FS for the SMP site, as well as a detailed schedule for the performance of the work. A preliminary scoping meeting between IT and NYSDEC personnel was held on July 2, 1998 to further define the scope of work for the RI/FS. Modifications to this scope of work were performed based upon subsequent conversations, meetings, and written comments by NYSDEC dated March 27, 2000.

This RI/FS Work Plan has been developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended, the National Contingency Plan (NCP) of March 8, 1990, the United States Environmental Protection Agency (USEPA) guidance document dated October 1988, and appropriate entitled *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* USEPA and New York State technical and administrative guidance documents.

The following are the documents specifically applicable to prepare an RI/FS, and will be considered in preparation of this Work Plan:

- *Guidance on Remedial Investigations Under CERCLA* (USEPA, 1985a);
- *Guidance on Feasibility Studies Under CERCLA* (USEPA, 1985b);
- *Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (USEPA, 1988a);
- *Data Quality Objectives: Development Guidance for Uncontrolled Hazardous Waste Site Remedial Response Activities* (USEPA, 1987a);
- *Interim Guidance of Superfund Selection of Remedy* (USEPA, 1986);
- *Superfund Exposure Assessment Manual* (USEPA, 1988b);
- *Interim Final Risk Assessment Guidance for Superfund Vol. I Human Health Evaluation Manual PART A* (USEPA, 1989b);

- *Interim Final Risk Assessment Guidance for Superfund Environmental Evaluation Manual* (USEPA, 1989c);
- *A Compendium of Superfund Field Operations Methods* (USEPA, December, 1987b);
- *CERCLA Quality Assurance Manual* (USEPA, Region II, 1987c);
- *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans* (USEPA, 1983).

This Work Plan represents one of the four project planning documents developed for the SMP RI/FS. The other three project planning documents associated with SMP are the Sampling and Analysis Plan (SAP), the Health and Safety Plan (HASP), and the Citizens Participation Plan. The SAP contains a Field Sampling Plan (FSP) as well as a Quality Assurance Project Plan (QAPP).

This Work Plan contains seven Sections, including this Introduction as Section 1.0. Section 2.0 describes the site location, site description and history and summary of previous investigations. Section 3.0 presents existing environmental conditions. Section 4.0 presents the Work Plan rationale for the RI sampling activities and the technical approach to preparing and executing the Work Plan. Section 5.0 presents the task plan for this RI/FS, which has been divided into ten major tasks. Section 6.0 of the Work Plan presents the project management approach, key positions, and the schedule of this project. Section 7.0 lists the references cited in the Work Plan.

2.0

2.0 Site Location, Site Description and History, and Summary of Previous Investigations

The following sections describe the site location, site description and history and a summary of previous investigations.

2.1 Site Location

The SMP site is located at 37-18 Northern Boulevard in Long Island City, New York (Figure 2-1 and Figure 2-2). The site is owned and operated by SMP and is located in an urban and industrial area. The property is approximately rectangular in shape and occupies more than 1 acre of land. The site property contains a large, six-story, industrial building with approximately 42,000 square feet per floor that occupies most of the site. SMP is the only occupant of the building. This SMP's Long Island City facility manufactures car parts and is SMP's corporate headquarters.

Bordering the site are Northern Boulevard to the north; Sunnyside Freight Railroad Yard to the south; 39th Street, an automobile dealership and a Merit gasoline filling station to the east; and commercial and industrial properties to the west. Various industrial, commercial, and residential properties are located across Northern Boulevard from the SMP site. A narrow strip of land on the south side of the property contains a loading dock and a dirt access path for vehicles (Figure 2-3). This strip of land is owned by the Metropolitan Transit Authority (MTA) and is part of a long-term lease to SMP. Contamination had been identified in the soil adjacent to the loading dock. This area is mostly dirt and gravel covered with some concrete remaining from a nearby road-paving project. Access to this area is limited to doors at the rear of the SMP building, a locked access gate at the adjacent automobile dealership, a railroad spur from 42nd Place to the east, and to railroad personnel by way of the Sunnyside Yard to the south. A highly industrialized area with a wide variety of activities ranging from small-scale assembly to large-scale manufacturing is located within the general vicinity of the SMP site.

2.2 Site Description and History

The site was historically involved in industrial and manufacturing activities since 1919 (EnviroAudit, 1996). SMP has occupied the on-site building since the mid-1900s. S. Karpen & Brothers occupied the building prior to that time.

SMP maintained a small plating line for chrome plating of small machine parts from approximately 1975 to 1984. The wastes generated from the chrome plating process were temporarily stored on-site prior to off-site disposal. SMP was previously engaged in painting automobile parts prior to distribution. Until 1984, solvent-based paints were used, after which aqueous-based paints were used until all painting operations were gradually eliminated between 1990 and 1991. Several other processes that SMP performed in the past also generated hazardous wastes. These include die-casting that was stopped in the 1970s, rubber production that was eliminated around 1985, and degreasing, using chlorinated solvents, that was eliminated in 1990.

Currently, SMP's main activity is the production of automobile parts and components. The manufacturing operations include metal fabrication and machining, plastic injection molding, and assembly. SMP also operates a small photography laboratory for production of newsletters, brochures, etc. The only hazardous or toxic materials involved in plant operations are lubricating oils for machinery, caustics for degreasing, phenolics used in molding processes, epoxies for coil production, and water-based inks involved in their small scale printing. All wastes are temporarily stored on-site in secure containers prior to off-site disposal at a licensed treatment, storage, and disposal (TSD) facility.

2.3 Summary of Previous Investigations

Several studies have been conducted at the SMP site or at adjacent sites (i.e., Amtrak Sunnyside Yard and the Merit "Northern" Station). These previous investigations are summarized in the following sections.

2.3.1 Summit Environmental Evaluations, Inc.

Following the observation of an oily sheen in a puddled area in the southeast side of the property off the loading dock, a preliminary investigation was initiated by Summit Environmental Evaluations, Inc. in September 1990. An area of approximately 2,700 square feet (30 feet by 90 feet) was excavated to a depth of 1 to 2 feet. The excavated soils (approximately 150 cubic yards) were either stockpiled or placed in roll-off containers that were located along the loading dock (Figure 2-4). Analysis of soil samples, collected on October 11, 1990, indicated that this area contained elevated levels of petroleum hydrocarbons and volatile organic compounds (VOCs), particularly 1,1,1-trichloroethane (TCA).

Based on the elevated levels of VOCs, Summit Environmental recommended remediation of the soils via high temperature incineration at a TSD facility (Summit Environmental Evaluations, 1990).

2.3.2 Public Service Testing Laboratories, Inc.

Subsequent to the Summit Environmental investigation, SMP contracted Public Service Testing Laboratories, Inc. to conduct additional analyses on the soil. Analyses were conducted for toxicity characteristic leaching procedure (TCLP) metals, VOCs, and semi-volatile organic compounds. The results of these additional analyses indicated non-detectable levels of VOCs. However, levels of lead detected from TCLP analyses yielded results above the hazardous toxicity thresholds in three of the five samples. Public Service Testing Laboratories, Inc. recommended disposal of the soils as a hazardous waste.

2.3.3 H2M Soil Investigation

In early 1991, H2M conducted an assessment of the soil quality in the area off the loading dock. This assessment included a soil gas survey and analysis of additional soil samples. The results of this assessment are documented in the *"Soil Investigation Report"* prepared by H2M Group in 1991. The soil gas survey included 50 test points covering an area of approximately 10,000 square feet (see Appendix A). A photo-ionization detector (PID) was used to detect VOCs. The highest concentrations were found immediately adjacent to the loading dock. In addition, an oily sheen was noted in the flooded excavation on the west side of the study area during the soil gas survey. Eleven soil samples were collected based on the results of the soil gas survey and on visual inspections. Six samples were collected from the stockpiled soils and five (two on-site and three off-site background) samples were collected from undisturbed soils. Soil samples were collected at a depth of 18 inches below grade. These samples were analyzed for total petroleum hydrocarbons (TPH), VOCs, lead, and TCLP lead. Elevated levels of TPH and VOCs were found in the stockpiled soils and in the undisturbed soils off the loading dock in the eastern portion of the site. Though TPH and VOCs were also detected in background samples, the concentrations were up to three orders of magnitude less than in the stockpiled soils and near the eastern portion of the loading dock. Based on the results, H2M reported that the soils could be classified as an environmental media contaminated with a listed hazardous waste and not a hazardous waste itself. However, H2M recommended further delineation of the impacted area (since non-excavated soils had also been found) and remediation via soil vapor extraction either in-situ or in soil venting piles (H2M Group, 1991).

2.3.4 H2M Remedial Investigations

Later in 1991, H2M began a Remedial Investigation in order to determine the nature, type, and physical state of soil and/or groundwater contamination associated with the operation of SMP's facility. Groundwater and soil samples were collected through the installation of six monitoring wells and thirteen soil borings in the eastern half of the site. The results of this investigation are documented in the *"Remedial Investigation Report"* prepared by H2M Group in 1992

All forty soil samples collected, with depths ranging from 5 to 40 feet, were analyzed for VOCs. In addition, select samples were analyzed for TPH and TCLP metals. Total VOC concentrations were as high as 35 mg/kg (see Appendix B); the most prevalent compounds detected in the shallow soil samples (above 7 feet) were chlorinated solvents such as TCA, tetrachloroethylene (PCE), methylene chloride, and trichloroethylene (TCE). Results indicated that soil contamination existed along the loading dock from the suspected source area near the southeast corner westward for about 200 feet and southward for 15 to 20 feet. Though most chlorinated solvent contamination was found at shallow depth, elevated levels of benzene, ethylbenzene, toluene and xylene (BTEX) were detected at depths greater than 10 feet (beneath the water table) which could have originated from the upgradient Merit "Northern" Gas Station site.

Of the six monitoring wells installed, four were along the loading dock and two were indoors in the northwest portion of the SMP building (see Appendix B). Groundwater level measurements determined a northerly direction of groundwater flow that was contradictory to the general regional groundwater flow direction that is south to southwest, according to a 1981 USGS regional map. The differences in groundwater flow direction are presumably due to a sump pump that operates continually in the SMP basement to prevent flooding, as well as potential dewatering operations in the local subway system and other nearby buildings (H2M Group, 1992).

Subsequent to the H2M RI, the remedial investigation of the adjacent Amtrak Sunnyside Yard documents groundwater flow from the east to the west. These differences in groundwater flow direction require further evaluation within the current SMP RI/FS.

All groundwater samples were analyzed for VOCs, TPH, and metals. Several metals and VOCs were found to exceed the NYSDEC groundwater standards. VOCs ranged from non-detect to 2,600 µg/l for xylene. Xylene is a BTEX constituent which could have originated from the

upgradient Merit "Northern" Gas Station site. Chlorinated solvents were also detected to a lesser extent. Metals detected in groundwater samples included iron, manganese, sodium, lead, chromium, copper, and zinc (H2M Group, 1992).

The 1992 RI report determined that unacceptable risks were unlikely from exposure to contaminated soils and that there is no exposure to groundwater. Therefore, No Action with site controls (e.g., paving and additional fencing) and continued groundwater monitoring was recommended in lieu of remediation.

2.3.5 EnviroAudit

In 1995, EnviroAudit conducted an investigation of surface and subsurface soils, as well as groundwater conditions within the surficial aquifer. This investigation included the drilling of fifteen soil borings with two borings completed as groundwater monitoring wells, collection and analysis of forty-four soil samples, and collection and analysis of three groundwater samples and two sump samples. The results of this investigation were documented in "*A Phase II EnviroAudit Subsurface Investigation and Summary Report of an Industrial Property Located at 37-18 Northern Boulevard in Lond Island City, New York*", prepared by EnviroAudit Ltd., in 1996.

Elevated levels of VOC contamination were found in an area of the loading dock, in site soils and groundwater (see Appendix C). The primary compounds detected in excess of clean-up guidelines were TCA, 1,1-dichloroethane (DCA), and trichloroethene (TCE). Lead was only detected at low levels using the TCLP analysis (EnviroAudit Ltd., 1996).

2.3.6 Amtrak Sunnyside Yard Remedial Investigations

The Amtrak Sunnyside Yard is a train makeup and maintenance facility that is located south and west of the SMP site. It is listed as a Class II Site in the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites (Site Number 241006), and has been the subject of a Remedial Investigation since 1989. Due to its close proximity to the SMP site the previous investigations regarding the groundwater in the vicinity of SMP, and potentially downgradient of SMP are of relevance.

The Amtrak Sunnyside Yard was subdivided into six operable units in order to address remedial efforts and accommodate construction schedules at the Yard. Operable Unit (OU) 6 was

designated as the groundwater OU and included the saturated soil beneath the Yard. A Phase I Remedial Investigation (Roux Associates, Inc., 1992) was conducted in 1990 and 1991. The results of the Phase I RI shallow groundwater monitoring indicated the following:

- No VOCs or semi-volatile organic compounds (SVOCs) were detected above standards;
- Only a limited number of SVOCs, predominantly polycyclic aromatic hydrocarbons (PAH), were detected;
- Polychlorinated biphenyls (PCB) were detected in only one monitoring well, which also contained separate-phase petroleum; and
- Iron, lead, manganese, and sodium were detected above the NYSDEC standards in most samples, which is typical for background conditions in industrialized urban environments with historic saltwater intrusion.

Subsequent investigations of the groundwater were conducted to further delineate the extent of contaminants, determine if migration of contaminants in groundwater is occurring either on site or off site; and develop additional information regarding groundwater flow characteristics. These were reported in the OU 6 RI Report (Roux Associates, Inc., 1999) and are summarized below.

Several VOCs, including BTEX, chlorinated solvents, styrene, carbon disulfide, and 4-methyl-2-pentanone, were detected in groundwater. Chlorinated solvents were detected in monitoring wells adjacent to the SMP site and west (i.e., downgradient) of the SMP site. The concentrations of 1,2-DCE, TCE, and PCE are presented in Appendix D for these wells and generally show a decrease in concentrations over the sample collection period. Though groundwater flow is toward the west from the SMP site, the water table is nearly flat in the vicinity of SMP, and data collected during the OU 6 RI indicate that their may be radial flow of contaminants in this area, thus indicating that the detected VOCs in these wells on the Amtrak Sunnyside Yard may be due to groundwater contamination at SMP.

Several SVOCs were also detected in the Amtrak Sunnyside Yard groundwater samples. Due to the proximity of the wells containing SVOCs to the separate-phase petroleum plume at the Yard, these detections are likely due to that plume. Several metals were also found at concentrations above local background concentrations.

2.3.7 Merit "Northern" Station

The Merit "Northern" Station is an active retail gasoline station with a one-story building, car wash, and kiosk. It is located east of the SMP property and was the subject of a recent environmental investigation (GES, 1998). In 1995, 45 underground storage tanks (UST) were decommissioned and removed and two others were decommissioned by abandonment in place. As part of the site investigation, a subsurface investigation was performed to define the vertical and horizontal extent of the hydrocarbon impact detected during the post-excavation sampling. Four monitoring wells were drilled on the Merit site in 1996 to assess groundwater quality. Soil samples were analyzed for BTEX, methyl tertiary butyl ether (MtBE), and gasoline-range organics (GRO). Groundwater samples were analyzed for BTEX, MtBE, and TPH. The highest concentrations of contaminants in groundwater were detected in the northeast section of the Merit site near the former location of the larger USTs. The lowest concentrations were detected in the southeast section of the site, and concentrations were intermediate in the northwest and southwest sections of the site. Concentrations of BTEX ranged from below detection in the southwest section of the site to a maximum of 1,110 µg/l benzene, 11,600 µg/l toluene, 4,250 µg/l ethylbenzene, and 20,500 µg/l xylene. MtBE concentrations in groundwater ranged from 11.4 µg/l to 8,770 µg/l. TPH concentrations in groundwater ranged from below detection to 8,400 µg/l. Concentrations of BTEX in groundwater at the Merit Site were greater than concentrations detected on the SMP site. Selected figures and tables from the Site Investigation Report (GES, 1998) are presented in Appendix E.

3.0

3.0 Existing Environmental Conditions

In this section, a summary of the existing environmental conditions which include site geology and hydrogeology, local climate, population and environmental resources, and the distribution and concentrations of contaminants is presented.

3.1 Site Geology

The site and regional geology were characterized based on previously published reports and observations made during various investigations at the site. Though Queens County soil mapping is limited, the geologic formations underlying the region are reported to be composed of a series of unconsolidated clay, sand, and gravel deposits of late Cretaceous and Pleistocene age. Crystalline bedrock of Precambrian age underlies these unconsolidated deposits and outcrops in northwestern Queens County near the East River.

The Upper Pleistocene deposit is the major unconsolidated deposit underlying Long Island City; this deposit unconformably overlies the Gardiners Clay and is found at the surface in nearly all of Queens County. The deposits, which are of glacial origin and include terminal moraine deposits, ground moraine deposits, and glacial outwash, are generally an unsorted and unstratified mixture of clay, sand, gravel, and boulders. Depth to bedrock ranges from zero feet in small areas of outcrop in northwestern Queens to as much as 300 feet in buried valleys. In the vicinity of SMP the deposits are estimated to be at least 60 feet thick with extensive clay layers present.

In the central to southeast portions of Queens County, the Upper Pleistocene deposits unconformably overlie the Gardiners Clay which consists primarily of greenish-gray clay and silts with interbedded sand. The Gardiners Clay is present beneath the site and it is of limited thickness. In the central portion of Queens County, the Gardiners Clay unconformably overlies the Precambrian bedrock. The remainder of the county (generally along or near the shorelines) is covered by estuary and salt marsh deposits (Soren, 1971). Many of these areas have been extended by artificial fill.

Observations made during investigation of the site found fill including sand, silt, concrete fragments, and wood railroad ties to two feet below grade. Below this, sands and gravel were observed to thirty feet below grade and are reported to be consistent with the published information on subsurface geology in the area.

3.2 Hydrogeology

Hydrogeology of the site has been characterized based on previously published reports and observations made during various investigations at the site. The hydrogeologic units correspond to the previously discussed geologic units. The major aquifer beneath Long Island City is the Upper Glacial Aquifer (Upper Pleistocene Deposits) which includes all of the saturated glacial drift. The sand and gravel beds are the most permeable with an estimated horizontal hydraulic conductivity of 270 ft/day (Franke and Cohen, 1972); other deposits contain less well-sorted clay and silt deposits that have much lower conductivities.

Groundwater within the Upper Glacial Aquifer may be locally confined in areas of the clay and silt deposits, but is generally unconfined; localized clay lenses result in areas of perched groundwater.

The depth to groundwater in the vicinity of the subject property is approximately 5 to 10 feet below grade. Regional horizontal groundwater flow was determined during a previous investigation to be to the south-southwest based on a 1981 USGS regional map. However, the local investigation of the adjacent Amtrak Sunnyside Yard documents groundwater flow from the east to the west. The groundwater eventually discharges either to the East River or to one of its tributaries. Vertical groundwater movement is restricted by the underlying Gardiners Clay where present or by the Precambrian bedrock that is considered to be the bottom hydrologic boundary of the groundwater flow system.

Potable wells are not confirmed to exist in or near the site nor are they expected to be developed in the future due to the extensive industrial nature of the area. Water supply wells may be found at locations well east of the site.

An on-site basement sump pump is operated continuously in the SMP building and may impact the groundwater hydraulics on-site; however, confirmation of this hypothesis is required. Previous investigations speculated that groundwater flow direction in the immediate site area is generally to the north toward the basement sump pump. However, a more recent investigation performed at the Amtrak Sunnyside Yard determined that groundwater flow in the vicinity of SMP is generally to the west. Additional investigations are required to verify groundwater flow direction.

3.3 Climate

Climate in the area of the site is temperate, with cold winters and warm summers. The average yearly temperature, based on historical weather data (1961 through 1990), is 54.7°F (12°C) (Washington Post, 2000). The lowest average yearly temperature generally occurs during the month of January at 25°F (-3°C); the highest average temperature generally occurs during the month of July at 85°F (29°C). Analysis of historical precipitation data averages (Washington Post, 2000) in the area of SMP indicates that the highest precipitation amounts generally occur in May and July (averages of 4.20 and 4.21 inches per month, respectively). The driest months tend to be February and October with average monthly precipitation amounts of 3.16 and 3.10 inches of precipitation, respectively.

3.4 Population and Environmental Resources

The Site is located in a heavily industrialized area of Long Island City, Queens County, New York. Queens County has a total population of 1,951,598 people residing in approximately 752,690 housing units (http://govinfo.kerr.orst.edu).

A highly industrialized area with a wide variety of activities ranging from small-scale assembly to large-scale manufacturing is located within the general vicinity of the SMP site. The Amtrak Sunnyside Yard, a NYSDEC inactive hazardous waste site (Site number 241006), is located south and southwest of the SMP building. The Merit "Northern" Gas Station is located to the east and hydraulically upgradient of the SMP site. Groundwater and soil contamination has been documented at these sites.

Previously, over 90 underground storage tanks identified on the New York State Leaking Underground Storage Tank (LUST) list were reported within a one-mile radius of the SMP site, indicating a significant number of USTs which may impact soil and groundwater quality in the area.

3.5 Distribution and Concentrations of Contaminants

Contaminants were detected during various soil and groundwater investigations at the site. The distribution of contaminants at the site was determined based on the results of several investigations.

3.5.1 Soil

Analysis of soil samples collected during a 1990 Summit Environmental investigation revealed the presence of elevated levels of petroleum hydrocarbons and VOCs primarily TCA. An area of approximately 2,700 square feet was excavated to a depth of 18 inches and roughly 150 cubic yards of soil were stockpiled on site.

In an attempt to validate soil contamination results obtained during the Summit Environmental investigation, five additional samples were analyzed by Public Service Testing Laboratories, Inc. for TCLP (extractable) metals and VOCs. No extractable VOCs were detected, but Public Service Testing reported levels of lead resulting from a TCLP analysis that exceeded hazard toxicity thresholds in three of the five samples analyzed.

A 1991 H2M preliminary soil investigation determined that soils in the area off the rear-loading platform were impacted with elevated levels of petroleum hydrocarbons and VOCs (see Appendix A). The preliminary soil investigation included a soil gas survey and the collection of 11 soil samples approximately 18 inches below grade. For the soil gas survey, over 50 points were surveyed throughout the site. PID readings of VOC concentrations ranged from 4.0 ppm to over 20 ppm. The highest readings were obtained along the loading dock and near an area of ponded waters exhibiting an oily sheen. The results of the soil sampling indicated that contaminated soil extended past the previously excavated area. H2M also concluded that, although the initial concern at the site was petroleum hydrocarbon contamination, the analytical data clearly indicate that VOCs are the more serious contaminant of concern. VOCs in soils were detected at concentrations as high as 894.2 mg/kg; total petroleum hydrocarbon (TPH) was detected at concentrations as high as 5,300 mg/kg; and lead was detected at concentrations as high as 647.5 mg/kg. Also, lead was detected in a TCLP analysis as high as 0.27 mg/l.

The RI, conducted by H2M and described in an August 1992 report, was performed to determine the nature, type, extent, and physical state of the soil and groundwater contamination associated with the operations at SMP (see Appendix B). The RI tasks included performance of soil borings and collection of soil quality data, installation of groundwater wells, and collection of groundwater quality data.

The soil boring program was initiated in October 1991 to determine the areal and vertical extent of soil contamination, to provide a fingerprint of specific contaminants, and to aid in soil

classification. A total of 13 soil borings were performed throughout the southeastern portion of the site (see Appendix B). Boring locations were selected to determine the extent of contamination along the loading dock and the distance that contamination extends toward the southern border of the site. Borings were also performed at locations where outdoor monitoring wells were installed to confirm that the source area of contamination is limited to the area adjacent to the loading platform.

Split spoon samples were screened using a flame ionization detector (FID). FID readings of split spoon samples ranged from less than 5 ppm to over 1,000 ppm. The highest readings were generally obtained at depths between 5 and 15 feet below grade. Soil samples were selected for laboratory analysis and analyzed for VOCs, TCLP metals, and TPH. Samples were collected from within an area of approximately 6,000 square feet and at depths ranging from the surface to forty feet below grade. Total VOC concentrations ranged from non-detect to 35 mg/kg (see Appendix B). The most prevalent compounds were TCA (mean concentration of 2.323 mg/kg), total xylenes (mean concentration of 2.253 mg/kg), PCE (mean concentration of 0.456 mg/kg), methylene chloride (mean concentration of 0.422 mg/kg), and TCE (mean concentration of 0.356 mg/kg). The reported mean concentrations were calculated using only detectable concentrations of the contaminant; non-detectable results were not factored into the calculation.

Review of the soil data from this investigation indicates that the primary source of contamination occurs along the loading platform with the center of contamination in the vicinity of soil borings B-4 and B-5. Total VOC concentrations near these borings were greater than 2.5 mg/kg and detected at depths greater than 20 feet below grade. A second possible source of contamination was found to be in the area near boring B-7, which was performed at the base of the stockpiled soils, where the highest single sample concentration of VOCs (35.3 mg/kg total VOCs) was detected. The high concentrations detected at 5-7 feet below grade at B-7 quickly diminished to near 1.0 mg/kg at 10 feet below grade, indicating that B-7 is likely not the primary source area, but a secondary source resulting from soil stockpiling. Results of the soil investigation program indicated that soil contamination along the loading dock extends from the southeast portion of the site (the soil stockpile area) approximately 200 feet to the vicinity of B-12 where all samples indicated non-detectable levels of VOCs. The depth of contamination immediately adjacent to the loading bay ranged from greater than 20 feet deep (in the saturated zone) near B-4 to less than 5 feet below grade near B-12. It was also concluded that contamination from the source

area extends in a southerly direction approximately 15 to 20 feet toward B-10 where relatively minor soil contamination (total VOCs about 1 mg/kg) was detected.

A Phase II subsurface investigation was conducted at the site in 1995 by EnviroAudit Ltd.; the investigation was voluntarily initiated by SMP (see Appendix C). The objective of the investigation was to study the site surface and subsurface soils, as well as groundwater conditions within the surficial aquifer. Fifteen soil borings were drilled, with two borings completed as monitoring wells. A total of 44 soil samples were performed and three groundwater samples were collected. Water was sampled from two existing dewatering sumps. Soil samples were collected from locations MW-7 and MW-8, as well as AB-1 through AB-13. Samples were collected from 0-2 feet below grade for site fill and surface soil screening. Samples were also collected at depths 5-7 and 10-12 feet below grade to consider the groundwater interface and saturated zone conditions.

Soil samples were analyzed for a total of 36 VOCs, TPH, and specific metals. Several soil samples were analyzed for identification of types of petroleum products. Total VOCs from laboratory analysis ranged from non-detect to over 8,000 mg/kg at various locations and depths. All surface samples contained measurable VOCs ranging from 0.488 mg/kg to 8,150 mg/kg. Total VOCs in the 5-7 foot samples ranged from non-detect to 23 mg/kg. Total VOCs in the 10-12 foot samples ranged from non-detect to 35.5 mg/kg. The highest concentrations were detected immediately adjacent to the loading dock in the central portion of the site. Concentrations of total VOCs dropped markedly with distance from this area. The most prevalent compounds detected included TCA, TCE, and DCA.

The highest total VOC concentration at 8,150 mg/kg was found at 0-2 feet at sample AB-2. The compounds with the highest concentrations detected in this location were TCA (7,000 mg/kg), DCA (640 mg/kg), and TCE (510 mg/kg). No recovery occurred at 5-7 feet due to debris in the sampling device. At the 10-12 feet interval, 9.44 mg/kg of total VOCs were detected, including TCA (7 mg/kg), DCA (0.910 mg/kg) and xylenes (0.810 mg/kg).

The adjacent location had the second highest concentration of total VOCs at the 0-2 feet sampling interval, 2,540 mg/kg. Again the most prevalent compound was TCA (1,600 mg/kg); also present were TCE (820 mg/kg), DCA (41 mg/kg), DCE and PCE (both at 34 mg/kg), and an

assortment of other compounds at below 5 mg/kg. Concentrations of total VOCs in the samples collected at the 5-7 and 10-12 feet intervals were 10 mg/kg and 1.2 mg/kg, respectively.

The highest concentrations of compounds detected appear to be spatially arranged in descending order of magnitude around an assumed spill area just off the loading dock in the vicinity of borings AB-1 and AB-2.

TPH was detected in samples ranging from 7 mg/kg to 94,000 mg/kg; spatial arrangement closely resembled that of the total VOC contamination. The highest concentrations were detected along the loading dock in the central portion of the site.

TCLP metal analysis indicated detections in soils ranging from non-detect to 0.624 mg/l.

3.5.2 Groundwater

During the hydrogeologic investigation conducted by H2M, two rounds of groundwater samples were collected (see Appendix B). The first round of samples, collected in October 1991, were taken from monitoring wells MW-1 through MW-4. Samples from wells MW-1 through MW-6 were collected during the second round of sampling in February 1992. The samples were analyzed for Target Compound List (TCL) purgeable organics, Target Analyte List (TAL) metals, cyanide, and TPH.

The analytical results from the two rounds of sampling were compared to the New York State Water Quality Regulations for Class GA groundwater; 10 out of the 24 inorganics exceeded these standards. The most significant deviations from the standards were for iron, manganese, and sodium. Iron exceeded the standard (300 µg/l) in all wells during both sampling events; concentrations ranged from 12,800 µg/l in MW-6 to 330,000 µg/l in MW-1, with a mean concentration of 103,000 µg/l. Manganese exceeded its standard of 300 µg/l in all wells during each sampling event; concentrations ranged from 607 µg/l in MW-6 to 9,260 µg/l in MW-4 with a mean concentration of 5,106 µg/l. Sodium concentrations exceeded the standard (20,000 µg/l) in all wells except MW-3; concentrations ranged from 16,900 µg/l in MW-3 to 102,000 µg/l in MW-4 with a mean concentration of 52,510 µg/l.

Other inorganics exceeding the standards included lead which exceeded its standard of 25 µg/l in all of the wells during the first round, and in 4 of 6 wells sampled during the second round; chromium, copper, and zinc exceeded their quality standards in six, five, and four wells respectively. Lead concentrations ranged from 11.3 µg/l in MW-6 to 848 µg/l in MW-1, with a mean concentration of 219 µg/l. The chromium standard (50 µg/l) was exceeded with concentrations ranging from 53 µg/l (MW-3) to 740 µg/l (MW-1). The copper standard (200 µg/l) was exceeded with concentrations ranging from 203 µg/l in MW-3 to 1,870 µg/l in MW-1. Zinc, with a standard of 300 µg/l, was present in concentrations ranging from 427 µg/l (MW-1) to 5,420 µg/l (MW-5).

Arsenic, barium, and cadmium exceeded their standards only sporadically during the first round, and no exceedances occurred during the second round. A cadmium concentration above the standard of 10 µg/l was detected in MW-1 (11.9 µg/l). Exceedances for arsenic and barium were minor in nature.

Of the 34 compounds analyzed for in the VOC analysis, 10 were detected above the New York State standard of 5 µg/l for principal organic compounds (POCs). The VOCs detected included DCE, DCA, DCE (total), TCA, TCE, benzene, PCE, toluene, ethylbenzene, and total xylenes; VOC concentrations above standards ranged from 6 µg/l to 2,600 µg/l. At least one VOC was detected in each well during both sampling events. The VOCs with the highest concentrations were TCA (mean concentration of 74 µg/l), benzene (mean concentration of 34 µg/l), toluene (mean concentration of 73 µg/l), ethylbenzene (mean concentration of 147 µg/l), and total xylenes (mean concentration of 684 µg/l).

The H2M RI report concluded that based on groundwater investigations, groundwater contaminant migrations are likely limited to the on-site area, due to the nature and magnitude of the dewatering activities on-site.

The Phase II subsurface investigation by EnviroAudit Ltd. included the collection of five groundwater samples from three monitoring wells and two dewatering sump samples (see Appendix C). Groundwater samples were analyzed for 36 VOCs, TPH, and specific metals, as well as hardness.

Detectable levels of solvent contamination were found in groundwater from all three of the monitoring wells sampled. Groundwater from MW-7 had the highest total VOC concentration of over 14,000 µg/l. This well was placed in the area of the highest concentrations of total VOCs in soils. The most prevalent compounds detected were DCA (6,800 µg/l), TCA (4,700 µg/l), cis-1,2-DCE (1,200 µg/l), TCE (810 µg/l), MtBE (380 µg/l), and total xylenes (350 µg/l). Samples from MW-6 (H2M installed well), inside the site building, contained detectable levels of PCE at 65 µg/l, TCE at 11 µg/l, and MtBE at 9 µg/l. The sample from MW-8 contained MtBE at 53 µg/l.

The shallow sump sample collected from within the building contained VOC concentrations ranging from 3 to 37 µg/l for a total VOC concentration of 143 µg/l. The deep sump sample collected from within the building contained non-detectable levels of VOCs.

3.5.3 Air

Ambient air monitoring was performed throughout the H2M RI using a PID and FID to obtain a preliminary representation of ambient air quality in the vicinity of the SMP contamination area. Readings ranged from 0 ppm (calibration gas equivalence units) to 10 ppm, which is typical of ambient air readings in industrialized, urban areas; therefore, no respiratory protection was recommended for site workers.

4.0

4.0 Work Plan Rationale

4.1 Technical Approach

The technical approach developed to address project-specific concerns focuses on two areas: 1) a phased approach to the field investigation, and 2) a goal-oriented approach to scoping the RI/FS project. The field investigation activities will be conducted in a two-phased approach to collect data of the appropriate quality to achieve contaminant delineation in a cost-effective manner. Scoping activities will concentrate on the ultimate goals of the project in order to develop an efficient work plan.

4.1.1 Field Investigation Strategy-Phased Approach

The field investigation for the SMP RI/FS will be conducted in a phased approach. The first phase of the investigation will involve the collection of soil samples using hand augers and via Geoprobe drilling to delineate the nature and extent of soil contamination. Groundwater samples will also be collected during the Geoprobe drilling. The second phase of the investigation will use the results of the Geoprobe groundwater samples to determine the locations for placement of groundwater monitoring wells and the screened interval depths, if necessary.

The major objectives of the Phase I field investigation are the following:

- Determine the nature and extent of surface soil contamination in the vicinity of the loading dock on the south side of the SMP facility;
- Determine the nature and extent of subsurface soil contamination in the vicinity of the loading dock on the south side of the SMP facility;
- Determine if soil contamination may extend from the vicinity of the loading dock under the loading dock and SMP facility; and
- Determine if groundwater contamination exists in the vicinity of the loading dock and beneath the SMP facility.

The major objectives of the Phase II field investigation are the following:

- Install monitoring wells at locations and with screened intervals as determined via the results of the Phase I field investigations;
- Determine groundwater flow direction and characteristics;

- Further delineate groundwater contamination emanating from the soils in the vicinity of the loading dock on the south side of the SMP facility;
- Gather sufficient data to perform a qualitative human health exposure assessment; and
- Gather data to adequately evaluate remedial alternatives.

4.1.2 Goal-Oriented Scoping

The primary goal of the RI/FS is to protect human health. This goal is accomplished by performing a site-specific qualitative human health exposure assessment, which will be based on the determination of significant impacts from past contaminant releases. The exposure assessment will determine if potentially unacceptable exposure may be present at the site. If no significant potential for exposure exists, a "No Action" scenario may be appropriate for SMP. If a significant potential for exposure exists, a focused feasibility study will be performed to assess appropriate remedial alternatives.

Both the qualitative exposure assessment and focused feasibility study require a nature and extent delineation of site-specific contaminants. The human health exposure assessment specifically requires investigation of potential exposure pathways, and appropriate data quality objectives (DQO). The feasibility study requires data collection adequate to define potential treatment/disposal volumes and contaminant transport parameters, appropriate geotechnical parameters, and treatability of waste streams. Data necessary to support these assessments will be collected during the field investigation. Risk assessment and feasibility study task managers will be intimately involved in scoping of the project plans to ensure project goals are met in the most efficient manner.

4.2 Data Quality Objectives

Data Quality Objectives (DQOs) are statements specifying the quality of data needed to support decisions relative to various stages of remedial actions. They are based on the concept that different data uses require different levels of data quality with respect to the precision, accuracy, and completeness of the data. DQOs must be in place to ensure that RI/FS results are of high quality, are scientifically and legally defensible, and have requisite levels of precision and accuracy to support any decisions made as a result of the findings of the investigation. As defined in the document "Data Quality Objectiveness for Remedial Response Activities (USEPA, 1987a), five analytical support levels exist to identify the data quality generated during investigations. The five levels are:

- Screening (Level 1): This provides the lowest data quality, but the most rapid results. It is often used for health and safety monitoring at the site, preliminary comparison to applicable and relevant and appropriate requirements (ARAR), initial site characterization to locate areas for subsequent and more accurate analyses, and for engineering screening of alternatives (bench-scale tests). These types of data include those generated on site through the use of PID, pH, conductivity and other real time monitoring equipment at the site.
- Field Analyses (Level 2): This provides rapid results and better quality than in Level 1. Analyses include mobile lab-generated data.
- Engineering (Level 3): This provides an intermediate level of data quality and is used for site characterization engineering analyses. It may include mobile lab-generated data and some analytical lab methods (e.g., laboratory data with quick turnaround used for screening, but without full quality control documentation).
- Conformational (Level 4): This provides the highest level of data quality and is used for purposes of risk assessment, engineering design, and cost analyses. These analyses require full USEPA's Contract Laboratory Program (CLP) analytical procedures.
- Non-Standard (Level 5): This refers to analyses by non-standard protocols, for example, when exacting detection limits, or analysis of an unusual chemical compound is required. These analyses often require method development or adaptation. The level of quality control is usually similar to Level 4 data.

Level 1 data includes field Organic Vapor Analyzer (OVA) or Photoionizer Detector (PID) readings gathered from boreholes and during other routine field activities. Field measurements of parameters such as pH, temperature, or specific conductivity are also examples of Level 1 data. These types of data may be used to demonstrate the adequacy of well development/purging procedures or in the case of PID or OVA readings, to help protect the health and safety of workers. On-site screening of soil samples will yield semi-quantitative results of DQO Level 1 quality. Analytical Level 2 includes quick turnaround analyses required for post-excavation and other remedial activities, and gas chromatograph analyses. Analytical Levels 3, 4 and 5 are required to perform risk assessments, feasibility studies and engineering designs.

Field sampling and laboratory analytical activities will be performed in accordance with the requirements of the QAPP. The data quality levels that will be used for the RI/FS are addressed in detail in the QAPP. Groundwater samples will be field measured for parameters such as pH,

temperature, and conductivity to provide real-time data. These field measurements will be designated as level 1. Geotechnical testing of soil samples will be used for characterization purposes, and will be Level 3. Analytical data generated from sample analysis for TCL and TAL parameters will be Level 4. These data can be used to verify confirmed areas of concern, support the qualitative risk assessments, and evaluate alternatives. The quality of the analytical data and associated detection limits specified for this Phase I investigation satisfy the overall DQOs required for use in the qualitative risk assessment and focused feasibility studies.

5.0

5.0 Task Plan for the RI/FS

The tasks for this RI/FS correspond to the tasks presented in the *"Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA"* (OSWER Directive 9335.3-01, USEPA, April 1989). The order in which these tasks are presented is the order in which the tasks will be performed. Some tasks, such as community relations, will be implemented throughout the RI/FS.

5.1 Task 1 - Project Planning

The project-planning task involves several subtasks that will be performed in order to develop the plans and corresponding schedule necessary to execute the RI/FS. These include several subtasks that have already been completed:

- Performing a detailed analysis of existing data;
- Conducting an initial site visit; and
- Participating in a scoping meeting with NYSDEC.

Additionally, the project planning also includes the preparation of a Work Plan (i.e., this document), Sampling and Analysis Plan (SAP), and Health and Safety Plan (HSP). The Work Plan documents the scoping process and presents the anticipated future tasks. The SAP contains two parts: 1) the Field Sampling Plan (FSP) that provides guidance for all field activities to be performed; and 2) a Quality Assurance Project Plan (QAPP) that describes the policy, organization, functional activities, and quality assurance and quality control protocols necessary to achieve DQOs dictated by the intended use of data.

5.2 Task 2 - Community Relations

The Citizen Participation Plan details the program of citizen participation activities that will be conducted during the SMP investigation. Specific requirements for citizen participation include the following:

- Preparation of SMP's Citizen Participation Record;
- Preparation of a contact list which includes residents adjacent to the site, government officials, media, environmental, civic and business groups and other groups or individuals affected by or interested in the SMP site or its RI/FS;

- Establishment of a document repository for the SMP site;
- Preparation and mailing of Fact Sheets which will accomplish the following: 1) at the start of the RI, announces the availability of the final draft RI/FS Work Plan and provides a brief analysis of the proposed investigation, 2) at the completion of the Feasibility Study and completion of the Proposed Remedial Action Plan (PRAP), outlines the PRAP and announces a 30-day comment period and public meetings; and 3) when the Record of Decision (ROD) is signed, describes the selected remedy and any significant changes from the proposed remedy and summarizes and responds to significant public comments.

5.3 Task 3 - Field Investigation

The field investigation for the SMP RI/FS will be conducted in two phases. The first phase of the investigation will involve the collection of soil samples using hand augers and Geoprobe drilling to delineate the nature and extent of soil contamination. Groundwater samples will be collected during the Geoprobe sampling. The second phase of the investigation will use the results of the Geoprobe groundwater samples to determine the locations for placement of groundwater monitoring wells and the screened interval depths.

The major objectives of the Phase I field investigation are the following:

- Determine the nature and extent of surface soil contamination in the vicinity of the loading dock on the south side of the SMP facility;
- Determine the nature and extent of subsurface soil contamination in the vicinity of the loading dock on the south side of the SMP facility;
- Determine if soil contamination may extend from the vicinity of the loading dock under the loading dock and SMP facility; and
- Determine if groundwater contamination exists in the vicinity of the loading dock and beneath the SMP facility.

The major objectives of the Phase II field investigation are the following:

- Install monitoring wells at locations and with screened intervals as determined through the results of the Phase I field investigations;

- Determine groundwater flow direction and characteristics;
- Further delineate groundwater contamination emanating from the soils in the vicinity of the loading dock on the south side of the SMP facility;
- Gather enough data to perform a qualitative human health exposure assessment; and
- Gather data to adequately evaluate remedial alternatives.

The field investigation will consist of the following subtasks:

- Subcontracting
- Mobilization and Demobilization
- Site Survey and Topographic Mapping
- Geoprobe/Hand Auger Investigation-Phase I Investigation
- Installation of Monitoring Wells-Phase II Investigation
- Monitoring Well Sampling-Phase II Investigation
- Slug Testing-Phase II Investigation
- Management of Wastes Generated During Field Investigation

5.3.1 Subcontracting

This subtask may include the awarding of subcontracts to perform certain field activities. The following subcontracts may be required:

- A surveying subcontract for surveying all sample locations and major site features;
- A subcontract for Geoprobe drilling, auger boring, and soil sampling, monitoring well installation and development;
- A supply of drums for the containerization of soil boring cuttings;
- Removal of drums containing contaminated soil boring cuttings;
- A subcontract for analytical laboratory services; and
- A subcontract for the development of Data Usability Summary Reports.

5.3.2 Mobilization and Demobilization

These subtasks will consist of field personnel orientation, equipment mobilization, identification and marking of sample locations, and demobilization. Mobilization and demobilization will take place for both the Phase I and Phase II investigations. Each field team member will attend an

orientation meeting to become familiar with the site history, health and safety requirements, and field procedures. Equipment mobilization will entail the ordering, purchasing or subcontracting for all sample equipment needed for the field investigation. Locations for the soil borings, and surface soil samples, as well as access points, will be surveyed and staked at the start of the site operations. Locations for the groundwater monitoring wells will be surveyed and staked during mobilization for Phase II investigations. Equipment will be demobilized at the completion of each phase of field activities as necessary. Equipment demobilization may include, but will not be limited to, sampling equipment, drilling subcontractor equipment, and health and safety decontamination equipment.

5.3.3 Site Survey and Topographic Mapping

A topographic map will be developed by a New York State licensed surveyor and will be used as a base map for the presentation of data during the development of the RI/FS. All soil boring and groundwater monitoring well sample locations will be surveyed by a New York State licensed surveyor. Upon completion of field operations, the surveyor will locate and establish elevations of all the locations sampled during both phases of the RI. This information will be plotted on a base map and also reported in tabular form.

5.3.4 Phase I Investigation: Geoprobe/Hand Auger Investigation

The Geoprobe investigation consists of the collection of both soil and groundwater samples at the SMP site. The objective of the Geoprobe soil sampling is to determine the nature and extent of contamination in the surface and subsurface soil in the vicinity of the loading dock on the south side of the SMP facility and to determine whether soil contamination may also be present under the loading dock and facility structures. The objective of the Geoprobe groundwater sampling is to aid in the determination of the nature and extent of groundwater contamination and to screen the groundwater column at various locations to determine the optimum location for placement of permanent monitoring wells.

A total of 5 surface soil, 25 vertical Geoprobe, and 6 angled Geoprobe sample locations will be drilled to determine the nature and extent of soil and groundwater contamination. The Geoprobe and surface soil sample locations are presented in Figure 5-1.

The 5 surface soil samples locations consist of the following:

- 5 surface soil sample locations with soil samples collected from 0-1ft: approximately 1 samples per location will be collected for a total of 5 soil samples.

The 25 vertical Geoprobe sample locations consist of the following:

- 11 shallow Geoprobe soil sample locations with samples collected from 0-1ft and 5-7ft: approximately 2 samples per location will be collected for a total of 22 soil samples.
- 5 deep Geoprobe soil sample locations with samples collected from 0-1ft, 5-7ft, 10-12ft, 15-17ft, and 20-22ft: approximately 5 samples per location will be collected for a total of 25 soil samples.
- 5 deep Geoprobe soil and groundwater sample locations with soil samples collected from 0-1ft, 5-7ft, 10-12ft, 15-17ft, and 20-22ft: approximately 5 samples per location will be collected for a total of 25 soil samples. Groundwater samples will be collected from 5-7 ft and 35-37ft: approximately 2 samples per location will be collected for a total of 10 groundwater samples.
- 4 deep Geoprobe groundwater samples locations with groundwater samples collected from 5-7 ft and 35-37ft: approximately 2 samples per location will be collected for a total of 8 groundwater samples.

The 6 angled Geoprobe sample locations consist of the following:

- 6 angled Geoprobe soil and groundwater locations with soil samples collected from the effective depths of 5-7ft and 10-12ft: approximately 2 samples per location will be collected for a total of 12 soil samples. Groundwater samples will be collected from 5-7 ft: approximately 1 sample per location will be collected for a total of 6 groundwater samples.

In summary, a total of 89 soil samples and 24 groundwater samples will be collected from the SMP site to determine the nature and extent of contamination. The above sampling strategy is divided into Geoprobe/hand auger soil sampling and Geoprobe groundwater sampling and is presented below.

5.3.4.1 Geoprobe/Hand Auger Soil Sampling

IT's soil sampling strategy focus on concentrating our samples in the two known source areas. The first know source area located in the southeast corner of the SMP site consisted of an oily sheen in a puddled area that was excavated and stockpiled by Summit Environmental in 1990. This area has been sampled by H2M subsequent to the excavation to determine that even though the horizontal depth of the excavation appeared to remove most of the contamination (excavation was less than 2 feet deep), the vertical extent of the excavation did not completely remove all residual contamination. The contamination in this area is shallow.

The second source area is located where the highest contamination levels were detected in the vicinity of MW-07 that was installed as part of the 1995 EnviroAudit investigation. This "hot spot" area contained elevated levels of chlorinated solvents and BTEX. The BTEX contamination was generally detected beneath the water table while the chlorinated solvent contamination was detected in both the unsaturated and saturated zone of the soils. Thus, this contamination is located deeper and extends into the water table whereas the first source area located at the previously excavated and stockpiled soil area is surficial in nature.

A total of 89 soil samples will be collected from the SMP site in order to determine the nature and extent of soil contamination. These 89 soil samples will be collected from the following locations:

- 5 soil samples from the 5 surface soil sampling locations
- 22 soil samples from the 11 shallow Geoprobe locations
- 50 soil samples from the 10 deep Geoprobe locations
- 12 soil samples from the 6 angled Geoprobe locations.

Table 5-1 presents the soil investigation scoping and rationale for the SMP site.

Continuous sampling will be conducted at all shallow Geoprobe locations for manual geologic logging of the borehole (11 locations). From the remaining 14 deep Geoprobe locations, continuous sampling for manual geologic logging will be conducted at 7 boring locations to develop an accurate representation of the Geology across the site. The borings requiring continuous logging will be determined in the field. Continuous sampling will not be conducted from the angled boring locations.

Surface Soil Sampling:

Five surface soil sample samples in the vicinity of the previously excavated soils and the hot spot area adjacent to the loading dock will be collected from the 0-1 foot depth increment. These samples will be collected using a hand auger. Three surface soil samples (SS-03, SS-04, and SS-05) were located within the area that was previously excavated and stockpiled. This area has proven to have surficial contamination remaining after the excavation. Two surface soil samples will be located at the fringe of the hot spot area adjacent to the loading dock.

Shallow Geoprobe Soil Sampling:

A total of 11 shallow Geoprobe soil borings will be drilled and two soil samples per location (0-1 ft and 5-5 ft) will be collected for a total of 22 samples. These shallow Geoprobes have been located within both source areas since both the hot spot area and the previously excavated soil area contain surficial contamination. Shallow Geoprobes have been utilized to characterize both the center and the fringes of the previously excavated soil area.

Surface soil samples from the 0-1 foot depth increment from the Geoprobe soil sampling locations may be collected via either a hand auger or the Geoprobe unit depending on site-specific conditions encountered during the field investigation. Subsurface soil samples will be collected using a Geoprobe sampling technique. Eleven (11) vertical shallow subsurface soil borings will be advanced using a Geoprobe drilling rig equipped with a Macro-Core sampler. Figure 5-1 depicts the locations of the borings. The Macro-Core sampler recovers a core of 2-inch diameter by 45 inches in length continuously to a depth of approximately 20 feet. Subsurface soils will be collected from across the water table that is assumed to occur at a depth of approximately 5-7 feet below grade.

Deep Geoprobe Soil Sampling:

A total of 10 deep Geoprobe soil borings will be drilled and five soil samples per location (0-1 ft, 5-7 ft, 10-12 ft, 15-17 ft, and 20-22 ft) will be collected for a total of 50 samples. Eight out of ten of these deep Geoprobes have been located primarily within the center and around the fringes of the hot spot area located adjacent to the loading dock. The placement of these eight deep borings will characterize the center of the hot spot as well as the southern, eastern and western fringes of the hot spot. Since significantly elevated levels of the BTEX contamination is primarily detected beneath the water table, the source of this contamination is suspect and an off-site upgradient source may be responsible. Thus, both shallow and deep characterization of this area is necessary to examine the relationship between the shallow chlorinate solvents and the

deeper BTEX contamination. The last two deep borings are placed under the bridge in the most upgradient on-site location to aid in the determination of background levels of BTEX emanating from upgradient sources.

The Geoprobe drill rig will be equipped with a Large Bore Drive Point Sampler, as necessary, to collect deeper samples. Though depths greater than 20 feet are not expected, if greater depths are required, the Geoprobe drill rig will be equipped with an Large Bore Drive Point Sampler. This tool is used for collecting discharge samples from greater depths, but has a smaller core diameter (1.125 inches) and is only 22 inches in length.

Angled Geoprobe Soil Sampling:

A total of 6 angled Geoprobe borings will be drilled and two soil samples per location (5-7 ft and 10-12 ft) will be collected for a total of 12 samples. These angled Geoprobes have been located within both source areas since both the hot spot area and the previously excavated soil area contamination may have extended under the loading dock in the northern direction. Along the loading dock, six soil borings will be advanced at approximately a 45 degree angle towards the SMP building to determine whether subsurface soil contamination may be present under the loading dock of SMP building. The Geoprobe sampler will be advanced at a diagonal length of 14-17 feet to collect a subsurface soil sample at an effective depth of 10-12 feet. A sample will also be collected at the effective depth of 5-7 feet. No surface soil samples will be collected due to their location directly adjacent to other vertical Geoprobe locations where surface soil samples are being collected

Proposed locations for soil borings and soil hand auger samples are presented on Figure 5-1. All soil samples will be analyzed for Target Compound List (TCL) VOCs. For evaluation of remedial alternatives, 10 percent of the samples will be analyzed for TCLP organic and metals and 20 percent of the samples will be analyzed for total organic carbon and grain size. In addition, eight surface soil samples (0-1 foot depth) in the area of the excavated soils and stockpiled soils will be analyzed for TCLP lead. A description of soil sampling, drilling, and decontamination procedures using the hand augers and Geoprobes will be provided in the Sampling and Analysis Plan (SAP).

5.3.4.2 Geoprobe Groundwater Sampling

A total of 24 Geoprobe groundwater samples will be collected from the SMP site in order to aid

in the determination of the nature and extent of groundwater contamination and to determine the optimum placement of permanent monitoring wells. These 24 Geoprobe groundwater samples will be collected from the following locations:

- 18 groundwater samples from the 9 deep Geoprobe locations
- 6 groundwater samples from the 6 angled Geoprobe locations.

Table 5-2 presents the groundwater investigation scoping and rationale for the SMP site.

Deep Geoprobe Groundwater Sampling:

A total of 9 deep Geoprobe groundwater borings will be drilled and two groundwater samples per location (5-7 ft and 35-37 ft) will be collected for a total of 18 samples. Three of these deep Geoprobes groundwater locations (GP-09, GP-13, and GP-11) have been located primarily within the center and around the fringes of the hot spot area located adjacent to the loading dock. The placement of these three deep borings will characterize the southern, eastern and western fringes of the hot spot. Since significantly elevated levels of the BTEX contamination is primarily detected beneath the water table, the source of this contamination is suspect and an off-site upgradient source may be responsible. The two deep borings, GP-23 and GP-25, are placed under the bridge in the most upgradient on-site location to aid in the determination of background levels of BTEX emanating from upgradient sources. The last four deep groundwater borings (GP-01, GP-02, GP-03, and GP-04) were located to determine the groundwater quality in the downgradient southwestern direction and to aid in the placement of permanent monitoring wells MW-12 and MW-13.

Angled Geoprobe Groundwater Sampling:

A total of 6 angled Geoprobe borings will be drilled and one groundwater sample per location (5-7 ft) will be collected for a total of 6 samples. These angled Geoprobes have been located within both source areas since both the hot spot area and the previously excavated soil area contamination may have extended under the loading dock in the northern direction. Along the loading dock, six soil borings will be advanced at approximately a 45-degree angle towards the SMP building to determine whether groundwater contamination may be present under the loading dock of SMP building.

Groundwater samples will be collected and analyzed for TCL VOCs. A discussion of sampling methodologies and techniques will be provided in the SAP.

5.3.5 Phase II Investigation

The Phase II Investigation will consist of the following three tasks:

- Monitoring well installation
- Monitoring well sampling
- Slug Testing

The exact placement and screened intervals of the monitoring wells will be determined based upon the results of the Phase I Investigation consisting of the Geoprobe/hand augering activities.

5.3.5.1 Monitoring Well Installation

Based on the results of the soil and groundwater samples from the Phase I field investigations, five additional monitoring well locations will be evaluated. The five proposed monitoring well locations will consist of three cluster well locations consisting of a shallow and deep well and two single well locations consisting of a shallow well. Thus, a total of eight new permanent monitoring wells (5 shallow and 3 deep) will be installed in 5 monitor well locations. These wells, in conjunction with two existing monitoring wells and one sump well, shall determine the horizontal and vertical extent of groundwater contamination in the vicinity of SMP. Two monitoring wells installed during previous investigations inside the SMP building, MW-5 and MW-6, are intact and usable (see Figure 5-1). Additionally, groundwater samples can be obtained from a sump located in the SMP building. A total of 11 wells (eight proposed and 3 existing) will be available at 8 locations for groundwater sampling.

Table 5-2 presents the groundwater investigation scoping and rationale for the SMP site.

Monitor well MW-11 is located in the center of the hot spot located adjacent to the loading dock. Groundwater samples collected from MW-7 contained the highest contaminant levels and since MW-7 was destroyed via heavy construction occuring at the Amtrak Sunnyside Yard, MW-11 serves to replace this well. MW-11 is a cluster well consisting of a shallow and deep well so that the vertical extent of groundwater contamination can be determined in the location of the hot spot.

Monitor well MW-10 is a single shallow well and is located at the farthest upgradient location within the SMP site to determine the immediate upgradient shallow groundwater quality.

Monitoring well MW-09 is the farthest upgradient well and is located directly across the street from the Merit Gas Station, the most probable upgradient source of contamination. MW-09 is a cluster well and consists of a shallow and deep well to determine the vertical extent of potential upgradient contamination.

Monitoring well MW-12, a single shallow well, is located immediately downgradient of the hot spot area and MW-11 and will aid in the determination of the extent of the downgradient contamination.

MW-13 is the farthest downgradient well located at the western edge of the SMP site. This well will determine if significant levels of contamination are leaving the SMP site. MW-13 is a cluster well (shallow and deep well) and will aid in the determination of both the horizontal and vertical extent of contamination.

The two existing monitoring wells and sump well located within the building will aid in the determination of the northwestern extent of groundwater contamination and determine the extent of influence the sump well has on the local hydrogeologic regime.

The five proposed shallow wells will be installed utilizing 4 inch PVC casing and screens to a depth of approximately 20 feet. The 15 foot screened interval will extend from 5 to 20 feet. The three proposed deep wells will also be installed utilizing 4-inch PVC casing and screens to a depth of approximately 40 feet. The 10 foot screened interval will extend from 30 to 40 feet.

5.3.5.2 Monitoring Well Sampling

Groundwater samples will be collected from existing and new monitoring wells using conventional well sampling techniques. The rationale for well placement and subsequent groundwater sampling activities performed during the Phase II Investigation is discussed above. A discussion of sampling methodologies and techniques is provided in the Sampling and Analysis Plan. Groundwater samples will be analyzed for TCL VOCs.

5.3.5.3 Slug Testing-Phase II Investigation

Slug testing will be performed at wells MW-9 through MW-13 to determine aquifer properties. Slug tests provide useful estimates of aquifer system properties in heterogeneous systems. The slug tests will be performed using both injection and withdrawal volumes. The selected volume

will be large enough to ensure that buildup or drawdown can be measured accurately, but small enough not to result in significant changes in aquifer saturated thickness.

To properly plan and design either a groundwater management strategy or a groundwater remedial system, knowledge of aquifer parameters is essential. Slug testing will allow calculation of hydraulic conductivity which, in concert with hydraulic gradient determined by groundwater contour plotting, will allow for determination of groundwater velocity. These parameters are essential for determining the rate of migration and fate of groundwater contaminants.

5.3.6 Management of Wastes Generated during Field Investigation

The activities associated with the collection of environmental samples may involve the generation of potentially contaminated decontamination water, soils (drill cuttings), and groundwater. These investigation wastes will be managed through a process of segregation, characterization, and storage. In general, wastes generated during the field investigation will be segregated according to matrix (e.g. water, soil). The wastes will be characterized into one of the following categories:

- RCRA Hazardous, or
- Non-hazardous

Upon characterization, an assessment of available options, ranging from immediate on-site disposal to off-site disposal, will be made.

5.3.6.1 Decontamination Water

All decontamination of equipment will be performed at a designated decontamination location within the boundaries of the site. This location will be determined prior to the commencement of field activities. The decontamination area will be constructed to provide adequate containment, collection, and storage of all decontamination water. Decontamination water will be segregated and stored on site.

5.3.6.2 Drill Cuttings

Drill cuttings generated during monitoring well installation will be managed in accordance with NYSDEC guidance. During Phase I field investigations, soil borings will consist of Geoprobe penetrations. Consequently, drill cuttings will not be generated from this activity.

5.3.6.3 Well Development/Purge Water

Groundwater generated during the development and purging of monitoring wells will be processed through carbon filters and discharged to the ground surface.

5.3.6.4 Used Personnel Protective Clothing and Equipment

The decontamination area will include suitable receptacles for the containment of all used protective clothing, respirator cartridges (if required), plastic sheeting, etc. Polyethylene bags will be used for this purpose.

5.3.6.5 Waste Minimization Practices

Waste minimization includes those activities that minimize or eliminate the generation of waste. Practical waste minimization practices will be implemented during the course of the field investigation activities to ensure that waste generation is kept to a minimum. The following waste minimization practices have been incorporated into the project plans and/or will be implemented during field activities:

- Use of Geoprobe soil and water sampling techniques to perform subsurface investigations during Phase I, eliminating the generation of drill cuttings for disposal;
- Identification of equipment requiring decontamination;
- Use of reusable items where possible to reduce waste generation;
- Use of material that is easily decontaminated;
- Segregation of clean and contaminated equipment; and
- Identification of procedures for containing residual contaminants (e.g., drill cuttings).

5.4 Task 4 - Sample Analysis and Usability Review

Samples collected during the field investigations will be subjected to a laboratory testing and usability review. A laboratory certified by the New York State Department of Health (NYSDOH) within the Environmental Laboratory Approval Program (ELAP) will conduct the analytical program. All soil samples collected will be analyzed for TCL VOA and 10 percent of soil samples for TCLP and 20 percent of soil samples for TOC analysis. All groundwater samples will be analyzed for TCL VOCs. The analytical methods that will be performed on both groundwater and soil samples are the following:

- USEPA CLP Statement of Work for Organic Analyses OLM04.02, May 1999;
- SW846 Method 8260B for TCLP Volatiles
- SW846 Method 8270C for TCLP Base/Neutral Extractables
- SW846 Method 8081A for TCLP Pesticides
- SW846 Method 8151A for TCLP Herbicides
- SW846 Method 6010B for TCLP Metals and Method 7470 for Mercury
- Lloyd Kahn Method for Total Organic Carbon

The analytical data reported from the laboratory will be reviewed and evaluated. Hundred percent of the data reported from the laboratory will be reviewed in detail and data usability summary reports for these data will be prepared to determine whether or not the data meet the project specific criteria for data quality and data usability. The data usability summary reports will be conducted in compliance with NYSDEC's *Guidance for the Development of Data Usability Summary Reports* (NYSDEC, 1997).

5.5 Task 5 - Data Evaluation

A preliminary evaluation of the Phase I investigation will be performed as soon as analytical data is received. This evaluation will be expedited in order to meet the projected schedule while still performing a cost-effective phased investigation. The data will be evaluated for critical contaminant levels. This preliminary evaluation supports the Phase II scoping activities such as determination of monitoring well locations and screened depths.

Data collected during both phases of the sampling program will be assembled, reviewed, and evaluated to satisfy the objectives of the investigation. The data collected will be used to identify the extent and nature of contamination, and to determine groundwater flow direction and contaminant migration pathways. Water level elevations measured at the wells will be used to develop equipotential maps of hydraulic head. The results of groundwater and soils analyses will be evaluated and mapped to illustrate the aerial extent of contamination.

Tabular summaries will be prepared to compare and evaluate the results from previous investigations with the current results. The results of the evaluation will be discussed in the RI report.

5.6 Task 6 - Risk Assessment

A qualitative risk assessment will be prepared and assess the potential adverse human health impacts due to exposure to the contaminants of concern in environmental media (i.e., soil and groundwater) associated with SMP in the absence of any actions to control or mitigate these releases.

The physical component of the site and the exposure pathways by which site-related constituents may reach human exposure points under the current land-use and future land-use scenarios will be presented. Each exposure pathway will be evaluated for the following four criteria necessary to indicate a complete potential exposure of a population:

- A source and mechanism of release of constituents to the environments;
- An environmental medium;
- A point of potential contact of humans to the contaminated medium; and
- An identified route of exposure.

Conceptual site models will be developed to aid in identifying potentially exposed populations and exposure pathways to environmental media. After complete exposure pathways are identified, the adverse health effects of the constituents of concern via identified complete exposure pathways under the current land-use and future land-use conditions will be discussed and presented in this section.

5.7 Task 7 - Treatability Study (Optional)

Currently, no treatability studies are anticipated for the RI/FS process. However, if at a later date, it is determined that a treatability study is warranted, it will be added either to the RI/FS or to the Remedial Design scope of work.

5.8 Task 8 - Remedial Investigation Report

After completion of the above tasks, a draft RI Report will be prepared and submitted for review. The RI Report will follow current USEPA guidance as contained in USEPA guidance document *Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA* dated October 1988. IT will initiate, develop and complete the RI Report in accordance with the state-approved RI/FS Work Plan.

The RI Report will:

(1) Include all data generated and all other information obtained during the field investigation;
(2) Summarize and compare historical data to new data;
(3) Provide all of the assessments and evaluations set forth in CERCLA, the NCP, and other relevant guidance documents;
(4) Identify any additional data that must be collected.

5.9 Task 9 - Focused Feasibility Study Report

After analytical data are collected, evaluated and presented in the RI Report, the remedial response objectives and response actions will be developed. Based upon the established remedial response objectives and the results of the exposure assessment, remedial alternatives will be developed and evaluated in accordance to the procedures recommended in *Guidance for Conducting RI/FS under CERCLA*. Due to the limited nature of contamination present at the SMP site, it is envisioned that a streamlined approach can be used in the development of a Focused Feasibility Study.

5.10 Task 10 – Post RI/FS Support

Upon approval if the final RI/FS reports, additional support services will be provided until the time the Record of Decision (ROD) is signed for SMP. These tasks may include any or all of the following efforts:

- Preparation of slides and materials for presentation at the public meeting for the RI/FS;
- Provide technical support to SMP and attend meetings with any Federal, New York State or local organizations regarding the RI/FS for SMP; and
- Preparation of the Responsiveness Summary or review if prepared by others.

6.0

6.0 Project Management Approach

6.1 Organization and Approach

The RI/FS Project Manager has primary responsibility for plan development and implementation of the remedial investigation and feasibility study, including coordination among the RI and FS leaders and support staff, development of bid packages, acquisition of engineering or specialized technical support, and all other aspects of the day-to-day activities associated with the project. The proposed project organization is presented in Figure 6-1. The RI/FS Project Manager identifies staff requirements, directs and monitors site progress, ensures implementation of quality procedures and adherence to applicable codes and regulations, and is responsible for performance within the established budget and schedule.

The RI Task Manager reports to and will work directly with the Project Manager to develop the SAP and is responsible for the implementation of the field investigation, the analysis, interpretation and presentation of data acquired relative to the site, and preparation of the RI report.

The Field Operations Leader (FOL) is responsible for on-site management for the duration of all site operations including the activities conducted, such as sampling, and the work performed by subcontractors such as well drilling and surveying. The FOL will provide consultation and decide on factors relating to sampling activities and changes to the field sampling program.

The FS Task Manager will work closely with the Project Manager and RI Task Manager to ensure that the field investigation generates the proper type and quantity of data for use in the initial screening of remedial technologies/alternatives, detailed evaluation of remedial technologies/alternatives, development of requirements for and evaluation of treatability study/pilot testing, if required, and associated cost analysis. The Focused Feasibility Study Report will be developed by the FS technical group.

The Risk Assessment Task Manager will support the scoping process to ensure the proper number and type of analytical samples are proposed in the field investigation effort. During the development of the RI report, the Risk Assessment Task Manager will work closely with the RI Task Manager to develop the site specific qualitative risk assessment. The Risk Assessment Task

Manager will also work closely with the FS Task Manager during the development of ARARs as well as the development of site-specific cleanup levels, if necessary.

The Analytical Chemistry Coordinator will ensure that the analytical laboratory performs the analyses as described in the Field Sampling Plan. The chemistry coordinator will be responsible for assuming that proper collection, packaging, preservation, and shipping of samples are performed in accordance with USEPA guidelines.

The task numbering system for the RI/FS effort is described in this work plan (Section 5.0). The Tasks are numbered as follows:

Task 001:	Project Planning and Management
Task 002:	Community Relations
Task 003:	Field Investigations
Task 004:	Analytical/Validation
Task 005:	Data Evaluation
Task 006	Risk Assessment
Task 007	Treatability Studies, if required (optional)
Task 008	Remedial Investigation Report
Task 009	Focused Feasibility Study Report
Task 010	Post RI/FS Support

Project progress meetings will be held, as needed, to evaluate project status, discuss current items of interest, and review major deliverables such as the RI and FS reports.

6.2 Quality Assurance

The project quality assurance requirements are stipulated in the QAPP, which will be prepared in accordance with EPA Region II Guidelines. The QAPP will include a description of the quality assurance and quality control protocols necessary to achieve the initial DQOs in the Work Plan. This plan will identify the data validation expert responsible for assessing the quality of the data, and the individual's qualifications and experience will also be presented.

6.3 Project Schedule

The proposed Project Schedule is outlined in the following table:

TASK DESCRIPTION	DATES OF PERFORMANCE
Project Planning Phase	
Development of Work Plan Scoping	5/13/98 - 7/02/98
NYSDEC Review and Comment on Scoping	7/02/98 - 3/29/00
Revise Scoping Document/Develop Draft Work Plan	3/30/00 - 5/23/00
NYSDEC Review and Comment on Draft Work Plan	5/23/00 - 6/23/00
Develop Draft SAP/HASP/CP	6/23/00 - 8/25/00
NYSDEC Review and Comment on SAP/HASP	8/25/00 - 9/22/00
Finalize SAP/HASP and Obtain NYSDEC Approval	9/22/00 - 10/5/00
Field Investigation Phase I	
Perform Phase I Field Investigation	10/10/00 - 10/20/00
Phase I Sample Analysis	10/20/00 - 11/24/00
Data Usability Summary Report (DUSR)	11/24/00 - 12/08/00
Development and Submission of Phase I Data Summary Tables	12/08/00 - 12/15/00
Field Investigation – Phase II	
Phase II Scoping	12/15/00-1/12/01
Project Plan Addendum for Phase II	1/12/01-2/9/01
NYSDEC Review and Approval of Phase II Addendum	2/9/01-3/9/01
Phase II Field Investigation	3/9/01-3/30/01
Phase II Sample Analysis	3/30/01-4/27/01
Phase II DUSR	4/27/01-5/11/01
Report Development	
Draft Remedial Investigation (RI) Report Development	5/11/01-6/8/01
NYSDEC Review and Comment on RI	6/8/01-7/6/01
Finalize RI and Obtain NYSDEC Approval	7/6/01-8/3/01
Feasibility Study (FS) Scoping Meeting	8/3/01-8/24/01
Draft FS Development	8/24/01-9/21/01
NYSDEC Review and Comment on FS Report	9/21/01-10/19/01
Finalize FS and Submit RI/FS to Record	10/19/01-11/16/01
Prepare Proposed Plan and Submit to Record	11/16/01-12/14/01
30-Day Public Comment Period	12/14/01-1/11/02
Prepare and approve ROD	1/11/02-2/8/02

7.0 References

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USEPA, 1989d, ***Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA. OSWER Directive 9335.3-01.***

Tables

Tables

TABLE 5-1
SOIL INVESTIGATION SCOPING AND RATIONALE

Project Work Plan
Remedial Investigation/Feasibility Study
Standard Motor Products

Sample Locations	Matrix	Depth (ft)	No. of Locations	No. of Samples	Sample Location Identification	Rationale
Surface Soil Sample Locations in Previously Excavated Soils Area and at the Fringe of the Hot Spot Area	Surface Soil	0-1	5	5	SS-03, SS-04 and SS-05	To investigate the vicinity of the previously excavated soils area.
					SS-01 and SS-02	To determine the fringe of the contaminated hot spot area.
Shallow Geoprobe Sample Location in Both the Hot Spot along Loading Dock and the Previously Excavated Soils Area	Surface and Subsurface soil (Geoprobe)	0-1 and 5-7	11	22	GP-19, GP-20 and GP-22	To investigate the vicinity of the previously excavated soils area.
					GP-14, GP-15, GP-18 and GP-2	To determine the southern extent of the previously excavated soils area.
					GP-05, GP-07, and GP-08	To determine the western extent of the hot spot soil contamination.
					GP-24	To determine the eastern extent of the previously excavated soils area.
Deep Geoprobe Sample Locations in the Vicinity of the Hot Spot Along the Loading Dock	Surface and Subsurface soil (Geoprobe)	0-1, 5-7, 10-12, 15-17, and 20-22	10	50	GP-09, GP-16,and GP-12	To examine the relationship between the shallow chlorinated solvent and deep BTEX contamination in the vicinity of the hot spot.
					GP-06 and GP-10	To determine the western extent of the deep soil contamination in the vicinity of the hot spot.
					GP-11	To determine the southern extent of the deep soil contamination in the vicinity of the hot spot.
					GP-13 and GP-17	To determine the eastern extent of the deep soil contamination in the vicinity of the hot spot.
					GP-23 and GP-25	To determine the eastern extent of the shallow soil contamination in the vicinity of the previously excavated soils area and the potential for background levels of deep upgradient BTEX soil contamination.
Angled Geoprobe Sample Locations at the Northern Extent of the Hot Spot and the Previously Excavated Soils Area	Subsurface Soil (Geoprobe)	5-7 and 10-12	6	12	GP-A2, GP-A3, and GP-A4	To examine the northern extent of the shallow chlorinated solvent and deep BTEX contamination in the vicinity of the hot spot.
					GP-A5 and GP-A6	To examine the northern extent of the contamination in the vicinity of the previously excavated soils.
					GP-A1	To determine the western fringe of the northern extent of soil contamination in the vicinity of the hot spot.
Total Number of Soil Samples				89		

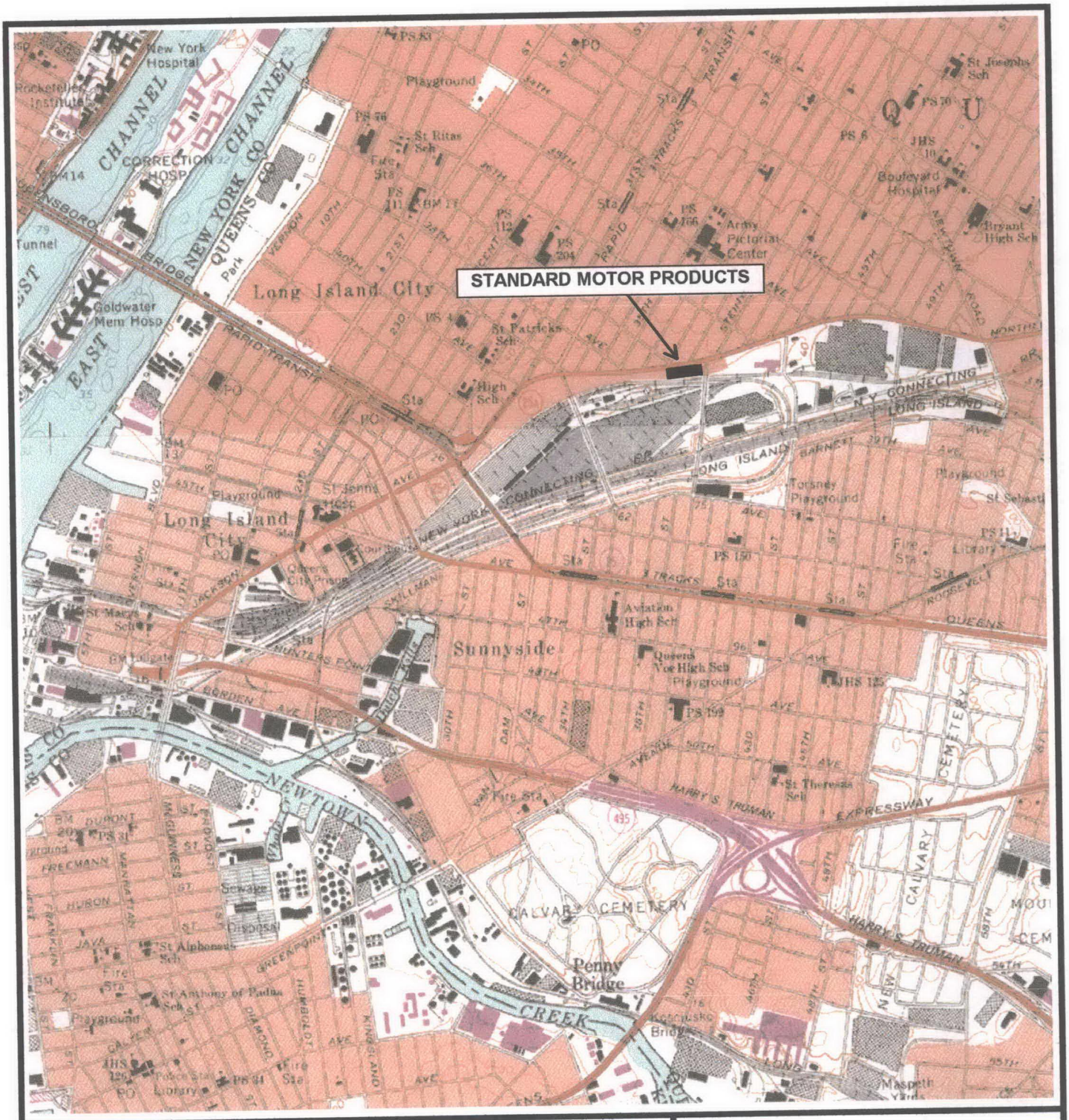
TABLE 5-2
GROUNDWATER INVESTIGATION SCOPING AND RATIONALE

Project Work Plan
Remedial Investigation/Feasibility Study
Standard Motor Products

Geoprobe/Monitoring Well Sample Locations	Matrix	Depth (ft)	No. of Locations	No. of Samples	Sample Location Identification	Rationale
Deep Geoprobe Sample Locations at the Area South of the SMP Building	Groundwater (Geoprobe)	5-9 and 35 38	9	18	GP-09 and GP-13	To evaluate the shallow and deep groundwater contamination in the hot spot area, the eastern and western fringes of contamination, and to optimize the placement of MW-11.
					GP-11	To determine the southern extent of the hot spot groundwater contamination.
					GP-23 and GP-25	To determine upgradient groundwater quality and to optimize the placement of MW-10.
					GP-03 and GP-04	To evaluate groundwater quality immediately downgradient of the hot spot and to optimize the placement of MW-12.
					GP-01 and GP-02	To evaluate groundwater quality at the most southwestern portion of the site and to optimize the placement of MW-13.
Angled Geoprobe Sample Locations at the Northern Extent of Contaminations in the Vicinity of the Hot Spot and the Previously Excavated Soils Area	Groundwater (Geoprobe)	5-9	6	6	GP-A2, GP-A3, and GP-A4	To examine the northern extent of the shallow chlorinated solvent and deep BTEX contamination in the vicinity of the hot spot.
					GP-A5 and GP-A6	To examine the northern extent of the contamination in the vicinity of the previously excavated soils.
					GP-A1	To determine the western fringe of the northern extent of groundwater contamination in the vicinity of the hot spot.
Monitoring Well Locations throughout the Site	Groundwater	Shallow 5-20, Deep 30-40	8	11	MW-11(shallow and deep)	To evaluate the shallow and deep groundwater contamination in the hot spot area.
					MW-10 (shallow)	To determine the immediately upgradient groundwater quality.
					MW-09 (shallow and deep)	To determine the farther upgradient groundwater quality.
					MW-12 (shallow)	To evaluate the near downgradient groundwater quality.
					MW-13 (shallow and deep)	To determine the northwestern extent of the groundwater contamination.
					MW-5 and MW-6 (existing wells)	To determine the northern extent of the groundwater contamination.
					Sump Sample	To determine the influence the sump has on local groundwater flow.
Total Number of Groundwater Samples				35		

Figures

Figures



SOURCE:
CENTRAL PARK AND BROOKLYN, NEW YORK
QUADRANGLES, 7.5 MINUTE SERIES

QUADRANGLE LOCATION

N
W E
S

FIGURE 2-1
SITE LOCATION MAP

STANDARD MOTOR PRODUCTS, INC.
37-18 NORTHERN BOULEVARD
LONG ISLAND CITY, NEW YORK

IT CORPORATION A Member of The IT Group	Prepared by: JLF	Date: 5/12/00
	Approved by:	Scale: 1"=2,000'
	Project Mgr:	Revision No.: 0
	File name: locationfigure.xls	Project No.: 775699

775699-B4.dwg 08/07/00 3:26pm A.D.R.

PROJECT NO.	FILE NO.	CHK'D.	DWG.	APVD.
775699	B4			

DRAWING NUMBER: 775699-B4

REV. NO.

PROJECT MANAGER: M. WATT | DRAWN BY: J.R.D. | DATE: 5/11/00

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INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 2-2
SURROUNDING FACILITY MAP

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY WORKPLAN

Prepared For:

STANDARD MOTOR PRODUCTS

NORTHERN BOULEVARD

39th. STREET

SIDEWALK

AMTRACK SUNNYSIDE YARD

STANDARD MOTOR PRODUCTS

CONSTRUCTION YARD

MERIT GASOLINE STATION

UNIVERSAL FORD

UNIVERSAL ISUZU

41st. STREET

STEINWAY STREET

HILTI CENTER

BELL ATLANTIC RETAIL STORE

J.E. ILLUSIONS CLUB

APARTMENT BUILDING

MEINEKE

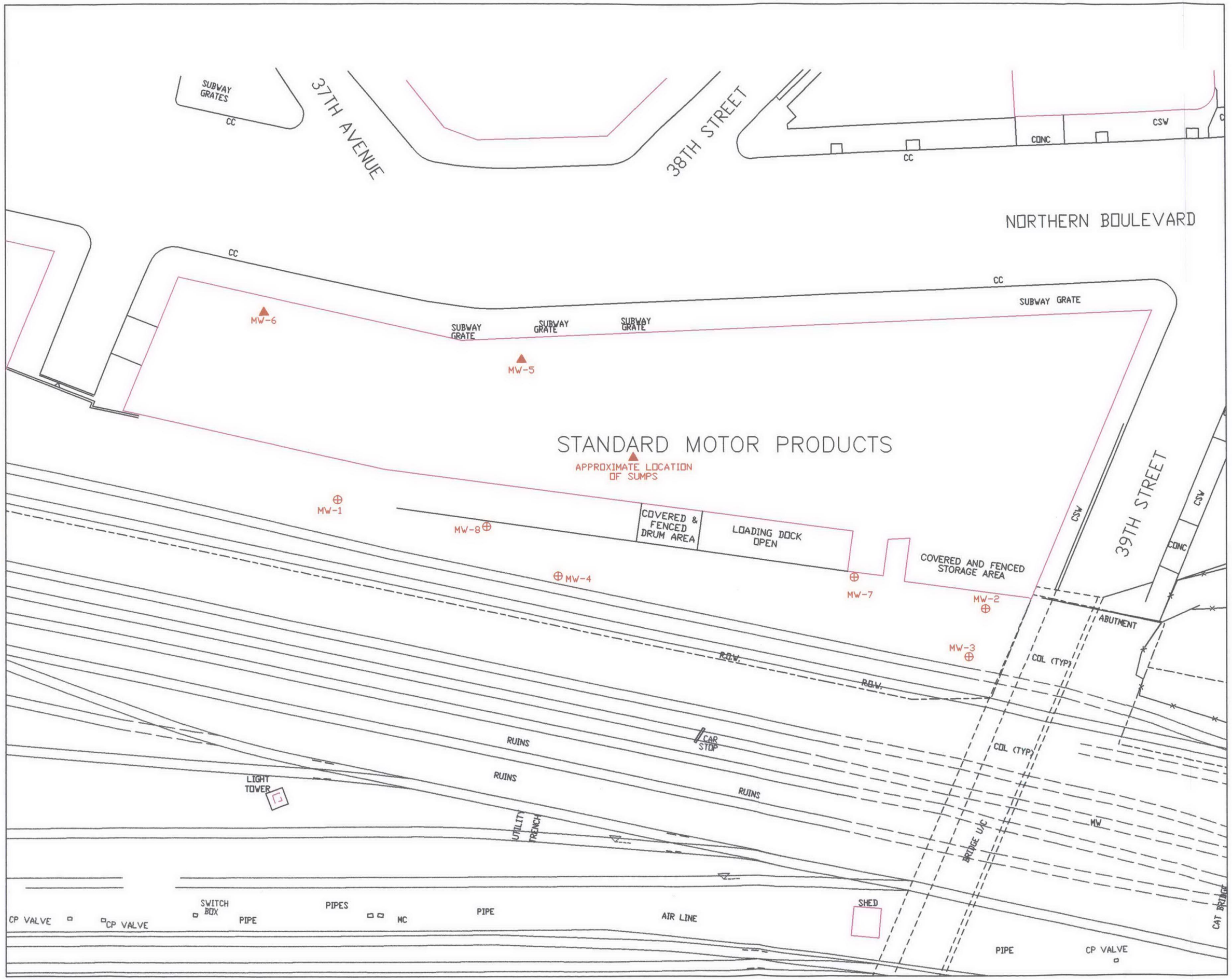
SUPERMARKET

PARKING LOT

AUTO REPAIR & QUICK LUBE

EMERALD SPA & RESTAURANT

LEGEND:



LEGEND:

MW-7 ⊕ PREVIOUS MONITORING WELLS THAT CAN NOT BE LOCATED

MW-5 ▲ EXISTING WELL/SUMP

25 0 25 50

SCALE OF FEET

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PROJECT MANAGER: M. WATT | DRAWN BY: J.R.D. | DATE: 5/11/00

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 2-3
SITE PLAN

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY WORKPLAN

Prepared For:

STANDARD MOTOR PRODUCTS

PROJECT NO.	FILE NO.	CHK'D:	DRAWING NUMBER	REV. NO.
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		APPV'D.		

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IMAGE	X-REF	OFFICE	DRAWING NUMBER
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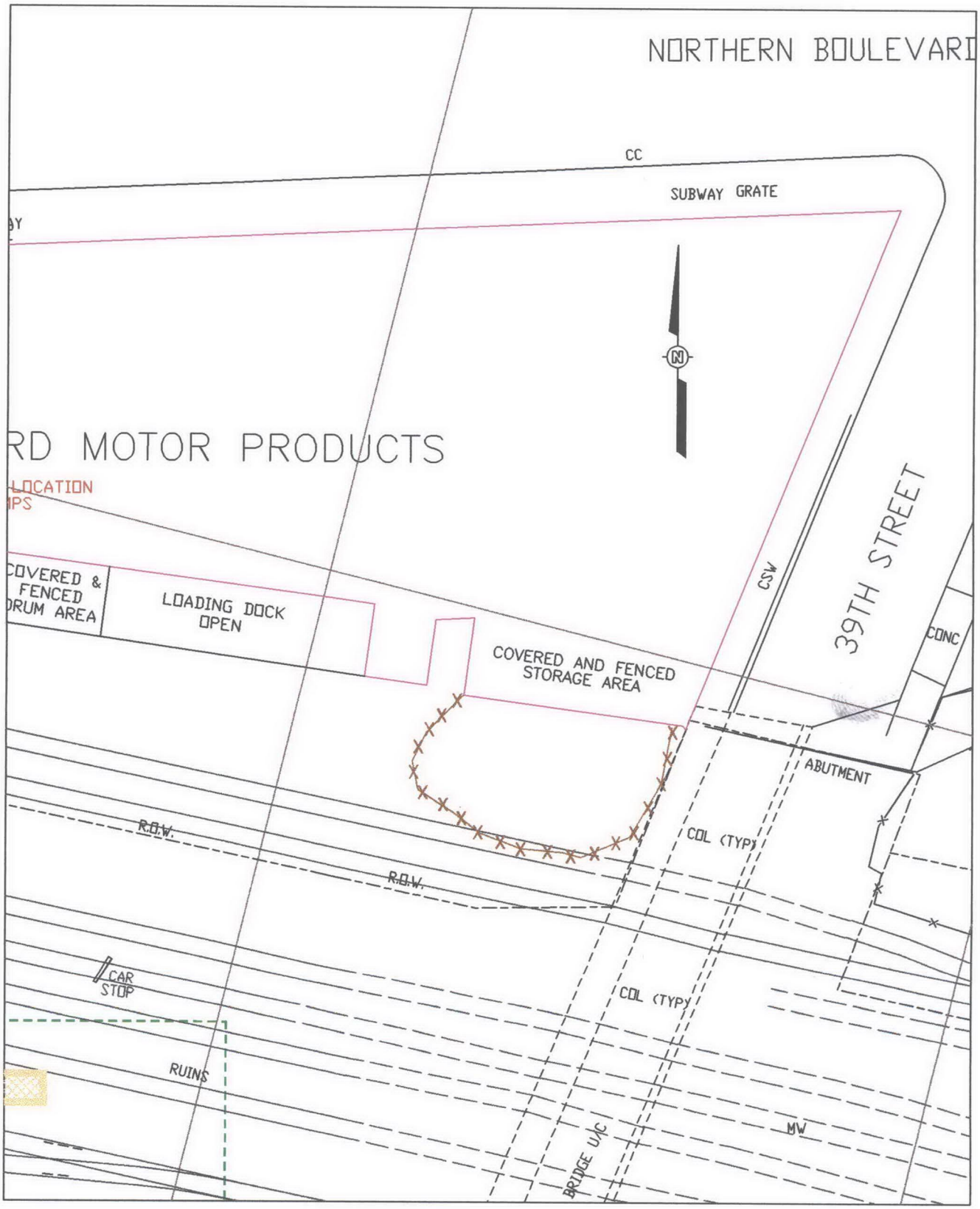


x APPROXIMATE VICINITY OF PREVIOUS EXCAVATED & STOCKPILED SOILS

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

IT CORPORATION

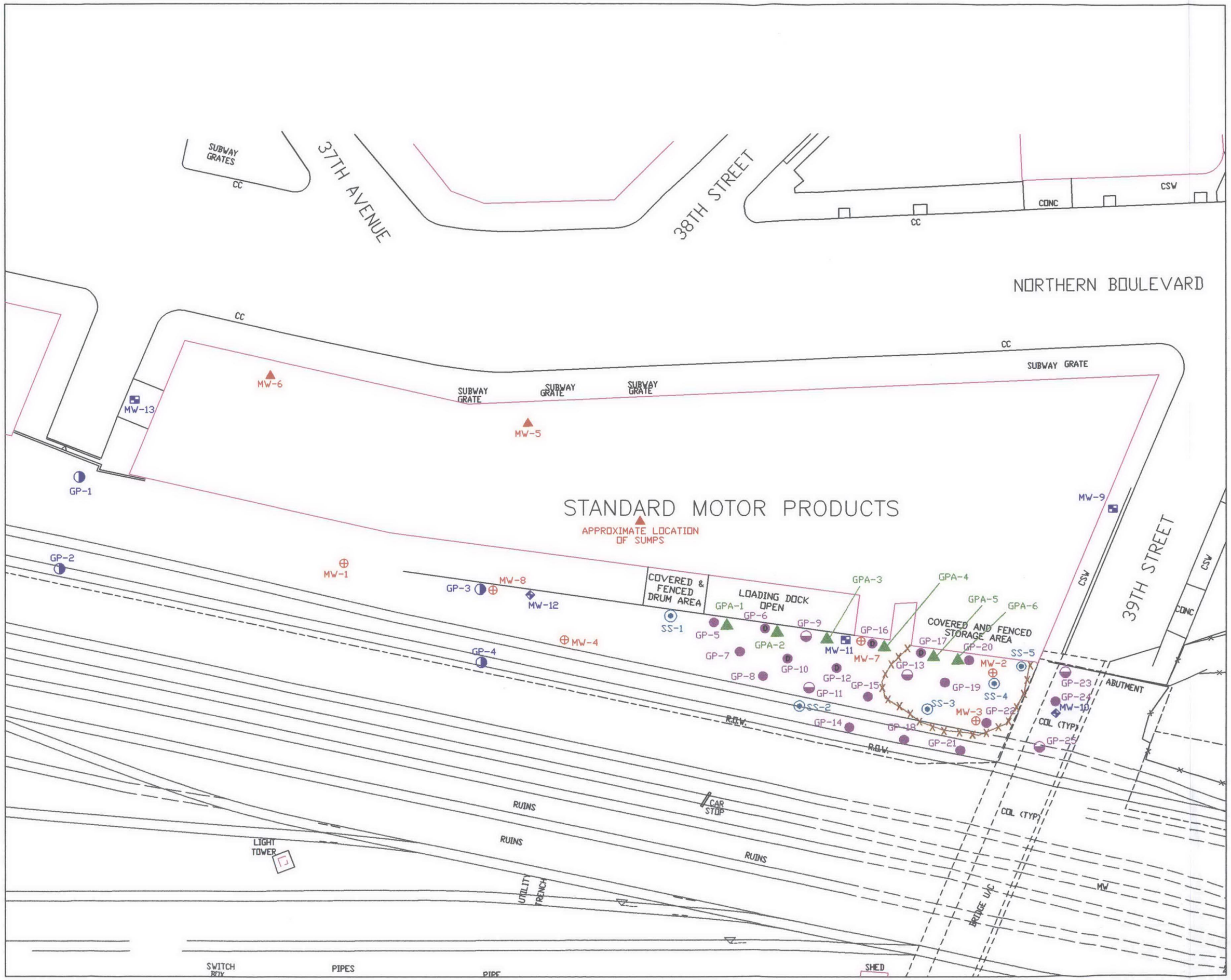
STANDARD MOTOR PRODUCTS
LONG ISLAND CITY, NEW YORK

FIGURE 2-4
APPROXIMATE LOCATION OF PREVIOUSLY EXCAVATED AND STOCKPILED SOIL

STANDARD MOTOR PRODUCTS

DESIGNED BY			CHECKED BY		
DRAWN BY			APPROVED BY		

SCALE:	DRAWING NO.	SHEET NO.	REVISION NO.
1" = 40 '	775699-A1		



LEGEND:

MW-7 ⊕	PREVIOUS MONITORING WELLS THAT CAN NOT BE LOCATED
MW-5 ▲	EXISTING WELL/SUMP
MW-11 ▪	PROPOSED DEEP/SHALLOW WELL CLUSTER (5–20' & 30–40')
MW-12 ◆	PROPOSED SHALLOW WELL (5–20')
SS-1 ◉	PROPOSED SURFACE SOIL SAMPLE BY HAND AUGER, (0–1'), 5 SAMPLES
GP-2 ●	PROPOSED SHALLOW GEOPROBE SOIL SAMPLES (0–1' & 5–7'), 11 SAMPLE LOCATIONS
GP-1 ●	PROPOSED DEEP GEOPROBE SOIL SAMPLES (0–1', 5–7',10–12' & 15–17' & 20–22'), 5 SAMPLE LOCATIONS
GPA-1 ▲	PROPOSED ANGLED GEOPROBE SOIL AND GROUNDWATER SAMPLES (SOIL: 5–7' & 10–12'), (GROUNDWATER: 5–7') 6 SAMPLE LOCATIONS
GP-1 ◑	PROPOSED DEEP GEOPROBE GROUNDWATER SAMPLE (5–7' & 35–37') 4 SAMPLE LOCATIONS
GP-11 ◒	PROPOSED DEEP GEOPROBE SOIL AND GROUNDWATER SAMPLES (SOIL: 0–1',5–7' & 10–12',15–17' & 20–22'), (GROUNDWATER: 5–7' & 35–37'), 5 SAMPLE LOCATIONS
x	APPROXIMATE VICINITY OF PREVIOUS EXCAVATED & STOCKPILED SOILS

25 0 25 50
SCALE OF FEET

REV. NO.	DATE	DESCRIPTION OF REVISION	REV. BY	ENG	CHKD BY	APPVD BY
0	-/--/--	DEVELOPED DRAWING	-.-.-			

PROJECT MANAGER: M. WATT | DRAWN BY: J.R.D. | DATE: 5/11/00

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 5–1
PROPOSED SAMPLE LOCATIONS

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY WORKPLAN

Prepared For:

STANDARD MOTOR PRODUCTS

PROJECT NO.	FILE NO.	CHK'D:	DRAWING NUMBER	REV. NO.
775699	B1	ENG.	775699–B1	
		APPVD.		

775699-B1.dwg 05/22/00 3:28pm J.R.D.

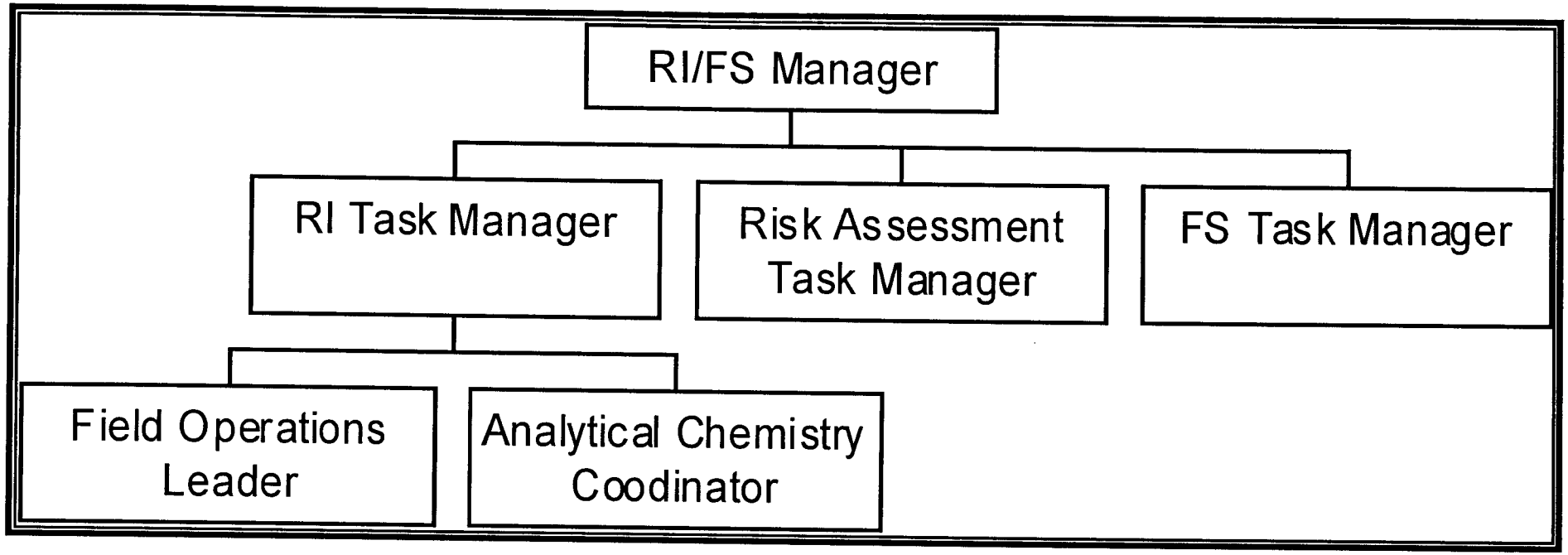


FIGURE 6-1
SMP RI/FS PROJECT ORGANIZATION

STANDARD MOTOR PRODUCTS, INC.
LONG ISLAND CITY, NEW YORK

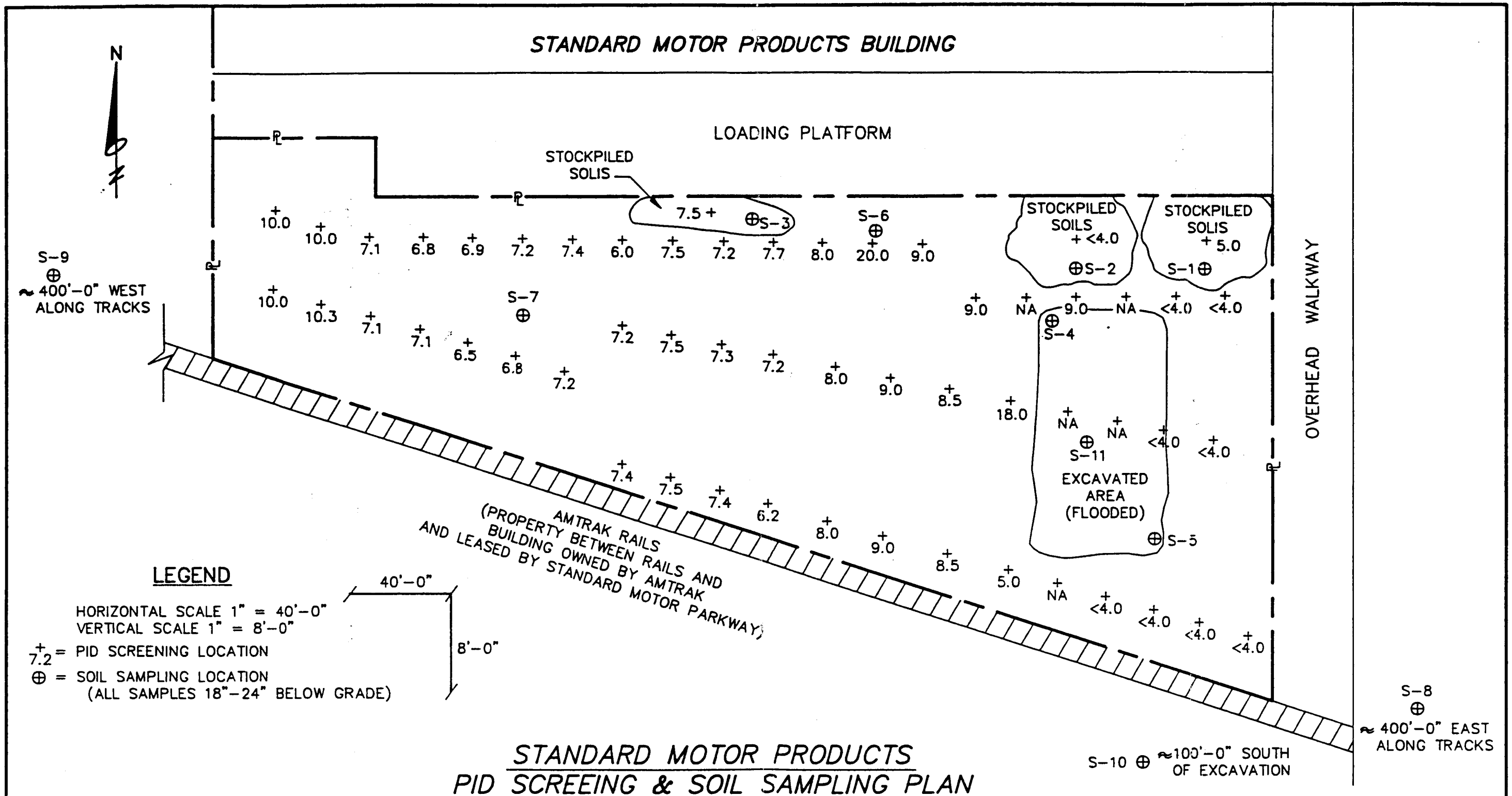
IT CORPORATION
A Member of The IT Group

Prepared by JLF	Date 5/12/00
Approved by	Scale 1"=2,000'
Project Mgr	Revision No. 0
File name locationfigure.xls	Project No. 775699

APPENDIX
A

Appendix A

Selected H2M Soil Investigation Report Figures and Tables



STANDARD MOTOR PRODUCTS
PID SCREEING & SOIL SAMPLING PLAN

STMP9101.DWG

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y. FAIRFIELD, N.J.

TABLE 1

SOIL ANALYSES

SAMPLE POINT	VOC (mg/kg)	TPH (mg/kg)	Pb (mg/kg)	TCLP Pb (mg/L)
S-1 [1]	48.612	5,300	647.5	0.07
S-2 [1]	58.287	2,380	419.5	0.17
S-3 [1]	37.487	3,325	302.9	0.10
S-4	10.944	3,270	340.6	0.12
S-5	0.021	557	21.1	<0.05
S-6	894.210	68	568.5	0.27
S-7	0.374	99	582.5	0.21
S-8 [2]	0.337	48	209.5	<0.05
S-9 [2]	0.164	<5	40.3	0.08
S-10 [2]	0.015	<5	151.2	0.19
S-11	1.100	272	278.9	0.11

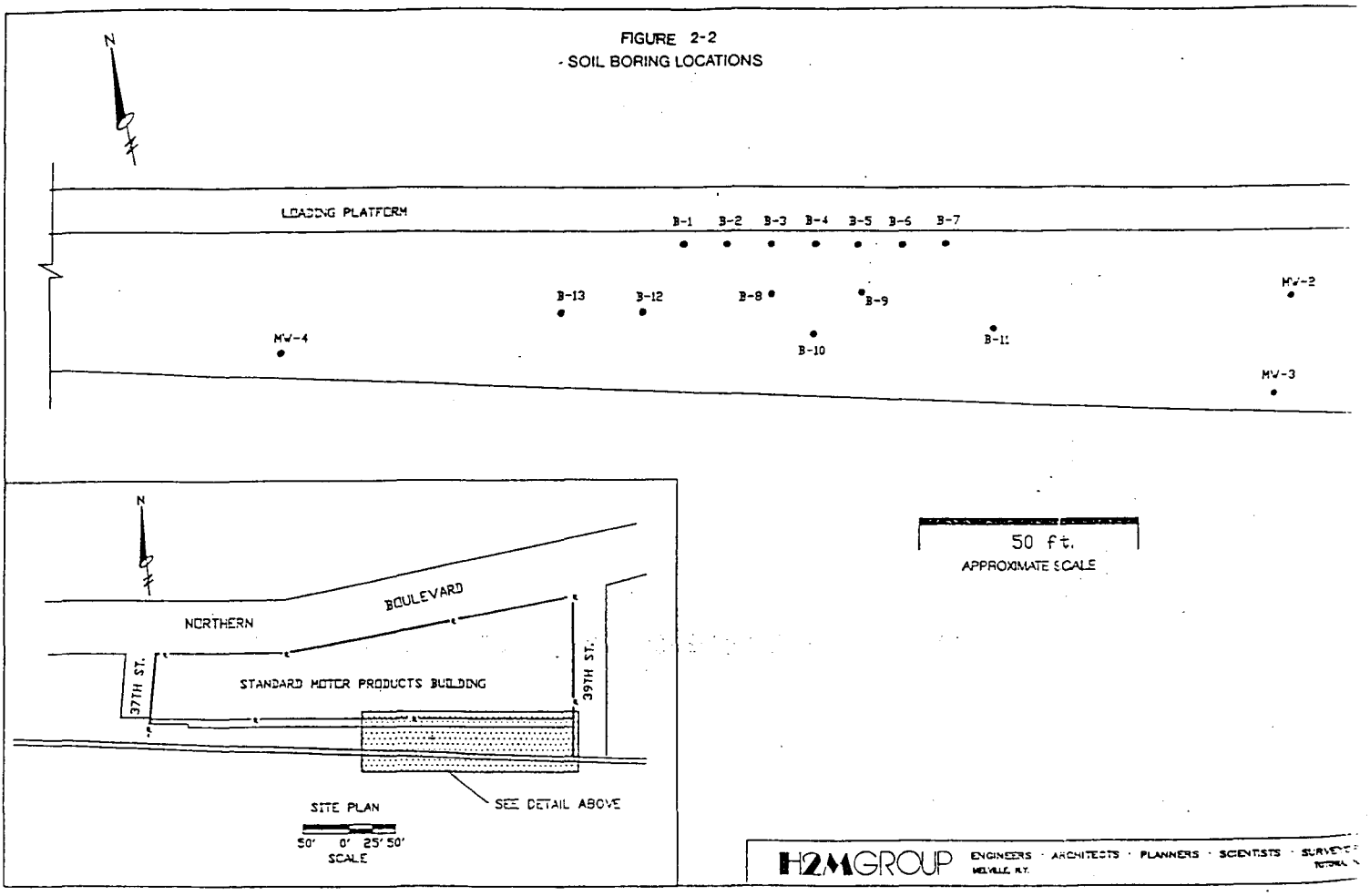
[1] Stockpiled soils
[2] Background soils

APPENDIX
B

Appendix B

Selected H2M Remedial Investigation Report Figures and Tables

FIGURE 2-2
- SOIL BORING LOCATIONS



H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y.

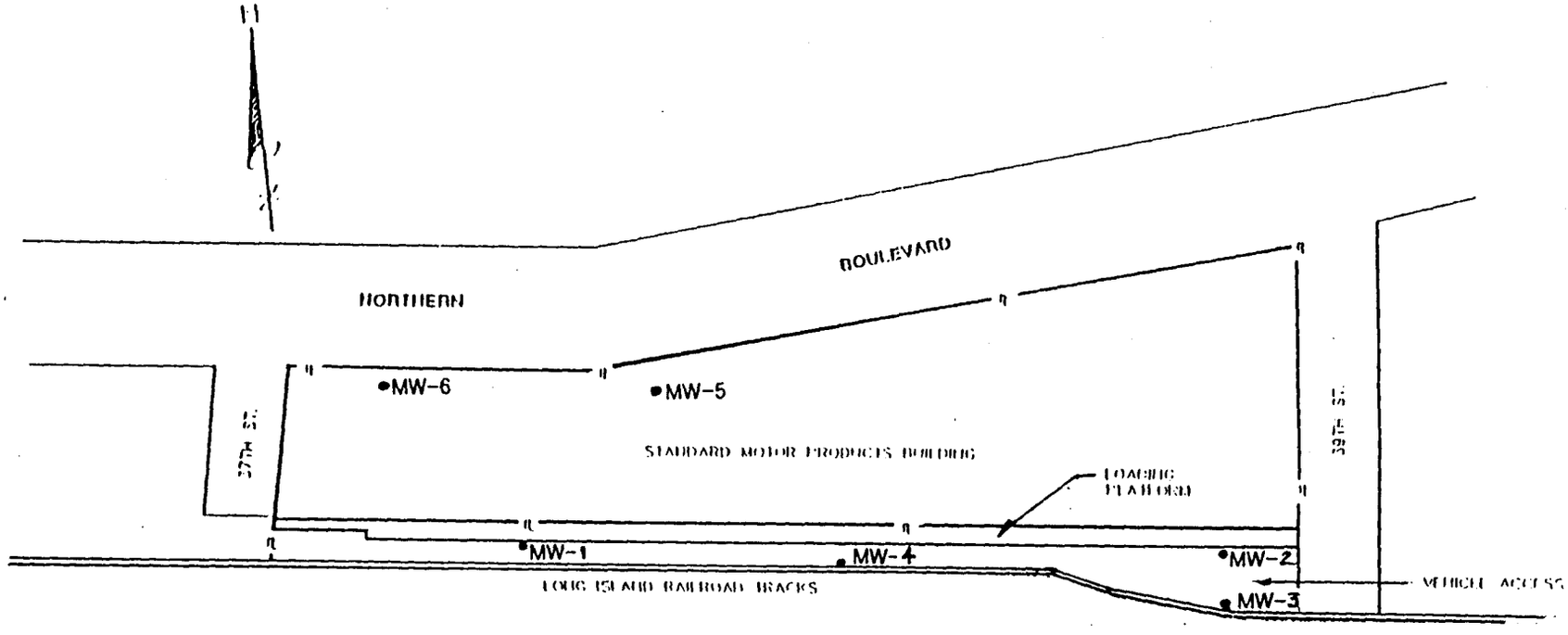


FIGURE 2-7
GROUNDWATER MONITORING WELL LOCATIONS

STANDARD MOTOR PRODUCTS, INC.
LONG ISLAND CITY, NEW YORK

50' 0' 25' 50'
SCALE

H2MGROUP

TABLE 2-1
SPLIT SPOON SAMPLE SCREENING RESULTS

LOCATION	DEPTH FT.	Split Spoon FID (c.g.e.-ppm)	Soil Jar FID (c.g.e.- ppm)	BLOW COUNTS No. of Blows Per 12 inches.
B-1	5	5	25	18
	10	1	12	18
	15	1	20	16
	20	0	7	15
B-2	5	40	220	20
	10	NA	26	18
	15	1	60	20
	20	0	100	20
B-3	5	9	560	22
	10	4	90	20
	15	4	240	16
	20	2	50	19
B-4	5	3	NA	20
	10	11	840	14
	15	8	330	15
	20	0	28	17
B-5	5	30	680	NA
	10	9	NA	16
	15	10	590	16
	20	10	160	18
B-6	5	1	150	18
	10	10	700	NA
	15	1	80	16
	20	6	110	18
B-7	5	4	1000	14
	10	10	100	NA
	15	7	190	NA
	20	1	24	18
B-8	5	0	100	12
	10	0	10	18
	15	0	26	17
	20	0	28	NA
B-9	5	2	440	14
	10	0	110	15
	15	0	5	NA
	20	0	60	NA
B-10	5	9	160	21
	15	6	100	20
	20	20	100	NA
	30	35	220	20
	40	8	24	22
B-11	5	1000	310	18
	10	140	310	NA
	15	480	350	NA
	20	50	100	NA
B-12	5	83	22	14
	10	26	8	17
	15	9	10	14
	20	7	6	12
B-13	5	16	10	15
	10	15	6	30
	15	14	NA	50
	20	22	42	18

NA - Data Not Available
Soil Jar OVA Readings taken at least 1 hour after storage in jars.

TABLE 2-2
SOIL DATA SUMMARY

Boring ID, Depth	Total VOCs	Methylene Chloride	1,1-Dichloro-ethene	1,1-Dichloro-ethane	C/T-1,2-Di-chloroethene	1,1,1-Tri-chloroethane	Trichloro-ethene	Benzene	Tetrachloro-ethylene	Toluene	Ethyl-benzene	Total Xylenes	Acetone
B-1, 5'-7'	1.750	0.350	0.011	0.017	0.044	0.770	0.110	0.008	0.390	0.009	0.006	0.035	<0.012
B-1, 10'-12'	2.967	0.780	0.015	0.350	0.290	0.940	0.450	<0.006	0.064	<0.006	<0.006	0.041	0.037
B-1, 20'-22'	0.110	0.036	<0.005	<0.005	<0.005	0.057	0.017	<0.005	<0.005	<0.005	<0.05	<0.005	<0.010
B-2, 5'-7'	2.232	0.800	0.045	0.200	0.650	<0.006	0.310	<0.006	0.180	0.012	<0.006	<0.006	0.035
B-2, 10'-12'	1.309	0.380	0.013	0.081	0.240	0.280	0.290	<0.006	0.011	<0.006	<0.006	0.014	<0.011
B-2, 20'-22'	0.650	0.480	<0.005	0.012	0.065	0.035	0.024	<0.005	<0.005	<0.005	<0.005	<0.005	0.034
B-3, 5'-7'	4.125	1.000	0.460	0.500	0.620	<0.006	0.290	0.035	0.930	0.034	<0.006	0.240	0.016
B-3, 15'-17'	3.670	0.770	0.120	0.058	0.290	1.000	0.290	0.008	0.470	0.011	0.140	0.460	0.053
B-4, 5'-7'	7.604	0.580	<0.006	0.095	0.059	5.000	1.400	<0.006	0.310	<0.006	0.086	0.074	<0.011
B-4, 10'-12'	14.095	0.130	<0.007	<0.007	0.036	2.100	0.130	<0.007	0.810	0.350	2.400	8.100	0.039
B-4, 20'-22'	2.570	0.100	<0.005	<0.005	<0.005	0.480	0.050	<0.005	0.140	<0.005	0.300	1.500	<0.010
B-5, 5'-7'	5.118	0.260	<0.006	0.059	0.061	2.200	0.260	<0.006	0.690	0.038	0.250	1.300	<0.011
B-5, 15'-17'	26.980	0.590	<0.021	<0.021	<0.021	7.600	<0.021	<0.021	0.390	<0.021	3.400	15.000	<0.042
B-6, 10'-12'	2.158	0.300	<0.011	<0.011	<0.011	0.890	0.400	<0.011	0.048	<0.011	<0.011	0.520	<0.022
B-6, 20'-22'	0.315	0.075	<0.006	<0.006	<0.006	0.240	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.012
B-7, 5'-7'	35.309	0.330	0.050	1.100	0.480	26.000	3.900	<0.026	1.500	0.079	0.270	1.600	<0.053
B-7, 10'-12'	1.260	0.580	<0.007	<0.007	<0.007	0.680	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.015
B-7, 15'-17'	0.808	0.220	<0.009	<0.009	<0.009	0.120	<0.009	<0.009	<0.009	<0.009	0.068	0.400	<0.019
B-7, 20'-22'	0.130	0.130	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.014
B-8, 5'-7'	2.861	2.100	<0.008	0.022	0.040	0.160	0.490	<0.008	<0.008	<0.008	<0.008	<0.008	0.049
B-8, 15'-17'	0.320	0.130	0.011	<0.008	<0.008	0.029	0.150	<0.008	<0.008	<0.008	<0.008	<0.008	<0.016
B-8, 20'-22'	0.076	0.024	<0.005	<0.005	<0.005	<0.005	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	0.044
B-9, 5'-7'	0.518	0.500	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	0.018
B-9, 10'-12'	0.244	0.230	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	0.014
B-9, 20'-22'	0.770	0.770	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.018
B-10, 5'-7'	1.273	0.910	<0.009	<0.009	0.023	0.150	0.190	<0.009	<0.009	<0.009	<0.009	<0.009	<0.017
B-10, 15'-17'	1.335	1.200	<0.007	<0.007	0.013	0.029	0.075	<0.007	<0.007	<0.007	<0.007	<0.007	0.018
B-10, 20'-22'	0.269	0.230	<0.006	<0.006	<0.006	0.024	0.015	<0.006	<0.006	<0.006	<0.006	<0.006	<0.013
B-10, 30'-32'	0.190	0.170	<0.007	<0.007	<0.007	<0.007	0.020	<0.007	<0.007	<0.007	<0.007	<0.007	<0.014
B-10, 40'-42'	0.016	0.016	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.012
B-11, 5'-7'	0.077	0.028	<0.007	<0.007	<0.007	<0.007	0.010	<0.007	<0.007	<0.007	<0.007	<0.007	0.039
B-11, 15'-17'	0.059	0.052	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.011
B-11, 20'-22'	0.191	0.100	<0.005	<0.005	<0.005	<0.005	0.011	<0.005	<0.005	<0.005	<0.005	<0.005	0.080
B-12, 5'-7'	0.000	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.012
B-12, 10'-12'	0.000	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.010
B-12, 15'-17'	0.000	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.012
B-13, 5'-7'	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.010
B-13, 10'-12'	ND	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.011
B-13, 15'-17'	ND	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.011
B-13, 20'-22'	0.009	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.011

* All results in mg/kg except as noted. ND = Non Detectable

** Depths refer to depth below grade., Boring locations are indicated in Figure

TABLE 2-3
STANDARD MOTOR PRODUCTS, INC.
GROUNDWATER INORGANICS SAMPLE RESULTS SUMMARY

	ROUND ONE- 10/31/91				ROUND TWO - 2/18/92						NYSDEC CLASS GA WATER STANDARDS PART 700-705 (9/91)
PARAMETER	MW-1	MW-2	MW-3	MW-4	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	
Aluminum	165.0	9.2	21.6	103.0	39.3	5.1	18.4	37.0	10.2	6.7	NA
Antimony	0.073	<0.028	<0.028	<0.028	<0.0246	<0.0246	<0.0246	<0.0246	<0.0246	<0.0246	NA
Arsenic	0.032	<0.0023	<0.0023	<0.0023	<0.0023	0.003	<0.0023	0.007	<0.0023	<0.0023	0.025
Barium	1.320	0.310	0.435	1.170	0.275	0.329	0.267	0.369	0.111	0.105	1.000
Beryllium	0.013	0.001	0.002	0.008	0.003	0.002	0.002	0.004	0.002	<0.0009	NA
Cadmium	0.0660	0.0071	0.0119	0.0578	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0100
Calcium	122.0	125.0	93.5	150.0	48.6	105.0	55.3	118.0	105.0	47.0	NA
Chromium	0.740	0.040	0.080	0.140	0.113	0.018	0.053	0.117	0.028	0.016	0.050
Cobalt	0.165	0.016	0.024	0.165	0.037	0.007	0.017	0.053	0.012	0.008	NA
Copper	1.870	0.174	0.203	0.651	0.376	0.089	0.085	0.204	0.038	0.042	0.200
Iron	330.0	33.7	67.0	305.0	64.9	53.9	48.3	90.8	20.0	12.8	0.3
Lead	0.848	0.097	0.132	0.808	0.097	0.034	0.030	0.111	0.018	0.011	0.025
Magnesium	99.8	39.3	29.6	89.6	26.2	24.5	15.3	55.1	30.6	13.8	NA
Manganese	5.370	4.530	8.900	9.260	2.230	5.530	5.470	2.820	6.330	0.607	0.300
Mercury	0.0011	0.0002	0.0002	0.0016	<0.0002	0.0003	0.0003	0.0003	<0.0002	<0.0002	0.0020
Nickel	0.332	0.052	0.097	0.362	0.067	0.045	0.047	0.103	0.068	0.024	NA
Potassium	38.1	8.5	11.7	25.4	9.0	5.5	7.3	12.0	4.3	0.0	NA
Selenium	<0.018	<0.0018	<0.0018	<0.0018	0.002	<0.0023	<0.0023	<0.0023	<0.0023	0.006	0.010
Silver	<0.0022	0.005	<0.0022	<0.0022	0.002	<0.0012	<0.0012	<0.0012	<0.0012	45.700	0.050
Sodium	49.5	91.4	50.3	102.0	22.2	60.9	16.9	98.9	79.1	45.7	20.0
Thallium	<0.0007	<0.0007	<0.0007	<0.0007	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	NA
Vanadium	0.638	0.109	0.094	0.426	0.125	0.070	0.059	0.139	0.036	0.022	NA
Zinc	2.080	0.210	0.219	0.993	0.427	0.140	0.133	0.294	5.420	0.102	0.300
Cyanide	<0.010	<0.010	<0.010	<0.010	NA	NA	NA	NA	NA	NA	0.100

NOTES:

All results in ug/l except as noted.

B - Entered if the reported value is less than the Contract Required Detection Limit, but greater than the Instrument Detection Limit.

NR - Data not analyzed for or reported.

NA- Data not available.

TABLE 2-4
STANDARD MOTOR PRODUCTS, INC.
GROUNDWATER VOC SAMPLE RESULTS SUMMARY

Well ID	Methylene Chloride	1,1-Dichloro-ethene	1,1-Dichloro-ethane	C/T-1,2-Di-chloroethene	1,1,1-Tri-chloroethane	Carbon Tetrachloride	Trichloro-ethene	Benzene	Tetrachloro-ethylene	Toluene	Ethyl-benzene	Total Xylenes	Acetone
ROUND 1 - October 31, 1991													
MW-1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	<0.010	0.014	<0.010	<0.010	<0.010	<0.010
MW-2	<0.010	0.011	0.013	0.011	0.120	<0.010	0.012	0.044	<0.010	0.100	0.050	0.740	<0.010
MW-3	<0.010	0.007	0.083	<0.010	0.130	<0.010	<0.010	0.100	<0.010	0.120	0.610	2.600	<0.010
MW-4	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Field Blank	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Trip Blank	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
ROUND 2 - February 18, 1992													
MW-1	0.002	<0.005	<0.005	<0.005	0.030	<0.005	0.003	<0.005	<0.005	0.004	<0.005	<0.005	<0.010
MW-2	<0.005	0.009	0.018	<0.005	0.210	<0.005	<0.005	0.086	0.014	0.190	0.570	1.800	<0.010
MW-3	<0.005	0.014	0.041	<0.005	0.240	<0.005	0.003	0.120	0.035	0.330	0.290	1.700	<0.010
MW-4	0.002	0.004	0.006	0.030	<0.005	<0.005	0.002	<0.005	0.003	<0.005	0.002	<0.005	0.005
MW-5	0.002	<0.005	<0.005	0.003	<0.005	<0.005	0.023	<0.005	0.069	<0.005	<0.005	<0.005	<0.010
MW-6	0.002	<0.005	<0.005	0.002	0.007	<0.005	0.010	<0.005	0.017	<0.005	<0.005	<0.005	0.003
Field Blank	0.003	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.010
Trip Blank	0.003	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.010

NOTES:

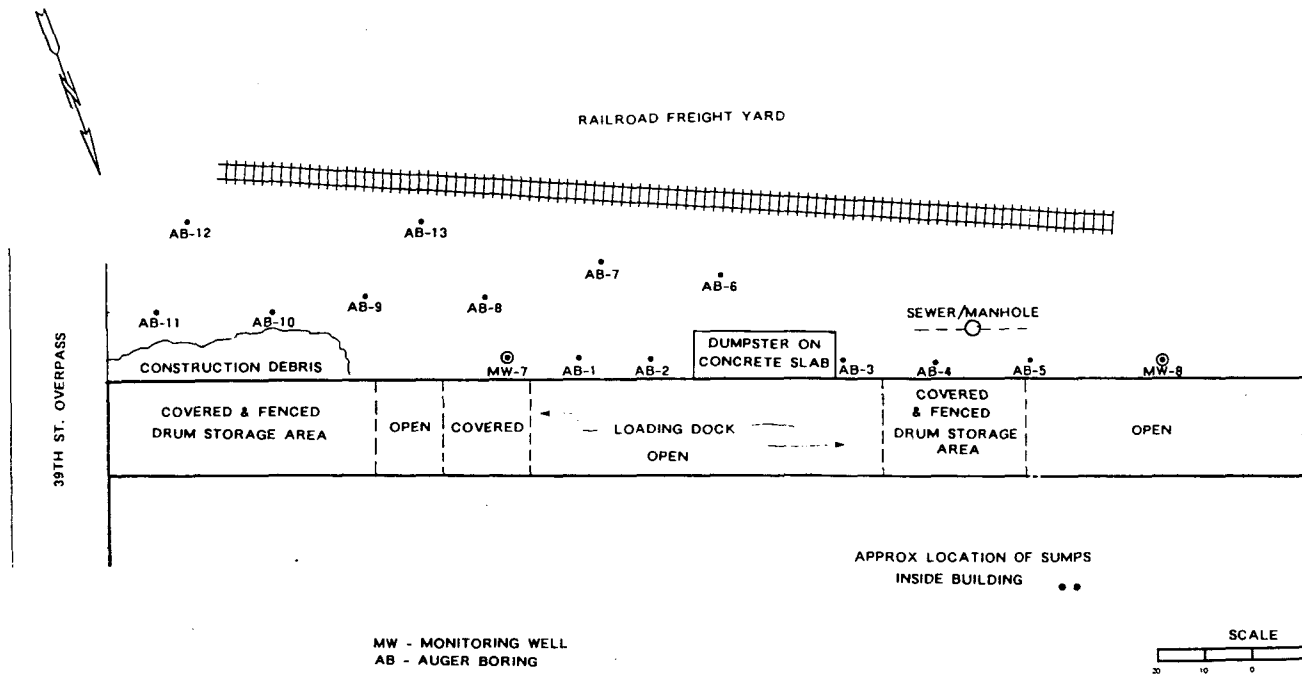
All results in mg/l except as noted.

Where necessary, samples were analyzed at a secondary dilution factor.

APPENDIX
C

Appendix C

Selected EnviroAudit Report Figures and Tables



SOURCE: "REMEDIAL INVESTIGATION REPORT STANDARD MOTOR PRODUCTS, INC." H2M GROUP - AUGUST 1992 & ENVIROAUDIT LTD SITE OBSERVATIONS & FIELD INVESTIGATION

ENVIROAUDIT LTD

STUDY AREA

37-18 NORTHERN BOULEVARD
LONG ISLAND CITY, N.Y.

PROJECT # 4-94-027 FIGURE 3

Table 1
Summary of Soil Analytical Results

Sample ID:	95-341	95-342	95-343	95-344	95-345	95-346	95-347	95-348	NYSDEC Standards
Sample Location / Depth (feet):	MW-7 / 0-2	MW-7 / 5-7	MW-7 / 10-12	Field Blank	AB-1 / 0-2	AB-1 / 5-7	AB-1 / 10-12	AB-2 / 0-2	
Sample Date	09/26/1995	09/26/1995	09/26/1995	09/26/1995	09/26/1995	09/26/1995	09/26/1995	09/26/1995	
PID Readings (ppm)	NA	39.1	824	NA	835	203	1,370	466	
Lead TCLP (mg/l)	0.062	ND	0.022	NA	0.222	ND	0.028	0.586	
TPH (ppm)	8,800	1,400	490	NA	66,000	5,700	6,700	94,000	
VOCs - EPA 8240 (ppb)									
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	320	ND	ND	7900
1,1-Dichloroethane	360*	1,800*	ND	ND	41,000*	ND	580*	640,000*	200
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	100
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	400
cis-1,2-Dichloroethene	ND	1,100*	ND	ND	34,000*	ND	ND	ND	300
Ethylbenzene	ND	ND	4,500	ND	1,900	ND	ND	ND	5500
Methylene Chloride	770*^	ND	3,500*^	ND	4,900*^	750*^	660*^	ND	100
MTBE	ND	ND	ND	ND	ND	ND	ND	ND	
Tetrachloroethene	ND	220*	ND	ND	34,000*	860	ND	ND	1400
1,1,1-Trichloroethane	2,400*	14,000*	1,500*	ND	1,600,000*	4,600*	ND	7,000,000*	760
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	
Trichloroethene	500*	6,400*	ND	ND	820,000*	3,600*	ND	510,000*	700
Trichloroflouromethane	ND	ND	ND	ND	ND	ND	ND	ND	
Xylenes	ND	ND	26,000*	ND	4,300*	ND	ND	ND	120
Total VOCs (ppb)	4,030	23,520*	35,500*	ND	2,540,100*	10,130*	1,240	8,150,000*	10,000
EPA METHOD 8015 (modified)									
TPH - GC (ppm)	NA	NA	NA	NA	NA	7100	7600	NA	
#4/#6 Fuel Oil (ppm)	NA	NA	NA	NA	NA	7100	7600	NA	

1. Only those compounds detected are listed in the above table
2. PID - Photo Ionization Detector
3. TPH - Total Petroleum Hydrocarbons
4. VOCs - Volatile Organic Compounds
5. ppb - parts per billion
6. ppm - parts per million
7. ND - not detected above the method dection limit
8. NA - Not analyzed
9. MTBE - Methyl tert Butyl Ether
10. TCLP - Toxicity Characteristic Leaching Procedure
11. ^ - dected in laboratory method blank
13. * - over NYSDEC Standards
12. J - estimated value

Table 1
Summary of Soil Analytical Results

Sample ID:	95-349	95-350	95-351	95-352	95-353	95-354	95-355	95-356	NYSDEC Standards
Sample Location / Depth (feet):	AB-2 / 10-12	AB-3 / 0-2	AB-3 / 5-7	AB-3 / 10-12	MW-8 / 0-2	MW-8 / 5-7	MW-8 / 10-12	AB-5 / 0-2	
Sample Date	09/26/1995	09/26/1995	09/26/1995	09/26/1995	09/26/1995	09/26/1995	09/26/1995	09/26/1995	
PID Readings (ppm)	978	18.2	14.6	18.6	102	15.3	7.6	15.3.	
Lead TCLP (mg/l)	ND	0.624	ND	0.158	0.218	0.117	0.053	0.158	
TPH (ppm)	6,800	2,300	72	93	1,500	17	25	1,800	
VOCs - EPA 8240 (ppb)									
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	7900
1,1-Dichloroethane	910*	250*	ND	ND	ND	ND	ND	ND	200
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	100
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	400
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	300
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	5500
Methylene Chloride	720*^	ND	ND	ND	120*^	ND	7^	ND	100
MTBE	ND	ND	ND	ND	ND	ND	ND	ND	
Tetrachloroethene	ND	96	ND	ND	ND	ND	ND	320	1400
1,1,1-Trichloroethane	7,000*	3,500*	ND	ND	300	ND	ND	930*	760
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	
Trichloroethene	ND	1,100*	ND	ND	68	ND	ND	990*	700
Trichloroflouromethane	ND	ND	ND	ND	ND	ND	ND	ND	
Xylenes	810*	66	ND	ND	ND	ND	ND	ND	120
Total VOCs (ppb)	9,440	5,012	ND	ND	488	ND	7	2,240	10,000
EPA METHOD 8015 (modified)									
TPH - GC (ppm)	NA	NA	NA	NA	NA	NA	NA	NA	
#4/#6 Fuel Oil (ppm)	NA	NA	NA	NA	NA	NA	NA	NA	

1. Only those compounds detected are listed in the above table
2. PID - Photo Ionization Detector
3. TPH - Total Petroleum Hydrocarbons
4. VOCs - Volatile Organic Compounds
5. ppb - parts per billion
6. ppm - parts per million
7. ND - not detected above the method dection limit
8. NA - Not analyzed
9. MTBE - Methyl tert Butyl Ether
10. TCLP - Toxicity Characteristic Leaching Procedure
11. ^ - dected in laboratory method blank
13. * - over NYSDEC Standards
12. J - estimated value

Table 1
Summary of Soil Analytical Results

Sample ID:	95-357	95-358	95-359	95-360	95-361	95-362	95-363	95-364	NYSDEC Standards
Sample Location / Depth (feet):	AB-5 / 5-7	AB-5 / 10-12	AB-4 / 0-2	AB-4 / 5-7	AB-4 / 10-12	Trip Blank	AB-6 / 0-2	AB-6 / 5-7	
Sample Date	09/26/1995	09/26/1995	09/26/1995	09/26/1995	09/26/1995	09/26/1995	09/27/1995	09/27/1995	
PID Readings	ND	12.2	15	24.5	17.8	NA	22	15.7	
Lead TCLP (mg/l)	ND	ND	0.115	ND	ND	NA	0.012	ND	
TPH (ppm)	31	13	3,500	13	78	NA	57	10	
VOCs - EPA 8240 (ppb)									
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	7900
1,1-Dichloroethane	ND	8	170	44	18	ND	ND	ND	200
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	100
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	400
cis-1,2-Dichloroethene	ND	ND	ND	16	18	ND	ND	ND	300
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	5500
Methylene Chloride	ND	10^	140*^	8	10	ND	ND	ND	100
MTBE	ND	ND	ND	ND	ND	ND	ND	13	
Tetrachloroethene	ND	ND	100	ND	ND	ND	ND	ND	1400
1,1,1-Trichloroethane	ND	19	1,200*	92	180	ND	6,300*	ND	760
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	
Trichloroethene	ND	10	470	13	82	ND	23,000*	ND	700
Trichloroflouromethane	ND	ND	ND	ND	ND	ND	ND	ND	
Xylenes	ND	ND	ND	ND	ND	ND	ND	ND	120
Total VOCs (ppb)	ND	47	2,080	173	308	ND	29,300*	13	10,000
EPA METHOD 8015 (modified)									
TPH - GC (ppm)	NA	NA	NA	NA	NA	NA	NA	NA	
#4/#6 Fuel Oil (ppm)	NA	NA	NA	NA	NA	NA	NA	NA	

1. Only those compounds detected are listed in the above table
2. PID - Photo Ionization Detector
3. TPH - Total Petroleum Hydrocarbons
4. VOCs - Volatile Organic Compounds
5. ppb - parts per billion
6. ppm - parts per million
7. ND - not detected above the method dection limit
8. NA - Not analyzed
9. MTBE - Methyl tert Butyl Ether
10. TCLP - Toxicity Characteristic Leaching Procedure
11. ^ - dected in laboratory method blank
13. * - over NYSDEC Standards
12. J - estimated value

Table 1
Summary of Soil Analytical Results

Sample ID:	95-365	95-366	95-367	95-368	95-369	95-370	95-371	95-372	NYSDEC Standards
Sample Location / Depth (feet):	AB-6 / 10-12	AB-7 / 0-2	AB-7 / 5-7	AB-7 / 10-12	AB-8 / 0-2	AB-8 / 5-7	AB-8 / 10-12	AB-9 / 0-2	
Sample Date	09/27/1995	09/27/1995	09/27/1995	09/27/1995	09/27/1995	09/27/1995	09/27/1995	09/27/1995	
PID Readings (ppm)	9.2	90.4	23.3	16.8	300	60.1	20.7	26.8	
Lead TCLP (mg/l)	0.013	0.145	ND	ND	0.021	ND	ND	0.043	
TPH (ppm)	15	3,500	24	9	15,000	29	200	2,600	
VOCs - EPA 8240 (ppb)									
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	7900
1,1-Dichloroethane	ND	1,100*	ND	ND	2,500*	ND	ND	1,600*	200
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	100
1,1-Dichloroethene	ND	ND	ND	ND	1,100*	ND	ND	350	400
cis-1,2-Dichloroethene	ND	ND	ND	ND	1,700*	ND	ND	ND	300
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	5500
Methylene Chloride	ND	1,100*^	ND	ND	650*^	ND	ND	510*^	100
MTBE	ND	ND	18	ND	ND	6	ND	ND	
Tetrachloroethene	ND	1,400*	ND	ND	ND	ND	ND	ND	1400
1,1,1-Trichloroethane	ND	9,500*	ND	ND	140,000*	ND	86	20,000*	760
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	
Trichloroethene	ND	38,000*	ND	ND	120,000*	ND	95	2,500*	700
Trichloroflouromethane	ND	ND	ND	ND	ND	ND	ND	ND	
Xylenes	ND	ND	ND	ND	ND	ND	ND	ND	120
Total VOCs (ppb)	ND	51,000*	18	ND	265,950*	6	181	24,960*	10,000
EPA METHOD 8015 (modified)									
TPH - GC (ppm)	NA	NA	NA	NA	NA	NA	NA	NA	
#4/#6 Fuel Oil (ppm)	NA	NA	NA	NA	NA	NA	NA	NA	

1. Only those compounds detected are listed in the above table
2. PID - Photo Ionization Detector
3. TPH - Total Petroleum Hydrocarbons
4. VOCs - Volatile Organic Compounds
5. ppb - parts per billion
6. ppm - parts per million
7. ND - not detected above the method dection limit
8. NA - Not analyzed
9. MTBE - Methyl tert Butyl Ether
10. TCLP - Toxicity Characteristic Leaching Procedure
11. ^ - dected in laboratory method blank
13. * - over NYSDEC Standards
12. J - estimated value

Table 1
Summary of Soil Analytical Results

Sample ID:	95-373	95-374	95-375	95-376	95-377	95-378	95-379	95-380	NYSDEC Standards
Sample Location / Depth (feet):	AB-9 / 5-7	AB-9 / 10-12	Field Blank	AB-10 / 0-2	AB-10 / 5-7	AB-10 / 10-12	AB-11 / 0-2	AB-11 / 5-7	
Sample Date	09/27/1995	09/27/1995	09/27/1995	09/27/1995	09/27/1995	09/27/1995	09/27/1995	09/27/1995	
PID Readings	26.8	25.5	19.4	9.7	24.5	65	21.4	27.7	
Lead TCLP (mg/l)	ND	0.014	NA	0.127	ND	ND	0.015	ND	
TPH (ppm)	13	30	NA	2,800	99	21	7,500	43	
VOCs - EPA 8240 (ppb)									
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	280	ND	7900
1,1-Dichloroethane	ND	ND	ND	1,600*	ND	ND	6,200*	ND	200
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	310	ND	100
1,1-Dichloroethene	ND	ND	ND	240	ND	ND	930*	ND	400
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	290	ND	300
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	5500
Methylene Chloride	7	ND	7^	620*	ND	ND	3,200*	ND	100
MTBE	8	7	ND	ND	160	30	ND	78	
Tetrachloroethene	ND	ND	ND	760	ND	ND	2,300*	ND	1400
1,1,1-Trichloroethane	ND	ND	ND	13,000*	ND	ND	39,000*	ND	760
1,1,2-Trichloroethane	ND	ND	ND	190	ND	ND	840	ND	
Trichloroethene	ND	ND	ND	5,300*	ND	ND	10,000*	ND	700
Trichloroflouromethane	ND	ND	ND	ND	ND	ND	890	ND	
Xylenes	ND	ND	ND	ND	ND	ND	790*	ND	120
Total VOCs (ppb)	15	7	7	21,710*	160	30	65,030*	78	10,000
EPA METHOD 8015 (modified)									
TPH - GC (ppm)	NA	NA	NA	NA	NA	25	NA	NA	
#4/#6 Fuel Oil (ppm)	NA	NA	NA	NA	NA	25	NA	NA	

1. Only those compounds detected are listed in the above table
2. PID - Photo Ionization Detector
3. TPH - Total Petroleum Hydrocarbons
4. VOCs - Volatile Organic Compounds
5. ppb - parts per billion
6. ppm - parts per million
7. ND - not detected above the method dection limit
8. NA - Not analyzed
9. MTBE - Methyl tert Butyl Ether
10. TCLP - Toxicity Characteristic Leaching Procedure
11. ^ - dected in laboratory method blank
13. * - over NYSDEC Standards
12. J - estimated value

Table 1
Summary of Soil Analytical Results

Sample ID:	95-381	95-382	95-383	95-384	95-385	95-386	95-387	95-388	NYSDEC Standards
Sample Location / Depth (feet):	AB-11 / 10-12	AB-12 / 0-2	AB-12 / 5-7	AB-12 / 10-12	AB-13 / 0-2	AB-13 / 5-7	AB-13 / 10-12	Trip Blank	
Sample Date	09/27/1995	09/27/1995	09/27/1995	09/27/1995	09/27/1995	09/27/1995	09/27/1995	09/27/1995	
PID Readings (ppm)	24.7	35.1	33.1	43.7	31.1	30.6	25.1	NA	
Lead TCLP (mg/l)	ND	0.105	ND	ND	0.09	ND	ND	NA	
TPH (ppm)	7	5,900	15	68	420	120	15	NA	
VOCs - EPA 8240 (ppb)									
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	7900
1,1-Dichloroethane	ND	2,200*	ND	ND	1,300*	ND	ND	ND	200
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	100
1,1-Dichloroethene	ND	ND	ND	ND	300	ND	ND	ND	400
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	300
Ethylbenzene	ND	ND	12	ND	ND	ND	ND	ND	5500
Methylene Chloride	37^	870*	ND	58^	930*	10^	8^	7^	100
MTBE	ND	ND	ND	94	ND	ND	ND	ND	
Tetrachloroethene	ND	ND	ND	ND	1,000	ND	ND	ND	1400
1,1,1-Trichloroethane	ND	3,700*	ND	ND	14,000j*	ND	ND	ND	760
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	
Trichloroethene	ND	1,300*	ND	ND	4,700*	ND	ND	ND	700
Trichloroflouromethane	ND	ND	ND	ND	ND	ND	ND	ND	
Xylenes	ND	ND	38	53	ND	ND	ND	ND	120
Total VOCs (ppb)	37	8,070	50	205	22,230*	10	8	7	10,000
EPA METHOD 8015 (modified)									
TPH - GC (ppm)	NA	NA	NA	NA	NA	NA	NA	NA	
#4/#6 Fuel Oil (ppm)	NA	NA	NA	NA	NA	NA	NA	NA	

1. Only those compounds detected are listed in the above table
2. PID - Photo Ionization Detector
3. TPH - Total Petroleum Hydrocarbons
4. VOCs - Volitale Organic Compounds
5. ppb - parts per billion
6. ppm - parts per million
7. ND - not detected above the method dection limit
8. NA - Not analyzed
9. MTBE - Methyl tert Butyl Ether
10. TCLP - Toxicity Characteristic Leaching Procedure
11. ^ - dected in laboratory method blank
13. * - over NYSDEC Standards
12. J - estimated value

Table 2
Summary of Groundwater Analytical Results

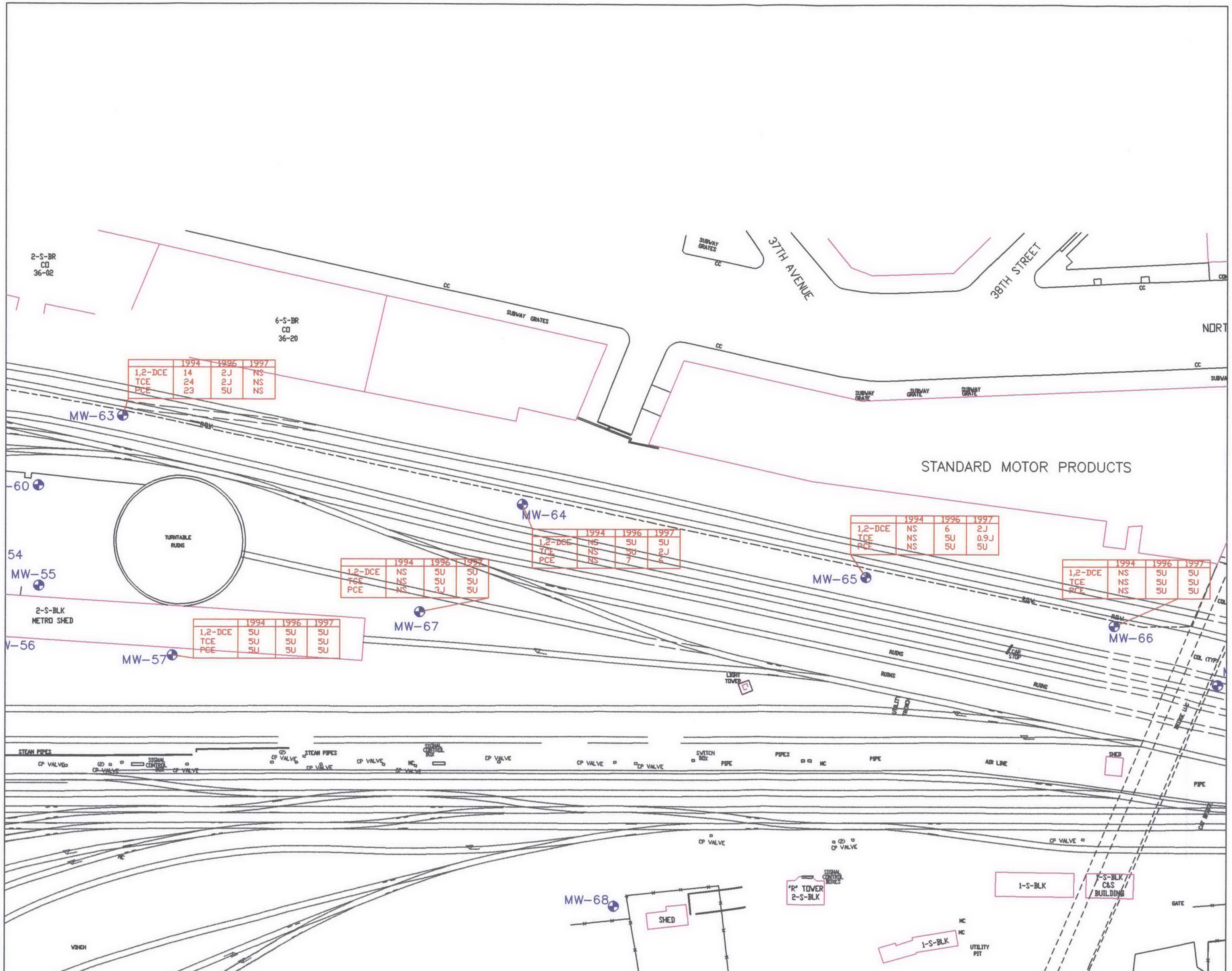
Sample ID.	95-389	95-390	95-392	95-393	95-394	95-395	95-396	NYSDEC Standards
Sample Location	Trip Blank	Field Blank	MW-6	MW-7	MW-8	Shallow Sump	Deep Sump	
Sample Date	10/11/95	10/11/95	10/11/95	10/11/95	10/11/95	10/11/95	10/11/95	
TPH (ppm)	NA	NA	ND	4.2	ND	ND	ND	
Inorganic Analysis (ppm)								
Iron	NA	NA	0.16	18	0.12	0.56	ND	300
Lead	NA	NA	ND	ND	ND	ND	ND	25
Magnesium	NA	NA	16.2	13.2	11.2	33.4	31.6	35,000
Calcium	NA	NA	79.3	80.9	69.0	97.0	88.3	Not listed
Hardness as CaCO3	NA	NA	215	256	218	379	350	Not listed
VOCs - EPA 8240 (ppb)								
Benzene	ND	ND	ND	ND	ND	7*	ND	0.7
Chloroethane	ND	ND	ND	ND	ND	17*	ND	5
1,1-Dichloroethane	ND	ND	ND	6,800*	ND	26*	ND	5
cis-1,2-Dichloroethene	ND	ND	ND	1,200*	ND	14*	ND	5
MTBE	ND	ND	9	380*	53*	37*	ND	50
Tetrachloroethene	ND	ND	65*	ND	ND	ND	ND	5
1,1,1-Trichloroethane	ND	ND	ND	4,700*	ND	24*	ND	5
Trichloroethene	ND	ND	11*	810*	ND	8*	ND	5
Vinyl Chloride	ND	ND	ND	ND	ND	3*	ND	2
Xylenes	ND	ND	ND	350*	ND	7*	ND	5
Total VOCs (ppb)	ND	ND	85	14,240	53	143	ND	

1. Only those compounds detected are listed in the above table
2. PID - Photo Ionization Detector
3. TPH - Total Petroleum Hydrocarbons
4. VOCs - Volatile Organic Compounds
5. ppm - parts per million
6. ppb - parts per billion
7. ND - not detected above the method dection limit
8. Not analyzed
9. MTBE - Methyl tert Butyl Ether
10. TCLP - Toxicity Characteristic Leaching Procedure
11. ^ - dected in laboratory method blank
12. J - estimated value
13. * - over NYSDEC Standards

APPENDIX
D

Appendix D

Selected Amtrak Sunnyside Yard Groundwater Analytical Results



◆	MONITORING WELL
NS	NOT SAMPLED
U	UNDETECTED
J	DETECTED BELLOW DETECTION LIMIT
1,2-DCE	1,2 -DICHLOROETHENE
TCE	TRICHLOROETHENE
PCE	TETRACHLOROETHENE

NOTE: ALL CONCENTRATIONS IN UG/L

40 0 40 80
SCALE OF FEET

REV. NO.	DATE	DESCRIPTION OF REVISION	REV. BY	ENG	CHK'D BY	APPV'D BY
PROJECT MANAGER:		M. WATT	DRAWN BY:	J.R.D.		DATE: 5/21/00

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE D-1
OFF-SITE GROUNDWATER SAMPLING RESULTS
AMTRAK SUNNYSIDE YARD

REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORKPLAN
Prepared For:
STANDARD MOTOR PRODUCTS
JUNE 1998

PROJECT NO.	FILE NO.	CHK'D: / ENG. / APPVD.	DRAWING NUMBER	REV. NO.
775699	B2		775699-B2	

775699-B2.dwg 08/22/00 11:36am J.R.D.

APPENDIX
E

Appendix E

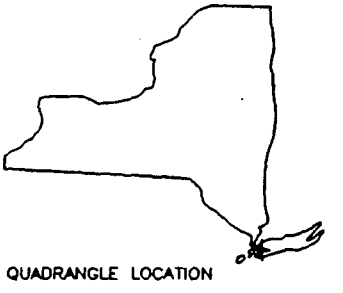
Selected Merit "Northern" Station
Site Investigation Report
Figures and Tables

GES GROUNDWATER & ENVIRONMENTAL SERVICES, INC.

SOURCE: USGS 7.5 MINUTE SERIES
TOPOGRAPHIC QUADRANGLE 1979
CENTRAL PARK, N.Y. – N.J.
CONTOUR INTERVAL = 10 feet

NORTH

0 2,000
FEET



QUADRANGLE LOCATION

FIGURE 1
SITE LOCATION MAP
MERIT GASOLINE STATION
3904 NORTHERN BOULEVARD
LONG ISLAND CITY, NEW YORK

GROUNDWATER & ENVIRONMENTAL SERVICES, INC.

NORTHERN BOULEVARD

39th STREET

MW1

MW2

MW3

MW4

CANOPY

CAR WASH

STORAGE BUILDING

MANAGERS OFFICE

FORMER GASOLINE UNDERGROUND STORAGE TANK AREA

FORMER. FUEL OIL TANK AREA

EXISTING 5' HIGH METAL FENCE

LEGEND

- FENCE
- DISPENSER ISLAND
- MONITORING WELL
- 600 GALLON WASTE WATER DOUBLE WALL FIBERGLASS UNDERGROUND STORAGE TANK
- 4,000 GALLON GASOLINE DOUBLE WALL FIBERGLASS UNDERGROUND STORAGE TANK

SITE PLAN

MERIT OIL OF NEW YORK, INC.
3904 NORTHERN BOULEVARD
LONG ISLAND CITY, QUEENS, NEW YORK

NORTH	SCALE IN FEET 0 15 30	DATE 5-1-98	SOURCE B
		DWG # RS0024	FIGURE 2

GROUNDWATER & ENVIRONMENTAL SERVICES, INC.

NORTHERN BOULEVARD

39th STREET

MW1
BTEX 176,660 ppb
MTBE 5,880 ppb
GRO 215 ppm

MW2
BTEX 3,042.8 ppb
MTBE ND
GRO 41.1 ppm

MW3
BTEX 80,900 ppb
MTBE 64.1 ppb
GRO 107 ppm

MW4
BTEX 6.052 ppb
MTBE ND
GRO 9.54 ppm

CANOPY
KIOSK
GASOLINE UNDERGROUND STORAGE TANK AREA
FORMER GASOLINE UNDERGROUND STORAGE TANK AREA
CAR WASH
BUILDING
FORMER. FUEL OIL TANK AREA
EXISTING 5' HIGH METAL FENCE

LEGEND

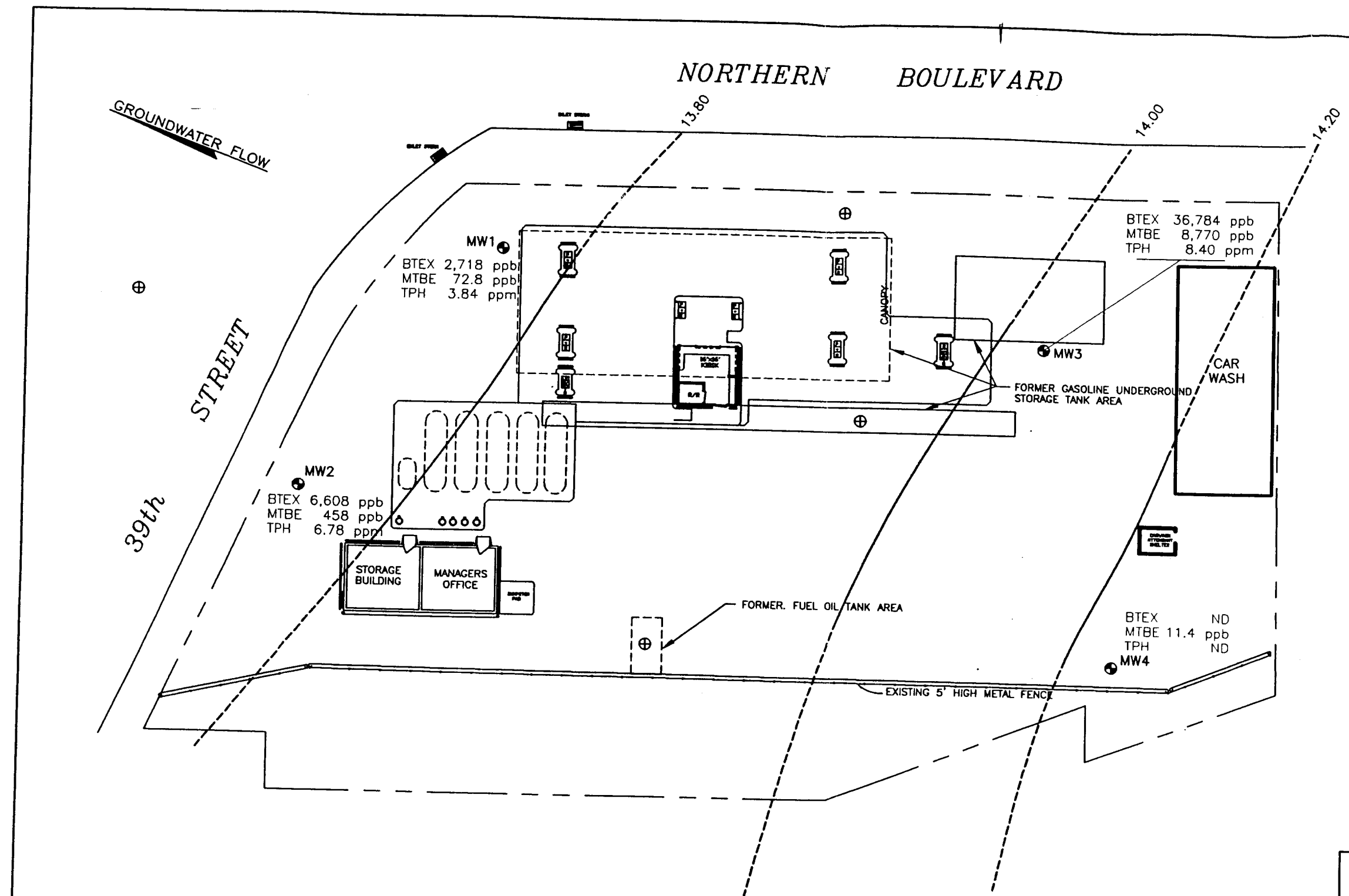
— · —	FENCE
⊕	MONITORING WELL
BTEX	BENZENE, TOLUENE, ETHYLBENZENE, XYLENES
MTBE	METHYL *tert*–BUTYL ETHER
ppb	PARTS PER BILLION
ND	NOT DETECTED
GRO	GASOLINE RANGE ORGANICS
ppm	PARTS PER MILLION

SOIL SAMPLING PLAN
JANUARY – FEBRUARY 1996

MERIT OIL OF NEW YORK, INC.
3904 NORTHERN BOULEVARD
LONG ISLAND CITY, QUEENS, NEW YORK

NORTH	SCALE IN FEET 0 15 30	DATE 2-19-98	SOURCE B
		DWG RS[illegible]024	FIGURE 4

GROUNDWATER & ENVIRONMENTAL SERVICES, INC.



LEGEND

———	FENCE
	DISPENSER ISLAND
⊕	MONITORING WELL
	600 GALLON WASTE WATER DOUBLE WALL FIBERGLASS UNDERGROUND STORAGE TANK
	4,000 GALLON GASOLINE DOUBLE WALL FIBERGLASS UNDERGROUND STORAGE TANK
⊕	PROPOSED MONITORING WELL
BTEX	BENZENE, TOLUENE, ETHYLBENZENE, XYLENES
MTBE	METHYL tert-BUTYL ETHER
ppb	PARTS PER BILLION
ND	NOT DETECTED
GW EL	GROUNDWATER ELEVATION (feet)
TPH	TOTAL PETROLEUM HYDROCARBONS
ppm	PARTS PER MILLION

MW	GW EL
1	13.78
2	13.76
3	14.01
4	14.21

NOTE:

GROUNDWATER ELEVATION CONTOURS IN FEET

SITE INFORMATION PLAN
13 MARCH 1996

MERIT GASOLINE STATION
3904 NORTHERN BOULEVARD
LONG ISLAND CITY, QUEENS, NEW YORK

NORTH

SCALE IN FEET
0 15 30

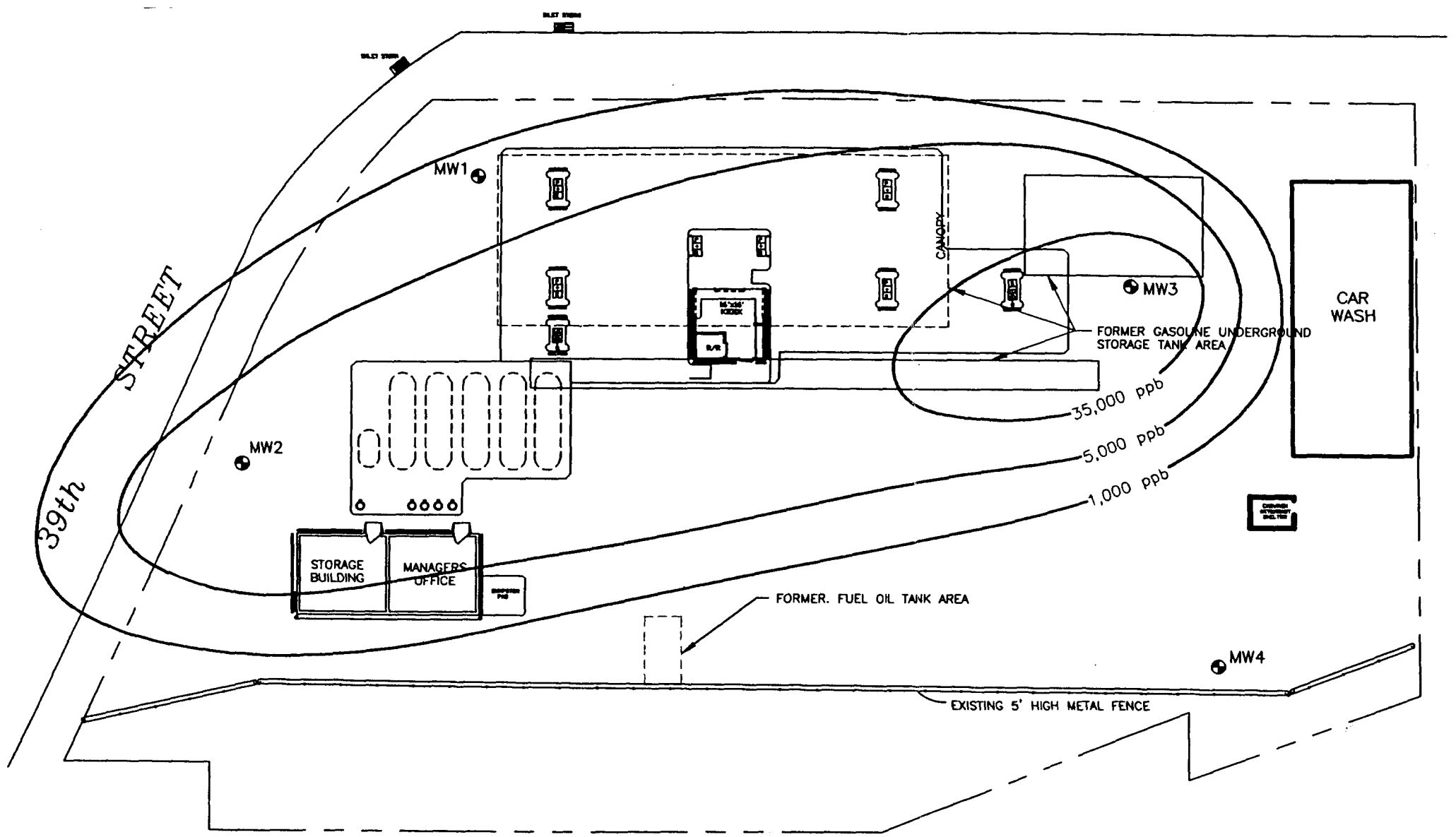
DATE 2-1[illegible]-98

SOURCE B

DWG # RS0024

FIGURE 5

GROUNDWATER & ENVIRONMENTAL SERVICES, INC.



LEGEND

- FENCE
- DISPENSER ISLAND
- MONITORING WELL
- 600 GALLON WASTE WATER DOUBLE WALL FIBERGLASS UNDERGROUND STORAGE TANK
- 4,000 GALLON GASOLINE DOUBLE WALL FIBERGLASS UNDERGROUND STORAGE TANK
- BTEX — BENZENE, TOLUENE, ETHYLBENZENE, XYLENES
- ppb — PARTS PER BILLION
- ND — NOT DETECTED

MW	BTEX (ppb)
1	2,718
2	6,608
3	36,784
4	ND

NOTE:

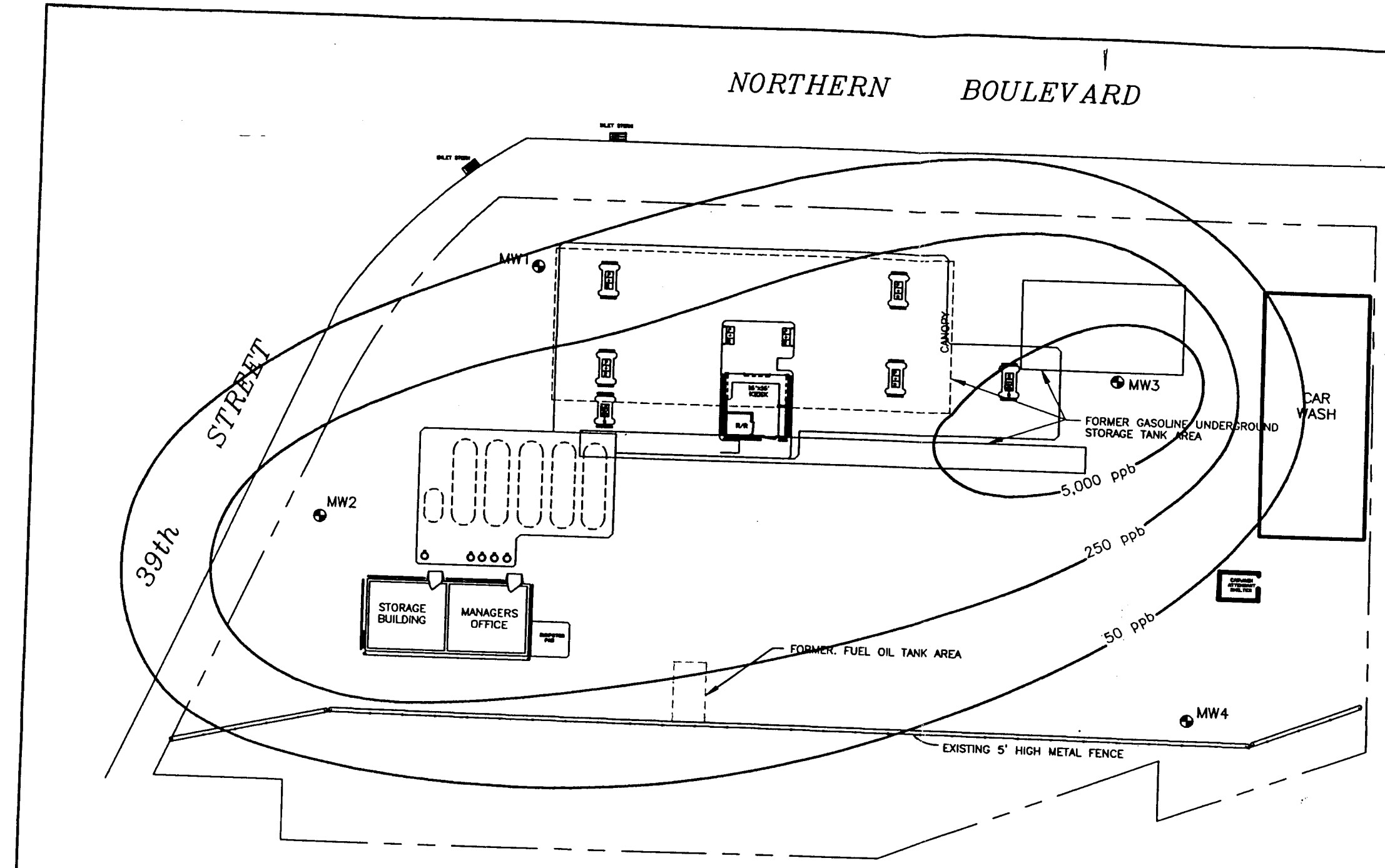
THIS MAP USES A STAGGERED CONTOUR INTERVAL.

BTEX PLUME MAP
13 MARCH 1996

MERIT OIL OF NEW YORK, INC.
3904 NORTHERN BOULEVARD
LONG ISLAND CITY, QUEENS, NEW YORK

NORTH	SCALE IN FEET	DATE	SOURCE
	0 15 30	2-19-98	B
		DWG # RS0024	FIGURE 6

GROUNDWATER & ENVIRONMENTAL SERVICES, INC.



LEGEND

- FENCE
- DISPENSER ISLAND
- MONITORING WELL
- 600 GALLON WASTE WATER DOUBLE WALL FIBERGLASS UNDERGROUND STORAGE TANK
- 4,000 GALLON GASOLINE DOUBLE WALL FIBERGLASS UNDERGROUND STORAGE TANK
- MTBE — METHYL *tert*–BUTYL ETHER (ppb)
- ppb — PARTS PER BILLION
- ND — NOT DETECTED

MW	MTBE (ppb)
1	72.8
2	458
3	8,770
4	11.4

NOTE:

THIS MAP USES A STAGGERED CONTOUR INTERVAL.

MTBE PLUME MAP
13 MARCH 1996

MERIT OIL OF NEW YORK, INC.
3904 NORTHERN BOULEVARD
LONG ISLAND CITY, QUEENS, NEW YORK

NORTH

SCALE IN FEET

0 15 30

DATE 2-19-98

SOURCE B

DWG # RS0024

FIGURE 7

Table 1
Summary of Soil Sampling Analytical Results
Merit Northern
3904 Northern Boulevard
Long Island City, New York

Analysis by Methods EPA 8020 (modified to include MTBE) and API REV 5

All results in parts per billion unless otherwise noted

Sample #	Date	Depth (Feet)	PID (ppm)	Benzene	Toluene	Ethyl-benzene	Total Xylenes
Boring #1 (MW-1)	1/31/96	22-24	200	**4,060**	**27,600**	**30,000**	**115,000**
MW-2	2/22/96	22-25	188	ND	73.8	**369**	**2,600**
MW-3	2/23/96	18-20	280	ND	**1,600**	**12,300**	**67,000**
MW-4	2/23/96	18-20	1.2	ND	ND	0.892	5.16
NYSAGV				**14**	**100**	**100**	**100**

Sample #	Date	Depth (Feet)	PID (ppm)	BTEX	MTBE	GRO (ppm)
Boring #1 (MW-1)	1/31/96	22-24	200	176,660	**5,880**	215
MW-2	2/22/96	22-25	188	3,042.80	ND	41.1
MW-3	2/23/96	18-20	280	80,900	64.1	107
MW-4	2/23/96	18-20	1.2	6.052	ND	9.54
NYSAGV				**nvg**	**1000**	**nvg**

NYSAGV=New York State
Alternative Guidance Values
Concentrations exceeding Alternative Guidance Values are in bold type
MTBE=Methyl Tert Butyl Ether
ND=Not detected
GRO=Gasoline Range Organics
ppm=parts per million
nvg=no value given

Table 2
Summary of Groundwater Monitoring Data
Merit Northern
3904 Northern Boulevard
Long Island City, New York

All measurements are in feet

Well #	Date	Casing Elevation	Depth to Water	Depth to LPH	Groundwater Elevation
MW-1	3/13/96	31.79	18.01	*	13.78
MW-2	3/13/96	32.88	19.12	*	13.76
MW-3	3/13/96	31.61	17.60	*	14.01
MW-4	3/13/96	32.12	17.91	*	14.21

LPH= Liquid Phase Hydrocarbons
*= LPH not detected by monitoring

Table 3
Summary of Groundwater Sampling Analytical Results
Merit Northern
3904 Northern Boulevard
Long Island City, New York

Analysis by EPA Method 602 (modified to include MTBE) and NJDEPE 418.1

All results in parts per billion unless otherwise noted

Well #	Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Total BTEX	MTBE	TPH (ppm)
MW-1	3/13/96	**249**	**635**	**304**	**1,530**	2,718	**72.8**	3.84
MW-2	3/13/96	**1,110**	**348**	**2,370**	**2,780**	6,608	**458**	6.78
MW-3	3/13/96	**434**	**11,600**	**4,250**	**20,500**	36,784	**8,770**	8.4
MW-4	3/13/96	ND	ND	ND	ND	ND	11.4	ND
NYSWQR		**0.7**	**5**	**5**	**5***	**nvg**	**50**	**nvg**

NYSWQR=New York State Water Quality Regulations
MTBE=Methyl Tert Butyl Ether
ND=Not detected
TPH=Total Petroleum Hydrocarbons
ppm=parts per million
nvg=no value given
*=for each isomer

Concentrations exceeding NYSWQR standards are in bold type

IT CORPORATION
A Member of The IT Group

Sampling and Analysis Plan
For
Remedial Investigation/Feasibility Study
Standard Motor Products Site

Site Code 2-43-014
37-18 Northern Boulevard
Long Island City, New York 11101

Revision 0

DRAFT

Prepared by:
IT Corporation
2200 Cottontail Lane
Somerset, NJ 08873

Prepared for:
Standard Motor Products, Inc.
37-18 Northern Boulevard
Long Island City, New York 11101

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
One Hunter's Point Plaza
47-40 21st Street
Long Island City, New York 11101

August 25, 2000

IT Project 775699

Table of Contents

IT CORPORATION
A Member of The IT Group

Field Sampling Plan
For
Remedial Investigation/Feasibility Study
Standard Motor Products Site

Site Code 2-43-014
37-18 Northern Boulevard
Long Island City, New York 11101

Revision 0

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August 25, 2000

IT Project 775699

Table of Contents

List of Figures

List of Appendix

List of Acronyms

AALA	American Association for Laboratory Accreditation
ASCII	American Standard Code Information Interchange
ASTM	American Society for Testing and Materials
°C	degrees Celsius
CAR	Corrective Action Report
CCB	continuing calibration blank
CCV	continuing calibration verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CF	calibration factor
CFR	Code of Federal Regulation
CIH	Certified Industrial Hygienist
CL	control limit
CLEAN	Comprehensive Long-Term Environmental Action
CLP	Contract Laboratory Program
COC	chain of custody
CVAAS	cold vapor atomic absorption spectroscopy
DOT	Department of Transportation
DQI	data quality indicator
DQO	data quality objective
DUSR	data usability summary report
EDD	electronic data deliverable
EDV	Environmental Data Validation, Inc.
EICP	extracted ion current profile
ELAP	Environmental Laboratory Approval Program
EPA	Environmental Protection Agency
FADL	Field Activity Daily Log
FS	Feasibility Study
FSP	Field Sampling Plan
g	gram
GC/MS	gas chromatography/mass spectroscopy

HCl	hydrochloric acid
HPLC	high-performance liquid chromatography
ICB	initial calibration blank
ICP	inductively coupled plasma
ICPAES	Inductively Coupled Plasma Atomic Emission Spectroscopy
ICPOES	Inductively Coupled Plasma Optical Emission Spectroscopy
ICS	interference check standard
ICV	initial calibration verification
ID	identification
IT	IT Corporation
LCL	lower control limit
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL	milliliter
MS	matrix spike
MSD	matrix spike duplicate
NA	not applicable
NCR	Nonconformance Report
NEESA	Naval Energy and Environmental Activity
NIST	National Institute of Standards and Technology
NIOSH	National Institute of Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List (Superfund)
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OSHA	Occupational Safety and Health Administration
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act

RF	response factor
RI	Remedial Investigation
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
SAP	Sampling and Analysis Plan
SI	Site Investigation
SMP	Standard Motor Products, Inc.
SOP	standard operating procedure
TCLP	Toxicity Characteristic Leachate Procedure
UCL	upper control limit
WP	work plan
µg/kg	microgram(s) per kilogram
µg/L	microgram(s) per liter
µg/mL	microgram(s) per milliliter
µL	microliter(s)

1.0 Introduction

IT Corporation (IT) is submitting this Field Sampling Plan (FSP) as part of the Sampling and Analysis Plan (SAP) in accordance with the March 30, 1998 Order on Consent between the New York State Department of Environmental Conservation (NYSDEC) and Standard Motor Products, Inc. (SMP). This Order on Consent stipulates requirements for the development and implementation of a Remedial Investigation/Feasibility Study (RI/FS) for the SMP site.

The FSP defines the procedures to be followed during the field investigation activities. Specifically, the FSP addresses:

- Data Quality Objectives;
- Responsibilities of Site Personnel;
- Number, Location, and Types of Samples;
- Sample Container Requirements and Holding Times;
- Sample Packaging and Shipping;
- Sample Documentation;
- Standard Operating Procedures (SOP) for Field Sampling, Monitoring, and Field Instrument Calibration;
- Actual Field Investigation and Sampling Activities; and
- Decontamination.

The following sections describe the site location, site description and history and summarizes the project objectives.

1.1 Site Location

The SMP site is located at 37-18 Northern Boulevard in Long Island City, New York. The site is owned and operated by SMP and is located in an urban and industrial area. A Site Plan is included as Figure 1-1. The property is approximately rectangular in shape and occupies more than 1 acre of land. The site property contains a large, six-story, industrial building with approximately 42,000 square feet per floor. The building occupies most of the site and SMP is the only occupant of the building. SMP manufactures car parts at this facility and it is the SMP corporate headquarters.

Bordering the site is Northern Boulevard to the north; Sunnyside Freight Railroad Yard to the south; 39th Street, an automobile dealership and a Merit gasoline station to the east; and commercial and industrial properties to the west. Various industrial, commercial, and residential properties are located across from SMP on Northern Boulevard. A narrow strip of land on the south side of the property contains a loading dock and a dirt access path for vehicles. This strip of land is owned by the Metropolitan Transit Authority (MTA) and is part of a long-term lease to SMP. Contamination has been identified in the soil adjacent to the loading dock. This area is mostly dirt and gravel covered with some concrete remaining from a nearby road-paving project. Access to this area is limited to doors at the rear of the SMP building, a locked access gate at the adjacent automobile dealership, a railroad spur from 42nd Place to the east, and to railroad personnel by way of the Sunnyside Yard to the south. A highly industrialized area with a wide variety of activities ranging from small-scale assembly to large-scale manufacturing is located within the general vicinity of the SMP site.

1.2 Site Description and History

The site was historically involved in industrial and manufacturing activities since 1919 (EnviroAudit, 1996). SMP has occupied the on-site building since the mid-1900s. S. Karpen & Brothers occupied the building prior to that time.

SMP maintained a small plating line for chrome plating of small machine parts from approximately 1975 to 1984. The wastes generated from the chrome plating process were temporarily stored on-site prior to off-site disposal. SMP was previously engaged in painting automobile parts prior to distribution. Until 1984, solvent-based paints were used, after which aqueous-based paints were used until all painting operations were gradually eliminated between 1990 and 1991. Several other processes that SMP performed in the past also generated hazardous wastes. These include die-casting operations that ceased in the 1970s, rubber production that was eliminated around 1985, and degreasing, using chlorinated solvents, that was eliminated in 1990.

Currently, SMP produces automobile parts and components. The manufacturing operations include metal fabrication and machining, plastic injection molding, and assembly. SMP also operates a small photography laboratory for production of newsletters, brochures, etc. The only hazardous or toxic materials involved in plant operations are lubricating oils for machinery, caustics for degreasing, phenolics used in molding processes, epoxies for coil production, and

water-based inks involved in their small scale printing. All wastes are temporarily stored on-site in secure containers prior to off-site disposal at a licensed treatment, storage, and disposal (TSD) facility.

1.3 Project Objectives

The overall goals of the RI/FS process are to obtain data to define site physical characteristics, source areas and the extent of migration through potential pathways, in order to:

- Determine if residual contamination presents a potential threat to human health and environmental receptors; and
- Develop and evaluate remedial alternatives, including the no-action alternative.

In order to achieve these goals in a cost-effective manner, the field investigation for the SMP RI/FS will be conducted in a two-phase approach. The first phase of the investigation involves the collection of soil samples using hand augers and Geoprobe drilling to delineate the nature and extent of soil contamination. Groundwater samples will also be collected during the Geoprobe drilling. The second phase of the investigation will use the results of the Geoprobe groundwater samples to determine the locations for placement of groundwater monitoring wells and the screened interval depths, if necessary.

The objectives of the Phase I field investigation are to:

- Determine the nature and extent of surface soil contamination in the vicinity of the loading dock on the south side of the SMP facility;
- Determine the nature and extent of subsurface soil contamination in the vicinity of the loading dock on the south side of the SMP facility;
- Determine if soil contamination may extend from the vicinity of the loading dock under the loading dock and SMP facility; and
- Determine if groundwater contamination exists in the vicinity of the loading dock and beneath the SMP facility.

The major objectives of the Phase II field investigation are to:

- Install monitoring wells at locations and with screened intervals as determined with the results of the Phase I field investigations;
- Determine groundwater flow direction and characteristics;

- Further delineate groundwater contamination due to contaminated soils in the vicinity of the loading dock on the south side of the SMP facility;
- Gather sufficient data to perform a qualitative human health exposure assessment; and
- Gather data to adequately evaluate remedial alternatives.

2.0 Field Investigation Activities

The field investigation for the SMP RI/FS will be conducted in two phases. The first phase of the investigation will involve the collection of soil samples using hand augers and Geoprobe drilling to delineate the nature and extent of soil contamination. Groundwater samples will be also be collected during the Geoprobe sampling. The second phase of the investigation will use the results of the Geoprobe groundwater samples to determine the locations for placement of groundwater monitoring wells and the depths of the screened interval.

This section addresses the field investigation tasks and sampling operations by matrix and type of procedures, which include:

1. Sample Tracking System
2. Mobilization and Demobilization
3. Quality Assurance and Quality Control
4. Decontamination
5. Field Investigation
6. Field Screening
7. Investigation Derived Waste

Each of these tasks are described below in detail.

2.1 Sample Tracking System

2.1.1 Sample Identification System

Each sample collected will be designated by an alphanumeric code that will identify the type of sampling location, matrix sampled, and the specific sample designation (identifier). Site-Specific Procedures are described below.

Sample identification will contain a sequential code consisting of two segments. The first segment will designate the location type and specific sample location. Location types will be identified by a two-letter code, for example: MW (monitoring well), GP (Geoprobe), etc. The specific sampling location will be identified using a two-digit number. The second segment will identify the matrix type and a sample designation of identifier that identifies the sample depth, the sampling event number, or other designation depending on the sample type. The matrix type will be designated by a two-letter code, for example: GW (groundwater), SS (soil). The sample

identifier will be represented by a two-digit code. For sequential depth intervals of soil samples, the sample identifier will correspond to depth increments.

The following is a general guideline for sample designation:

FIRST SEGMENT		SECOND SEGMENT	
AA	NN	AA	NN
Location type	Specific Location	Matrix Type	Sample Identifier
GP	03	SS	01

SYMBOL DEFINITIONS:

A = Alphabetic
N = Numeric

LOCATION TYPE

MB = Manual Boring (Hand Auger)
GP = Geoprobe Boring
GA = Angled Geoprobe Boring
MW = Monitoring Well
SU = Building Sump
TB = Trip Blank
FB = Field Blank
DR = Drum
BD = Blind Duplicate

MATRIX TYPE:

SS = Soil
GW = Groundwater
SW = Surface Water
SD = Sediment
IS = Investigation Derived Waste (Solid)
AQ = Aqueous Blend

SAMPLE IDENTIFIER:

Soil Depth Interval (feet)	Designation
Blind Duplicate	00
0-1 feet	01
0-2 feet	02
1-3 feet	03
2-4 feet	04
3-5 feet	05
4-6 feet	06
5-7 feet	07
6-8 feet	08
7-9 feet	09
8-10 feet	10
9-11 feet	11
10-12 feet	12
11-13 feet	13
12-14 feet	14
13-15 feet	15
Etc.	

Groundwater Geoprobe Interval (feet)	Designation
Blind Duplicate	00
0-1 feet	01
0-2 feet	02
1-3 feet	03
2-4 feet	04
3-5 feet	05
4-6 feet	06
5-7 feet	07
6-8 feet	08
7-9 feet	09
8-10 feet	10
Etc.	

Groundwater Sampling Event	Designation
First round of sampling	01
Second round of sampling	02

An example of a sample identification is as follows: For a Geoprobe soil sample obtained at a depth of 0-2 foot at location 03, the sample identification will be GP03-SS02. Another soil sampled obtained from a depth of 4-6 feet from the same boring will be identified as GP03-SS06. A Geoprobe groundwater sampled collected from a depth of 12-14 feet at location 03 would have a designation of GP03-GW14. For blank samples, the first field blank taken from the groundwater sampling apparatus would be identified as FB01-AQ01, and the first trip blank would be identified as TB01-AQ01.

2.1.2 Sample Containers and Analytical Requirements

Table 7-1 located in the QAPP summarizes the container requirements, sample preservation, holding times and analytical requirements for water and soil samples.

2.1.3 Sample Documentation

The sample team or individual performing a particular sampling activity is required to keep a field notebook. The field notebook will be filled out at the location of sample collection immediately after sampling. The logbook will contain sample descriptions including sample number, sample collection time, sample location, sample description, sampling method used, daily weather conditions, field measurements, name of sampler, and other site-specific observations. The field notebook will contain any deviations from protocol, visitor's names, or community contacts made during sampling, geologic and other site-specific information that the Field Operations Leader warrants as noteworthy.

The Field Operations Supervisor will also maintain a sample logbook which consists of a loose-leaf notebook containing sample collection log sheets and other sampling forms included in Appendix A. All forms including Chain-of-Custody Forms completed during a sampling day will be inserted into the logbook at the end of the day.

2.1.4 Sample Packaging and Shipping

Following collection, analytical samples will be placed in coolers and chilled to four degrees Centigrade with bagged ice immediately following collection. Prior to shipment to the analytical

laboratory, glass jars will be wrapped in bubble-wrap or an equivalent material that will prevent jar breakage during shipment. The wrapped glass jars will then be placed in a plastic bag and sealed. Polyethylene jars will be placed in a plastic bag and sealed. The analytical samples in each cooler will be packed with bagged ice to maintain 4 degrees Centigrade and then stabilized to minimize sample container movement during shipment to the analytical laboratory by utilizing a suitable packing material. Samples will be shipped to the analytical laboratory in an appropriate amount of time by an overnight delivery firm to allow for laboratory analysis within the analytical parameter holding times.

The chain-of-custody forms will be signed by the field sampler and placed in a plastic bag and sealed. Additional forms, as provided by the laboratory, will also be placed in a plastic bag and sealed. The bags with the forms will then be attached to the inside of the cooler lid. The coolers to be shipped will then be sealed with duct tape to prevent accidental discharge of their contents during shipment. A custody seal will be placed across the lid opening of each cooler to ensure that the integrity of the contents of the cooler has not been compromised during shipment. The coolers will then be delivered or picked-up at the site location by an overnight delivery firm for overnight shipment to the analytical laboratory.

2.2 Mobilization and Demobilization

This subtask consists of field personnel orientation, equipment mobilization, and the staking of sampling locations. Each field team will attend an orientation meeting to become familiar with the scope of work, the history of the site, health and safety requirements, and field procedures. Equipment mobilization will entail ordering, purchasing, and if necessary, fabricating of all sampling equipment and decontamination area.

A decontamination pad will be erected within the site boundaries to prevent contaminated materials from being transferred off-site. The pad will provide an area for the decontamination of larger equipment such as drill rigs, etc. The pad will provide for containment of water used for decontamination and will be equipped with a pump for transfer to drums. A source of water will be identified and conveyed to the pad.

Demobilization will be performed at the completion of each phase of the field activities as necessary. Equipment demobilization may include but not limited to sampling equipment,

drilling subcontractor, Geoprobe subcontractor, and health and safety decontamination equipment. No field office trailer or utility hookups are necessary for this project.

2.3 Quality Assurance and Quality Control (QA/QC)

This section describes the QA/QC requirements for field activities.

2.3.1 Field Instrument Calibration and Preventive Maintenance

The sampling team is responsible for assuring that a master calibration/maintenance log is maintained for each field-measuring device. At the minimum, each log will contain the following information:

- Name of device and/or instrument calibrated;
- Device/instrument serial and/or ID number;
- Frequency of calibration;
- Date of calibration;
- Results of calibration;
- Name of person performing calibration;
- Manufacturer identification and lot number of the calibration gas (PID) or standard (pH buffer solutions, conductivity solutions).

2.3.2 QA/QC Sample Collection

Sample specific QA/QC requirements are listed below.

2.3.2.1 Field Blanks (SOP 1)

Field Blanks will be collected to evaluate potential cross-contamination of samples due to repeated use of the same sampling equipment. Field blank samples will be performed on the following sampling equipment: bowls, spoons, acetate liners, split-barrel sampling devices (split-spoons) and pans used to collect soil samples; disposable polyethylene cups used to collect sediment, and from the bailers used to collect groundwater during monitoring well sampling. Field blanks will be collected for each particular piece of sampling equipment each day it is used to collect environmental samples. The field blank must be collected in a similar fashion as the environmental sample.

The minimum frequency of field blanks is one field blank for every twenty samples shipped to the analytical laboratory. Therefore, if more than twenty samples of the same matrix are collected in one day, and additional field blank will be collected that day to maintain the minimum requirement of one field blank per twenty samples.

Field blanks will be collected using the procedure described below:

- Decontaminate the sampling device using the procedures outlined in this plan. Groundwater sampling field blanks will be collected by pouring deionized water through a new bailer.
- Pour distilled/deionized water over the sampling equipment and collect the rinse water in the appropriate pre-preserved sample bottles.
- Label the bottles and handle as an analytical sample following the methodology described in this plan. Record the event in the field notebook.

2.3.2.2 Trip Blanks (SOP 2)

A trip blank is an aliquot of deionized water that is sealed in a sample bottle, which is provided to the sampling team by the analytical laboratory. The trip blank is used to determine whether any contamination occurred to sample bottles and field blank water during shipment from the laboratory to the site, onsite during sample collection and storage and during sample shipment to the laboratory. The trip blanks are analyzed for VOCs only. Sealed trip blank bottles will be labeled and placed in the cooler that will contain the day's aqueous VOC samples and bottles. The trip blank will remain with those samples and bottles during the day's sampling event and during shipment to the analytical laboratory. If multiple coolers are required to store and transport aqueous VOC samples, each cooler must contain an individual trip blank. Trip blanks will accompany only aqueous samples.

2.3.2.3 Duplicate Samples

Duplicate samples will be collected to check laboratory reproducibility of analytical data. At least five percent (one out of every 20 samples) of the total number of collected samples will be duplicated. For projects consisting of less than 20 samples of a collection type, a minimum of one duplicate sample will be collected per sample type.

The duplicate samples will be labeled in a manner so that the analytical laboratory cannot identify the corresponding actual analytical sample (blind duplicate). Field duplicate collection time will be recorded as "0000" on the COC form.

The actual analytical sample identification and the corresponding blind field duplicate identification **must** be noted in the field notebook and on the sample collection log. Duplicate samples will be collected for each of the environmental matrices sampled.

2.3.2.4 Matrix Spike/Matrix Spike Duplicate Volume Requirements

To ensure that the analytical laboratory has sufficient volume for MS/MSD analysis, triple sample volume must be submitted to the analytical laboratory. At least five percent (one out of every 20 samples) of the total number of collected samples will be submitted for MS/MSD analysis. The MS samples will be labeled with the corresponding actual sample's alphanumeric code followed by "MS" and the MSD samples will be labeled with the corresponding actual sample's alphanumeric code followed by "MSD." MS/MSD samples must be collected from each of the environmental matrices sampled.

2.4 Decontamination (SOP 3)

As presented below, all field sampling equipment will be decontaminated prior to sampling. Equipment leaving the site will also be decontaminated as outlined in the Health and Safety Plan. All decontamination activities will be completed at a decontamination area within the site boundaries.

All drilling equipment will be steam-cleaned prior to use. Pressurized steam will be used to remove all visible excess material from augers, rods, drill bits, the back of the drilling rig, and other parts of the rig which contact augers, rods, and split-spoons. Steam cleaning will be conducted on the on-site decontamination pad.

The centrifugal or submersible pumps, if used, will be decontaminated with an Alconox detergent rinse and by pumping approximately 20 gallons of potable water through the pump.

SOP 3A. Decontamination of Sampling Equipment:

Unless otherwise specified, reusable field sampling equipment and split-spoon samplers will be decontaminated prior to use and between sampling points. The resulting decontamination fluids will be pumped through carbon and discharged to the ground surface. Bowls, spoons, trowels, split-spoon samplers, etc., will be decontaminated as follows:

- Potable water rinse;
- Alconox and potable water scrub;
- Potable water rinse; followed by
- Distilled/deionized water rinse.

SOP 3B. Drilling/Heavy Equipment Decontamination:

Drilling equipment (drilling rigs, augers, downhole hammer and tools) shall be thoroughly steam-cleaned at the onsite decontamination pad between each drilling location. Split-spoon samplers will be steam-cleaned between borings. The sampling team will decontaminate the split-spoons between samples as described in SOP 3A.

The liner on which decontamination occurs shall be made of 30 mil. polyethylene. An 80 mil. polyethylene pad will be placed on the 30 mil. liner where drill rigs and equipment will be decontaminated. 3/4" plywood shall be placed on top of the 80 mil. liner. 6" x 6" timber shall be used to construct the curb. A sump pump shall be placed in a corner. The pad will be sloped so that the pump will collect the decontamination fluids. The decontamination pad can also consist of a pre-constructed wash basin. The decontamination pad will be inspected at least once a week during active use and repairs will be made as necessary. Decontamination fluids will be transferred into a 55-gallon drum and fines will be allowed to settle. See Section 2.7 for details

Extraneous contamination and cross-contamination will be controlled by wrapping the sampling equipment with aluminum foil when not in use and changing and disposing of the sampler's gloves between samples. Decontamination of sampling equipment will be kept to a minimum in the field, and wherever possible, dedicated sampling equipment will be used.

Personnel directly involved in equipment decontamination will wear protective clothing, as specified in the Health and Safety Plan.

2.5 Field Investigation

The field investigation for the SMP RI/FS will be conducted in two phases. The first phase of the investigation will involve the collection of soil samples using hand augers and Geoprobe drilling to delineate the nature and extent of soil contamination. Groundwater samples will be collected during the Geoprobe sampling. The second phase of the investigation will use the analytical results of the Geoprobe groundwater samples to determine the locations for placement of

groundwater monitoring wells and the screened interval depths. The location of all proposed sample locations is depicted in Figure 2-1.

2.5.1 Site Survey

A site surveys will be performed at the SMP to locate all sample points. A New York State licensed surveyor will perform all surveying. Upon completion of field operations, the surveyor will locate all borings and establish elevations and locations of all the monitoring wells during the Remedial Investigation. This information will be plotted on a site map and also reported in tabular form. The field measurements will be oriented according to existing benchmarks or property information on or around the site, and plotted according to the New York State Planar Coordinate System and Mean Sea Level Datum of 1929.

The minimum precision for location of each monitoring well and the traverse baseline will be 0.5 foot horizontal distance, 0.01 foot vertical distance and to the nearest 10 seconds for horizontal angle. Each well casing will be marked where the elevation was established. Each traverse station will be set using a hub and tack with a flagged witness lath indicating traverse number.

2.5.2 Surface Soils (SOP 4)

Five surface soil samples (SS-1 through SS-5) in the vicinity of the previously excavated soils and the hot spot area adjacent to the loading dock will be collected from the 0-1 foot depth increment. These samples will be collected using a hand auger or disposable polyethylene scoops. Two surface soil samples will be located at the fringe of the hot spot area adjacent to the loading dock.

All soil samples collected will be analyzed for TCL VOA and 10 percent of soil samples for TCLP and 20 percent of soil samples for TOC analysis. The analytical methods that will be performed are the following:

- USEPA CLP Statement of Work for Organic Analyses OLM04.02, May 1999;
- SW846 Method 8260B for TCLP Volatiles
- SW846 Method 8270C for TCLP Base/Neutral Extractables
- SW846 Method 8081A for TCLP Pesticides
- SW846 Method 8151A for TCLP Herbicides
- SW846 Method 6010B for TCLP Metals and Method 7470 for Mercury
- Lloyd Kahn Method for Total Organic Carbon

Surface soil will be collected in the following manner at each location:

1. A decontaminated stainless steel hand auger or new disposable polyethylene scoop will be used at each location.
2. Using the auger, collect surface soil from a depth of 0 to 12 inches below grade.
3. Directly place soil sample into sample container for VOA analysis (TCL or TCLP), ensuring that no headspace exists in sample jars. Field screen soil sample using a portable PID meter and record readings and classify the soil.
4. If collecting a TOC or TCLP sample, place remaining soil sample in ss bowl and thoroughly homogenize the soil in the bowl and fill the appropriate containers for TOC and TCLP analysis.
5. Place the labeled analytical samples in a cooler and chill to 4 degrees Centigrade.
6. Complete entry in field notebook and chain-of-custody forms.

2.5.3 Geoprobe Sampling of Soil and Groundwater

The Geoprobe investigation consists of the collection of both soil and groundwater samples at the SMP site. A total of 25 vertical Geoprobe and 6 angled Geoprobe sample locations will be drilled to determine the nature and extent of soil and groundwater contamination.

The 25 vertical Geoprobe sample locations consist of the following:

- 11 shallow Geoprobe soil sample locations with samples collected from 0-1ft and 5-7ft: approximately 2 samples per location for a total of 22 soil samples.
- 5 deep Geoprobe soil sample locations with samples collected from 0-1ft, 5-7ft, 10-12ft, 15-17ft, and 20-22ft: approximately 5 samples per location for a total of 25 soil samples.
- 5 deep Geoprobe soil and groundwater sample locations with soil samples collected from 0-1ft, 5-7ft, 10-12ft, 15-17ft, and 20-22ft: approximately 5 samples per location for a total of 25 soil samples. Groundwater samples will be collected from 5-7 ft and 35-37ft: approximately 2 samples per location for a total of 10 groundwater samples.
- Deep Geoprobe groundwater samples locations with groundwater samples collected from 5-7 ft and 35-37ft: approximately 2 samples per location for a total of 8 groundwater samples.

The 6 angled Geoprobe sample locations consist of the following:

- 6 angled Geoprobe soil and groundwater locations with soil samples collected from the effective depths of 5-7ft and 10-12ft: approximately 2 samples per location will be collected for a total of 12 soil samples. Groundwater samples will be collected from 5-7 ft: approximately 1 sample per location will be collected for a total of 6 groundwater samples.

In summary, a total of 89 soil samples and 24 groundwater samples will be collected from the SMP site to determine the nature and extent of contamination.

2.5.3.1 Geoprobe Soil Sampling Locations

A total of 89 soil samples will be collected from the SMP site in order to determine the nature and extent of soil contamination. These 89 soil samples will be collected from the following locations:

- 22 soil samples from the 11 shallow Geoprobe locations.
- 50 soil samples from the 10 deep Geoprobe locations.
- 12 soil samples from the 6 angled Geoprobe locations.

Shallow Geoprobe Soil Sampling:

A total of 11 shallow Geoprobe soil borings will be drilled and two soil samples per location (0-1 ft and 5-5 ft) will be collected for a total of 22 samples. These shallow Geoprobes have been located within both source areas since both the hot spot area and the previously excavated soil area contain surficial contamination. Shallow Geoprobes have been utilized to characterize both the center and the fringes of the previously excavated soil area, while the shallow Geoprobes have only been used to characterize the fringes of the hot spot area since the center of the hot spot requires deeper sampling.

Surface soil samples from the 0-1 foot depth increment from the Geoprobe soil sampling locations may be collected with either a hand auger or the Geoprobe unit depending on site-specific conditions encountered during the field investigation. Subsurface soil samples will be collected using a Geoprobe sampling technique. Eleven (11) vertical shallow subsurface soil borings will be advanced using a Geoprobe drilling rig equipped with a Macro-Core sampler. Subsurface soils will be collected from across the water table that is assumed to occur at a depth of approximately 5-7 feet below grade. Continuous sampling will be conducted during the installation of the shallow Geoprobe boring for geological logging of the borehole.

Deep Geoprobe Soil Sampling:

A total of 10 deep Geoprobe soil borings will be drilled and five soil samples per location (0-1 ft, 5-7 ft, 10-12 ft, 15-17 ft, and 20-22 ft) will be collected for a total of 50 samples. Eight out of ten of these deep Geoprobes have been located primarily within the center and around the fringes of the hot spot area located adjacent to the loading dock. The placement of these eight deep

borings will characterize the center of the hot spot as well as the southern, eastern and western fringes of the hot spot. Since significantly elevated levels of the BTEX contamination is primarily detected beneath the water table, the source of this contamination is suspect and an off-site upgradient source may be responsible. Thus, both shallow and deep characterization of this area is necessary to examine the relationship between the shallow chlorinated solvents and the deeper BTEX contamination. The last two deep borings are placed under the bridge in the most upgradient on-site location to aid in the determination of background levels of BTEX emanating from upgradient sources.

The Geoprobe drill rig will be equipped with a Large Bore Drive Point Sampler, as necessary, to collect deeper samples. Though depths greater than 20 feet are not expected, if greater depths are required, the Geoprobe drill rig will be equipped with an Large Bore Drive Point Sampler. This tool is used for collecting discrete soil samples from greater depths, but has a smaller core diameter (1.125 inches) and is only 22 inches in length.

Continuous sampling will be conducted during the installation of seven of the 11 deep Geoprobe borings for geological logging of the borehole. The borings requiring geologic logging will be field determined.

Angled Geoprobe Soil Sampling:

A total of 6 angled Geoprobe borings will be drilled and two soil samples per location (5-7 ft and 10-12 ft) will be collected for a total of 12 samples. These angled Geoprobes have been located within both source areas since both the hot spot area and the previously excavated soil area contamination may have extended under the loading dock in the northern direction. Along the loading dock, six soil borings will be advanced at approximately a 45-degree angle toward the SMP building to determine whether subsurface soil contamination may be present under the loading dock of SMP building. The Geoprobe sampler will be advanced at a diagonal length of 14-17 feet to collect a subsurface soil sample at an effective depth of 10-12 feet. A sample will also be collected at the effective depth of 5-7 feet. Continuous sampling will not be conducted at the angled Geoprobe borings.

All soil samples will be analyzed for Target Compound List (TCL) VOCs. For evaluation of remedial alternatives, 10 percent of the samples will be analyzed for TCLP organic and metals and 20 percent of the samples will be analyzed for total organic carbon and grain size. In addition, eight surface soil samples (0-1 foot depth) in the area of the excavated soils and stockpiled soils will be analyzed for TCLP lead.

2.5.3.2 Geoprobe Soil Sampling Procedures (SOP 5)

The Geoprobe unit is a modified hydraulic rotary hammer drill mounted on a foldaway assembly in a vehicle. The assembly transfers a portion of the weight of the vehicle onto the probe and drives the probe with the force of the hydraulic hammer. This combination enables the operator to drive probes to depths of 90 ft below ground surface and collect soil and groundwater samples from that depth. It is important to note that achievable depth is directly related to the subsurface conditions at the site.

Two soil sampling options are available with the Geoprobe unit, the Macro-Core sampler and the Large Bore Sampler.

2.5.3.2.1 Macro-Core Samplers

Shallow soil sampling will be performed using a Maco-Core system. The Macro-Core Sampler allows the operator to perform continuous soil sampling from the ground surface to approximately 12 feet below grade. The Macro-Core sampler consists of:

- Nickel-plated sample tube is 48-inch long x 2-inch diameter and holds a 46-inch liner. Overall length is 51.25 inch.
- Recovers 45-inch long x 1.5-inch diameter cores.
- Liners are PETG (clear plastic) for easy identification and logging of soils and can be capped for storage and transport.
- Replaceable cutting shoe is hardened tool steel.
- Tapered drive head fits standard Geoprobe 1-inch diameter probe rods.

The Macro-Core Sampler is designed to start collecting a sample upon initial driving into the subsurface. To sample deeper, the soil above the desired sampling interval must be removed. The sampler may be lowered to each new sampling depth by lowering the sampler down the previously sampled hole and connecting probe rods together until it reaches the top of the new sampling interval. The cutting shoe is tapered to minimize scraping soil off the walls of the hole. In some soils, the hole may not stay entirely open due to soil sloughing. Visual inspection of the sample may reveal loose soil or significantly different soil at the top end of the tube due to sloughing. Some compensation can be figured into a sample log. However, if excessive sloughing is a problem, operators may choose to use the Large Bore soil sampler as described in the following section.

The assembly and sampling protocols for the angled and normal Geoprobes are identical except for the setup of the derrick angle.

Assembly:

Scrub all sampler parts thoroughly with laboratory grade detergent and distilled or deionized water before assembly. Push the pre-flared end of the liner over the interior end of the cutting shoe. Insert the liner over the interior end of the cutting shoe. Insert the liner into the sample tube and screw the cutting shoe into the sample tube. A wrench may be used to tighten the cutting shoe. Screw the drive head into the opposite end of the sample tube.

Sampling:

When driving the sampler from the surface, follow these instructions:

1. Connect a drive cap to the drive head at the top end of the sampler.
2. Raise the probe shell to the highest position. Next, raise the foot up off the surface to allow room to place the sampler below the hammer. Be sure to keep the derrick straight.
3. Insert an anvil into the hammer and place the sampler and probe rod in the driving position. Raise the hammer latch into the up position while initially driving the sampler to avoid contact with the drive head.
4. Use the FOOT control to apply down pressure and activate the hammer as necessary to begin sampling. When the foot reaches the ground surface, begin using the PROBE control to apply down pressure as in normal operation.
5. Add a probe rod and drive the sampler until the drive head reaches the ground surface. Do not over-drive the sampler.

To take samples at consecutive intervals, lower the sampler down the previously made hole by connecting probe rods together until the bottom end of the sampler stops at the next sampling interval.

Removal:

If sampling below 4 feet, pull out all of the probe rods until the sampler has been pulled out to just above the surface. When the sampler is visible above the surface, attach a pull cap to the top of the drive head. Continue to pull the sampler out of the hole using the probe control. When the limit of the 40-inch probe stroke (Series 8 Geoprobe machines) has been reached, continue to pull the sampler up using the FOOT control.

If the sampler is lodged tightly in the ground, the back of the carrier vehicle may be pulled downward in response to the resistance as pulling with the FOOT cylinder is attempted. This can damage the base frame of the Geoprobe machine. If the sampler cannot be retrieved easily (without excessive resistance), follow these steps:

1. Lower the FOOT and disengage the hammer latch from the pull cap.
2. Raise the FOOT at least 12 inches above the ground surface and place a foot extension or large timbers firmly beneath the FOOT. A foot extension may be improvised by stacking wooden boards.
3. Lower the probe shell and close the hammer latch over the pull cap on the sampler. A 12" probe rod may be needed to lift the sampler up high enough for the latch to close over the pull cap.

Recovering the Soil Sample:

Once the sampler has been removed from the hole, the soil sample is easily recovered by unscrewing the cutting shoe and pulling the liner out. The exterior of the cutting shoe features a notch for attaching a wrench to loosen tight threads. Applying a sharp blow to the notch with a flat screwdriver and a hammer is also useful for loosening the cutting shoe.

Collecting Soil Sample:

Once the sample core liner has been recovered, the sampling team can collect the soil sample for sample analysis.

1. Don new pair of disposable gloves.
2. Cut the liner along the entire length to expose the core.
3. Immediately field screen entire length of the sample core, document results.
4. Bias toward the highest PID readings, collect soil sample using a ss/disposable spatulas or spoon and place into sample container for VOC (TCL or TCLP if required).
5. Describe carefully the approximate recovery (length), the USCS classification, composition, color, moisture, etc. of the recovered soil.
6. If collecting TOC, grain size or TCLP sample, place remaining soil sample in decontaminated ss bowl and thoroughly homogenize the soil in the bowl and fill the appropriate containers for TOC and TCLP analysis.
7. Place the labeled analytical samples in a cooler and chill to 4 degrees Centigrade.
8. Complete entry in field notebook and chain-of-custody forms.

2.5.3.2.2 Large Bore Drive-Point System

The Large Bore Drive-Point System is a unique soil sampling system deigned for use with the Geoprobe hydraulic soil-probing machine. Unlike split-spoon samplers, the Drive-Point sampler remains completely sealed while it is pushed or driven to the desired sampling depth. A piston stop-pin at the trailing end of the sampler is removed by means of extension rods inserted down the inside diameter of the probe rods after the sampler has been driven to depth. This enables the piston to retract into the sample tube as it is displaced by soil while the sample is being taken.

Assembly:

Decontaminate all sampling parts thoroughly in accordance with the decontamination protocol described in SOP 3. All parts must fit tightly. The stop-pin requires a new O-ring for each sample. The pin should be tightened down with a wrench so that it exerts pressure against the piston rod. Damage to the pin or drive head could occur during driving if the pin is not tight.

Probing:

1. Attach assembled sampler onto leading Geoprobe probe rod. (A 12-inch probe rod is recommended to initially drive the Standard 24-inch and the Large Bore Samplers. Replace the 12-inch rod with a 24-inch or 36-inch probe rod as soon as the sampler is driven below the surface.)
2. Drive the sampler into the ground. Stop when the drive head is just above the surface and re-tighten the stop-pin using a 3/8-inch wrench for the point and a 1-inch or adjustable wrench for the drive head. Most vibrations that could loosen the stop-pin occur with the initial driving.
3. Drive the sampler to the top of the desired sampling interval. Attach additional probe rods as necessary to reach depth.

IMPORTANT: Some soil conditions may warrant using a retractable or solid drive point to pre-probe the hole to the desired sampling depth. Information about the subsurface and depth to bedrock should be known before driving the sampler. Damage will occur if the sampler is driven into rock or other impenetrable layer.

Stop-Pin Removal:

1. Move the probe unit away from the top of the probe rods to allow for room to work.
2. Remove the drive cap and lower extension rods down the inside diameter of the probe rods using couplers to join rods together.

3. Attach the extension rod handle to the top extension rod and rotate the handle clockwise. Some resistance will be felt when the stop-pin begins to disengage. Continue to rotate the handle until the resistance ends. Lift up on the handle to check if the threads are completely disengaged.
4. Remove the extension rods from the probe rods. The stop-pin should be attached to the end extension rod upon removal.

Sampling:

1. Wear appropriate health and safety equipment as outlined in the Health and Safety Plan.
2. Replace drive cap onto top probe rod. If the top of the probe rod is already in the lowest driving position, it will be necessary to attach another probe rod before driving.
3. Mark the top probe rod with a marker or tape at the appropriate distance above the ground surface (i.e. 10-inch or 22-inch for the standard samplers, 24-inch for the Large Bore.)
4. Drive the sampler the designated distance. Be careful not to over-drive the sampler that could compact the soil sample making it difficult to extract.
5. Retract the probe rods from the hole to recover the sampler. On standard 24-inch and Large Bore Samplers, it may be necessary to remove the piston tip and piston rod when the sampler drive head has been pulled just above the surface. Replace the drive head and attach a pull cap to pull the sampler out the remaining distance.

Collecting Soil Sample:

Once the sample core liner has been recovered, the sampling team can collect the soil sample for sample analysis.

1. Don new pair of disposable gloves.
2. Cut the liner along the entire length to expose the core.
3. Immediately field screen entire length of the sample core, document results.
4. Bias toward the highest PID readings, collect soil sample using a ss/disposable spatulas or spoon and place into sample container for VOC (TCL or TCLP if required).
5. Describe carefully the approximate recovery (length), the USCS classification, composition, color, moisture, etc. of the recovered soil.
6. If collecting TOC, grain size or TCLP sample, place remaining soil sample in decontamined ss bowl and thoroughly homogenize the soil in the bowl and fill the appropriate containers for TOC and TCLP analysis.
7. Place the labeled analytical samples in a cooler and chill to 4 degrees Centigrade.

Complete entry in field notebook and chain-of-custody forms.

2.5.3.3 Geoprobe Groundwater Sampling Locations

A total of 24 Geoprobe groundwater samples will be collected from the SMP site in order to aid in the determination of the nature and extent of groundwater contamination and to determine the optimum placement of permanent monitoring wells. These 24 Geoprobe groundwater samples will be collected from the following locations:

- 18 groundwater samples from the 9 deep Geoprobe locations.
- 6 groundwater samples from the 6 angled Geoprobe locations.

Groundwater samples will be collected and analyzed for TCL VOCs.

Deep Geoprobe Groundwater Sampling:

A total of 9 deep Geoprobe groundwater borings will be drilled and two groundwater samples per location (5-7 ft and 35-37 ft) will be collected for a total of 18 samples. Three of these deep Geoprobes groundwater locations (GP-09, GP-13, and GP-11) have been located primarily within the center and around the fringes of the hot spot area located adjacent to the loading dock. The placement of these three deep borings will characterize the southern, eastern and western fringes of the hot spot. Since significantly elevated levels of the BTEX contamination is primarily detected beneath the water table, the source of this contamination is suspect and an off-site upgradient source may be responsible. The two deep borings, GP-23 and GP-25, are placed under the bridge in the most upgradient on-site location to aid in the determination of background levels of BTEX emanating from upgradient sources. The last four deep groundwater borings (GP-01, GP-02, GP-03, and GP-04) were located to determine the groundwater quality in the downgradient southwestern direction and to aid in the placement of permanent monitoring wells MW-12 and MW-13.

Angled Geoprobe Groundwater Sampling:

A total of 6 angled Geoprobe borings will be drilled and one groundwater sample per location (5-7 ft) will be collected for a total of 6 samples. These angled Geoprobes have been located within both source areas since both the hot spot area and the previously excavated soil area contamination may have extended under the loading dock in the northern direction. Along the loading dock, six soil borings will be advanced at approximately a 45-degree angle toward the SMP building to determine whether groundwater contamination may be present under the loading dock of SMP building.

2.5.3.4 Geoprobe Groundwater Sampling Procedures (SOP 6)

Groundwater sampling will be collected with the Geoprobe by using a screen point sampler. The screen point sampler allows the user to drive a sealed stainless steel screen to depth, open the screen, and obtain a water sample via a tubing system to the surface. It features a 19" screen encased in a perforated stainless steel sleeve. The screen section remains totally enclosed in a sheath until it is pushed out into the formation at the desired depth.

While the Screen Point Sampler is being driven to the desired sampling depth, it is kept sealed by O-ring connections placed at critical locations on the assembly. When the desired sampling depth is reached, the sampler is pulled up about 2-feet which disengages the expendable drive point and creates an open borehole from which to sample. The inner core, which consists of a stainless steel wire screen inside of a perforated stainless steel sleeve, is then pushed out into the borehole and water is allowed to enter the sampler. A groundwater sample can then be collected.

High density polyethylene tubing will be connected to the top of the screen section using Post-Run tubing (PRT) adapters. Water samples can be bailed from the rod bore or pumped directly from the screen section using the peristaltic pump. The sampling tubing must be dedicated to individual wells and cannot be reused.

The sampler is easily disassembled for cleaning. The assembled Screen Point Sampler is 1 inch O.D. x 36 inch overall length and threads onto the leading probe rod.

Assembly:

Clean all parts thoroughly with laboratory grade detergent and distilled or deionized water before assembly. A clean screen insert should be used for each new sample. It is recommended that new O-rings be installed at each O-ring location prior to each sample. After O-rings have been installed, follow these steps:

1. Push the Screen Insert and Plug into the Screen Sleeve from the bottom. The bottom end has one drain hole.
2. Push the Screen Connector over the top end of the Screen Sleeve and push the Sleeve Connector Pin into place.
3. Insert the Screen Sleeve, Screen Connector first, into one end of the Sampler Sheath.
4. Slide the Drive Point Seat over the end of the screen assembly that protrudes from the Sampler Sheath. Thread it in until tight using a 7/8" wrench.

5. Push the screen assembly just far enough into the Sampler Sheath that a GW-445 expendable drive point can be pushed into place in the Drive Seat.
6. Screw the GW Drive Head with the O-ring end first into the open end of the Sampler Sheath.

NOTE: These parts must be assembled so as to allow free movement of the screen assembly inside of the Sampler Sheath, there should be no internal binding. The assembled sampler is not ready to be driven into the subsurface.

Probing:

Place a drive cap on the assembled sampler and drive it into the subsurface. Continue driving by adding Geoprobe probe rods until the sampler tip has been driven about 1 foot below the target sampling depth. Once that depth has been reached, disengage the expendable drive point by pulling the rods back a distance of about 2 feet.

Exposing Screen:

In stable formations, the screen assembly may be pushed out into the open borehole by lowering 3/4 inch tubing affixed with a PRT adapter to the top end of the screen assembly. The threads on the PRT adapter are engaged with the threads on the Screen Connector by pushing gently downward on the tubing and rotating it counter-clockwise. When properly connected, the Screen assembly can be pushed out of the Sampler Sheath by pushing down on the tubing. A water sample can be drawn through the tubing.

In unstable formations, the screen assembly may have to be pushed out of the Sampler Sheath by means of extensions rods inserted down the inside of the probe rods. The end of the rods should be equipped with an extension rod coupler to protect the threads on the Screen Connector. A steady push is sufficient, excessive hammering on the rods should be avoided. After pushing the screen into the formation, the extension rods need to be removed in order to begin sampling.

Sampling:

Water sampling may be accomplished by using 3/8" tubing and a stainless steel PRT adapter as previously described. Once the PRT adapter has made connection with the Screen Connector, a vacuum may be applied to the top of the tubing. This will be done with a bladder pump.

If the PRT system is not used, Teflon or stainless steel tubing equipped with a bottom check valve may be used. The tubing is oscillated up and down and the water sample is pushed upward into the tubing by a ball that repeatedly lifts and seats. The tubing will begin to feel heavier as it

fills with several feet of water. It can then be lifted out of the probe rods, cut, and the water poured into a vial for analysis. This same tubing/check valve arrangement has been used to pump multi-liter samples from the probe rod. If the sampling tubing with the check valve arrangement is used, decontamination must be performed in accordance with SOP 4.

Removal:

When the sampling procedure is finished, the probe rods and sampler may be extracted. If the PRT system is used, remove the tubing by pulling up firmly on it until it disconnects from the PRT adapter down-hole. The PRT adapter will remain attached to the Screen Connector.

2.5.4 Monitoring Well Installation

The five proposed monitoring well locations (MW-9 through MW-13) will consist of three cluster well locations consisting of a shallow and deep well and two single well locations consisting of a shallow well. Thus, a total of eight new permanent monitoring wells (5 shallow and 3 deep) will be installed in 5 monitor well locations. These wells, in conjunction with two existing monitoring wells and one sump well, shall determine the horizontal and vertical extent of groundwater contamination in the vicinity of SMP.

The five proposed shallow wells will be installed utilizing 4 inch PVC casing and screens to a depth of approximately 20 feet. The 15 foot screened interval will extend from 5 to 20 feet. The three proposed deep wells will also be installed utilizing 4-inch PVC casing and screens to a depth of approximately 40 feet. The 10 foot screened interval will extend from 30 to 40 feet.

2.5.4.1 Monitoring Well Drilling Procedure (SOP 7)

1. At each well location, the boring will be drilled by hollow stem auger methods.
2. Formation samples will be continuously collected with a split-spoon sampling device and will be described by the on-site hydrogeologist using Universal Soil Classification System (USCS). The on-site hydrogeologist will prepare a well log for each well, which will be recorded on the Sample/Core Log. Split-spoon samples will be collected and screened with the PID/OVA. Data will be included in the Sample/Core Logs for each proposed well site. All drill bits, rods and other equipment that comes in contact with the formation will be steam cleaned before use and between drilling locations.
3. Drilling and well installation will be performed by a New York licensed well driller under the direction of a hydrogeologist. Only potable water from an approved source will be used (if necessary) as an aid in drilling boreholes by the hollow-stem auger method.

2.5.4.2 Monitoring Well Installation (SOP 8)

Monitoring well installation will proceed in accordance with the specifications provided below. The well screen, casing, and all backfill materials will be installed within the hollow-stem augers and the augers will be removed as well installation proceeds. In the event the augers break during removal, the well(s) will be acceptable provided the screen zone and the bentonite seal have been fully exposed.

1. Wells will be constructed of 4-inch diameter, PVC well casing and PVC screen. Well screens will be 15 feet in length across the water table and 10 feet for the deeper screen interval. Only new, undamaged, factory-wrapped and domestically manufactured well casing and screen, meeting ASTM water well standards, will be used. A vented PVC well cap and bottom cap will be installed on each wall. Wells will be completed approximately 2 feet above land surface.

2. All casing and screen sections will be flush-joint and internally threaded. Joints will be made up so that when tight, threads are buried within the casing walls. No couplings, solvents, glues, or chemical cleaners will be used in well construction.

3. The well casing and screen will be set 2 to 5 feet above the base of the borehole with bottom-capped 4-inch PVC riser to create a sump for collecting fines. After setting the well screen and casing, an appropriately sized gravel pack will be installed within the borehole annulus from the bottom of the borehole to approximately 2 feet above the top of the screen. A 1-foot thick fine sand (finer than gravel pack) layer will be emplaced in the annulus on top of the gravel pack.

4. A 100 percent polymer-free bentonite (thick slurry) will be installed by tremie pipe within the annular space above the fine sand layer. The bentonite seal will be a minimum of 2 feet thick. During installation, the tremie pipe will be gradually withdrawn from the annular space as the slurry is added.

5. A 95-percent/5-percent Bentonite grout will be installed within the annular space above the bentonite seal using a tremie pipe. In all wells, the grout will be installed to approximately 2 feet below land surface in one continuous operation.

6. Wells will be completed by cementing a steel protective casing with a hinged locking cover in place over the well, or by attaching cap to the steel surface casing. Protective casings will be 5 feet in length and installed to a depth of 2.5 feet below land surface. A cement pad constructed around the well casings will be sloped to permit drainage of rainwater away from the casing and well. Wells can also be completed using a flush-mount well box. The well box shall have the appropriate label and be of the bolt down type.

7. Upon completion of all well installation, a licensed surveyor will survey the new monitoring wells. The surveyor will determine measuring point elevation and ground elevation to the nearest 0.01 ft.

The construction of completed wells will be documented using a Monitoring Well Construction diagram. During soil boring advancement, the IT geologist will use a Visual Classification of Soils form (or similar form) to record lithologic data and general information regarding the boring. An example of these forms are included in Appendix A.

2.5.4.3 Monitoring Well Development (SOP 9)

Following installation, the monitoring wells will be developed by overpumping with a submersible pump and mechanical surging. All newly installed groundwater monitoring wells will be developed for the purpose of removing fine material from the gravel pack and re-establishing normal hydraulic conditions in the sampling interval. Well development will proceed under the supervision of a geologist. A minimum period of 24 hours is required between the construction and development of the well.

During well development, the discharge water will be monitored frequently (approximately every 15 minutes for free pumping wells or after every several well volumes for low yielding wells) for turbidity, specific conductivity, pH, and temperature using field instruments. Development and purge water will be processed through carbon filters and discharged to the ground surface. Development will continue until a turbidity of 50 Nephelometric Turbidity Units (NTU) or less is obtained with a calibrated NTU meter. If this is not practical, due to a naturally high content of fine particles in the native material, well development will continue for at least one hour. The stabilization of field parameter values will be used as an indication of when development is nearing completion. However, it cannot be arbitrarily assumed that if readings stabilize (i.e., three consecutive readings of all field parameters within 10%) the well is developed, nor can it be

anticipated if readings will ever stabilize when pumping water from a contaminated plume is heterogeneous in nature.

Efforts will be made to produce water for sampling that is as clear and sediment-free as possible. Field parameters will be recorded in the bound logbook. Water, dispersing agents, acids, disinfectants, or other additives will not be used during development. During development, water will be removed throughout the entire screened interval by periodically lowering and raising the submersible pump. Wells will not be sampled for a minimum of 2 weeks following development.

The development of newly installed wells will be documented using a Monitoring Well Development Form. An example of this form is included in Appendix A.

2.5.5 Monitoring Well Sampling

Groundwater samples will be collected from all existing and new monitoring wells during phase II of the investigation using conventional well sampling techniques. A discussion of sampling methodologies and techniques is provided below. Groundwater samples will be analyzed for TCL VOCs.

A minimum of two weeks will be required after development of the new wells before sampling of the new wells may proceed. Prior to sampling, a round of synoptic water levels will be taken in one day from all wells. In addition, water-level measurements will be collected at all accessible monitoring wells from Sunnyside Freight Railroad Yard and the Merit gasoline filling station.

Three to five well volumes will be purged using a submersible pump. Field measurements of specific conductance, pH, specific conductance, dissolved oxygen, turbidity, Eh and temperature will be collected.

Purge water will be discharged to the ground surface after passing through a carbon filter. Specific conductance, pH, specific conductance, dissolved oxygen, turbidity, Eh and temperature will be measured at the start of purging operations and after each purged volume. Stabilization of these parameters of +/-10% from successive purged volumes indicates that the groundwater within the well is at equilibrium with the aquifer. Pumps shall use ASTM 2239 polyethylene tubing dedicating to each well.

A disposable bailer suspended on polypropylene rope will be used to obtain the groundwater samples. Samples will be collected within three hours of purging. All samples will be sent to a CLP laboratory for the analyses for TCL VOCs.

2.5.5.1 Monitoring Well Groundwater Sampling Procedures (SOP 10)

The following procedure will be used for monitoring well groundwater sampling.

1. Wear appropriate health and safety equipment as outlined in the Health and Safety Plan. In addition, samplers will don new sampling gloves at each individual well prior to sampling.
2. Visually examine the exterior of the monitoring well for signs of damage or tampering and record in the field logbook.
3. Unlock well cap.
4. Take and record in field logbook PID and/or OVA readings from the well head.
5. Measure the static water level in the well with a decontaminated electronic water level indicator. The water level indicator will be rinsed with deionized water in between individual wells to prevent cross-contamination.
6. Calculate the volume of water in the well as follows:

   Volume (in gallons) = $0.163 \times Tr^2$

   Where, T - well depth (feet) - static water level (feet)

   r = well radius (inches)
7. Purge 3 to 5 volumes of water from the well. Purge water will be discharged to the site grounds after passing through a carbon filter. Use disposable rope and tubing for purging each well.
8. Measure and record time, temperature, pH, Eh, turbidity, DO and specific conductance as each volume of well water is purged.
9. After purging, allow static water level to recover to approximate original level.
10. Obtain sample from well with a disposable bailer suspended on disposable poly rope. The maximum time between purging and sampling will be 3 hours.
11. Sample for VOCs first by lowering the bailer slowly to avoid degassing, then collect other organic and inorganic samples by pouring directly into sample bottles from bailers.
12. Place analytical samples in cooler and chill to 4°C.
13. Decontaminate submersible pump using the procedure outlined in this document. Discard pump discharge line and bailer rope.
14. Re-lock well cap.

15. Fill out field notebook, sample log sheet, labels, custody seals and Chain-of-Custody forms.

The purging and sampling of each monitoring well will be documented using a Monitoring Well Sampling Log. An example of this form is included in Appendix A.

2.5.5.2 Water Level Measurement Procedure (SOP 11)

1. Clean all water-level measuring equipment using decontamination procedures.
2. Remove locking well cap, note weather, time of day, and date, etc. in field notebook, or on an appropriate form.
3. Remove well casing cap.
4. Monitor headspace of well with vapor detector (PID or OVA) to determine presence of volatile organic compounds, and record in field notebook.
5. Lower water level measuring device into well until the water surface is encountered.
6. Measure distance from water surface to reference measuring point on well casing, and record in field notebook.
7. Measure total depth of well and record in field notebook or on log form.
8. Remove all downhole equipment, replace well casing cap and locking steel caps.
9. Calculate elevation of water:

$$Ew = E - D$$

Where,

Ew = Elevation of Water
E = Elevation at point of measurement
D = Depth to Water

2.5.6 Aquifer Testing

Aquifer testing refers to the physical testing methods used to determine the hydrologic characteristics of confined or unconfined aquifers. The physical testing method to be employed at the SMP site is slug testing. Slug tests are conducted by instantaneously changing the water level in a well by adding, removing or displacing a known volume of water and then monitoring the water level recovery in the well.

A slug test is an aquifer test in which the water level in a well is instantaneously changed by removing, adding or displacing a known volume of water. The water level response in the well is monitored over a period of time in the slugged well. The water level response is generally proportional to aquifer transmissivity and hydraulic conductivity. To instantaneously "remove" or "add" a known volume of water, the insertion and removal of a solid slugging rod will be utilized at the SMP site.

Two types of slug tests will be performed at SMP. The first test will be a falling head slug test. The solid slugging rod will be inserted and the water level in the well will rise. The water level will then fall to pre-test static as the water displaced by the solid slugging rod is dissipated by the aquifer. The second type of slug test is the rising head test. After the falling head test has run to completion and the water level in the well is within 90 percent of the static water level, the slugging rod will be withdrawn and the water level in the well fall. The water level in the well will then rise to account for the simulated removal of a slug of water.

During slug testing, water levels will be measured with a water level indicator. In addition, pressure transducers with associated data loggers will be used to measure water levels as they can record a large number of measurements on a more rapid basis. The water level data collected with the water level indicator will serve as back-up data should the pressure transducers or data logger fail.

The procedures described below are written for use with a slugging rod and pressure transducer/data logger. The pressure transducer/data logger packages have the ability to be pre-programmed for the rate of water level measurements. To obtain frequent measurements during the initial portion of each slug test and less frequent measurements near the end of the test, the "logarithmic" recording function on the data logger will be used.

Five slug tests will be performed at each of the well locations (MW-9 through MW-13). At least two tests will be performed within the deeper aquifer. Field personnel will have the capability to briefly review data in the field in order to determine if the data collected is valid and accurate. In the event the data appears to be faulty (poor pattern), the data logger will be re-calibrated, setup, and the test repeated.

2.5.6.1 Slug Test Procedures (SOP 12)

The following procedure will be followed for conducting slug tests at selected monitoring wells.

1. Any newly installed wells must be developed prior to commencement of slug testing activities.
2. Inspect slug testing equipment to ensure that it is in working order.
3. Decontaminate all downhole equipment in accordance with the procedures outlined in this document.
4. Obtain a water level measurement and sound the bottom of the well. Record information in the field logbook.

5. Calculate the height of the water column. The height of the water column should be sufficient to totally immerse the slugging rod and also allow for concurrent use of a pressure transducer during the testing.
6. Connect the pressure transducer to the data logger and enter calibration coefficients into data logger. Lower the pressure transducer in the water column to a depth that will not interfere with the insertion or withdrawal of the slugging rod. Secure the transducer wire to well head using tape.
7. Turn on the pressure transducer/data logger and set the recording frequency according to the instruction manual. The frequency of measurement to be used is "logarithmic."
8. Measure the water level and record level to document change in head due to transducer.
9. Concurrently start the data logger and lower the slugging rod as quickly as possible to a depth below the static water level. Record the time of the initiation of the test.
10. Continue to monitor water level decline with the pressure transducer/data logger, taking periodic water level measurements with the water level indicator. Record all measurements and time.
11. The falling head slug test may be terminated once the water level has declined to within 90 percent of the pre-test static. Once the falling head test is terminated, take a physical water level measurement with the water level indicator. Record the measurement and the time.
12. Program the equipment for the rising head slug test. Use care not to delete previously recorded data from the data logger.
13. Re-measure the water level and record the measurement with the time.
14. Concurrently start the data logger and remove the slugging rod as quickly as possible from the well. Record the time of the initiation of the test.
15. Continue to monitor water level rise with the pressure transducer/data logger, taking periodic water level measurements with the water level indicator. Record all measurements and time.
16. The rising head slug test may be terminated once the water level has risen to within 90 percent of the pre-test static. Once the rising head test is terminated, take a physical water level measurement with the water level indicator. Record the measurement and the time.
17. The data will be reviewed in the field to ensure the validity of the test.
18. The falling and rising head tests may be repeated, as necessary.
19. Once all tests are completed, the downhole equipment may be removed, decontaminated, and transferred to the next well to be slug tested.

The slug testing data will be analyzed using computer software to estimate transmissivity and hydraulic conductivity.

2.6 Field Screening

Field screening for organic compounds will be performed for two reasons. First, the organic screening is part of the Health and Safety monitoring program. This will serve as an immediate indication as to organic hazards at the work location and will determine if personnel health and safety protection is adequate. Second, the results of the field screening will be used as criteria for selecting samples for chemical analysis. Screening with a Photo Ionization Detector (PID) meter will be performed during the field investigation during all sample collection activities.

2.7 Investigation Derived Waste (IDW)

2.7.1 Liquid Waste

Water collected from the decontamination pad and buckets used for decontamination of field sampling equipment will be collected into 55-gallon drums and suspended sediment will be allowed to settle. Following settling, the liquid portion will be pumped through carbon and spoiled to the ground surface. The sediment portion will be transferred to a 55-gallon drum containing decontamination sediment and handled as solid IDW.

All water generated during development and well sampling will be treated at the time of collection via carbon adsorption and spoiled to the ground.

2.7.2 Solid Waste

Subsurface soils generated during monitoring well installation and soil sampling activities and sediment collected from decontamination water will be stored in 55-gallon drums and staged at the well or a central staging area as solid IDW. The drums will be labeled. At the conclusion of well installation and soil sampling activities, one composite sample will be collected from these drums containing solid IDW to characterize this waste for disposal.

3.0 References

NIOSH, OSHA, USCG, USEPA, 1985, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities."

U.S. Environmental Protection Agency, (U.S. EPA), March 1990a, "CLP Organic Statement of Work."

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U.S.EPA, 1989, "Region II Quality Assurance (QA) Manual."

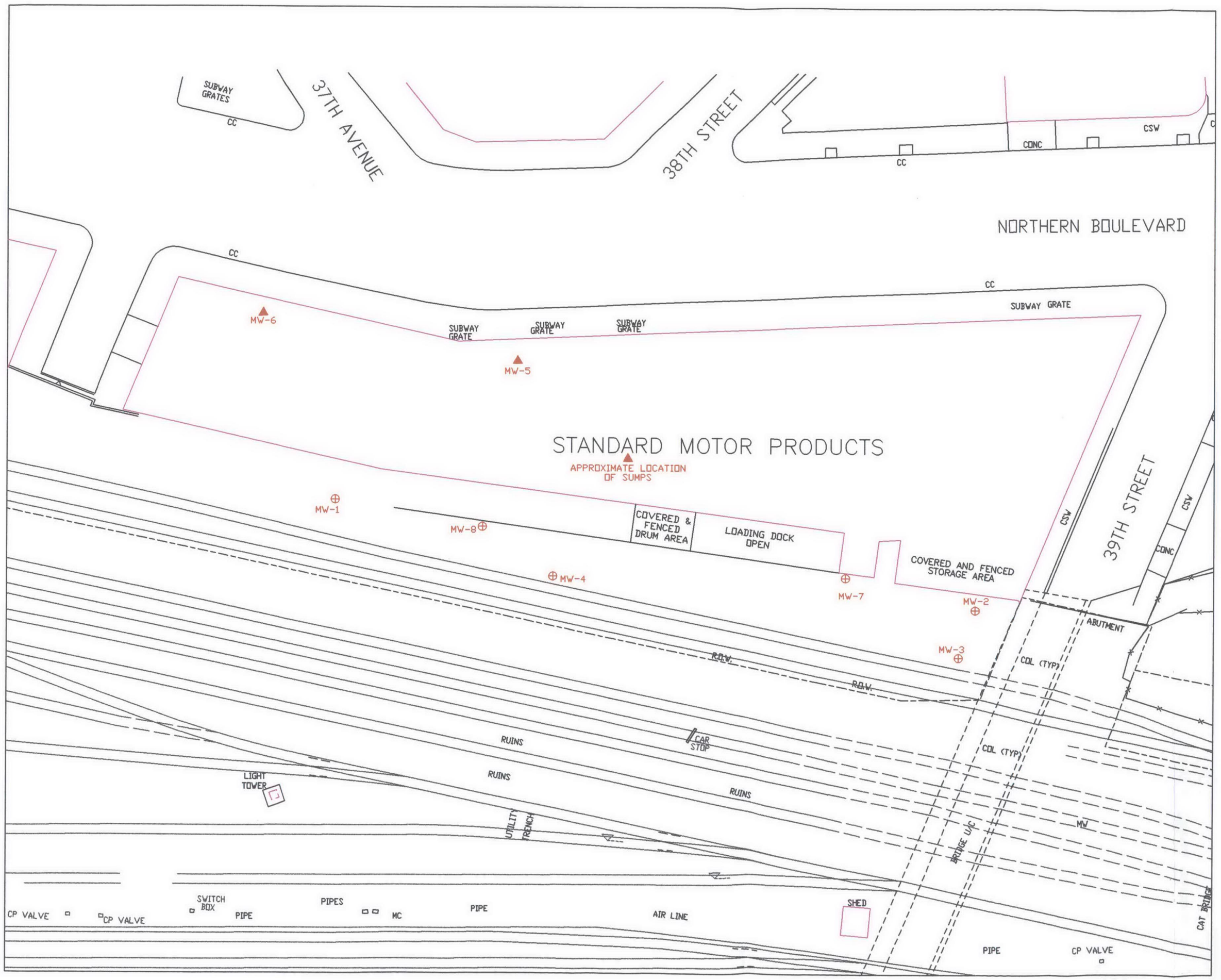
U.S.EPA, 1988, "The Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup."

U.S.EPA, December 1987a, "A Compedium of Superfund Field Operations Methods."

U.S.EPA, 1987b, "Data Quality Objectives for Remedial Response Activities," U.S. EPA/540/6-87/004.

Figures

FIGURES



LEGEND:

MW-7 ⊕ PREVIOUS MONITORING WELLS THAT CAN NOT BE LOCATED

MW-5 ▲ EXISTING WELL/SUMP

25 0 25 50

SCALE OF FEET

REV. NO.	DATE	DESCRIPTION OF REVISION	REV. BY	ENG	CHKD BY	APPVD BY
0	-/--/--	DEVELOPED DRAWING	-.-.-.			

PROJECT MANAGER: M. WATT | DRAWN BY: J.R.D. | DATE: 5/11/00

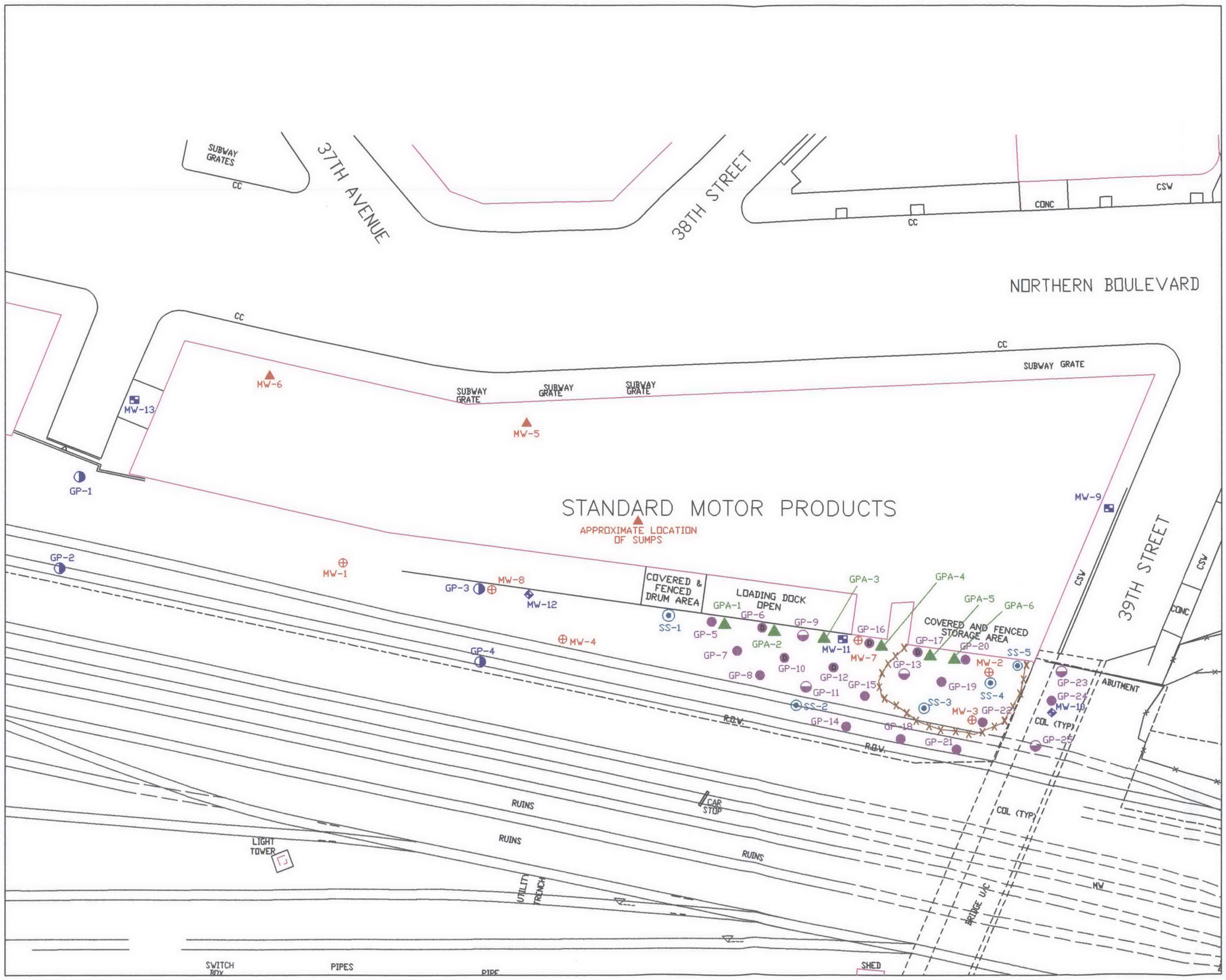
INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 1-1
SITE PLAN
FIELD SAMPLING PLAN

Prepared For:
STANDARD MOTOR PRODUCTS
LONG ISLAND CITY, NEW YORK

PROJECT NO.	FILE NO.	CHK'D:	DRAWING NUMBER	REV. NO.
775699	B3	ENG. APPVD.	775699-B3	

775699-B3.dwg 05/22/00 2:03pm J.R.D.



LEGEND:

MW-7	PREVIOUS MONITORING WELLS THAT CAN NOT BE LOCATED
MW-5	EXISTING WELL/SUMP
MW-11	PROPOSED DEEP/SHALLOW WELL CLUSTER (5-20' & 30-40')
MW-12	PROPOSED SHALLOW WELL (5-20')
SS-1	PROPOSED SURFACE SOIL SAMPLE BY HAND AUGER, (0-1'), 5 SAMPLES
GP-2	PROPOSED SHALLOW GEOPROBE SOIL SAMPLES (0-1' & 5-7'), 11 SAMPLE LOCATIONS
GP-1	PROPOSED DEEP GEOPROBE SOIL SAMPLES (0-1', 5-7',10-12' & 15-17' & 20-22'), 5 SAMPLE LOCATIONS
GPA-1	PROPOSED ANGLED GEOPROBE SOIL AND GROUNDWATER SAMPLES (SOIL: 5-7' & 10-12'), (GROUNDWATER: 5-7') 6 SAMPLE LOCATIONS
GP-1	PROPOSED DEEP GEOPROBE GROUNDWATER SAMPLE (5-7' & 35-37') 4 SAMPLE LOCATIONS
GP-11	PROPOSED DEEP GEOPROBE SOIL AND GROUNDWATER SAMPLES (SOIL: 0-1',5-7' & 10-12',15-17' & 20-22'), (GROUNDWATER: 5-7' & 35-37'), 5 SAMPLE LOCATIONS
x	APPROXIMATE VICINITY OF PREVIOUS EXCAVATED & STOCKPILED SOILS

25 0 25 50
SCALE OF FEET

REV. NO.	DATE	DESCRIPTION OF REVISION	REV. BY	ENG	CHK'D BY	APP'D BY
0	-/--/--	DEVELOPED DRAWING	-.-.-			

PROJECT MANAGER: M. WATT | DRAWN BY: J.R.D. | DATE: 5/11/00

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 2-1
PROPOSED SAMPLE LOCATIONS
FIELD SAMPLING PLAN

Prepared For:

STANDARD MOTOR PRODUCTS

PROJECT NO.	FILE NO.	CHK'D:	DRAWING NUMBER	REV. NO.
775699	B1	ENG. APP'D.	775699-B1	

775699-B1.dwg 05/22/00 3:26pm J.R.D.

APPENDIX
A

Appendix A
Example Field Log Forms

IT CORPORATION
A Member of The IT Group

FIELD ACTIVITY DAILY LOG

DAILY LOG				
	DATE			
	NO.			
	SHEET		OF	

PROJECT NAME:	PROJECT NO.:
FIELD ACTIVITY SUBJECT:	
DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:	
VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS:
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
IT PERSONNEL ON SITE:	
SIGNATURE:	DATE:

TAILGATE SAFETY MEETING

Division/Subsidiary _____ Facility _____

Date _____ Time _____ Job Number _____

Customer _____ Address: _____

Specific Location _____

Type of Work _____

Chemicals Used _____

SAFETY TOPICS PRESENTED

Protective Clothing/Equipment _____

_____

Chemical Hazards _____

_____

Physical Hazards _____

_____

Emergency Procedures _____

_____

Hospital / Clinic _____ Phone ( ) _____ Paramedic Phone ( ) _____

Hospital Address _____

Special Equipment _____

_____

Other _____

_____

ATTENDEES

NAME PRINTED	SIGNATURE

ing conducted by:

NAME PRINTED	SIGNATURE

Supervisor _____ Manager _____

36-8-85

INTERNATIONAL TECHNOLOGY CORPORATION

MONITORING WELL DEVELOPMENT RECORD

Project Name: _____ Project No.: _____

Well No.: _____ Date Developed: _____

Field Personnel: _____

Weather Conditions: _____

Well Development Method: _____

Total Well Depth:	Time Started:
Depth to Water Table:	Time Completed:
Height of Water Column:	Notes:
Well Diameter:	
Well Volume:	

Well Volume Removed	Temperature	pH	Specific Conductance	Turbidity
Initial Reading				

Comments: _____

Prepared by: _____

Signature: _____

Date: _____

FIGURE ITEES 0008–12

INTERNATIONAL TECHNOLOGY CORPORATION

OBSERVATION WELL REPORT

IT TERMINAL ____________________ PROJECT # ____________

____________ JOB LOCATION | ____________ WEATHER CONDITIONS | ____________ DATE

WELL #	DEPTH TO FLUID	DEPTH TO WATER	PRODUCT THICKNESS	COMMENTS

705-5-89

____
SYSTEMS TECHNICIAN

INTERNATIONAL TECHNOLOGY CORPORATION

WATER QUALITY
FIELD COLLECTION REPORT

PROJECT NAME _____

PROJECT NUMBER _____

DATE COLLECTED _____

TIME COLLECTED _____

COLLECTED BY _____

DATE RECEIVED BY LAB _____

RECEIVED BY _____

SAMPLE DESCRIPTION

SAMPLE NUMBER _____

SAMPLE TYPE _____

CHEM. _____ BACT. _____

METALS _____ D.O. _____

RAD _____ ORGANIC _____

NUTRIENTS _____

SAMPLING INFORMATION

AIR TEMPERATURE _____

WATER TEMPERATURE _____

DEPTH OF SAMPLE _____

LOCATION SKETCH

FIELD READINGS

	READ 1	READ 2	READ 3
pH			
Spec. Cond. μMHOS/cm @ 25°C			
D.O. MG/L			

METER CALIBRATION

pH TEMP.	pH STD.	pH STD.	D.O. TEMP.	D.O. @O	D.O. @STD	SPEC. COND. TEMP	SPEC. COND. LOW	SPEC. COND. HIGH
OK ✓			OK ✓			OK ✓		

REDOX:

SAMPLE _____ mv @ _____ °C ZOBEL _____ mv @ _____ °C

SAMPLE LOCATION _____

WEATHER CONDITIONS _____

ADDITIONAL REMARKS _____

TEST EQUIPMENT LIST

EQUIPMENT NUMBER	EQUIPMENT NAME

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BE LISTED.

INTERNATIONAL TECHNOLOGY CORPORATION

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

SAMPLE COLLECTION LOG

PROJECT NAME _____

SAMPLE NO. _____

SAMPLE LOCATION _____

SAMPLE TYPE _____

COMPOSITE _____ YES _____ NO

COMPOSITE TYPE _____

DEPTH OF SAMPLE _____

WEATHER _____

CONTAINERS USED	AMOUNT COLLECTED

COMMENTS:

PREPARED BY: _____

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER:	PROJECT NAME:	
BORING NUMBER:	COORDINATES:	DATE:
ELEVATION:	GWL: Depth Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST:	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS:		PAGE OF

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____

_____

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY SITE REPORT

JOB NAME: _____

JOB NUMBER: _____

SITE LOCATION: _____

DATE: _____

TIME FROM: _____ TO: _____

DAY NUMBER: _____

SITE CONDITIONS: _____

WEATHER CONDITIONS: _____

TEMPERATURE HIGH: _____

TEMPERATURE LOW: _____

DAILY WORK DESCRIPTION AND COMMENTS: _____

SCHEDULE AND PERFORMANCE STATUS: _____

ORDERS, DIRECTIVES, NOTICES AND PROTESTS: _____

ADDITIONAL-EXTRA UNANTICIPATED COST FACTORS: _____

CONDITIONS ENCOUNTERED: (Subsurface, Problems in Work Performance, etc. _____

DELAYS ENCOUNTERED: (Owner Caused, Weather, Strikes, etc. _____

OTHER IMPORTANT SITUATIONS AND DECISIONS: _____

LABOR SUMMARY: _____

EQUIPMENT: (Arrival & Departure, Breakdown, Repair Problems, etc.) _____

MATERIAL: (Major Arrival, Delivery Problems, etc.) _____

SUBCONTRACTORS: (Working on Job < Problems, etc.) _____

VISITORS ON SITE: _____

IT PERSONNEL ON SITE: _____

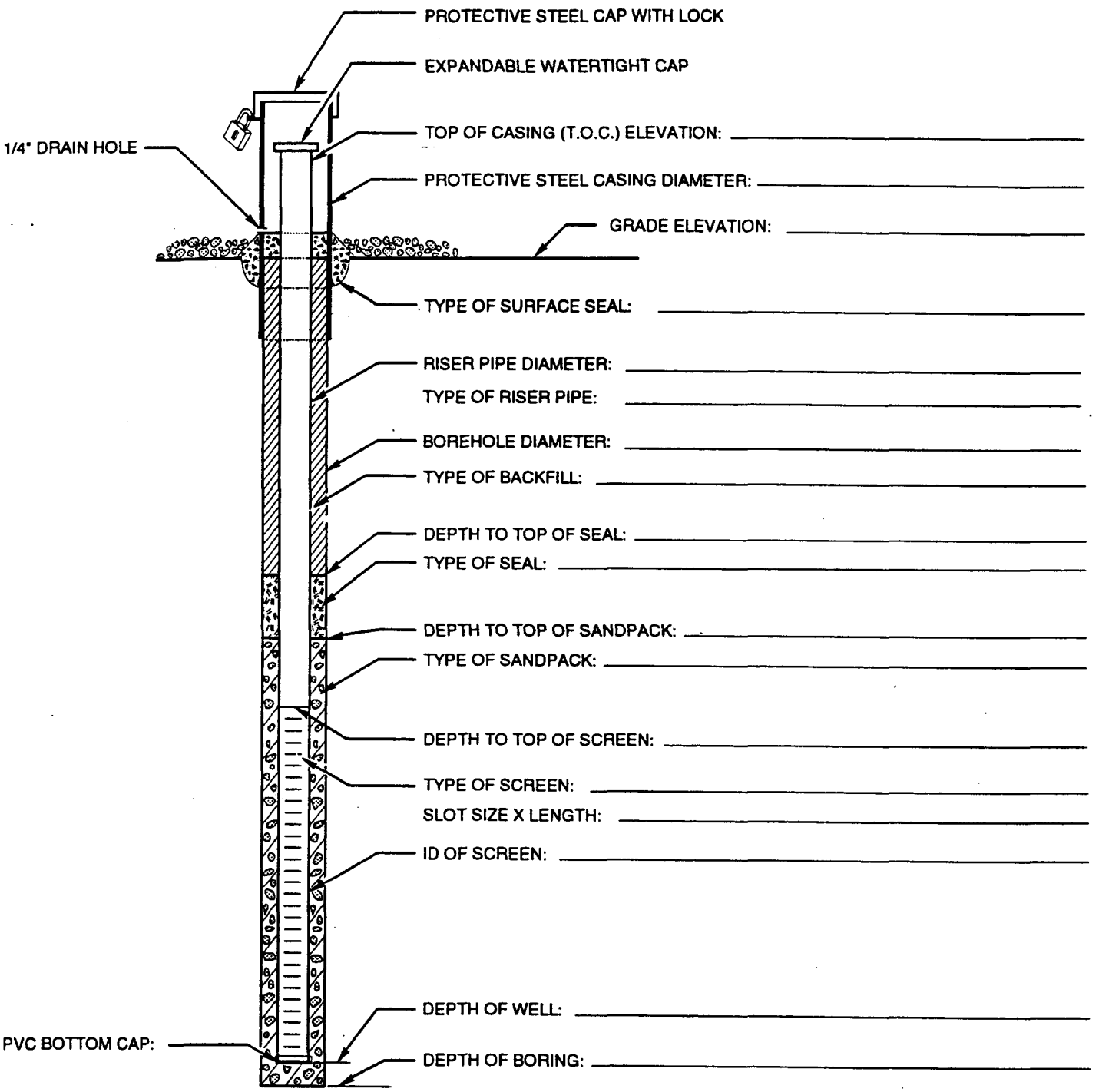
IMPORTANT TELEPHONE CALLS: _____

MEETINGS: _____

DISTRIBUTION:
SITE MGR
PROJECT MGR
CONTROLS MGR
MGR ADMIN/FINANCE
V.P. REMEDIATION
FILE COPY

SIGNED: _____ DATE: _____ _____

868-4-91



No.	DATE	REVISION/DESCRIPTION		NAME	DATE
			DESIGN BY:		
			DRAWN BY:	T. M.	10/2/94
			CHKD BY:		10/14/94
			ENGINEER:		
			APPVD BY:		10/14/94

INTERNATIONAL TECHNOLOGY CORPORATION

NOT TO SCALE

WELL CONSTRUCTION REPORT FORM
FOR OVERBURDEN WELLS

JOB No.

DATE

SHEET 1 OF 1

DWG No.

IT CORPORATION
A Member of The IT Group

Quality Assurance Project Plan
For
Remedial Investigation/Feasibility Study
Standard Motor Products Site

Site Code 2-43-014
37-18 Northern Boulevard
Long Island City, New York 11101

Revision 0

DRAFT

Prepared by:
IT Corporation
2200 Cottontail Lane
Somerset, NJ 08873

Prepared for:
Standard Motor Products, Inc.
37-18 Northern Boulevard
Long Island City, New York 11101

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
One Hunter's Point Plaza
47-40 21st Street
Long Island City, New York 11101

August 25, 2000

IT Project 775699

Standard Motor Products
Remedial Investigation/Feasibility Study
Quality Assurance Project Plan

Approval Sheet

Date: August 25, 2000

Title: Quality Assurance Project Plan

Organization: Standard Motor Products, Inc.
37-18 Northern Boulevard
Long Island City, NY 11101

Prepared by: IT Corporation
2200 Cottontail Lane
Somerset, NJ 08873

Approved by:

_____

Joseph M. O'Connell, Project Manager, NYSDEC/Region 2

_____

Thomas Jackson, Kelly Drye & Warren
Authorized Representative for Standard Motor Products, Inc.

_____

Maria Watt, P.E., IT Project Manager

_____

Charles W. Hunter, IT QA/QC Officer

Table of Contents

List of Tables

List of Appendix

List of Acronyms

AALA	American Association for Laboratory Accreditation
ASCII	American Standard Code Information Interchange
ASTM	American Society for Testing and Materials
°C	degrees Celsius
CAR	Corrective Action Report
CCB	continuing calibration blank
CCV	continuing calibration verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CF	calibration factor
CFR	Code of Federal Regulation
CIH	Certified Industrial Hygienist
CL	control limit
CLEAN	Comprehensive Long-Term Environmental Action
CLP	Contract Laboratory Program
COC	chain of custody
CVAAS	cold vapor atomic absorption spectroscopy
DOT	Department of Transportation
DQI	data quality indicator
DQO	data quality objective
DUSR	data usability summary report
EDD	electronic data deliverable
EDV	Environmental Data Validation, Inc.
EICP	extracted ion current profile
ELAP	Environmental Laboratory Approval Program
EPA	Environmental Protection Agency
FADL	Field Activity Daily Log
FS	Feasibility Study
FSP	Field Sampling Plan
g	gram
GC/MS	gas chromatography/mass spectroscopy

HCl	hydrochloric acid
HPLC	high-performance liquid chromatography
ICB	initial calibration blank
ICP	inductively coupled plasma
ICPAES	Inductively Coupled Plasma Atomic Emission Spectroscopy
ICPOES	Inductively Coupled Plasma Optical Emission Spectroscopy
ICS	interference check standard
ICV	initial calibration verification
ID	identification
IT	IT Corporation
LCL	lower control limit
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL	milliliter
MS	matrix spike
MSD	matrix spike duplicate
NA	not applicable
NCR	Nonconformance Report
NEESA	Naval Energy and Environmental Activity
NIST	National Institute of Standards and Technology
NIOSH	National Institute of Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List (Superfund)
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OSHA	Occupational Safety and Health Administration
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act

RF	response factor
RI	Remedial Investigation
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
SAP	Sampling and Analysis Plan
SI	Site Investigation
SMP	Standard Motor Products, Inc.
SOP	standard operating procedure
TCLP	Toxicity Characteristic Leachate Procedure
UCL	upper control limit
WP	work plan
µg/kg	microgram(s) per kilogram
µg/L	microgram(s) per liter
µg/mL	microgram(s) per milliliter
µL	microliter(s)

1.0 Introduction

IT Corporation (IT) is submitting this Quality Assurance Project Plan (QAPP) as part of the Sampling and Analysis Plan (SAP) in accordance with the March 30, 1998 Order on Consent between the New York State Department of Environmental Conservation (NYSDEC) and Standard Motor Products, Inc. (SMP). This Order on Consent stipulates requirements for the development and implementation of a Remedial Investigation/Feasibility Study (RI/FS) for the SMP site. This QAPP presents the organization, objectives, functional activities, and specific quality assurance and quality control (QA/QC) activities associated with the SAP for the remedial investigation. It describes the specific protocols that will be followed for sample handling and storage, chain-of-custody, and laboratory analyses. This plan also presents details regarding data quality objectives for the project, sampling and preservation procedures for samples collected in the field, sample documentation, sample packaging and shipping, and laboratory analytical procedures for all media sampled.

QA/QC procedures will be in accordance with applicable technical standards, EPA and NYSDEC requirements, government regulations and guidelines, and specific project goals and requirements. This QAPP, prepared by IT, is in accordance with the following EPA and NYSDEC guidance documents:

- *Data Quality Objectives Process for Hazardous Waste Investigations* (EPA, 2000)
- *EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5* (EPA, 1999)
- *Guidelines for Quality Assurance Project Plans, EPA/G-5* (EPA, 1998)
- *Region II CERCLA Quality Assurance Manual, Revision 1* (EPA, 1989)
- *Guidance for Data Quality Assessment, Practical Methods for Data Analysis, EPA QA/G-9* (EPA, 1996)
- *Guidance for the Data Quality objective Process, EPA QA/G-4* (EPA, 1994)

1.1 Project Objectives

The overall goals of the RI/FS process are to obtain data to define site physical characteristics, source areas and the extent of migration through potential pathways, in order to:

- Determine if these residuals present potential threats to human health and environmental receptors; and

- Develop and evaluate remedial alternatives, including the no-action alternative.

In order to achieve these goals in a cost-effective manner, the field investigation for the SMP RI/FS will be conducted in a two-phase approach. The first phase of the investigation involves the collection of soil samples using hand augers and via Geoprobe drilling to delineate the nature and extent of soil contamination. Groundwater samples will also be collected during the Geoprobe drilling. The second phase of the investigation will use the results of the Geoprobe groundwater samples to determine the locations for placement of groundwater monitoring wells and the screened interval depths, if necessary.

The objectives of the Phase I field investigation are to:

- Determine the nature and extent of surface soil contamination in the vicinity of the loading dock on the south side of the SMP facility;
- Determine the nature and extent of subsurface soil contamination in the vicinity of the loading dock on the south side of the SMP facility;
- Determine if soil contamination may extend from the vicinity of the loading dock under the loading dock and SMP facility; and
- Determine if groundwater contamination exists in the vicinity of the loading dock and beneath the SMP facility.

The major objectives of the Phase II field investigation are to:

- Install monitoring wells at locations and with screened intervals as determined via the results of the Phase I field investigations;
- Determine groundwater flow direction and characteristics;
- Further delineate groundwater contamination emanating from the soils in the vicinity of the loading dock on the south side of the SMP facility;
- Gather sufficient data to perform a qualitative human health exposure assessment; and
- Gather data to adequately evaluate remedial alternatives.

1.2 QAPP Organization

The project description and the site history are presented in Section 1.0 of the Field Sampling Plan (FSP) portion of this Sampling and Analysis Plan (SAP). The FSP also contains the detailed discussion of the sampling methods. This portion of the QAPP contains the following sixteen sections:

- Section 1.0 - Introduction

- Section 2.0 - Project Management
- Section 3.0 – Problem Definition/Background
- Section 4.0 – Project/Task Description and Schedule
- Section 5.0 – Quality Objectives and Criteria for Measurement Data
- Section 6.0 – Documentation and Records
- Section 7.0 – Sampling Requirements
- Section 8.0 – Instrument Calibration and Frequency
- Section 9.0 – Internal Quality Control Checks
- Section 10.0 – Calculation of Data Quality Indicators
- Section 11.0 – Corrective Actions
- Section 12.0 – Data Reduction, Evaluation, and Reporting
- Section 13.0 – Preventive Maintenance Procedures
- Section 14.0 – Performance and System Audits
- Section 15.0 – Quality Assurance Reports to Management
- Section 16.0 - References

2.0 Project Management

IT will furnish the necessary personnel, materials, equipment, services and facilities to perform the work contracted from SMP in Long Island City, NY. The work performed will include an RI/FS to address impacted soil and groundwater in the SMP facility.

2.1 Project Task/Organization

IT will provide a team of fully trained personnel. The team will include a multi-disciplinary technical staff (engineers, chemists, risk assessors, geologists, hydrogeologists, and administrative support personnel). This team will provide the support necessary to perform the RI/FS at the SMP site.

IT will also provide a management structure to ensure that personnel are properly trained and competent for the success of the SMP RI/FS. IT will ensure that any and all services or deliverables under this contract will be in compliance with Federal, State, and local laws, regulations, guidance and policies and changes or updates to these regulations, guidance and policies.

2.2 Organization and Responsibilities

This section discusses the general project organization and responsibilities within IT and the environmental laboratory that will provide analytical services under the contract. The qualifications of the independent data validator who will review and evaluate data and prepare the data usability summary report (DUSR) will also be presented in this section.

2.2.1 IT Corporation

Figure 2-1 presents the organizational structure and key personnel to effectively manage and execute the RI/FS project. All participants are directly subject to the requirements of this QAPP.

2.2.1.1 Project Manager

The Project Manager will be responsible for the successful execution of all aspects of the RI/FS project and will be directly responsible to SMP for all activities performed by IT and subcontractors. The Project Manager will be the prime point of contact with SMP and will have day-to-day responsibility for technical, financial, and scheduling issues. The Project Manager's responsibilities will include, but are not limited to the following:

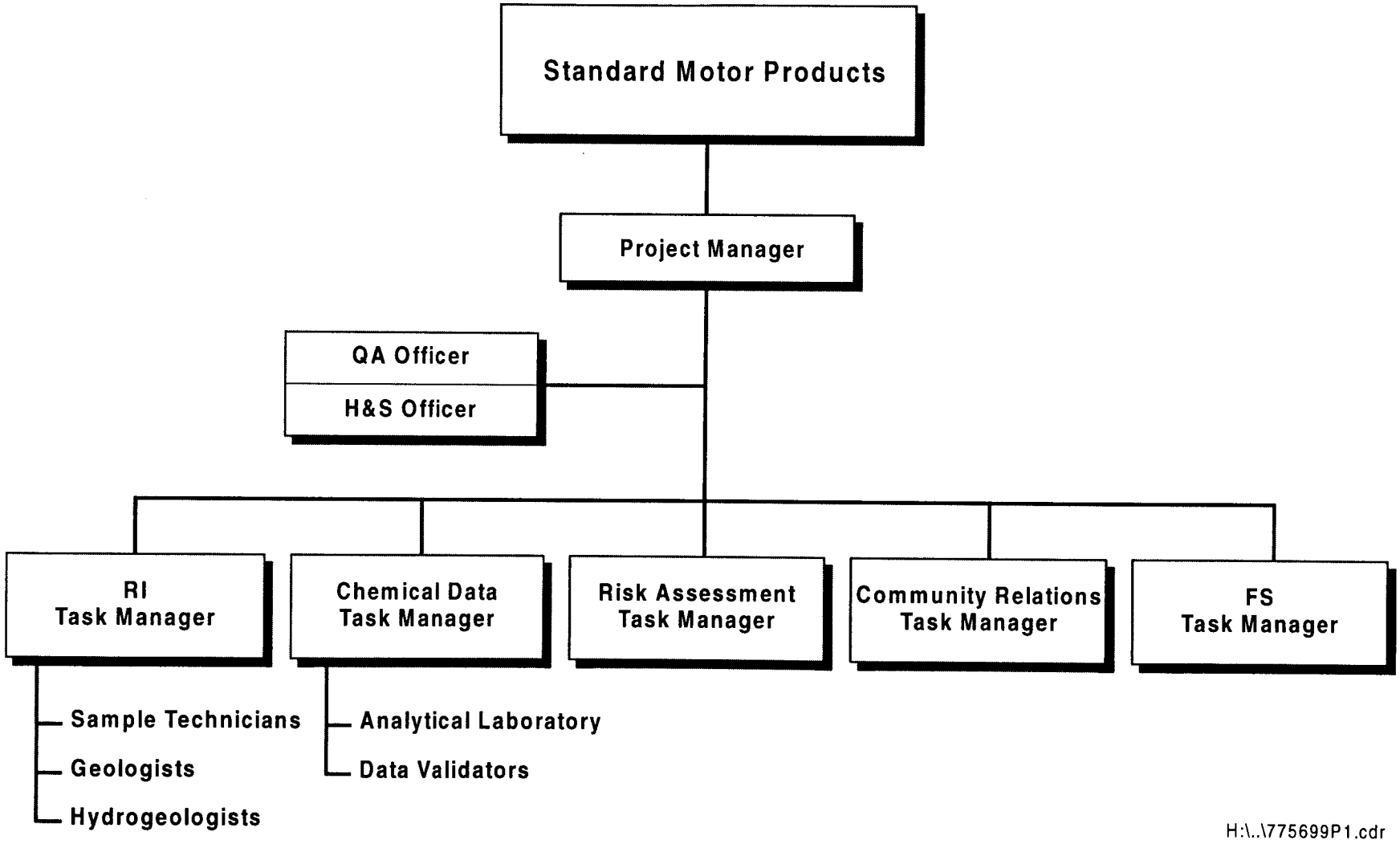


Figure 2-1
Standard Motor Products
Remedial Investigation/Feasibility Study
Project Operation

- Procurement and supervision of subcontractor service;
- Assignment of duties to the project staff and orientating the staff to the needs and requirements of the project;
- Coordinating the efforts of the Task Managers;
- Approval of project-specific procedures and internally prepared plans, drawings, and reports;
- Attending meetings, as appropriate, with SMP and the NYSDEC;
- Dissemination of project-related information from SMP;
- Serving as liaison between the project staff and other internal groups, such as QA and H&S;
- Serving as the "collection point" for project staff reporting of nonconformances and changes in project documents and activities;
- Determining the effects on the project from the reported changes and nonconformances, and determining the appropriateness for reporting such items to SMP;
- Notifying the Project and QA Group of nonconformances and changes; and
- Review of project documents.

2.2.1.2 Quality Assurance Officer

The QA Officer is responsible for development and revision of this QAPP and overseeing project QA/QC activities. The QA Officer will provide the necessary guidance to the project team on quality-related matters, perform the project audits, and develop audit reports. The QA Officer has the authority to identify quality problems; initiate, recommend, or provide corrective actions; and verify the implementation of the corrective actions. The QA Officer is outside of the project production chain; he facilitates executive-level awareness and has the authority to take actions independent of the Project Manager if deemed necessary to ensure the integrity and effectiveness of the QA/QC program.

2.2.1.3 Health and Safety Officer

The Health and Safety (H&S) Officer is responsible for directing the overall health and safety program and conducting periodic audits to ensure compliance with the Health and Safety Plan. He assists in the development of specific health and safety plans, provides oversight and technical assistance to the implementation of the plans in the field, coordinates appropriate training programs, and maintains health and safety records. He is outside of the project production chain and can take actions independent of the Project Manager, if required, for protecting the health and safety of project personnel.

2.2.1.4 Task Managers

For this project, five Task Managers (RI, Chemical Data, Risk Assessment, FS and Community

Relations) will report to the Project Manager to execute the principal technical tasks and to ensure that multiple tasks can be concurrently performed. Task Managers are considered a critical position in IT's management structure. They are responsible for the successful schedule and budget performance on all RI and FS activities, including work plan development and implementation, day-to-day activities of the technical staff and subcontractors, technical quality of the work, and any required technical documents.

2.3 Analytical Laboratory

Analytical laboratory support specific to the SMP's investigations will be provided by Severn Trent Laboratory (STL), located in Edison, New Jersey. STL is a New York State Department of Health (NYSDOH), Environmental Laboratory Approval Program (ELAP) certified laboratory. A copy of STL's NYSDOH ELAP certification is presented in Appendix A. STL's Quality Assurance Manual is provided in Appendix B.

STL's Organization charts is presented in STL's QA Manual (Appendix B). The responsibilities of key personnel are described in the following subsections.

2.3.1 Laboratory Quality Assurance Manager

The Laboratory QA Manager is responsible for the laboratory QA/QC in accordance with the requirements of this QAPP and in conjunction with the laboratory's established laboratory QA Program. This individual will be responsible for documentation of the following:

- accepting or samples received by the laboratory are analyzed in accordance with required methodologies;
- instrument calibrations are performed properly and documented;
- field and internal laboratory QC samples are analyzed and documented; and
- all analytical results for both field and QC samples are reported to the contractor in an acceptable electronic format capable of being transmitted into a database.

The QA Manager is also responsible for processing laboratory Non-Conformance Reports (NCRs) in a timely manner and for implementing Corrective Action Report recommendations and requirements.

2.3.2 Laboratory Project Manager

It will be the responsibility of the analytical laboratory to assign one Project Manager (and backup) who will be IT's single point of contact. The Laboratory Project Manager will be responsible for:

- initiation and maintenance of the service contract with IT on individual job tasks;
- preparation of all laboratory-associated work plans, schedules, and manpower allocations;
- provision of day-to-day direction of the laboratory project team including analytical;
- department managers, supervisors, QA personnel, and data management personnel;
- coordination of all laboratory related financial and contractual aspects of the project;
- provision of formatting and technical review for all laboratory reports;
- provision of day-to-day communication with the contractor;
- provision of final review, approval on all laboratory analytical reports to the contractor; and
- respond to all post-project inquiries.

2.3.3 Laboratory Director

The Laboratory Director is responsible for all aspects of laboratory operations to ensure timely completion of all contractual obligations. In conjunction with the Technical Director, responsibilities include:

- Monitor the progress of sample preparation and analysis;
- working with the Laboratory Project Manager to ensure all project objectives are met;
- provision of guidance to analytical department managers; and
- facilitation of transfer of data produced by the analytical departments to the report preparation and review staff for final delivery to the client.

2.3.4 Laboratory Analysis Team Leaders

The responsibilities of each Analysis Team Leader include the following:

- coordination of all analytical functions related to their specific analytical areas;
- provision of technical information to and oversight of all analysis being performed;
- review and approval of all analytical results produced by their specific analytical area of expertise; and
- maintenance of all analytical records and information pertaining to the analysis being performed.

2.3.5 Laboratory Staff Chemists and Technicians

The responsibilities of the Staff Chemists and Technicians include the following:

- perform assignments made by the their respective team leaders;
- maintenance, repair, and calibration of equipment assigned to them;
- extraction, digestion, cleanup and preparation of samples extracts for instrumental analysis; and
- sample analysis and review of the work accomplished.

2.3.6 Laboratory Sample Management Team Leader

The Sample Management Team Leader shall be responsible for the receipt of all environmental samples and handle them in such a manner that the external and internal chains-of-custody are not violated. This individual is responsible for the handling, control, inspection, safekeeping and disposal of all environmental samples following receipt by the analytical laboratory. Additionally, this person is responsible for defining sample supply requirements and providing them to the client in a timely manner.

2.3.7 Laboratory Data Management Team Leader

The laboratory shall maintain a full time Data Management Team Leader, or equivalent, whose responsibilities include: support and maintenance of the laboratory database; initiate the creation of IT's compatible electronic data; and serve as the single point-of-contact for transmission of the electronic data deliverables and corrections of versions with problems.

2.3.8 Technical Backup for All Positions

The analytical laboratory shall perform sufficient support training of backup personnel, so that there are no instances whereby vacations, illness, or excused absences interfere with the acceptable handling and turnaround of the contractor's environmental samples.

2.4 Data Validator

Environmental Data Validation, Inc. (EDV) will provide the independent data review and evaluation of the analytical data to determine whether the analytical data meets the SMP RI/FS specific criteria for data quality and data use. EDV is a certified, small, woman-owned, disadvantaged data validation and consulting business established in 1990. EDV provides a full range of data validation services for organics (including dioxins and furans), inorganics, ecological and radiological samples for matrices such as air, oil, water, tissue, sludge, and soil. EDV has prepared DUSRs for NYSDEC submittals and also undertaken comprehensive professional assignments on various types of projects such as CERCLA, Comprehensive Long-

Term Environmental Action, Special Analytical Service, National Pollutant Discharge Elimination System (NPDES) and Resource Conservation and Recovery Act (RCRA).

Its principal Maxine Walters, has over 13 years experience performing data validations for chemical and radiological data. All data validators at EDV hold a Bachelor of Science degree, and have extensive hands-on laboratory and instrumentation experience in organic, inorganic and radiological chemistry. EDV, Inc., has over 45 years combined experience in the areas of sample preparation, laboratory analysis and data validation for chemical and radiological parameters. Specific client experience includes: consulting work with universities and private sector clients; environmental work with US Naval Energy and Environmental Support Activity (NEESA) - Navy CLEAN Program, Army Corps of Engineers, NYSDEC, State of PA, State of WV, Air Force Center for Environmental Excellence (AFCEE), USEPA Regions I, II, III, IV, and V, and many private sector clients.

3.0 Problem Definition/Background

IT will furnish the necessary personnel, materials, equipment, services and facilities to perform the work contracted by SMP. Work performed under this contract will be performed as directed by Mr. Thomas Jackson, Kelly, Drye & Warren, an authorized representative for SMP.

As stated in Section 2.1, IT will assemble a team of fully trained personnel to provide the support and necessary actions to complete the RI/FS. IT will also provide a management structure that ensures personnel are available and competent to complete the remediation tasks.

3.1 Background

The SMP site, located at 37-18 Northern Boulevard in Long Island City, NY, is located in an urban and industrial area. This SMP's Long Island City facility manufactures car parts and is SMP's corporate headquarters. Bordering the site are Northern Boulevard to the north; Sunnyside Freight Railroad Yard to the south; 39th Street, an automobile dealership and a Merit gasoline filling station to the east; and commercial and industrial properties to the west.

Environmental media concern at the SMP site is groundwater and the soil in the vicinity of the loading dock on the south side of the SMP facility. Volatiles have been identified to be the major contaminants in the soil and groundwater. An Order on Consent between the NYSDEC and SMP was issued on March 30, 1998. This Order on Consent requires the development and implementation of an RI/FS for the SMP site. IT has been contracted to perform the RI/FS. Details of the site background and history are presented in Section 1.0 of the FSP.

3.2 Definition of Problem

The goal of this work effort is to determine the nature and extent of surface soil and subsurface soil contamination in the vicinity of the loading dock, and further delineate groundwater contamination emanating from the soils in the vicinity of the loading dock. The potential impact of the soil and groundwater contamination on human health will also be qualitatively assessed. Finally, an FS will be conducted to evaluate alternatives to cleanup the SMP site.

4.0 Project/Task Description and Schedule

The field activities will be conducted in a phased approach. The first phase of the investigation involves the collection of soil samples using hand augers and via Geoprobe drilling to delineate the nature and extent of soil contamination. Groundwater samples will also be collected during the Geoprobe drilling. After reviewing the findings of the first phase investigation, specifically, the results of the Geoprobe groundwater, the second phase of the investigation will be conducted to determine the locations for placement of groundwater monitoring wells and the screened interval depths, if necessary

When the nature and extent of the soil and groundwater contamination is defined, a qualitative human health exposure assessment will be performed and remedial alternatives will be evaluated for the SMP site.

4.1 Analytical Measurements

Previous site investigations have identified VOCs to be the major contaminants in groundwater and in the soil adjacent to the loading dock. The Work Plan and the FSP have detailed description on sample collection and analytical measurements. The samples collected will be analyzed for various analytical parameters (see Table 7.1), after which the analytical data will be reviewed and evaluated for quality objectives as per Section 5.0 prior to the determination of the natural and extent of contamination at the SMP site.

All soil samples collected will be analyzed for TCL volatile organics, 10 percent of soil samples for TCLP, and 20 percent of soil samples for TOC analysis. All groundwater will be analyzed for TCL volatile organics. The analytical methods and protocols for analytical measurements are detailed in Section 5.0 of this QAPP.

4.2 Assessment Techniques

Throughout the project duration data will be assessed to determine system specifications, efficacy, and performance goal achievement. Assessment of overall data quality will be performed at all steps. This assessment will be completed jointly by the RI Task Manager and the Chemical Data Task Manager, and will consist of sampling/site documentation review and data evaluation of laboratory data results. The RI Task Manager will track data value treads to determine the extent of contamination in the soil and groundwater at the SMP site.

4.3 Schedule

The project schedule is defined in the project Work Plan.

5.0 Quality Objectives and Criteria For Measurement Data

The EPA specifies the following five major characteristics of data quality that must be addressed in environmental sampling and analytical projects:

- Accuracy – The degree of agreement of a measurement (or measurement average) with an accepted reference or true value. It is a measure of system bias. It is usually expressed as the difference of measured from true values or as a percentage of the difference.
- Precision – A measure of agreement among individual measurements of the same property under similar conditions. It is expressed in terms of percent difference between replicates or in terms of the standard deviation.
- Completeness- A measure of the amount of valid data obtained compared to the amount expected to be collected under normal correct conditions. It is usually expressed as a percentage. The completeness objective will be calculated on those samples reaching the laboratories intact, not the total number of samples collected, since breakage during transit can occur for which the laboratories are not responsible.
- Representativeness – Expresses the degree to which data accurately and precisely represents a characteristic of a data population, process condition, a sample point, or an environmental condition.
- Comparability – Expresses the confidence with which one data set can be compared to another. To achieve comparability in this project, the data generated will be reported using units of micrograms per liter or micrograms per kilogram. Analytical results will be comparable to that produced from similar laboratories using the same instrumentation and methodology. Standard reference materials will be used to document traceability of calibration standards, and allow comparison of data across laboratories performing analysis.

The QA objectives for chemical and physical measurement data for this project in terms of precision, accuracy, and completeness are listed in Tables 5-1, 5-2 and 5-3.

The frequency of quality control sample analysis will be one field blank, one field duplicate, one trip blank (for volatile analysis only) blank, one matrix spike and one duplicate per analytical batch. A batch will not exceed twenty field samples. Exceptions may be made when there is

insufficient sample or other analytical limitations (i.e., matrix interferences). The frequency of quality control samples may be increased but may not be less stringent than specified above.

5.1 Data Quality Objectives

Data Quality Objectives (DQOs) are qualitative and quantitative statements derived from the DQO process that specify, from an end user's perspective, the quality of data required to support decisions made during investigative and/or remedial activities. The DQOs specify the maximum level of uncertainty the user is willing to accept, while not affecting the accuracy of project decisions. DQOs are developed prior to data collection and should be specified for all data collection activities that take place.

5.1.1 Project Data Quality Objectives

Specifically, the overall project objectives with respect to data quality are to obtain analytical data, which are technically sound and legally defensible. This is to be accomplished through the proper implementation of the field sampling procedures, chain-of-custody (COC) documentation, controlled laboratory analysis, and review or validation of the reported data prior to their use. The necessary procedures for field sampling, COC, laboratory analysis, reporting of data and corrective actions are discussed in other sections of this QAPP.

General project objectives are to:

- Provide data of sufficient quality and quantity to support the ongoing remedial investigation and feasibility studies;
- Provide data of sufficient quality to meet NYSDEC and Region II EPA Federal requirements;
- Ensure samples are collected and analyzed in accordance with the approved procedures established within this document; and
- Specify the necessary QA/QC procedures for all environmental activities to meet NYSDEC requirements.

5.1.2 Data Quality Objectives Process

The Data Quality Objectives (DQO) process IT will employ consists of seven steps. The output from each step influences the choices that will be made later in the process. This seven-step DQO process will ensure that the type, quantity, and quality of environmental data used in the

decision-making process for this project will be appropriate for the intended application. Each of the seven steps is described briefly below.

- Step 1 – State the Problem: Concisely describe the problem to be studied. Review prior studies and existing information to gain a sufficient understanding to define the problem.
- Step 2 – Identify the Decision: Identify what questions the study will attempt to resolve and what actions may result.
- Step 3 – Identify the Inputs to the Decision: Identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statement.
- Step 4 – Define the Study Boundaries: Specify the time periods and spatial area to which decisions will apply. Determine when and where data should be collected.
- Step 5 – Develop a Decision Rule: Define the statistical parameter of interest, specify the action level and integrate the previous DQO outputs into a single statement that describes the logical basis for choosing among alternative actions.
- Step 6 – Specify Tolerable Limits on Decision Errors: Define the decision-maker's tolerable decision error rates based on a consideration of the consequences of making an incorrect decision. A decision error rate is the probability of making an incorrect decision based on data that inaccurately estimate the true state of nature.
- Step 7 – Optimize Design: Evaluate information from the previous steps and generate alternative data collection designs. Choose the most resource-effective design that meets all DQOs.

The first six steps will be completed before the planning team develops the data collection design. The final step will depend on the output of the first six steps.

6.0 Documentation and Records

6.1 Training and Certifications

IT will furnish fully trained and experienced personnel to successfully complete the tasks required under the SMP RI/FS contract. IT has established a comprehensive training program to ensure that personnel are qualified to perform their responsibilities and assigned tasks. The process and requirement for training utilizes job task analyses to formulate training baselines and ongoing need assessments for identifying training needs. Both required training and employee development training are factored into Individual Development Plans and schedules to ensure that training priorities are established and satisfied.

Required training is administered commensurate with the individual's position and job function. Specific areas of training provided by IT include, but not limited to, the following:

- New Employee Orientation
- Environmental Sampling Training
- Data Evaluation Training
- Data Management Training
- Procurement Training
- Health and Safety Training
- Employee Development
- Operations
- Computer System/Programs

IT personnel performing specific tasks or functions related to data collection and data quality must have the requisite education, training and/or experience to perform their job.

6.2 Documentation and Records

This section defines which records are critical to the success to the project and what information must be included in analytical reports. This section also specifies the proper data reporting format and the document control procedures. This will facilitate clear, direct communication of the data and its conclusions and be a resource document for the design of future site activities.

6.2.1 Information Included in the Reporting Packages

The selection of which records are to be included in a data reporting package must be determined based on how the data will be used. Data generated for no-critical project decisions may require different supporting QA/QC documentation from data generated for critical project decisions or data to be used for Litigation. When possible, field and laboratory records should be integrated to provide a continuous track of reporting. The following are typical records required for Non-critical Decisions, Critical Decisions and Litigation for inclusion in the data reporting packages.

6.2.1.1 Field Operating Records

Typical field data records to be included with the project files are listed in Table 6-1.

6.2.1.2 Laboratory Records

Table 6-2 lists the laboratory-specific records that should be included with the analytical deliverables for non-critical project decisions, critical project decisions, and litigation.

7.0 Sampling Requirements

All sampling activities including collection, preservation, packaging, handling, labeling, shipping, and storage will be performed in accordance with EPA, National Institute of Occupational Safety and Health (NIOSH), American Society for Testing and Material (ASTM), Department of Transportation (DOT), and Occupational Safety and Health Administration (OSHA) protocols. The scope and methodology of the site exploration and sampling activities are fully described in the FSP. These activities include:

- Sample tracking
- Mobilization and demobilization
- Quality assurance and quality control
- Soil sampling
- Monitoring well installation
- Water level measurement
- Groundwater sampling

Requirements for sample identification, sample container requirements, and holding times, packaging and shipping, sample documentation, and field sampling QA/QC are detailed in the FSP.

The locations of the sampling stations and sample media to be collected during these investigations are presented in Section 2.0 of the FSP.

7.1 Sample Identification, Handling, and Shipping

7.1.1 Sample Identification

All samples will be assigned a unique identification code consisting of two parts. These parts generally consist of the project, sample type, boring number or location, and additional identification codes (as needed). Examples of the codes used for each sample type are identified in Section 2.0 of the FSP.

7.1.2 Container, Preservation, and Holding Time

Table 7-1 presents project-specific information, including number of samples, laboratory methods of analysis, sample preservation, sample containers and project-specific holding times.

The specific number of containers required for this study will be estimated and supplied by the analytical facilities. Additional sample volumes will be collected and provided, when necessary, for the express purpose of performing associated laboratory QC (e.g., laboratory duplicates).

All sample containers will be provided by STL, the analytical support laboratory. They will also provide the required types and volumes of preservatives with containers when they are delivered to the contractor. Temperature preservation will be maintained at 4EC (∀2EC) immediately after collection and will be maintained within this temperature range until the samples are analyzed. In the event that sample integrity, such as holding times, cooler temperatures, etc., is compromised, re-sampling will occur as directed by the NYSDEC/Region II Project Manager.

7.1.3 Chain-of-Custody Protocol and Shipping Requirements

Chain-of-custody (COC) records are prepared for all samples collected, regardless of the reason for sample collection. The record form is initiated at the point of sample collection and maintained with the samples during transfer to a laboratory providing the sample containers. The Chemical Data Task Manager will notify the laboratory of the anticipated schedule of upcoming field sampling activities. This notification will included information concerning the number and type of samples, as well as the anticipated date(s) for shipment of samples to the laboratory. The laboratory will be responsible for supplying insulated containers (typical coolers) for storing and shipping the samples.

The COC, sample packaging, and shipment procedures during the field activities and laboratory operations summarized below will ensure that samples will arrive at the laboratory with the COC intact and trace the path of the initial sample bottles and preservation at the laboratory to the field for sample collection.

7.1.3.1 Field Chain-of-Custody Procedures

The field custody procedures for sample container receipt, documentation, transfer custody, and shipment are discussed in the following paragraphs.

Field Procedures: Field technicians receiving the sample containers check each cooler and inspect the contents for breakage upon receipt. All sample bottles within each shipping container are individually labeled with an adhesive identification tag provided by the laboratory.

Field Activity Daily Logs/Documentation: When a sample is collected or a measurement is made, a detailed description of the location shall be recorded on a Field Activity Daily Log (FADL) or bound logbook. An example of which may be found in Appendix A of the FSP. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume, and number of containers. A sample identification number will be assigned before sample collection. Field QA/QC samples, which will receive entirely separate sample identification numbers, will be noted under sample description. Equipment employed to make field measurements will be identified along with their calibration dates.

Transfer of Custody and Shipment Procedures: Following Sample collection, the field technician properly completes the COC for each sample. A properly completed COC form shall accompany all samples collected for chemical analysis. The sample numbers and locations will be listed on the COC form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record will document transfer of custody of samples from the sampler to another person, to the laboratory, or to/from a secure storage area.

Once the sample containers are filled, they are immediately placed in the cooler with sealed bags of ice ("wet ice") or synthetic ice packs ("blue ice") to maintain the samples at 4°C (±2°C). The COC forms are then signed and placed in a sealed plastic bag in the cooler. The shipping containers are then closed and properly sealed and the cooler is shipped to the laboratory via an overnight courier or hand delivered under appropriate COC procedures. Whenever possible, the samples will be shipped within 24 hours of collection. Samples will not be shipped later than 48 hours following collection. Each individual having access to the samples signs and dates the record form, with the form being completed upon receipt in the laboratory. All samples are delivered via commercial carrier to the appropriate laboratory. The commercial carrier's waybill acts as an extension of the COC as along as custody seals on the shipping containers remain intact. Upon receipt of the coolers at the laboratory, the contents of coolers are inspected and the COC signed, thus accepting custody of the samples.

7.1.3.2 Laboratory Chain-Of-Custody Procedures

The laboratory COC procedures for sample receipt and log-in, sample storage, tracking during sample preparation and analysis, and laboratory storage of data are discussed in the following paragraphs.

Cooler Receipt Checklist: The condition of shipping coolers and enclosed sample containers will be documented upon receipt at the analytical laboratory. This documentation will be accomplished using the cooler receipt checklist. A supply of these checklists will be provided to the subcontracted laboratory at the start of the project.

Laboratory Internal Chain of Custody: It is expected that the laboratory will maintain an internal chain of custody to track the location and possession of all samples at all times during the analytical process. The internal chain shall be initiated by the sample management team and continue with the request by the preparation or analytical section and shall follow the sample throughout its lifetime in the laboratory. The internal COC shall be an integral portion of the final analytical data package. Signatures from and to sample receiving should always be the beginning and end of an internal COC. Sample container or sample disposal must be documented on a COC-like form.

7.2 Field QA/QC Samples

The field QA/QC samples are analyzed for the purpose of assessing the quality of the sampling effort and of the reported analytical data. QA and QC samples to be used for this project are field duplicates, trip blanks (for volatile analysis only), field blanks, and MS/MSD. These QA/QC samples will be collected at a ratio of 1:20 per field sample. In other words, for every 20 field samples collected, one field blank, one field duplicate, one trip blank (if applicable), and one MS/MSD will be collected.

7.2.1 Trip Blanks

A trip blank will accompany each cooler of samples sent off-site for volatile analysis and will be analyzed for TCL volatiles in groundwater samples. This serves as a check on the level of cross contamination which may occur during shipment and/or storage. Trip blanks are to be prepared by the laboratory and consist of analyte free water provided by the off-site laboratory. Analyte free water is defined a water that has been treated and analyzed to confirm that none of the

analytes of concern are present. Certifications for analyte free water are made available upon request.

7.2.2 Field Blanks

Field blanks (equipment rinsate samples) will be used to verify that cross-contamination is not occurring. These samples will be collected at a frequency of on per day, per matrix. Equipment rinsate samples will be collected by pouring analyte-free water over the decontaminated sampling surface and collecting the runoff in the appropriate sample container(s).

7.2.3 Field Duplicates

Field duplicates are used to assess the precision (reproducibility) of the sample collection process. One field duplicate will be collected for every 20 samples collected.

7.2.4 Matrix Spike/Matrix Spike Duplicates

Additional sample material will be collected in the field to provide sufficient volume of the sample matrix for the laboratory to run the required matrix spike/matrix spike duplicate (MS/MSD) in their batch QC samples. MS/MSD will be field generated to support the precision of field sampling and analytical techniques. One MS/MSD will be analyzed for every 20 samples collected for TCL volatile analysis.

8.0 Instrument Calibration and Frequency

Instrumentation both in the field and at the laboratory must be calibrated to ensure accurate results. Calibrations must be verified at defined times and performance criteria established.

8.1 Calibration Standards

All standards used to calibrate field monitoring instrumentation must be certified by the manufacturer. Purchased standard solutions for field and laboratory uses must be traceable to National Institute of Standards and Technology (NIST) materials and must be obtained with their accompanying documentation. Any standards made from neat materials shall be made from materials of at least 96 percent purity using balances with readability of at least 0.001 gram.

All standards made from neat materials shall be made based upon weight. Standards from liquid neat materials shall be made by adding the liquid to a tared volumetric flask at least half-filled with solvent and then adjusting the final volume. Standards shall not be made based upon density. All standards and dilutions shall be made from pesticide or purge & trap grade solvents or ASTM Type II reagent grade water.

All standards shall be assigned unique tracking numbers and be entered into a bound standards notebook. All standards must be labeled with:

- Standard number
- Description/concentration
- Initials of person who made the standard
- Date standard was made
- Expiration date

Standards shall be stored and maintained in accordance with Table 8-1.

8.2 Calibration of Instrumentation

Calibration of laboratory equipment will be based on the laboratory's approved written SOPs. Records of calibration, repairs, or replacement will be filed and maintained by laboratory personnel performing QC activities. These records will be filed at the location where the work is performed and will be subject to QA audit. Procedures and records of calibration will follow NYSDEC requirements and IT-reviewed laboratory-specific QA plan.

Records of calibration will be kept as follows:

- Each instrument will have a record of calibration with an assigned record number.
- A label will be affixed to each instrument showing identification numbers, manufacturer, model numbers, date of last calibration, signature of calibrating analyst, and due date of next calibration. Reports and compensation or correction figures will be maintained with the instrument.
- A written step-wise calibration procedure will be available for each piece of test and measurement equipment.
- Any instrument that is not calibrated to the manufacturer's original specification will display a warning tag to alert the analyst that the device carries only a "Limited Calibration."

Details of laboratory calibration procedures and frequency are provided in STL's QA Manual (Appendix B). Actual details of the calibration requirements shall be found in the laboratory-specific SOPs.

8.2.1 High Performance Liquid Chromatography (HPLC)

Initial calibration consists of a minimum five-point standard curve of all target compounds within the linear range of the specific detector. The lowest standard in the calibration shall be no greater than 2-times the reporting limit (preferably at or below the reporting limit). The acceptability of the curve is based on either the percent Relative Standard Deviation (%RSD) of the response for each compound calibrated, or the linear regression of the data points for each compound. Following the initial calibration of the instrument, linearity of the curve shall be checked with a second source calibration standard. The curve and instrument response shall be checked during the analytical sequence (preferably after every 10 samples). Acceptability of the continuing calibration check is based upon either percent recovery or percent difference.

8.2.2 Inductively Coupled Plasma Optical Emission Spectroscopy (ICP or ICP-OES)

The ICP instrument shall be calibrated with a minimum of 3 standards plus a blank. Calculation of the curve is determined by linear regression using a correlation coefficient (r) ∃0.995 as acceptance criteria. Following the calibration, the highest standard must be rerun and agree within 5% of the true concentration. The instrument calibration shall be verified with an Initial Calibration Verification (ICV) standard at the midpoint of the range of the curve. Agreement of the ICV must be within ∀10% of the true concentration. Following the ICV, the Initial Calibration Blank (ICB) is run to provide instrument response with no analyte present. The Interference Check Standards (ICS-A and ICS-AB) are then run to first determine the recovery of the major cations and then the recovery of the minor cations in the presence of the major cations. Acceptable recovery of the ICS is within 80-120% of the true values for both the major and minor cations. To provide information regarding the low end of the calibration curve response, a low-level standard is run. Presently, there are no acceptance criteria for this determination, but it is used to provide information about recovery at the low end. After every 10 samples, a Continuing Calibration Verification (CCV) standard and Continuing Calibration Blank (CCB) are run to determine curve acceptability. This is continued until all samples are analyzed. Recalibration of the instrument and reanalysis of samples shall be performed if the ICS-A, ICS-AB, or CCV fails criteria.

8.2.3 Gas Chromatography / Mass Spectrometry (GC / MS)

The GC/MS instrument shall be initially tuned with decafluorotriphenylphosphine, DFTPP, and meet certain acceptance criteria. Following successful instrument performance check, it is calibrated with a minimum of 5 standards. Calculation of the linearity of the curve is determined either by Mean Relative Response Factor (RRF) or linear regression using a correlation coefficient (r) ∃0.995 as acceptance criteria. Mean RRF calculation is acceptable if the relative standard deviation (%RSD) average of all the RRFs is less than 15%. Following the successful calibration, samples are run until a twelve-hour period has expired. After the twelve-hour period the instrument must again be successfully tuned and followed with a continuing calibration standard (mid-point calibration standard).

8.2.4 Cold Vapor Atomic Absorption Spectroscopy (CVAAS)

The determination of mercury is performed using CVAAS. Prior to analysis, the CVAAS

instrument shall be calibrated with a 5-point standard curve. The linear regression of the resulting curve shall be no less than r ≥0.995 for use. Following calibration, the curve shall be verified with a second source midpoint calibration standard to agreement within ±20% of the true value. The low end of the calibration curve shall be checked with a calibration verification blank. The blank shall not contain analyte in excess of reporting limit (RL). After the determination of 10 samples, the calibration will be re-verified with another midpoint CCV which must be recovered within 80-120% of the true value. Re-calibration of the instrument and reanalysis of samples shall be performed if the CCV fails criteria.

8.3 Analytical Support Areas

The following subsections discuss the calibration needs for operations within the analytical laboratory necessary to support the instrumentation portion.

8.3.1 Analytical Standards

All primary reference and secondary working standards used for the purpose of instrument calibration and recovery determinations must be to be traceable to NIST or USEPA sources. The preparation and use of these standards must be documented in a standards logbook which shall include the preparer's name, date of preparation, date of expiration, and storage location.

8.3.2 Laboratory Balances

All balances to be used for sample weights and/or standards preparation must receive an annual manufacturer's calibration. The balance must be calibrated daily with a minimum of two (preferably three) Class "S" weights which bracket the range of weights to be determined. A hardbound balance logbook must be maintained with the results of the daily calibrations.

8.3.3 Laboratory Refrigerators/Freezers

All cold storage units (for both samples and standards) must be monitored daily for proper use. The acceptable working range of the unit must be clearly posted on the unit's front panel. All thermometers used for monitoring must be immersion type and be calibrated against a NIST certified thermometer on a yearly basis.

8.3.4 Laboratory Water Supply

The laboratory water unit shall be capable of supplying sufficient quantities of American Society for Testing and Materials (ASTM) Type II reagent water (resistivity of >1 megohm-cm @25EC) to the required analytical areas. Recommendations for "polishing" water for analytical use are ion-exchange units for inorganic analyses and distillation/deionization followed by UV treatment or carbon absorption for organic analyses. Conductivity or resistance reading of the system water shall be documented daily, at a minimum or greater dependant upon the water usage.

9.0 Internal Quality Control Checks

Internal QC provides data quality consistent with the intended purpose of the sample collection. Implementation of QC procedures during sample collection, analysis, and reporting ensures that the data obtained are consistent with its intended use. Both field QC and laboratory QC checks are performed throughout the work effort to generate data confidence.

9.1 Field Sample Collection

Collecting field QC samples in accordance with the procedures described in the FSP and QAPP accomplishes the assessment of field sampling precision and accuracy. NYSDEC/USEPA protocol requires the collection of field QA/QC at the specified rate per sampling event. Therefore, for every sampling event, a field duplicate and a field blank shall be collected to determine the impact of field conditions upon the analytical data.

9.2 Laboratory Analysis

Analytical QC measures are used to determine if the analytical process is in control, as well as to determine the sample matrix effects on the data being generated. STL has provided a written QA Manual (Appendix B) that provides rules and guidelines to ensure the reliability and validity of work conducted at the laboratory. Compliance with the QA Manual is coordinated and monitored by the laboratory's QA department, which is independent of the operating departments. For this investigation, the qualified contract analytical laboratory's QA Manual will be referenced and implemented in its entirety.

The laboratory shall provide documentation in each data package that both initial and ongoing instrument and analytical QC functions have been met. The laboratory will reanalyze any non-conforming analysis, if sufficient sample volume is available. It is expected that sufficient sample volumes will be collected to provide for reanalysis, if required. The types of laboratory internal QC samples are described in the following subsections.

9.2.1 Batch Quality Control

Sample batch QC can either be associated with sample preparation or with the analytical determination. In either case the batch is not to exceed twenty samples of similar matrix. The preparation batch is the set of samples that are extracted or digested together by the same laboratory technician, with the same lot of reagents, and during the same time period. All the

samples within the same preparation batch must be of the same matrix and must have its own unique method blank and QC samples as defined in the following sections. The analytical batch is the group of samples that are analyzed together during the same analytical sequence within one continuous time period. The analytical batch can consist of multiple preparation batches, but must analyze all constituents of the preparation batch. QC cannot be run separately from the analytical samples.

9.2.2 Method Blanks

One type of method blank is the preparation (prep) blank. The prep blank is a sample of a pure non-contaminated matrix of interest (usually reagent grade water or purified silica sand) that is subjected to all of the sample preparation (digestion, distillation, extraction) and analytical methodology applied to the samples. The preparation blank is used to assess the level of background contamination that might affect low-level concentration results. The affect to low concentration samples could be:

- false positive results (i.e., reported detects for non-detect parameters),
- biased high low concentration results (i.e., higher detected quantities than really present).

This type of method blank must be prepared and analyzed with each analytical sample batch. The second type of method blank is the instrument blank, which is either an aliquot of neat reagents or reagent water that is analyzed prior to samples to establish background levels of the analytical system.

Analytical sensitivity goals are identified in Section 5.0 tables as reporting limits (practical quantitation limits). Method blank levels should be below these levels for all analytes. Contamination levels reported in the blanks are never subtracted from the sample's reported concentration.

9.2.3 Laboratory Control Samples (LCS)

The LCS contains known concentrations of all analytes representative of the contaminants to be determined and is carried through the entire preparation and analysis process. The primary purpose of the LCS is to establish and monitor the laboratory's analytical performance control. Commercially available LCSs. LCS prepared in-house must be made from a source independent of that of the calibration standards. An LCS must be analyzed with each analytical sample batch.

The results, as percent Recovery (%R), for each LCS analyte shall be plotted on a control chart.

9.2.4 Matrix-Specific Quality Control

Matrix-specific QC is based upon precision and accuracy performance of actual environmental samples. Sample duplicates, sample surrogate spikes, and MS/MSD are examples of matrix-specific QC.

9.2.5 Laboratory Duplicates

Laboratory duplicates are separate aliquots of a single sample that are prepared and analyzed concurrently by the laboratory. This duplicate sample shall not be a method blank, trip blank, or field blank. The primary purpose of the laboratory duplicate is to check the precision of the laboratory analyst, the sample preparation methodology, and the analytical methodology. If there are significant differences between the duplicates, the affected analytical results will be re-examined. One duplicate pair per sampling delivery group will be a laboratory duplicate, with fractions rounded to the next whole number.

9.2.6 Surrogate Spikes

A surrogate spike is prepared by adding a pure compound to a sample before extraction for organic analysis. The compound in the surrogate spike should be of a similar type to that being assayed in the sample. The purpose of a surrogate spike is to determine the efficiency of recovery of analytes in the sample preparation and analysis. The percent of recovery of the surrogate spike is then used to gauge the total accuracy of the analytical method for that sample.

9.2.7 Method-Specific Quality Control

The laboratory must follow specific quality processes as defined by the method. These will include measures such as calibration verification samples, instrument blank analysis, internal standards implementation, method of standard addition utilization, serial dilution analysis, post-digestion spike analysis.

10.0 Calculation of Data Quality Indicators

Laboratory results will be assessed for compliance with required precision, accuracy, representativeness, completeness, comparability and sensitivity.

10.1 Precision

The precision of the laboratory analytical process will be determined through evaluation of the comparative determination of the LCS and LCSD, the MS and MSD, and/or the sample and sample duplicate analyses.

Investigative sample matrix precision will be assessed by comparing the analytical results between MS/MSD for both organic and inorganic analyses and laboratory duplicate analyses for inorganic analysis. The RPD will be calculated for each pair of duplicate analysis using the appropriate formula in Table 10-1 and produce an absolute value for RPD. This precision measurement will include variables associated with the analytical process, influences related to sample matrix interferences, and sample heterogeneity.

10.2 Accuracy

The accuracy of the laboratory analytical measurement process will be determined by comparing the percent recovery for the LCS / LCSD versus its documented true value.

Overall project accuracy include the assessment of investigative sample using the analytical results of MS and MSD samples. The %R of LCS and MS/MSD samples will be calculated using the appropriate formula on Table 10-1. This overall accuracy will include variables associated with the analytical process, influences related to sample matrix interferences, and sample heterogeneity. It is theorized that the lead recovery for the stabilized soil material may be compromised due the presence of excess sulfate in the stabilizing component. Pre-project testing is planned to test this theory. Therefore, if proven, the recovery of the laboratory control samples will be the main source of accuracy measurements.

10.3 Completeness

Data completeness of laboratory analyses will be assessed for compliance with the amount of data required for decision making. The completeness is calculated using the following equation:

$$\% \text{ Completeness} = \frac{\text{Number of Valid Results}}{\text{Number of Possible Results}} \times 100$$

10.4 Sensitivity

Sensitivity of the analytical determination is directly reported to the laboratory's MDL. Achieving MDL depends on sample preparation techniques, instrumental sensitivity, and matrix effects. Therefore, it is important to determine actual MDLs through the procedures outlined in 40 CFR 136, Appendix B. MDLs should be established for each major matrix under investigation (i.e., water, soil) through multiple determinations, leading to a statistical evaluation of the MDL.

It is important to monitor instrument sensitivity through calibration blanks and low concentration standards to ensure consistent instrument performance. It is also critical to monitor the analytical method sensitivity through analysis of method blanks, calibration check samples, and LCSs.

10.5 Project Completeness

Project completeness will be determined by evaluating the planned versus actual data. Consideration will be given for project changes and alterations during implementation. All data not flagged as rejected (R-qualified) by the review, verification, validation, or assessment processes will be considered valid. Overall, the project completeness will be assessed relative to media, analyte, and area of investigation.

10.6 Representativeness/Comparability

Representativeness expresses the degree to which data accurately reflect the analyte or parameter of interest for the environmental media examined at the site. It is a qualitative term most concerned with the proper design of the sampling program. Factors affecting the representativeness of analytical data include appropriate sample population definitions, proper sample collection and preservation techniques, analytical holding times, use of standard analytical methods, and determination of matrix or analyte interferences. Sample collection, preservation, analytical holding time, analytical method application, and matrix interferences will be evaluated by reviewing project documentation and QC analyses.

Comparability, like representativeness, is a qualitative term relative to the confidence of how one project data set compares with another. The comparability issue is controlled through the use of defined sampling methodologies, use of standard sampling devices, standard analytical protocols/procedures, and QC checks with standard control limits. Through proper implementation and documentation of these standard practices, the project will establish confidence that data will be comparable to other project and programmatic information.

Additional input to determine representativeness and comparability may be gained through statistical evaluation of data populations, chemical charge balances, compound evaluations, or dual measurement comparisons.

11.0 Corrective Actions

Corrective actions may be required for two major types of problems: analytical/equipment problems and noncompliance with criteria. Analytical and equipment problems may occur during sampling, sample handling, sample preparation, laboratory instrumental analysis, and data review.

11.1 General Field Issues

All nonconformance situations noted during the sampling phase of the project operation shall be documented and acted upon through a formal corrective action program. The person identifying the problem is responsible for notifying the RI Task Manager and ultimately the Project Manager. When the problem is analytical in nature, information on these problems will be promptly communicated to the NYSDEC/Region II Project Manager. Implementation of corrective action will be confirmed in writing by the laboratory QA Manager to IT Project Manager.

Any nonconformance issue in conflict with the established QC procedures in the SAP will be identified and corrected in accordance with this section of the QAPP. IT Project Manager or their designee will issue a non-conformance report (NCR) for each nonconforming condition.

Corrective actions will be implemented and documented on a FADL or in a field logbook. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are deemed insufficient, work may be stopped through a stop-work order issued by IT Project Manager and the NYSDEC/Region II Project Manager.

For unexpected situations encountered during field activities whereby changes to operating system are necessary to implement, a Field Work Variance will be issued. All variances from existing operating procedures, field sampling plan, quality assurance requirements, and/or health and safety plans will be documented on a Field Work Variance.

11.2 Laboratory Analyses

Each site-specific investigation laboratory QA plan shall provide systematic procedures to identify laboratory related out-of-control situations and corrective actions. Corrective actions shall be implemented to resolve problems and restore malfunctioning analytical systems.

Laboratory personnel shall have received QA training and shall be aware that corrective actions are necessary when:

- QC data are outside warning or control windows for precision and accuracy
- Blanks contain target analytes above acceptable levels and must be investigated
- Undesirable trends are detected in spike recoveries or RPD between duplicates
- There are unusual changes in detection limits
- Deficiencies are detected by internal audits, external audits, or from performance evaluation samples results
- Inquiries concerning data quality are received.

Corrective action procedures are often handled at the bench level by the analyst who reviews the preparation or extraction procedure for possible errors, checks the instrument calibration, spike and calibration mixes, and instrument sensitivity. If the problem persists or cannot be identified, the matter is referred to the Laboratory Director and the QA Manager for further investigation. Once resolved, full documentation of the corrective action procedure is filed with project records and the QA Department, and the information is summarized within case narratives.

11.2.1 Incoming Samples

Problems noted during sample receipt will be documented in the appropriate laboratory document. The Chemical Data Task Manager will be contacted immediately to determine the resolution. All corrective actions will be thoroughly documented.

11.2.2 Sample Holding Times

When sample extraction/digestion or analytical analysis is not performed within method required holding time specifications, IT Chemical Data Task Manager, ultimately IT Project Manager and NYSDEC/Region II Project Manager will be notified immediately to determine the resolution. All corrective actions will be thoroughly documented.

11.2.3 Instrument Calibration

Instrumentation that fails to meet standardization or calibration criteria shall not analyze project samples. All project samples will be reanalyzed if initially performed following an initial and/or

continuing calibration analytical sequence that does not meet method requirements. Corrective action may require standard re-preparation, instrument maintenance, and instrument re-calibration and re-standardization.

11.2.4 Practical Quantitation/Reporting Limits

All appropriate measures shall be required to prepare and clean up samples in an attempt to achieve the practical quantitation/reporting limits. When difficulties arise in achieving these limits, the laboratory will notify IT Chemical Data Task Manager, ultimately IT Project Manager and NYSDEC/Region II Project Manager to determine the resolution. All corrective actions shall be thoroughly documented.

Any dilutions impacting the practical quantitation limits will be documented in case narratives along with revised quantitation limits for those analytes affected. Analytes detected above the method detection limits, but below the practical quantitation limits, will be reported as estimated values. Both the undiluted and diluted set of data shall be provided to the contractor.

11.2.5 Method Quality Control

Failure of method-required QC shall require corrective actions for all affected data. IT Chemical Data Task Manager, ultimately IT Project Manager and NYSDEC/Region II Project Manager will be notified as soon as possible to discuss possible corrective actions, particularly when unusual or difficult sample matrices are encountered.

11.2.6 Calculation Errors

When calculation or reporting errors are noted within any given data package, reports will be reissued with applicable corrections. Case narratives will clearly state the reasons for re-issuance of reports. Corrective actions may include:

- re-analyzing the samples, if holding time criteria permit
- evaluating blank contaminant sources, elimination of these sources, and reanalysis
- modifying the analytical method (i.e., standard additions) with appropriate notification and documentation
- re-sampling and analyzing
- evaluating and amending sampling procedures

- accepting data and acknowledging the level of uncertainty.

If re-sampling is deemed necessary due to laboratory problems, IT Chemical Data Task Manager, ultimately IT Project Manger will identify the necessary cost recovery approach to implement the additional sampling effort.

12.0 Data Reduction, Evaluation, and Reporting

This section describes the data review process enacted to ensure validity and usability of the laboratory analytical data. Prior to its submittal to IT, the laboratory technical personnel will initially review all data generated by the laboratory. This review will provide a check to ensure the correctness of the reported results and generate a case narrative to explain any anomalies that may affect the validity or usability of the data. Following receipt of the data package, the electronic data will be validated by the database and the hardcopy data will be reviewed or validated by the contractor's chemists or designees.

12.1 Data Reduction

All raw data generated from the SMP RI/FS project will be reduced by the laboratory to provide a documented CLP-like data package to IT.

12.1.1 Field Measurements and Sample Collection

Raw data from field measurements and sample collection activities will be appropriately recorded in field logbooks or FADLs. Data to be used in project reports will be reduced and summarized. The methods of data reduction will be documented.

IT Chemical Data Task Manager or designee is responsible for data review of all field-generated data. This includes verifying that all field descriptive data are recorded properly, that all field instrument calibration requirements have been met, that all field QC data have met frequency and criteria goals, and that field data are entered accurately in all logbooks and worksheets.

12.1.2 Laboratory Services

All samples collected for these investigations will be sent to STL located at Edison, NJ, a NYSDOH ELAP certified laboratory for analysis. Data reduction, evaluation, and reporting of samples analyzed by the laboratory will be performed according to specifications outlined in the laboratory's QA Manual and this QAPP. Laboratory reports shall include analytical holding time compliance, method blank results, summarized QA/QC results, raw data, preparation logs and analytical run-logs.

STL will perform in-house analytical data reduction under the direction of the Laboratory QA Manager. The Laboratory QA Manager or designee is ultimately responsible for assessing data

quality and informing IT and NYSDEC of any data that are considered unacceptable or require caution on the part of the data user in terms of its reliability. Data will be reduced, reviewed, and reported as described in the laboratory QA Manual. Data reduction, review, and reporting activities performed by the laboratory are summarized below and detailed in the STL's QA Manual:

- The analyst who generated the raw data has the primary responsibility for the accuracy and completeness of the data. All data will be generated and reduced as per the QAPP defined methods and laboratory SOPs.

- A peer analyst will perform a Level 1 technical data review consistent with an established set of guidelines. The review shall ensure the completeness and correctness of the data while assuring all method QC measures have been implemented and were within appropriate criteria. Items to be reviewed include: preparation logs, analysis runs, methodology, results, quality control results, internal QC checks, checklists and signoff sheets.

- The area supervisor or data review specialist will complete the Level 2 technical review. This level reviews the data for attainment of QC criteria as outlined in the established methods and for overall reasonableness. It will ensure all calibration and QC data are in compliance, qualitative identification of compounds is correct, quantitative calculations are correct. At least 10 percent of the data calculations shall be reviewed. This review shall document that the data package is complete and ready for reporting and archival.

- Upon acceptance of the raw data by the area supervisor, the analytical report is generated and sent to the Laboratory Project Manager or QA representative for Level 3 administrative data review. This total overview review will ensure consistency and compliance with all laboratory instructions, the laboratory QA plan, the project laboratory SOPs, and the project QAPP.

- The Laboratory Project Manager will complete a thorough review of all reports.

- Final reports will be generated and signed by the Laboratory Project Manager.

- Data Packages (in CLP-like style) will then be delivered to IT for data review, evaluation, or assessment.

The data review process will include identification of any out-of-control data points and data omissions, as well as interactions with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analyses may be made by IT Project Manager based on the extent of the deficiencies and their importance in the overall context of the project. The laboratory shall provide laboratory qualifiers (flags) to data that are: 1) concentrations below required detection limit (J); 2) non-detected concentration (U); 3) blank contamination (B); 4) rejected data (R); and 5) concentration in exceedance of instrument detection limit (E).

Laboratory will prepare and retain full analytical and QC documentation for the project. Such retained documentation will be both hard (paper) copy and electronic storage media (e.g., magnetic tape) as dictated by the analytical methodologies employed. As needed, laboratories will supply hard copies of the retained information.

Laboratories will provide the following information to IT in each analytical data package submitted:

- cover sheets listing the samples included in the report and narrative comments describing problems encountered in analysis,
- tabulated results of inorganic, organic, and miscellaneous parameters identified and quantified,
- analytical results for QC sample spikes, sample duplicates, initial and continuing calibration verifications of standards and blanks, standard procedural blanks, LCSs and other deliverables as identified in Section 8.3 entitled Data Reporting,
- associated raw data to support the tabulated results for samples and QA/QC, and
- tabulation of instrument detection limits determined in pure water.

12.2 Data Evaluation

In addition to the laboratory's in-house review of the data, an independent review of the laboratory data packages prior to its incorporation into a final report and a Data Usability

Summary Report (DUSR) will be performed by qualified data validators. The DUSR preparation will be in compliance with the NYSDEC Guidance for Development of Data Usability Reports which is included in Appendix C.

12.3 Data Reporting

All data generated for the SMP investigations will be provided in both hardcopy and electronic format. The laboratory will be required to confirm sample receipt and log-in information. The laboratory will return a copy of the completed COC and confirmation of the laboratory's analytical log-in to the contractor within 24 hours of sample receipt.

The analytical laboratory will prepare and deliver a full copy of an analytical data package similar to that required by CLP. The lab is required to retain a full copy of the analytical and QC documentation. Such retained documentation will include all hard copies and other storage media (e.g., magnetic tape). As needed, the subcontract analytical laboratory will make available all retained analytical data information.

The data shall be formatted in acceptable format to facilitate electronic data entry, review, and evaluation. The electronic data set will be transferred automatically into IT's database. Following the transfer, the data set will be reviewed and evaluated. The module will provide an error report, which includes data flags in accordance with the above-referenced protocols. The report will be accompanied with additional qualifiers, based on the findings of DUSR.

An evaluation of data accuracy, precision, sensitivity and completeness, based on criteria in Section 10.0 (Calculation of Data Quality Indicators) of this QAPP, will be performed by a data assessor. This data quality assessment will indicate that data are: (1) usable as a quantitative concentration, (2) usable with caution as an estimated concentration, or (3) unusable due to excessive out-of-control QC results.

Each data set will be incorporated into investigation reports as required.

13.0 Preventive Maintenance Procedures

Periodic preventive maintenance is required for sensitive analytical instruments. Instrument manuals are kept on file for reference if equipment needs repair. Troubleshooting sections of manuals are often useful in assisting personnel in performing maintenance tasks.

Any equipment requiring routine maintenance will be tagged with a maintenance label. This label will indicate the data the maintenance was performed, the person maintained the equipment, and the next scheduled maintenance date. Historical equipment maintenance records will be kept in individual equipment history logs with each instrument. Appropriate and sufficient replacement parts or backup equipment will be available so sampling and monitoring tasks will not be substantially impeded or delayed.

13.1 Field Instruments and Equipment

The field equipment for this project may include temperature probes, pH meters, conductivity meters, and geophysical equipment. Specific preventive maintenance procedures to be followed for field equipment are those recommended by the manufacturers.

13.2 Laboratory Instruments

The STL's QA Manual (Appendix B) presents the discussion of the laboratory's routine preventive maintenance program which will be conducted to minimize the occurrence of instrument failure and other system malfunctions. All laboratory instruments will be maintained in accordance with manufacturer's specifications and the requirements of the specific method employed. This maintenance will be carried out on a regular, scheduled basis and will be documented in the laboratory instrument service logbook for each instrument. Emergency repair or scheduled manufacturer's maintenance will be provided under a repair and maintenance contract with factory representatives.

13.3 Support Equipment

Support equipment includes items such as safety devices, storage and transportation containers, wind indicators, cameras, and vehicles which may be required for completing an environmental monitoring or measurement task. Support equipment will be periodically inspected to maintain the performance standards necessary for proper and efficient execution of all tasks and responsibilities.

14.0 Performance and System Audits

Performance and system audits of both field and laboratory activities will be conducted to verify that sampling and analysis are performed in accordance with the procedures established in the FSP and QAPP.

Internal performance and system audits of laboratory will be conducted by the Laboratory QA Manager as directed in the laboratory QA Manual. These system audits will include examination of laboratory documentation of sample receiving, sample log-in, sample storage, COC procedures, sample preparation and analysis, and instrument operating records. Internal performance audits are also conducted on a regular basis. Single-blind performance samples are prepared and submitted along with project samples to the laboratory for analysis. The Laboratory QA Manager will evaluate the analytical results of these single-blind performance samples to ensure that the laboratory maintains acceptable performance.

15.0 Quality Assurance Reports to Management

15.1 Quality Assurance Reports

Each laboratory will provide analytical QC summary statements (case narratives) with each data package. All COC forms will be compared with samples received by the laboratory. All deviations will be identified on the receiving report such as broken or otherwise damaged containers. Summary QC statements will accompany analytical results as they are reported by the laboratory in the form of case narratives for each sample delivery group.

Any departures from approved plans will receive prior approval from NYSDEC/Region II Project Manager and will be documented with field change orders. These field change orders will be incorporated into the project file.

IT will maintain the contents of files for this project, including all relevant records, reports, logs, field logbooks, pictures, subcontractor reports, correspondence, and COC forms. These files will be stored under custody of IT Project Manager. Analytical laboratories will retain all original analytical raw data information (both hard copy and electronic) in a secure, limited access area and under custody of the laboratory Project Manager.

15.2 Quality Control Summary Reports

At the conclusion of field investigation activities and laboratory analysis, IT, in addition to any review conducted by the laboratory, will perform its own data review, evaluation and usability of the submitted data. This activity will include assignment of flags to data, documentation of the reason(s) for the assignments, and description of any other data discrepancies. IT will then prepare a DUSR in accordance with NYSDEC Guidance for the Development of Data Usability Summary Reports (see Appendix C), which will be included as an appendix to the final report as determined by the project schedule.

16.0 References

American Society of Testing and Materials (ASTM), 1999, ***Annual Book of ASTM Standards***, Volume 04.08, Soil and Rock.

EPA, 2000, ***Data Quality Objectives Process for Hazardous Waste Investigations***, EPA QA/G-4HW, Final, EPA/600/R-00/007.

EPA 1999, ***EPA Requirements for Quality Assurance Project Plans***, EPA QA/R-5, Internal Final.

EPA, 1998, ***Guidance for Quality Assurance Project Plans***, EPA QA/G-5, EPA/600/R-98/019.

EPA, 1996, ***Guidance for Data Quality Assessment, Practical Methods for Data Analysis, EPA QA/G-9.***

EPA, 1994, ***Guidance for the Data Quality objective Process, EPA QA/G-4,*** EPA/600/R-96/055.

EPA, 1989, ***EPA Region II CERCLA Quality Assurance Manual, Final Copy, Revision 1.***

Tables

Tables

Table 5-1
Analytical Quality Control Objectives

Quality Assurance Project Plan
Standard Motor Products Site

Parameter	*Frequency of Calibration*	*Typical Precision (a,b) (% RFD)*	*Typical Accuracy (a) (% of Recovery)*	*Expected Completeness*	*Reporting Limit (c)*	*Extraction/Analytical Methods*
TCL Volatile Organics	Daily	Compound Specific	Compound Specific	Minimum 90%	CRQL	CLP Method OLM04.02 (5/99)
TCLP Volatile	Daily	Compound Specific	Compound Specific	Minimum 90%	RL	1311/8260B
TCLP Base/Neutral Extractables	Daily	Compound Specific	Compound Specific	Minimum 90%	RL	1311/8270C
TCLP Pesticides	Daily	Compound Specific	Compound Specific	Minimum 90%	RL	1311/8081A
TCLP Herbicides	Daily	Compound Specific	Compound Specific	Minimum 90%	RL	1311/8151A
TCLP Metals	Daily	20%	80-120	Minimum 90%	RL	1311/6010B&7470
Total Organic Carbon	Daily	26.3%(d)	71.8-120(d)	Minimum 90%	100 mg/Kg(d)	Lloyd Kahn Method

(a) Compound specific precision and accuracy are provided in Table 5-2.
(b) = Relative Percent Difference (RPD)
(c) Reporting Limits (RL) for TCL Volatile Organics (Contract Required Quantitation Limits) are listed in Table 5-3; Reporting Limits for TCLP are listed in Table 5-2.
(d) For soil only

Table 5-2
Organic and Inorganic Method Reference and Quality Control Objectives

Quality Assurance Project Plan
Standard Motor Products Site

Parameter (Organic)	*Matrix Spike Precision (RPD %)*		*Accuracy % of Recovery*		*ReportingLimit Water (mg/L)*
	Water/Leachate	*Solids*	*Water/Leachate*	*Solids*	
TCL Volatile Compounds:					
1,1-Dichloroethylene	14	22	61-145	59-172	(a)
Trichloroethylene	14	24	71-120	62-137	(a)
Benzene	11	21	76-127	66-142	(a)
Toluene	13	21	76-125	59-139	(a)
Chlorobenzene	13	21	75-130	60-133	(a)
TCLP Volatile Compounds					
Vinyl Chloride	40	NA	41-162	NA	0.005
1,1-Dichloroethene	40	NA	68-126	NA	0.002
Chloroform	40	NA	79-131	NA	0.005
1,2-Dichloroethane	40	NA	75-134	NA	0.002
2-Butanone	40	NA	39-115	NA	0.005
Carbon Tetrachloride	40	NA	75-141	NA	0.002
Trichloroethene	40	NA	58-137	NA	0.001
Benzene	40	NA	76-119	NA	0.001
Tetrachloroethene	40	NA	71-122	NA	0.001
Chlorobenzene	40	NA	81-121	NA	0.005
TCLP Acid/Base-Neutral Extractable Compounds:					
2-Methylphenol	40	NA	28-105	NA	0.08
4-Methylphenol	40	NA	25-98	NA	0.08
2,4,6-Trichlorophenol	40	NA	48-127	NA	0.08
2,4,5-Trichlorophenol	40	NA	51-123	NA	0.08
Pentachlorophenol	40	NA	54-150	NA	0.16
1,4-Dichlorobenzene	40	NA	28-98	NA	0.08
Hexachloroethane	40	NA	19-91	NA	0.04
Nitrobenzene	40	NA	30-96	NA	0.04
Hexachlorobutadiene	40	NA	17-88	NA	0.08
2,4-Dinitrotoluene	40	NA	63-109	NA	0.08
Hexachlorobenzene	40	NA	55-124	NA	0.04
Pyridine	40	NA	0-108	NA	0.08
TCLP Pesticide Compounds:					
Gamma-BHC	31	NA	65-124	NA	0.001
Chlordane	14	NA	63-130	NA	0.005
Endrin	28	NA	84-130	NA	0.001
Heptachlor	26	NA	88-148	NA	0.001
Heptachlor Epoxide	21	NA	69-122	NA	0.001
Methoxychlor	27	NA	87-197	NA	0.001
Toxaphene	20	NA	60-138	NA	0.005
TCLP Herbicide Compounds:					
2,4-D	45	NA	22-98	NA	0.08
2,4,5-TP (Silvex)	46	NA	26-151	NA	0.08
2,4,5-T	44	NA	21-118	NA	0.08
TCLP Metal Compounds:					
Arsenic	20	NA	80-120	NA	0.0038
Barium	20	NA	80-120	NA	0.0014
Cadmium	20	NA	80-120	NA	0.0004
Chromium	20	NA	80-120	NA	0.001
Lead	20	NA	80-120	NA	0.0025
Mercury	20	NA	80-120	NA	0.0001
Selenium	20	NA	80-120	NA	0.0048
Silver	20	NA	80-120	NA	0.0014

(a) Reporting limits for TCL volatile organics (CRQL) are listed in Table 5-3.

Table 5-3
Contract Reporting Quantitation Limits for TCL Volatile Organics

Quality Assurance Project Plan
Standard Motor Products Site

	Quantitation Limits	CAS No.	Water (ug/l)	Low Level Soil (ug/kg)	Med Level Soil (ug/kg)
Volatiles					
1	Dichlorodifluoromethane	75-71-8	10	10	1200
2	Chloromethane	74-87-3	10	10	1200
3	Vinyl Chloride	75-01-4	10	10	1200
4	Bromomethane	74-83-9	10	10	1200
5	Chloroethane	75-00-3	10	10	1200
6	Trichlorofluoromethane	75-69-4	10	10	1200
7	1,1-Dichloroethene	75-35-4	10	10	1200
8	1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	10	10	1200
9	Acetone	67-64-1	10	10	1200
10	Carbon Disulfide	75-15-0	10	10	1200
11	Methyl Acetate	79-20-9	10	10	1200
12	Methylene Chloride	75-09-2	10	10	1200
13	t-1,2-Dichloroethene	156-60-5	10	10	1200
14	Methyl tery-butyl Ester	1634-04-4	10	10	1200
15	1,1-Dichloroethane	75-34-3	10	10	1200
16	c-1,2-Dichloroethene	156-59-2	10	10	1200
17	2-Butanone	78-93-3	10	10	1200
18	Chloroform	67-66-3	10	10	1200
19	1,1,1-Trichloroethane	71-55-6	10	10	1200
20	Cyclohexane	110-82-7	10	10	1200
21	Carbon Tetrachloride	56-23-5	10	10	1200
22	Benzene	71-43-2	10	10	1200
23	1,2-Dichloroethane	107-06-2	10	10	1200
24	Trichloroethene	79-01-6	10	10	1200
25	Methylcyclohexane	108-87-2	10	10	1200
26	1,2-Dichloropropane	78-87-5	10	10	1200
27	Bromodichloromethane	75-27-4	10	10	1200
28	c-1,3-Dichloropropene	10061-01-5	10	10	1200
29	4-Methyl-2-pentanone	108-10-1	10	10	1200
30	Toluene	108-88-3	10	10	1200
31	t-1,3-Dichloropropene	10061-02-6	10	10	1200
32	1,1,2-Trichloroethane	79-00-5	10	10	1200
33	Tetrachloroethene	127-18-4	10	10	1200
34	2-Hexanone	591-78-6	10	10	1200
35	Dibromochloromethane	124-48-1	10	10	1200
36	1,2-Dibromoethane	106-93-4	10	10	1200
37	Chlorobenzene	108-90-4	10	10	1200
38	Ethylbenzene	100-41-4	10	10	1200
39	Xylene (total)	1330-20-7	10	10	1200
40	Styrene	100-42-5	10	10	1200
41	Bromoform	75-25-2	10	10	1200
42	Isopropylbenzene	98-82-8	10	10	1200
43	1,1,2,2-Tetrachloroethane	79-34-5	10	10	1200
44	1,3-Dichlorobenzene	541-73-1	10	10	1200
45	1,4-Dichlorobenzene	106-46-7	10	10	1200
46	1,2-Dichlorobenzene	95-50-1	10	10	1200
47	1,2-Dibromo-3-chloropropane	96-12-8	10	10	1200
48	1,2,4-Trichlorobenzene	120-82-1	10	10	1200

Table 6-1
Field Data Records

Quality Assurance Project Plan
Standard Motor Products Site

Deliverable Requirement	Data for Non-Critical Decisions	Data for Critical Decisions	Data for Litigation Purposes
Sample Collection Record	X	X	X
Sample Maps or Diagrams	X	X	X
Chain-of-Custody Records	X	X	X
QC Sample Records	X	X	X
General Field Procedures	X	X	X
Corrective Action Reports	X	X	X
Regulatory Compliance Reports	X	X	X

Table 6-2
Laboratory Data Deliverable Package Requirements

Quality Assurance Project Plan
Standard Motor Products Site

Method	Deliverable Requirement	Data for Non-Critical Decisions	Data for Critical Decisions	Data for Litigation Purposes
Metals	Case Narrative	X	X	X
	Corrective Action Report	X	X	X
	Cross-reference of IT Sample Numbers, Lab IDs, and analytical QC batches	X	X	X
	Chain-of-Custody Form, Cooler Receipt form	X	X	X
	Data Summary for Each Sample (See Note 1)	X	X	X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits)	X	X	X
	Matrix Spike (MS) Report (including concentration spiked, percent recovered, percent recovery acceptance limits)	X	X	X
	Post-digestion Spike Recovery for ICP	X	X	X
	Duplicate Sample Report	X	X	X
	Blank Results	X	X	X
	Initial Calibration Data		X	X
	Continuing Calibration Data		X	X
	ICP Interference Check Sample Report		X	X
	Standard Addition Results		X	X
	ICP Serial Dilution Results			X
	Copies of Preparation Logs			X
	Copies of Analysis Run Logs		X	X
	Copies of Standard Preparation Logs			X
	Raw Data and Instrument Printouts			X
	Percent Moisture	X	X	X
	PH			X (Note 2)
Organics by GC or HPLC	Case Narrative	X	X	X
	Corrective Action Report	X	X	X
	Cross-reference of IT Sample Numbers, Lab IDs, and analytical QC batches	X	X	X
	Chain-of-Custody Form, Cooler Receipt form	X	X	X
	Data Summary for each blank and sample *(See Note 1)*	X	X	X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits)	X	X	X
	Surrogate Recovery Report (including concentration spiked, percent recovered, and percent recovery acceptance limits)	X	X	X
	Matrix Spike/Matrix Spike Duplicate (MS/MSD) Report (including concentration spiked, percent recovered, percent recovery acceptance limits, relative percent difference (RPD), and RPD acceptance limits)	X	X	X
	Initial Calibration Data for each column (indicate which column was used for quantitation)		X	X
	Continuing Calibration Data (indicate which column was used for quantitation)		X	X
	Chromatograms for each sample (and reruns), confirmation runs, blank, spike, duplicate, and standards		X (Note 4)	X
	Raw Quantitation Report (area vs. retention time)			X
	Copies of Sample Preparation Bench Sheets		X	X

Table 6-2
Laboratory Data Deliverable Package Requirements

Quality Assurance Project Plan
Standard Motor Products Site

Method	Deliverable Requirement	Data for Non-Critical Decisions	Data for Critical Decisions	Data for Litigation Purposes
	Copies of Standard Preparation Logs			X
	Copies of Run Logs			X
Organics by GC/MS	Case Narrative	X	X	X
	Corrective Action Report	X	X	X
	Cross-reference of IT sample numbers, Lab IDs, and analytical QC batches		X	X
	Chain-of-Custody Form, Cooler Receipt Form	X	X	X
	Data Summary for each blank and sample (See Note 1)	X	X	X
	Tentatively Identified Compounds (TICs) for each sample (ten peaks)		X	X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits)	X	X	X
	Surrogate Recovery Report (including concentration spiked, percent recovered, and percent recovery acceptance limits)	X	X	X
	Matrix Spike/Matrix Spike Duplicate (MS/MSD) Report (including concentration spiked, percent recovered, percent recovery acceptance limits, relative percent difference (RPD), and RPD acceptance limits)	X	X	X
	Instrument Performance Check (Tuning) Report		X	X
	Initial Calibration Data (including acceptance limits)		X	X
	Continuing Calibration Data (including acceptance limits)		X	X
	Internal Standard Areas and Retention Times Reports (including acceptance limits and out-of-control flags)		X	X
	Reconstructed Ion Chromatogram for each sample and rerun, blank, spike, duplicate, and standard			X
	Raw Quantitation Report			X
	Raw and background subtracted mass spectra for each target analyte found			X
	Mass spectra of TICs with library spectra of 5 best-fit matches			X
	Copies of Sample Preparation Bench Sheets		X	X
	Copies of Standard Preparation Logs			X
	Copies of Run Logs			X
	Percent Moisture	X	X	X
	PH			X (Note 2)
Inorganic Chemistry (Note 2)	Corrective Action Report	X	X	X

Table 7-1
Sample Collection and Analytical Protocols

Quality Assurance Project Plan
Standard Motor Products Site

Matrix	*Parameters*	*Samples (+No. Field QC Samples)*	*No. and Type of Field QC*	*Sample Container*	*Volume*	*Sample Preservation*	*Maximum Sample Holding Time*	*Extraction/ Analytical Methods*
Soil Samples	TCL Voaltile Organics	89 (+20)	5 MS 5 MSD 5 Field Blank 5 Field Duplicates	One 4 oz glass vials	Fill Containers	Cool to 4C	14 Days	OLM04.02 (5/99)
	TCLP Volatiles	9 (+2)	1 Field Blank 1 Field Duplicate	One 8 oz. glass bottle	Fill Containers	Cool to 4C	14 Days Extraction	1311/8260B
	TCLP BNA	9 (+2)	1 Field Blank 1 Field Duplicate	One 8 oz. glass bottle	Fill Containers	Cool to 4C	14 Days Extraction/ 7 Days Prep	1311/8270C
	TCLP Pesticides and Herbicides	9 (+2)	1 Field Blank 1 Field Duplicate	One 8 oz. glass bottle	Fill Containers	Cool to 4C	14 Days Extraction/ 7 Days Prep	1311/8081A & 8151A
	TCLP Metals and Mercury	9 (+2)	1 Field Blank 1 Field Duplicate	One 8 oz. glass bottle	Fill Containers	Cool to 4C	14 Days Extraction 120 Days Prep (28 days Prep for Hg)	1311/6010B & 7470
	TOC	18(+2)	1 Field Blank 1 Field Duplicate	One 4 oz. glass bottle	Half Full	Cool to 4C	14 Days	Lloyd Kahn Method
Geoprobe/Ground water Samples	TCL Volatile Organics	24(+10)	2 MS 2 MSD 2 Trip Blank 2 Field Blank 2 Field Duplicate	Three 40 ml glass vials w/Teflon septum caps	Fill Containers	Cool to 4C, HCL	7 Days	OLM04.02 (5/99)
Monitoring Well Groundwater Samples	TCL Volatile Organics	11 (+5)	1 MS 1 MSD 1 Trip Blank 1 Field Blank 1 Field Duplicate	Three 40 ml glass vials w/Teflon septum caps	Fill Containers	Cool to 4C, HCL	7 Days	OLM04.02 (5/99)

Table 8-1
Calibration Standard Storage

Quality Assurance Project Plan
Standard Motor Products Site

Standard Type	Storage	Expiration
Inorganics		
pH Buffers	Room Temperature	6 months
ICP/GFAA or Wet-chemistry stocks	Refrigerate ICP/GFAA room temp.	6 months
Intermediates	Refrigerate ICP/GFAA room temp.	1 month
Working standards	Room temperature	Fresh daily
Organics		
Stocks for semi-volatiles	Refrigerate	6 months
Intermediates	Refrigerate	3 months
Working standards(non-aqueous)	Refrigerate	1 month
Working standards (aqueous)	Refrigerate	Fresh daily
Volatile stocks	Freezer	6 months
Intermediates	Freezer	1 month
Working standards	Refrigerate	Fresh daily

Table 10-1
Statistical Calculations
Remedial Investigation/Feasibility
Standard Motor Products Site

Statistic	Symbol	Formula	Definition	Use
Mean	$\overline{x}$	$\left(\frac{\sum_{i=1}^{n} x_i}{n}\right)$	Measure of central tendency	Used to determine the average value of multiple measurements
Standard Deviation	S	$\sqrt{\left(\frac{\sum (x_i - \overline{x})^2}{n-1}\right)}$	Measure of the relative scatter of the data	Used in calculating variation of measurements
Relative Standard Deviation	RSD	$(S/\overline{x}) \times 100$	Relative standard deviation adjusts for the magnitude of observations	Used to assess the precision parameter for replicate results
Percent Difference	%D	$\left(\frac{x_1 - x_2}{x_1}\right) \times 100$	Measure of the difference between two observations	Used to assess the accuracy parameter
Relative Percent Difference	RPD	$\left(\frac{x_1 - x_2}{(x_1 + x_2) \div 2}\right) \times 100$	Measure of variability that adjusts for the magnitude of observations	Used to assess the analytical precision of duplicate measurements
Percent Recovery	$\%R$	$\left(\frac{x_{measured}}{x_{true}}\right) \times 100$	Recovery of spiked compounds in control sample (LCS)	Used to assess the accuracy parameter

Table 10-1
Statistical Calculations
Remedial Investigation/Feasibility
Standard Motor Products Site

Percent Recovery	% R	$\frac{(x_s - x_u)}{x_a} \times 100$ where: x_s is the value of the spiked sample, x_u is the value of the unspiked sample, x_a is amount spiked into the sample	Recovery of spiked compounds in the sample matrix	Used to assess matrix effects and precision between the MS and MSD

APPENDIX
A

918-2-99

Appendix A
STL's NYSDOH ELAP Certifications

STATE OF NEW YORK
DEPARTMENT OF HEALTH

Wadsworth Center The Governor Nelson A. Rockefeller Empire State Plaza P.O. Box 509 Albany, New York 12201-0509

...onia C. Novello, M.D., M.P.H.
Commissioner

Dennis P. Whalen
Executive Deputy Commissioner

DEAR LABORATORY DIRECTOR:

Enclosed are the amended ELAP Certificate(s) of Approval for permit year 2000-2001 issued to your environmental laboratory. The Certificate(s) supersede any previously issued and are in effect through March 31, 2001. Please carefully examine the Certificate(s) to insure that the categories, subcategories and analytes for which your laboratory is approved are listed correctly, as well as verifying your laboratory's name, address, director and identification number.

Please notify this office of any corrections required. We may be reached at (518) 485-5570.

Sincerely,

Linda L. Madlin

Linda L. Madlin
Administrative Assistant
Environmental Laboratory
Approval Program

LLM:mes
Enclosure

NEW YORK STATE DEPARTMENT OF HEALTH

ANTONIA C. NOVELLO, M.D., M.P.H. Commissioner

Expires 12:01 AM April 1, 2001
ISSUED April 1, 2000
REVISED July 14, 2000

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

Lab ID No.: 11452

Director: MR. MICHAEL URBAN
Lab Name: STL ENVIROTECH
Address : 777 NEW DURHAM ROAD
EDISON NJ 08817

is hereby APPROVED as an Environmental Laboratory for the category

ENVIRONMENTAL ANALYSES NON POTABLE WATER

All approved subcategories and/or analytes are listed below:

Chlor. Hydrocarbon Pesticides :
- 4,4'-DDD
- 4,4'-DDE
- 4,4'-DDT
- alpha-BHC
- Aldrin
- beta-BHC
- Chlordane Total
- delta-BHC
- Dieldrin
- Endrin aldehyde
- Endrin
- Endosulfan I
- Endosulfan II
- Endosulfan sulfate
- Heptachlor
- Heptachlor epoxide
- Lindane
- Methoxychlor
- Toxaphene

Wastewater Miscellaneous :
- Boron, Total
- Cyanide, Total
- Color
- Corrosivity
- Phenols
- Oil & Grease Total Recoverable
- Hydrogen Ion (pH)
- Specific Conductance
- Sulfide (as S)
- Surfactant (MBAS)
- Temperature
- Organic Carbon, Total

Residue (ALL)

Wastewater Metals III :
- Gold, Total
- Cobalt, Total
- Molybdenum, Total
- Tin, Total
- Titanium, Total
- Thallium, Total

Wastewater Metals II (ALL)
Nitroaromatics and Isophorone (ALL)
Nutrient (ALL)
Polynuclear Aromatics (ALL)
Phthalate Esters (ALL)
Purgeable Aromatics (ALL)
TCLP Additional Compounds (ALL)

Acrolein and Acrylonitrile (ALL)
Benzidines (ALL)
Chlorophenoxy Acid Pesticides (ALL)
Chlorinated Hydrocarbons (ALL)
Demand (ALL)
Haloethers (ALL)
Wastewater Metals I (ALL)
Mineral (ALL)
Nitrosoamines (ALL)
Organophosphate Pesticides (ALL)
Polychlorinated Biphenyls (ALL)
Priority Pollutant Phenols (ALL)
Purgeable Halocarbons (ALL)

Serial No.: 107397

Wadsworth Center

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DOH-3317 (3/97)

NEW YORK STATE DEPARTMENT OF HEALTH

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EDISON NJ 08817

is hereby APPROVED as an Environmental Laboratory for the category

ENVIRONMENTAL ANALYSES/ POTABLE WATER

All approved subcategories and/or analytes are listed below:

Drinking Water Non-Metals :
- Alkalinity
- Calcium Hardness
- Chloride
- Cyanide
- C[illegible]ivity
- Fluoride, Total
- Nitrite (as N)
- Nitrate (as N)
- Hydrogen Ion (pH)
- Solids, Total Dissolved
- Sulfate (as SO4)

Drinking Water Trihalomethane (ALL)
Volatile Aromatics (ALL)

Drinking Water Metals I (ALL)
Volatile Halocarbons (ALL)

Drinking Water Metals II (ALL)

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NEW YORK STATE DEPARTMENT OF HEALTH

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Director: MR. MICHAEL URBAN
Lab Name: STL ENVIROTECH
Address : 777 NEW DURHAM ROAD
EDISON NJ 08817

is hereby APPROVED as an Environmental Laboratory for the category

ENVIRONMENTAL ANALYSES/SOLID AND HAZARDOUS WASTE

All approved subcategories and/or analytes are listed below:

Characteristic Testing :
- Corrosivity
- Ignitability
- Reactivity
- TCLP
- E.P. Toxicity

Purgeable Aromatics (ALL)

Miscellaneous :
- Cyanide, Total
- Lead in Paint
- Hydrogen Ion (pH)
- Sulfide (as S)

Polychlorinated Biphenyls (ALL)
Purgeable Halocarbons (ALL)

Acrolein and Acrylonitrile (ALL)
Chlor. Hydrocarbon Pesticides (ALL)
Haloethers (ALL)
Metals II (ALL)
Organophosphate Pesticides (ALL)
Phthalate Esters (ALL)

Chlorophenoxy Acid Pesticides (ALL)
Chlorinated Hydrocarbons (ALL)
Metals I (ALL)
Nitroaromatics Isophorone (ALL)
Polynuclear Arom. Hydrocarbon (ALL)
Priority Pollutant Phenols (ALL)

Serial No.: 107399

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DOH-3317 (3/97)

NEW YORK STATE DEPARTMENT OF HEALTH

ANTONIA C. NOVELLO, M.D., M.P.H. Commissioner

Expires 12:01 AM April 1, 2001
ISSUED April 1, 2000
REVISED July 14, 2000

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Lab ID No.: 11452

Director: MR. MICHAEL URBAN
Lab Name: STL ENVIROTECH
Address : 777 NEW DURHAM ROAD
EDISON NJ 08817

is hereby APPROVED as an Environmental Laboratory for the category

CONTRACT LABORATORY PROTOCOL (CLP)

All approved subcategories and/or analytes are listed below:

CLP Inorganics | CLP PCB/Pesticides | CLP Semi-Volatile Organics | CLP Volatile Organics

Serial No.: 107400

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DOH-3317 (3/97)

APPENDIX
B

Appendix B
STL Quality Assurance Manual

STL Envirotech
a division of Severn Trent Laboratories, Inc.

STL Envirotech
777 New Durham Road
Edison, NJ 08817
Tel: (732) 549-3900
Fax: (732) 549-3679
www.stl-inc.com

QUALITY ASSURANCE MANUAL
STL-ENVIROTECH

777 New Durham Road
Edison NJ 08817

Revision 3

April 19, 2000

Approved Signatures:

Madhuri R. Dave 4/19/00
Madhuri R. Dave Date
Quality Assurance Officer

4/19/00
Michael J. Urban Date
Laboratory Director / Technical Director

4/19/00
Daniel Santaniello Date
General Manager

Laboratory Locations

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Mobile, AL 36693
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Anaheim, CA 92805
Tel: (714) 937-1094
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Colorado
STL Aurora
10703 East Bethany Drive
Aurora, CO 80014
Tel: (303) 751-1780
Fax: (303) 751-1784

Connecticut
STL Monroe
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Monroe, CT 06468
Tel: (203) 261-4458
Fax: (203) 268-5346

Florida
STL Miami
10200 USA Today Way
Miramar, FL 33025
Tel: (954) 431-4550
Fax: (954) 431-1959

STL Pensacola
11 East Olive Road
Pensacola, FL 32514
Tel: (850) 474-1001
Fax: (850) 478-2671

STL Tallahassee
2846 Industrial Plaza Drive
Tallahassee, FL 32301
Tel: (850) 878-3994
Fax: (850) 878-9504

STL Tampa West
6712 Benjamin Road, Suite 100
Tampa, FL 33634
Tel: (813) 885-7427
Fax: (813) 885-7049

Georgia
STL Savannah
5102 LaRoche Ave
Savannah, GA 31404
Tel: (912) 354-7858
Fax: (912) 351-3673

Indiana
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Valparaiso, IN 46383
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Fax: (219) 464-2389

Illinois
STL Chicago
2417 Bond Street
University Park, IL 60466-3182
Tel: (708) 534-5200
Fax: (708) 534-5211

Maryland
STL Baltimore
19 Loveton Circle
Sparks, MD 21152
Tel: (410) 771-4920
Fax: (410) 771-4407

Massachusetts
STL Billerica
149 Rangeway Road
N. Billerica, MA 01862
Tel: (978) 667-1400
Fax: (978) 667-7871

STL Westfield
Westfield Executive Park
53 South Hampton Road
Westfield, MA 01085
Tel: (413) 572-4000
Fax: (413) 572-3707

New Jersey
STL Edison
777 New Durham Road
Edison, NJ 08817
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Fax: (732) 549-3679

STL Whippany
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Whippany, NJ 07981
Tel: (973) 428-8181
Fax: (973) 428-5222

New York
STL Buffalo
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Amherst, NY 14228
Tel: (716) 691-2600
Fax: (716) 691-7991

STL Newburgh
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Newburgh, NY 12550
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Fax: (914) 562-0841

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STL-Austin
14046 Summit Drive
Austin, TX 78728
Tel: (512) 244-0855
Fax: (512) 244-0160

STL Corpus Christi
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Corpus Christi, TX 78408
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Fax: (361) 289-2477

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Houston, TX 77084
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Table of Contents

List of Appendices

1.0 Quality Assurance Policy Statement

Introduction

The purpose of this manual is to document quality assurance program criteria and procedures for STL Edison facility. Quality assurance procedures are designed to meet or exceed all routine regulatory quality assurance requirements for environmental analyses and to provide analytical results of documented precision and accuracy.

STL Edison provides analytical testing of environmental water, soil, and waste samples for a variety of clients ranging from small businesses to Fortune 100 companies and government agencies. Our goal, from the company's inception, has been to be the laboratory of choice in New Jersey and the surrounding region known first and foremost for the quality of the data we produce and the service we provide. The commitment of STL Edison to production of the highest quality data is reflected by our investment in the best available analytical instrumentation. STL Edison performs testing of a full array of sample matrices for a wide variety of organic chemicals, trace metals and conventional indicators of environmental quality.

Policy

At STL Edison our goal is to provide testing services that:

- Provide high quality, consistent, and objective environmental testing services that meet all federal, state, and municipal regulatory requirements.
- Generate data that are scientifically sound, legally defensible, meet project objectives, and are appropriate for their intended use.
- Provide STL clients with the highest level of professionalism and the best service practices in the industry.
- Build continuous improvement mechanisms into all laboratory, administrative, and managerial activities.
- Maintain a working environment that fosters open communication with both clients and staff.

Continuous efforts toward improvement are built into every activity of the laboratory. These improvements ensure that STL is maintained as a high-quality, efficient testing laboratory.

STL Mission Statement:

We enable our customers to create safe and environmentally favorable policies and practices, by leading the market in scientific and consultancy services. We provide this support within a customer service framework that sets the standard to which others aspire. This is achieved by people whose professionalism and development is valued as the key to success and through continued investments in science and technology.

Scope

This QAM applies to all associates of the laboratory. There is a firm commitment from all members of the laboratory to follow a comprehensive QAM. This commitment and dedication to quality is fully supported from the bench level to upper management in order to meet the objectives of our analytical laboratory and best serve our clients.

This QAM undergoes an annual review by the QA Manager, the General Manager, and the Laboratory Director. Revisions to the QAM are distributed throughout the laboratory to replace the outdated copies so that only the most current revision is in use. It is the joint responsibility of the QA Manager, the Technical Directors and Laboratory Section Supervisors to ensure that all associates familiarize themselves with, and comply with, the procedures laid out in this manual and associated documentation.

The policies and practices of quality assurance/quality control presented in the following text are set forth as minimums.

2.0 Organization and Management

STL consists of twenty-four laboratory facilities; twenty-two in the United States and 2 in the United Kingdom. Each facility is under the supervision of a General Manager who reports to the Chief Operator Officer.

It is the policy of the laboratory that at each management and operational level a designated deputy or deputies are assigned. These deputies maintain continuity of service and other functions in the event of the absence of key staff. The General Manager ensures that all staff are made aware of their respective designated deputies and that they are fully aware of the extent and limitations of their responsibility.

It is the policy of the laboratory to discourage and reject all influence or inducements offered

either by customers or suppliers which might adversely affect results or otherwise compromise the judgment or impartiality of the staff. It is the responsibility of the General Manager to inform customers and suppliers of this policy when necessary. In the event that any such influences or inducements are encountered, staff are instructed to inform management immediately. It is the responsibility of the General Manager to take appropriate action to prevent recurrence.

The Quality Managers Program within the laboratory is operated independently of the laboratory sections generating data. In this way, objectivity in the evaluation of laboratory operations is obtained. The laboratory structure provides a means for communication from the bench level up to the General Manager. This organization facilitates the generation of data, several levels of data review, and the monitoring of the overall quality of the data produced in the laboratory before it is reported to the client. An organizational chart, resumes of key staff and experience and educational profiles for the entire laboratory are presented in Appendix A.

3.0 Roles and Responsibilities

Each section within the laboratory has specific roles and responsibilities in terms of producing a product of known quality. All laboratory personnel are expected to have a working knowledge of the QAM. A copy of the most recent QAM is available to each laboratory section and QAM training is periodically performed for new laboratory associates. It is expected that associates at every level ensure that data is generated in compliance with this QAM. The responsibilities of certain key positions are detailed below.

The General Manager is directly and ultimately responsible for ensuring data quality and providing operational direction at STL. Responsibilities include:

- Development of policies and general quality assurance strategies in collaboration with the Laboratory Directory and laboratory Section Supervisors.
- Allocate personnel and resources throughout the laboratory section.
- Long term planning, setting goals, and achieving the financial business, and quality objectives of STL.
- Oversee the efforts of laboratory marketing and sales.
- Review monthly management reports and quality assurance reports.

The Laboratory Director reports to the General Manager and is responsible for all aspects of laboratory operations to ensure timely completion of all contractual obligations. In conjunction with the Technical Directors, responsibilities include:

- Monitor the progress of sample preparation and analysis.
- Supervision of staff, setting goals and objectives for both the business and the employees, and achieving the financial, business, and quality objectives of the facility.
- Establish the priority of sample analysis in order to meet QA and client deadlines.
- Maintain well-versed technical understanding of analytical methodology for the evaluation of laboratory operations, development of procedural improvements, investigation of non-compliant results and implementation of corrective action.
- Review Standard Operations Procedures and ensure conformance to those procedures.
- Communicate resource needs to management.

The QA Manager reports to General Manager and Corporate QA Manager and is responsible for the preparation, maintenance and implementation of the QAM. Responsibilities include:

- Authority for stopping, accepting or rejecting analytical data, method modifications, QA programs and QC criteria.
- Conduct internal system and data audits to monitor laboratory compliance with the QAM and SOPs.
- Provide assistance in the development of laboratory management documents including SOPs as well as control, revision and distribution thereof.
- Identify areas where corrective action is required and then ensure implementation and completion of the resulting action.
- Oversee laboratory participation in performance evaluation programs and regulatory certification and accreditation programs.
- Act as point of contact regarding QA matters for the laboratory.

Project Managers are instrumental in assisting both the laboratory and the client during the course of a project. Responsibilities include:

- Coordination of laboratory services directly with clients.
- Understanding contractual requirements and effectively communicating client needs to laboratory personnel.
- Notification of clients regarding specific non-conformance, changes or difficulties encountered within the laboratory.
- Investigation of problems with samples and shipping containers received from the field.
- Monitoring of analytical work progress.
- Client Invoicing
- Addressing questions and concerns raised by clients after data packages are received.

The Technical Directors and the Laboratory Section Supervisors and/or Group Leaders report directly to the Laboratory Director. They are responsible for the daily activities of analyses and maintenance of SOPs within the group. Responsibilities include:

- Supervises the daily activities of analyses, bench level chemists or data review within the group.
- Manage the groups laboratory operations including; work scheduling, sample tracking and prompt reporting of results.
- Perform secondary review of raw data for accuracy and completeness, check calibrations and calculations and reconcile any non-compliant data.
- Accept or reject data based on compliance with established quality control criteria.
- Ensure that all instrumentation and equipment meet performance criteria and calibration requirements. Schedules instrument repairs.
- Supervision and training of staff, setting goals and objectives for the employees, and achieving the quality objectives of their section.
- Order and maintain inventory of consumable items, standards and instrument replacement parts.

At the bench level, analysts are responsible for the generation of data by analyzing samples according to written SOPs and state regulations. Responsibilities include:

- Maintain a thorough understanding of the QAM and the SOPs associated with their specific function.
- Ensure that all steps related to sample analysis are documented completely and accurately.
- Perform initial review of sample preparation information, calculations, qualitative identifications and raw data with the authority to stop, accept or reject data based on compliance with well-defined QC criteria.
- Provide prompt notification to the Section Supervisor and/or Technical Directors of problems or anomalies detected.
- Prepare standards used for instrument calibration.
- Monitor and maintain standard laboratory equipment such as refrigerators, ovens, and water systems as necessary.
- Perform routine instrument maintenance.

The Sample Custodian is responsible for the receipt and handling of samples within the laboratory. Responsibilities include:

- Implementation of proper sample receipt procedures and sample preservation.
- Implements, completes and/or reviews external and internal chain-of-custody, as appropriate.
- Communicates and records anomalies associated with the condition of samples upon receipt of samples to the Project Manager.
- Assigns a laboratory identification number to a sample and logs the sample into the Laboratory Information Management System (LIMS).
- Secures sample storage and preservation.
- Assists Health and Safety Officer with sample disposal.
- Reviews storage monitoring records.

Reporting and Document Control Staff is responsible for compiling and achieving data results and analytical reports. Responsibilities include:

- Compiles analytical reports and provides data package and electronic deliverables according to the client request.
- Ensures that all aspects of data deliverable production, organization, contract compliance screening, archival storage, packaging and data delivery operations are performed according to the client requirements.

The Information Technology Department is responsible for the design and maintenance of the laboratory's computer hardware and software. Responsibilities include:

- Implementation and validation of new data systems.
- Network Administration.
- Hardware and software maintenance.
- E-mail Administration.
- Provide support and training to all computer users.
- Review and implementation of all Client specific EDDs.

4.0 Training

It is the policy of the laboratory to employ permanent staff who are appropriately qualified and/or trained to perform their respective duties. Where, for commercial reasons, it is necessary to employ temporary staff, the laboratory ensures that the same criteria as those governing permanent staff apply with respect to training and qualifications.

Personnel training procedures begin with an established orientation program designed to familiarize the new associate with safety and chemical hygiene issues, the importance of quality assurance/quality control in the analytical laboratory, and company policies and benefits.

The level of training necessary to perform analytical tasks is determined from employee's academic background and past experience, technical courses, and on-the-job training with specific methods or instrumentation. The responsibility for formal academic training lies foremost with the individual. The responsibility for the additional specialized skills obtained through in-house training or external workshops is a shared obligation of the individual, their supervisor, and the laboratory. An individual's academic and professional experience is kept on file including an initial statement of qualifications or resume and any additional documentation concerning subsequent training. Copies of certificates of completion, transcripts, diplomas, or other documentation are included in the files as appropriate.

New associates for all departments undergo the same orientation procedure. All personnel are required to watch a J.T.Baker SAF-T-TRAINING video tape covering basic Chemical Safety Training. New associates complete the viewing of this tape within their first 30 days of employment. The basic training functions covered by the video tape includes:

- Chemical Labeling
- Material Safety Data Sheets
- Chemical Hazard Information
- Accident Prevention and Spill Control

STL has a fundamental responsibility to provide facilities, equipment, maintenance, and an organized program to make necessary improvements to ensure a safe working environment. Unless associates fulfill their responsibilities for laboratory safety, the safety-related features of the facility and established safety programs will be ineffective. Also a J.T. Baker SAF-T-TRAINING Manual is read by the new employees within the same time frame specified above.

In order to ensure that the policies and objectives of this QAM are communicated to all new personnel, all associates are required to read this QAM during the training process. This training is documented on the *Record of Individual Training* (Appendix B; Forms) and included in the training files of each associate. Training records are available for inspection from the personnel department.

Trainees are under the supervision of experienced analysts who are responsible for showing them the analytical procedures including applicable QA/QC measures. A new analyst is not permitted to perform an analysis until their supervisor is confident that the analytical and QA/QC

procedures can be carried out correctly and method proficiency is documented.

STL Edison facility is equipped with many structural safety features. Each associate is familiar with the location, use, and capabilities of general and specialized safety features associated with their workplace. To protect associates from potential workplace hazards, STL provides and requires the use of certain items of protective equipment. These include safety glasses, protective clothing, gloves, respirators, etc. For a complete description of the types of personal safety equipment available and applicable to a particular workspace, refer to the laboratory Chemical Hygiene Plan manual.

On-Going Training

STL has a firm commitment to make sure that all analysts remain proficient in the tests that they perform. SOP's are reviewed annually and analysts are required to read the latest version of the SOP. Performance evaluations (both single and double blind) are routinely analyzed by the laboratory.

5.0 Laboratory Facility and Equipment

STL Edison has been active in environmental analysis since STL's founding in 1985 and offers a full range of analytical services for environmental industry. The physical layout of the laboratory is presented in Appendix C, updated layout of the laboratory will be added to the revised QAM. Approximately 30,000 square feet of floor space are utilized for analytical work and support staff. All laboratories are compliant with current Occupational Safety and Health Administration regulations and are equipped with unique environmental controls including air flow monitoring, solvent recovery, waste heat utilization, and building security systems. In addition the laboratories are outfitted with instrumentation exhibiting advanced technology and automation.

The laboratory facility has centralized high purity water system; Computer networking and centralized gas distribution to support it's analytical services.

Security

Because of the nature of STL's work, adequate security of the facilities, equipment, and project files is necessary. Visitors register upon entering the building and are accompanied by an associate while visiting. Laboratory Section Supervisors ensure that their personnel are familiar with STL's security policies.

STL associates are familiar with and adhere to standards of confidentiality mandated by individual contracts and common sense business practices. All associates are required to sign a nondisclosure agreement as a term and condition of hire.

In addition, all of the STL laboratories have adopted a formal ethics policy reflecting our belief that the cornerstone of any business relationship is ethical behavior and data. As a result of this, all of our associates receive formal ethics training and sign a formal ethics agreement. This policy is a vehicle to outwardly show our commitment to quality.

Equipment Inventory

A comprehensive list of major instrumentation available, along with supporting and miscellaneous equipment can also be found in Appendix C.

6.0 Preventive Maintenance

In order to prevent system down time, minimize corrective maintenance costs and ensure data validity, the laboratory employs a system of preventive maintenance. General preventive maintenance procedures, many of which are unique to particular instruments, are outlined in each instrument's operation manual. All routine maintenance is performed as recommended by the manufacturer. The manuals also assist in the identification of commonly needed replacement parts, so that an inventory of these parts can be maintained at the laboratory. It is the Section Supervisor's responsibility to make sure that the most current version of the operator manual is available in the laboratory. Routine maintenance is performed by the analyst while external technicians may be called in for major repairs. In addition, an in-house instrument specialist who has received training for repair of all major pieces of laboratory equipment is available.

A bound maintenance and repair log notebook is kept with each instrument to record all routine and non-routine maintenance. Notation of the date and maintenance activity is recorded every time service procedures are performed. This includes routine service checks by laboratory personnel as well as factory service calls. The return to analytical control following instrument repair is also noted in laboratory maintenance logbooks.

The basic preventive maintenance is outlined in the SOP for *Preventive Maintenance and Calibration Procedures For All Analytical Instruments and Ancillary Equipment.*

7.0 Computer Hardware and Software

Whenever possible the laboratory establishes standards for computer systems and peripheral equipment. In instances where a vendor-provided solution is bundled with hardware and software, the vendor certifies that the proposed hardware is readily operate with existing hardware platforms, and will provide operating and maintenance instructions. Computer system hardware is configured by STL associates or trained vendor technicians. Major hardware items include systems used for data collection, multi-user file servers, and multi-user printers.

Prior to release for production, use of any in-house developed software is considered under development. Software is validated prior to release. Validation of software consists of testing the output of the software based on sample input data, and comparing the output with independently calculated results.

STL employs the use of Norton anti-virus software to detect and remove viruses from software.

Following is a list of COMPUTING CAPABILITIES.

HARDWARE

- 2 Hewlett Packard D-Class Servers
- 5 Hewlett Packard 9000 Unix Workstations
- 1 Sun Ultra Enterprise 350 Unix Server
- 1 Novell Netware 5.0 Server
- 4 Windows NT 4.0 Servers
- 75 + IBM - Type Personal Computers
- 20 Networked Laser Printers
- Cisco and Ascend Routers
- Fault-Tolerant RAID Disk Storage
- Digital Audio (DAT) based backup Hardware

SOFTWARE

Operating Environments

- Unix (HP-UX) Sun Solaries)
- DOS/Windows 3.1
- Windows 95/98
- Windows NT

Network Environments
- Novell Netware 5.0
- Unix
- Windows NT 4.0 Server

Network Topologies
- IPX
- TCPIP
- 10BaseT-Ethernet
- 100BaseTX-Ethernet
- ISDN
- Frame-Relay

Network Security
- RAPTOR Firewall Software

Remote Computing
- ISDN Dial-Up
- Virtual Private Networking via Internet

Office Software
- Microsoft Office 97

Scientific Software
- HP GC Chemstation
- HP MS Chemstation
- Target 3.4
- Ward Scientific

Development Software
- Power Builder 4.0, 7.0
- Visual C++
- Sapphire/WEB

Database Management Software
- Informix

8.0 Laboratory Scope of Test

The laboratory performs a wide variety of inorganic and organic analyses on various matrices including air, water, soil, and sludge. Analyses follow acceptable protocols approved under applicable state and federal programs. Detailed descriptions of accepted procedures and reporting limits are maintained in the individual method SOP's. Appendix D of this QAM presents a summary of the methods employed by STL's Edison facility. The laboratory is approved to provide testing in a number of state and federal programs. A listing of these can be found in Appendix E.

9.0 Reference To Test Procedures Used

The following list includes the sources for the majority of analytical methods referenced by the laboratory:

Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, USEPA, January, 1996.

Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act, 40 CFR Part 136, USEPA Office of Water.

Methods for Chemical Analysis of Water and Wastes, EPA 600 (4-79-020), 1983.

Methods for the Determination of Organic Compounds in Drinking Water, EPA-600/4-88-039, December 1988, Revised, July 1991, Supplement I, EPA-600-4-90-020, July 1990, Supplement II, EPA 600/R-92-129, August 1992.

Methods for the Determination of Inorganic Substances in Environmental Samples, EPA 600(R-93-100), August 1993.

Statement of Work for Inorganic Analysis, ILM04.0, USEPA Contract Laboratory Program, Multi-media, Multi-concentration.

Statement of Work for Organics Analysis, OLM03.2, OLM04.2 USEPA Contract Laboratory Program, Multi-media, Multi-concentration.

Standard Method for the Examination of Water and Wastewater, 19th edition; Eaton, A.D. Clesceri, L.S. Greenberg, A.E. Eds; American Water Works Association, Water Pollution

Control Federation, American Public Health Association: Washington, D.C., 1995.

Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846), Third Edition, September 1986, Final Update I, July 1992, Final Update IIA, August 1993, Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996.

Annual Book of ASTM Standards, American Society for Testing & Materials (ASTM), Philadelphia, PA.

USEPA Low Concentration Organic Analysis, USEPA, OLC2.1.

Procedures for Handling and Chemical Analysis of Sediment and Water Samples, Plumb, Russell, USEPA Corps of Engineers, May 1991.

10.0 Arrangements Ensuring Laboratory Review of New Work

A thorough review is conducted before the laboratory performs any new or additional work. The General Manager or his designee, the Laboratory Director and the Laboratory Section Supervisors, all consider available resources before accepting new work. Both current and pending workload are considered prior to accepting new work. If the laboratory determines it has the ability to perform the work a Project Manager is assigned and a quotation is prepared.

The same consideration must be evaluated prior to the laboratory expanding its scope of testing. Feasibility of method development and method proficiency demonstration must be established. The requirements for certifications are also considered. Laboratory management including the General Manager, Laboratory Director, QA Manager, Project Managers and Section Supervisors will consider all above factors with the ultimate decision being that of the General Manager. If the laboratory determines it has the ability and desire to perform the work, a plan for implementation is prepared. This would include but not be limited to: acquiring necessary equipment, reagents and/or standards, training analysts, writing appropriate SOPs and performing MDL studies.

11.0 Client Confidentiality

It is the laboratory policy not to release any information pertaining to projects and reports, except to the client who submitted the samples or who is responsible for payment without the consent of the client. Prior to release of any information to a third party, the laboratory must document

consent from the original client. This release may be transmitted via facsimile, but must be on the client company letterhead.

12.0 Procedure for Addressing Complaints

This procedure provides guidance for investigation of any client or regulatory agency's technical complaint. That is, a complaint concerning the validity of the laboratories test result or test methods or the interpretation of a client's technical specification. Complaints may originate verbally or in written form. All complaints are documented and investigated by the Project Manager. The Laboratory Director is responsible for working together with the Project Manager to investigate and resolve the complaint; dependent on the complexity and severity of the complaint. The QA Manager and Technical Directors may be called upon to resolve the issue. In cases where the complaint relates to data quality or the quality system, the QA Department may conduct an internal audit.

13.0 Subcontracting of Tests

Subcontracting is arranged with the documented consent of the client. All QC guidelines specific to the client's analytical program are transmitted to the subcontractor and agreed upon before sending the samples to the subcontract facility. Proof of required certifications from the subcontract facility are maintained in STL project records. Where applicable, specific QC guidelines, QAPPs, and/or SAPs are transmitted to the subcontract laboratory. Samples are subcontracted under formal Chain of Custody (COC).

Subcontract laboratories may receive an on-site audit by a representative of STL's QA staff if it is deemed appropriate by the QA Manager. The audit involves a measure of compliance with the required test method, QC requirements, as well as any special client requirements.

Project reports from external subcontract laboratories are not altered and are included in original form in the final project report provided by STL.

Subcontracting may also occur between STL facilities. Subcontracting within STL is subject to the same requirements as detailed above.

14.0 Procedures for Traceability of Measurements

An external certified service engineer services balances on an annual basis. This service is documented on each balance with a signed and dated calibration stamp. Balance calibrations are verified on a daily basis using Class S weights. Analytical balances are checked at multiple weights and the measured weight is recorded in a bound monitoring logbook. Any discrepancies are brought to the immediate attention of the QA Department.

All mercury thermometers and temperature probes are calibrated annually at ambient temperatures against a traceable reference fluke thermometer. The QA Department maintains all thermometer calibrations. On a daily basis the temperature readings of the ovens, refrigerators, and other temperature-controlled equipment are recorded in a monitoring logbook, which are maintained at 4 ± 2 °C. This chart is reviewed and maintained by the Sample Management Section Supervisor who initiates any corrective action that is required.

The conductivity of the laboratory-deionized water is checked daily with an in-line meter. The accuracy of the meter is checked monthly with a conductivity probe in accordance with EPA method 120.1. This information is recorded in a notebook, which is maintained by the Wet Chemistry Section Supervisor.

Traceability of measurements is assured through the use of a system of documentation and analysis of testing materials. All standards used in the calibration of instrumentation are certified by the supplier as to their accuracy. These certificates of analysis are maintained by the laboratory. The preparation of all standards is recorded in department Standard Preparation Logbooks. Information to facilitate traceability is included in this documentation. All standard and reagent labels must contain the following information: solution ID, concentration, date of preparation, initials of preparer and expiration date.

15.0 Data Quality Objectives

The goal of data quality objectives discussed below is to ensure that data is gathered and presented in accordance with procedures appropriate for its intended use, and that the data is of known and documented quality able to withstand scientific and legal scrutiny. The quality of the measurement data is defined in terms of precision, accuracy, representativeness, completeness, comparability, and traceability.

Precision measures the reproducibility of measurements. It is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the same process under similar conditions. Total precision is the measurement of the variability associated with the entire sampling and analysis process. It is determined by analysis of

duplicate or replicate field samples and measures variability introduced by both the laboratory and field operations. Duplicate samples and matrix duplicate spiked samples are analyzed to assess field and analytical precision, and the precision measurement is determined using the relative percent difference (RPD) between the duplicate sample results.

Accuracy is a statistical measurement of correctness and includes components of random error (variability due to imprecision) and systemic error. It therefore reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ from the true value or known concentration of the spike or standard. Analytical accuracy is measured by comparing the percent recovery of analytes spiked into an Lab. Control Sample (LCS) also known as Blank Spike to a control limit. For volatile and semivolatile organic compounds, surrogate compound recoveries are also used to assess accuracy and method performance for each sample analyzed.

Representativeness is defined as the degree to which a single measurement is indicative of the characteristics of a larger sample or area. More specifically, it is the degree to which the data gathered by the project accurately and precisely represents the actual field conditions. The laboratory makes every effort to ensure a representative aliquot is removed from the sample container. Homogenization of the sample is carried out when appropriate.

Completeness is defined as the percentage of measurements that are judged to be valid measurements. Factors negatively affecting completeness include the following: sample leakage or breakage in transit or during handling, missing specified holding times, losing sample during Laboratory analysis through accident or improper handling, improper documentation such that traceability is compromised, or rejection of sample results due to failure to conform to QC criteria specifications. A completeness objective of at least 90% of the data specified by the statement of work is the goal established for most projects.

Comparability of results between current and past sampling events, and between analytical sequences of a method is achieved through Quality Assurance Project Plans (QAPP), controlled SOP's, and experienced, well trained analysts.

Traceability is the extent to which reported analytical results can be substantiated by supporting documentation. Traceability documentation exists in two essential forms: those, which link the quantitation process to authoritative standards, and those, which explicitly describe the history of each sample from collection to analysis and disposal. The traceability goal for the laboratory is 100%.

16.0 Quality Control Measures

The quality control program implemented in the laboratory includes the analysis of method blanks, check standards, laboratory control samples (LCS also called as blank spikes) analytical spikes, and surrogate spikes. Depending upon the analysis, every analytical series includes one or more of these controls. The combination of controls used in an analysis must be completely representative of the analytical task including all aspects of sample preparation and sample analysis. This section describes routine procedures used to monitor laboratory method performance and substantiate validation of data. Controls analyzed in conjunction with samples are essential in the evaluation of the quality of the generated data. These programs may include any of the following quality controls in addition to other project specific obligations.

Method blanks are prepared and analyzed with each analytical batch of twenty or fewer samples (608 - per 10 samples) to identify possible sources of contamination within the analytical process. Method blanks are treated as samples (i.e., they go through each stage of the analytical process including glassware, reagents, instrumentation, and any other source of possible contamination that may affect sample results). Surrogate recoveries, and elevated levels of compounds must be evaluated for method blanks. The control limits and corrective actions for method blanks are defined in the method SOP's.

Instrument Blanks are prepared (for CLP & Delaware) as an unprocessed aliquot of reagent used to monitor the contamination of the analytical system. An instrument blank is analyzed at the start of the analytical sequence and after highly contaminated samples to confirm that the instrument is contaminate-free before continuing with sample analyses. Instrument blanks are also commonly known as *continuing calibration blanks* in inorganic analyses.

Laboratory Control Samples (LCS) also known as Blank Spikes are prepared and analyzed with each batch of samples. Laboratory control samples are fortified with all compounds of interest at documented levels and with the same spiking solution as the MS. Aqueous and solid laboratory control samples are analyzed using the same sample preparation, reagents, and analytical methods employed for the samples received. Method performance is monitored by the measure of accuracy of the results.

The results of the LCS (Blank Spike), used in conjunction with the MS samples provide an indication of whether the laboratory performed the method correctly or the sample matrix affected the results. When a laboratory control sample duplicate (LCSD (Blank Spike DUP)) is required, a percent recovery may be calculated, as well as a relative percent difference (RPD) between the LCS (Blank Spike) and the LCSD (Blank Spike DUP). The control limits and corrective actions for LCS (Blank Spike)'s are defined in the method SOP's.

Surrogates are non-target analyte compounds that are similar in composition and behavior to the target analytes but are not expected to be found in environmental media (often, isotopically labeled target analytes are used). Surrogates are spiked into every sample, quality control sample and method blank for organic analyses. Extractable organic analyses are spiked with surrogates at the time of extraction; and volatiles prior to analysis. Surrogates responses are used to evaluate the accuracy of the laboratory performance of the analytical method in a specific sample matrix and are expressed as percent recoveries. The control limits and corrective action for surrogate spikes are specified in the method SOP's.

Internal Standards are non-target analyte compounds that are similar to the target analytes but are not expected to be found in environmental media (generally, isotopically labeled target analytes are used) and are added to every standard, quality control sample and field sample at a known concentration prior to analysis. Internal standard area responses and retention times are evaluated in all samples and blanks according to the method of analysis. IS responses are used as the basis for quantitation of target analytes. Lab. Control Sample (LCS) samples are also commonly known as method blank spikes. The control limits and corrective action for internal standards are specified in the method SOP's.

Matrix Spikes/Matrix Spike Duplicates (MS/MSD) are prepared and analyzed with each batch of 20 samples or less (Method 608/10 samples) (if specified by the client) of the same matrix for organic analyses and a MS is prepared and analyzed with each batch of 20 samples of the same matrix for inorganic analyses. The MS/MSD samples are prepared by taking an aliquot of an actual site sample and fortifying it with the selected target analytes of interest. The MS/MSD samples are analyzed using the same sample preparation, reagents, and analytical methods employed as the field samples. MS and MSD responses are used to evaluate the accuracy and precision of the laboratory performance of the analytical method in a specific sample matrix. Results from site samples other than that of the client's will not be reported with the data package. Control limits for recoveries of the matrix spike/matrix spike duplicate compounds are listed in the method SOP's.

Replicate analyses are prepared and analyzed for inorganic samples and for certain organic drinking water analyses with each batch of 20 samples of the same matrix. Control limits for replicate analyses are listed in the method SOP's.

Calibration Check Standards are analyzed with each analytical series at the frequencies stated in the methods. For metals, GC, and Wet Chemistry analyses calibration check standards are analyzed at a frequency of 10%, or after every ten samples (Method 8081A-8082/20 samples). For GC/MS analyses, the frequency of the calibration check standard is every 12 hours. The tuning criteria must be met prior to analyzing blanks, standards or samples. Control limits for

calibration check standards are listed in the method SOP's.

Instrument Check Sample is a solution containing both interfering and analyte elements of known concentration that can be used to verify background and interelement correction factors.

Initial Calibration Verification sample is a prepared standard solution that is composed of the analytes of interest made from a different source than those used in the standards for the initial calibration.

The following table provides a brief summary of the frequency and control limits for the fundamental quality control measures performed for analyses by the laboratory. Additional types of quality control are performed as necessary.

Parameter	QC type	Frequency	Control Limits	Corrective Action
Volatile Organics	method blank	1 per batch	target analytes below RL, 10x exception for lab solvents	System check, reanalysis of associated samples
	surrogate spike	each sample, standard, blank	limits listed in method	Review, reanalyze based on technical judgment
	MS/MSD	set per 20 samples per matrix	limits listed in method	Report results
	LCS (Blank Spk.)	1 per batch	limits listed in method	review, reanalyze LCS (Blank Spk.) and associated samples, if appropriate
Semi-volatile Organics	method blank	1 per 20 samples or each batch	Target analytes below RL, 5X exception for common lab contaminates.	reanalysis, if still out, reextract w/ samples
	surrogate spike	each sample, standard, blank	limits listed in method	review, re-extract based on technical judgment
	MS/MSD	set per 20 samples per matrix	limits listed in method	report results
	LCS (Blank Spike)	1 per 20 samples or each batch	limits listed in method	review, reextract w/samples, if appropriate
Extractable Organics	Method blank	1 per 20 samples or each batch	all compounds below RL	reanalysis, if still out, reextract w/samples
	Surrogate spike	each sample, standard, blank	limits listed in method	review, re-extract based on technical judgment
	MS/MSD	set per 20 samples per matrix	limits listed in method	report results
	LCS (Blank Spk.)	1 per 20 samples or each batch	limits listed in method	review, reanalysis or reextract w/samples, if appropriate
Metals	lab reagent/prep blank	1 per 20 samples or batch	analyte below RL	redigest batch
	LCS (Blank Spk.)	1 per batch	Soils- Limits provided by vendor; Waters - ± 20%	redigest batch
	Replicates	1 per 20 samples per matrix	± 20%	flag results
	Matrix spikes	1 per 20 samples per matrix	75-125%	flag results
Wet Chemistry	Lab reagent/prep blank	1 per 20 samples or batch	analyte RL	system check, reanalysis of batch
	LCS (Blank Spk.)	1 per batch	80-120% recovery	system check, reanalysis of batch
	Replicates	1 per 20 samples per matrix	± 20%	flag results
	Matrix spike	1 per 20 samples per matrix	75-125%	flag results

RL = Reporting Limit

17.0 Statistical Control Limits

Control charts provide a means for long-term trend analysis as well as a tool for real time data assessment. Statistical control limits are prepared for most routine methods and matrices analyzed by the laboratory after accumulation of at least 20 data points. The % recovery of laboratory control samples, matrix spikes and surrogates are monitored and charted. The relative % difference (RPD) of laboratory duplicates is also monitored and recorded.

Control limits derived from laboratory data are calculated in terms of multiple standard deviation from a mean or other reference point. Warning limits are set at ± 2 standard deviations and control limits are set at ± 3 standard deviations. Initial limits are established after a minimum of twenty data points are available. Once established, the control limits are updated at least annually. If method specified limits are available, the calculated control limits are compared to them. The laboratory adopts method-specified limits whenever available rather than use laboratory generated limits for actual evaluation of data. This provides consistency over time, particularly for ongoing projects. In cases where acceptance limits are not specified in methodology, laboratory generated control limits are used for data evaluation.

In addition to control limits, control charts are used to determine if trends are occurring. Data points consistently above or below the mean, or points becoming steadily high or low over time indicate the occurrences of trending or bias in the procedure. Investigation and corrective action is taken if these situations are observed.

18.0 Procurement and Inventory Control

Chemical reagents, solvents, gases, glassware and general supplies are ordered as needed to maintain sufficient quantities on hand. Purchasing guidelines for all equipment and reagents effecting data quality are well defined and documented. Similarly, performance specifications are documented for all items of equipment having an effect on data quality. Any item critical to the analysis, such as an instrument or reagent, received and accepted by the organization is documented. This includes type, age, and acceptance status of the item. Reagents are dated upon receipt and upon opening to establish their order of use and to minimize the possibility of exceeding their shelf life.

Requests for equipment affecting the quality of analytical data are submitted in writing to the Section Supervisors or Laboratory Director for technical approval. After approval, the requisition is submitted to the Administrative Section Supervisor for purchase approval.

19.0 Procedures for Handling Test Items - Sample Custody

Sample representativeness and integrity are the foundations upon which meaningful analytical results rely. A documented and approved sampling plan reflecting data quality objectives should be in place at the sampling site. The integrity of the sample should be maintained through the use of preservation techniques specified in the relevant protocols. Samples should be submitted to the laboratory under standard chain-of-custody (COC) procedures. A copy of the laboratory *Chain of Custody* form can be found in Appendix B.

Sample Acceptance Policy

Samples are considered "compromised" if the following conditions are observed upon sample receipt:

- Cooler and/or samples are received outside of temperature specification.
- Samples are received broken or leaking.
- Samples are received beyond or close to the holding time.
- Samples are received without appropriate preservative.
- Samples are received in inappropriate containers.
- COC does not match samples received.
- COC is not properly completed or not received.
- Breakage of any Custody Seal.
- Apparent tampering with cooler and/or samples.
- Headspace in volatiles samples.
- Seepage of extraneous water or materials into samples
- Inadequate sample volume.
- Illegible, impermanent, or non-unique sample labeling.

Samples are received at the laboratory by a designated Sample Custodian. The Sample Custodian removes the samples from the cooler and compares the sample labels with the information provided on the chain of custody form. If applicable, sample preservation, including temperature, is checked upon sample receipt (volatile water sample preservation is checked at the time of screening). Any non-conformance or irregularity is noted and brought to the immediate attention of the Project Manager, and if appropriate, a Corrective Action Form or Sample Receipt/NonConformance Form is generated. The Project Manager takes appropriate action and documents the resolution in and Sample receipt/Non-Conformance Form. This documentation is attached it to the clients chain-of-custody.

STL Edison utilizes a custom designed Laboratory Information Management System (LIMS) to uniquely identify and track samples and analytical data throughout the facility. The laboratory additionally maintains a hand written master log as a parallel paper system backup, which is described in the *Sample Handling* SOP. The following information is entered into the computer:

* Job number (unique to the job or set of samples)
* Date received
* Sample Date
* Sample matrix
* Client's name
* Client's Site Name or Number
* Billing information - purchase order numbers
* Sample number (unique to this sample)
* Refrigerator location
* Date analytical results due
* Turnaround Time
* Number of containers
* Additional comments
* Client's address
* Analyses requested
* Notation of special handling instructions
* Deliverable Requirements

This information is stored as part of the STL Job data which is identified by a unique Job Number. Each sample is assigned a unique laboratory ID number (a sequential 6 digit number). Two labels with this number are placed on each container of the sample (one on the side and one on the top). If there is more than one container per sample a letter suffix is assigned to track each container. The laboratory number, letter suffix, and a description of the container is recorded in the STL Job Number comment section. Once labeled, the samples are placed in the appropriate storage area.

Once the STL Job Number has been generated, method specific analytical worksheets are generated for distribution to the appropriate supervisors and analysts. A secondary review of the STL Job Number is carried out by the Project Manager to ensure compliance with project requirements. When the laboratory is ready to analyze a sample, an analyst requests the appropriate sample aliquot from the Sample Custodian by presenting their sample request worksheet. The analyst may be required to sign an internal chain-of-custody form when removing the sample aliquot from the sample management area based on the project requirement. These documents can be provided to the client in full data packages, wherever required.

When the analysis is complete, the analyst returns the sample to the custodian and relinquishes custody. Samples are stored in the refrigerators until their established disposal date, typically 14 days from the date the results are submitted. The client may request a longer storage time. When their storage period expires, the samples are removed from the refrigerator for disposal. All unused solid samples removed from the refrigerators are packed for disposal and tested to insure compliance with applicable state and federal guidelines.

Sample and extract disposal is carried out following applicable state and federal guidelines. A discussion of the storage and disposal procedures for laboratory waste generated at the laboratory is included in Appendix F of this document. Detailed instructions on the log-in and receipt can be found in the *LOGIN, Procedure For Sample Receipt, Login, Iidentification, And Storage SOP NO. LOGIN01.*

20.0 Holding Times, Preparation and Sample Screening

Holding times for every analysis are established in Federal or State regulations and is documented in the method SOPs or on a project specific basis. Holding times are normally tracked throughout the facility using the LIMS. Work is scheduled by the Laboratory Director and Section Supervisors to avoid expiration of any sample prior to analysis. If any holding times are not met the laboratory informs the Project Manager as soon as possible and the project manager notifies the client.

Samples are prepared according to standardized methods. Batches are generated in the preparation lab according to preparation method, analytical method, and matrix. In general, batches do not exceed 20 field samples of the same matrix and are defined as samples prepared at the same time.

Inorganics (Metals and Wet Chemistry) - Samples for analyses are prepared in batches containing a maximum of 20 samples of the same or similar matrix. A laboratory blank and laboratory control sample are digested with each batch. A matrix spike and replicate analyses are performed for every 20 samples of the same matrix.

Organics - Samples for organics analyses are prepared in batches containing a maximum of twenty samples of the same or similar matrix. The organic extraction labs are equipped for handling many matrices and various clean-up requirements including Florisil, GPC, silica gel, acid-base, copper and sulfur. A method blank is performed with each batch. Lab control samples are extracted with each batch for applicable methods. Matrix spike and matrix spike duplicate analyses are performed for every 20 samples of the same matrix.

Re-preparation - Re-preparation or re-analysis of a sample may be required in cases of contamination, missed dilution, low surrogate recovery, etc. If the need for reanalysis/re-preparation has been determined, the request is forwarded to the appropriate department. Additionally a Corrective Action Report is filed with the QA Department when the laboratory has initiated a re-preparation request.

Screening - Samples for organics analyses are screened prior to analysis and/or extraction.

Screening helps to prevent unnecessary re-runs and lower instrument re-calibration, re-tune and analyst labor time. All GC and GC/MS volatiles are screened prior to analysis by headspace GC ECD and FID detectors. If necessary, soil semi-volatiles are pre-screened prior to extraction to determine if they require low or medium level extraction procedures. If necessary, all semi-volatile extracts are screened prior to analysis using GC with FID detectors.

21.0 Procedures for Calibration and Verification

Calibration of instrumentation is required to ensure that the analytical system is operating correctly and functioning at the proper sensitivity to meet established reporting limits. Each instrument is calibrated with standard solutions appropriate to the type of instrument and the linear range established for the analytical method.

Method specific SOP's discuss in detail how each instrument is calibrated, including frequency for calibration and re-calibration, and the source or grade of the calibration materials. The range of analyses performed and instrumentation utilized is extensive and the calibration procedures are instrument specific, varying from analysis to analysis. The calibration procedures for organics usually include an initial system performance check and some type of initial calibration (with a minimum of five calibration standards for most methods) with each analytical series. On-going and closing calibration checks are also included in most analytical series. For each type of calibration standard or performance check there are specific criteria to meet before sample analyses begin. These criteria are established in the methodologies as they are written in the referenced texts or by contract specifications.

Gas Chromatography/Mass Spectrometry (GC/MS)- Prior to analysis of samples, the instrument is tuned with bromofluorobenzene (BFB) for volatile compounds and decafluorotriphenyl-phosphine (DFTPP) for semivolatile compounds or other tune criteria as specified by the method used. No samples are analyzed until the instrument has met the tuning criteria of the method.

In general, the instrument is then calibrated for all target compounds. An initial calibration curve is produced to define the working range to establish criteria for identification. This initial calibration is evaluated on a daily basis to ensure that the system is within calibration. If the daily standard does not meet the established criteria, the system is recalibrated.

Gas Chromatography- Each chromatographic system is calibrated prior to performance of analyses. Initial calibration consists of determining the working range, establishing limits of detection, and establishing retention time windows. The calibration is checked as required to ensure that the system remains within specifications. In addition, continuing calibrations are

performed at frequencies required by the method used. If the calibration checks do not meet established criteria, corrective action that may include recalibration and reanalysis of samples is taken.

*Metals- A*nalysis for metals generally involves two types of analytical instrumentation: inductively coupled argon plasma emission spectroscopy (ICP), and atomic absorption spectroscopy (AA).

Each ICP is calibrated prior to use by analyzing a multi-element calibration standard. The calibration is then verified using standards from an independent source. For CLP a linear range verification check standard is analyzed and reported quarterly for each element analyzed by ICP. This concentration is the upper limit of the ICP linear range and any result found above this limit must be diluted and reanalyzed. The calibration is monitored throughout the day by analyzing a Continuing Calibration Blank (CCB) and a Continuing Calibration Verification Standard (CCV). If the verification standard does not meet established criteria, corrective action is performed.

Each AA unit is calibrated prior to any analyses being conducted. A calibration curve is prepared with a minimum of a calibration blank and three standards and then verified with a standard that has been prepared from an independent source at a concentration near the middle of the calibration range (CCV). The calibration is then verified on an ongoing basis with a calibration blank and a CCV. If the ongoing calibration standard does not meet established acceptance criteria, corrective action is performed.

All samples for furnace analyses are single spiked. The method of standard additions or sample dilution is used when the single spike analysis indicates matrix interferences are present.

Wet Chemistry- The field of classical (wet) chemistry involves a variety of instrumental and wet chemical techniques. Calibration and standardization procedures vary depending on the system and analytical methodology required for a specific analysis. The calibration is checked on an ongoing basis to ensure that the system remains within specifications. If the ongoing calibration check does not meet established criteria, analysis is halted and corrective action is taken. The procedures include examination of instrument performance and recalibration and reanalysis of samples back to the previous acceptable calibration check.

Methods performed at the laboratory are validated prior to sample analysis. Method validation involves the determination of sensitivity and linearity and reproducibility studies. This would include but are not limited to: writing appropriate method SOPs and performing method detection limit studies.

Method sensitivity is determined by method or instrument detection limit studies. The procedure to determine the method detection limit (MDL) follows 40CFR Part 136 Appendix B (revision 1.1). The reporting limit for a given analyte may be derived from the MDL. MDL studies are conducted annually on all routine analytical methods.

Inorganic instrument detection limits (IDLs) are determined quarterly in accordance with EPA Contract Laboratory Program procedures outlined in the *Statement of Work for Inorganic Analyses* (Document number ILM04.0) for AA, ICP and Cyanide analyses.

The MDL is the approximate limit at which an analyte can be *qualitatively* detected using a specific method at a 99% confidence interval. The MDL is a statistically calculated value and measures the sensitivity of an entire method and is independent of device. The RL or Limit of Quantitation , is the limit at which a compound can be qualitatively detected and *quantified* at a 99% confidence interval. The RLs are also set based on specific knowledge about the analyte, project specific requirements and/or regulatory requirements. The RL is always greater than the MDL is typically set based on 3-5 times the MDL.

STL – Envirotech reports results to the sample specific RL's. For most methods the low calibration standard is set at the laboratory Reporting Limit (RL) to monitor method sensitivity per instrument per calibration. Sample specific RL's are derived by taking into account various sample specific data, which can include the amount of the sample subject to testing, percent moisture, dilution factors, interferences and the base RL's for the analysis.

In some cases, it is appropriate to report values between the MDL and the RL. In this region, an analyte can be qualitatively detected, but not accurately quantified. Any data point reported in this region is flagged with a "J" for organics and a "B" for inorganics, to indicate that it is an estimated value.

22.0 Data Reduction

Each laboratory section provides extensive data review prior to reporting results to the client. In general an analyst will process data in one of the following ways:

- Manual computation of results with manual reporting
- Computer computation of results with manual reporting
- Computer computation and reporting of results

If the analyst manually processes the data, all steps in the computation are provided for review

including the source of the input parameters such as response factors, dilution factors, and calibration constants. All calculations of manually processed data are checked during secondary review.

For data that is processed using a computer and then entered into the LMS by an analyst or data entry personnel, a hard copy of the computer generated results is kept and uniquely identified with the sample number and any other preparation or dilution information as may be needed. The hard copy results are used for data validation and secondary review.

If computer processed data is directly acquired from the instrumentation, hard copies of the actual data are made and the analyst verifies that the following are correct before releasing instrumental data to the reporting system:

- Sample numbers
- Calibration constants/ response factors
- Output parameters such as units and compound names
- Numerical values used for detection limits
- Dilution and preparation factors

The hard copy of the results is used for data validation and review. After initial demonstration of proficiency of computerized programs computer calculations are randomly spot checked while the manual entry of every result is verified.

23.0 Data Review

The analyst who generates the data (i.e., log in, prepares and/or runs the samples) is responsible for primary review. The primary review is often referred to as a "bench-level" review. One of the most important aspects of primary review is to make sure that the test instructions are clear, and that all project specific requirements have been understood and followed. Once the analysis is complete, the primary reviewer ensures that: sample preparation information is complete, accurate, and documented, calculations have been performed correctly, quantitation have been performed accurately, qualitative identifications are accurate, client specific requirements have been followed, method and process SOPs have been followed, method QC criteria have been met, QC samples are within established limits, dilution factors are correctly recorded and applied, non-conformances and/or anomalous data have been properly documented and appropriately communicated, COC procedures have been followed. If the instrument calibration and recoveries of all quality control samples are within specified tolerances, then the data are presented for secondary review. If instrument calibration or the recoveries of any quality control

samples exceed specified tolerances, then affected sample results are evaluated and generally the samples are submitted for re-analysis. Any manual integration that occurs are dated and signed and if appropriate, noted in the case narrative.

Secondary review (a complete technical review) is typically conducted by laboratory Section Supervisors or data review personnel to determine if analytical results are acceptable. All calibrations, manual calculations and transcriptions are checked for accuracy and quality control sample results are evaluated against specified tolerances. If instrument calibration and recoveries of all quality control samples are within specified tolerances, then the data are presented to the Project Manager for final (tertiary) review.

Laboratory Director or senior chemistry personnel perform final review of the data to determine if all analytical results of a sample(s) are consistent. Correlation of results for different parameters of a sample is evaluated at this time before the data is presented in a final report to the client. If discrepancies or deficiencies exist in the analytical results, then corrective action is taken.

Periodic data audits of final reports by the QA Department are conducted to determine that precision, accuracy, completeness and traceability goals of the sample analysis are being conducted.

A complete description and basic elements of the laboratory data review process and procedures are outlined in the laboratory *Data Review* SOP.

24.0 Data Reporting

After all analytical data has been reviewed, the final report is assembled for submission to the client. The laboratory currently offers four levels for reporting analytical results.

Results data consist of measurements taken during field analysis with the report consisting of results only.

Results/QC reporting consists of an analytical report with results and Internal quality control results.

Reduced Deliverables reporting consists of an analytical report with internal quality control results reported; these include laboratory control standards, surrogate spike recoveries, and method blank results.

Regulatory Format (RF) refers to data submitted in CLP-like format. *RF* is defined by the submission of QA/QC supporting material including the raw laboratory data similar to that provided with CLP Statements of Work (SOW). Submission of data in this format results in an independently validatable package. *RF* reporting includes narrative, analytical results, supportive documentation including all raw data and preparation sheets, and all documentation related to chain of custody. Once the document is assembled, the sections are distinguished with index tabs. The pages are paginated in numerical order and photocopied. Copy(s) of the documentation are sent to the client, and the original document is retained in storage for a minimum of five (5) years.

25.0 Document Control

Security and control of documents is necessary to ensure that confidential information is not distributed and that all current copies of a given document are from the latest applicable revision. Unambiguous identification of a document is through a header placed in the upper right or left hand corner of each page. The header contains the document name, revision number, revision date and number of pages.

The following documents are controlled by the QA Department: Laboratory Forms, Laboratory Quality Manual (QAM) and Standard Operating Procedures (SOP's). These documents require written approval by appropriate management prior to release to the laboratory. A controlled copy number and the following red colored marking identify controlled copies of documents:

CONTROLLED DOCUMENT
DO NOT DUPLICATE
If this stamp is not colored red, this is not a controlled copy.

The QAM and SOPs are reviewed annually. As approved revisions to controlled documents are prepared and distributed, outdated versions are removed from the laboratory and destroyed. The original copy of each revision is archived by the QA Department for reference purposes. All documents distributed internally are controlled in this manner. Documents distributed externally (to clients, etc.) are uncontrolled copies. The laboratory SOP titled *Document Control* provides detailed procedures to laboratory associates.

SOP's are written procedures for standardized methods (i.e. SW-846, EPA-600 methods) and are supplied primarily to document specific laboratory procedures used to satisfy the general requirements specified in the individual methods and to explain any differences between the

application of the established method and the published procedure. If any difference exists between STL's SOP and a standard method's specific procedures, method validation studies are performed to document the fact that the change does not adversely affect the applicability of the method. In general, every effort is made to adhere to the protocols of the standard method.

Standard Operating Procedures (SOP's) contain the basic procedures and practices the laboratory uses to analyze a method. These procedures provide a basis for training new associates and for showing customers how analyses are performed.

26.0 Records

The laboratory retains all records related to sample analysis including raw data, calculations, derived data, calibrations and test reports. These records are maintained in a systematic manner for a minimum of five (5) years. Longer periods of storage may be arranged at the time of project initiation.

Mistakes are never erased, deleted or written over. They are corrected by drawing a single line through the error and entering the correction alongside. The correction is then initialed and dated by the responsible person.

Each log book page or, as required, each entry is dated and initialed by the analyst at the time the record is made. Pages inserted into logbooks are stapled to a clean, bound page. Specific information on the types of logbooks, format of entry, and other pertinent information are contained in the appropriate sectional SOPs.

The Technical Directors and/or Laboratory Section Supervisors for accuracy, completeness, and compliance to this QAM periodically reviews laboratory notebooks. If all entries on the pages are correct, then the laboratory Section Supervisor initials and dates the reviewed pages. Corrective action is taken for erroneous entries before the laboratory Section Supervisor signs off with their approval.

27.0 Performance Assessment

The laboratory participates in several internal and external laboratory check sample programs as a means for examining overall laboratory performance as well as to qualify for various federal and state certification programs. Internal or intra-laboratory check sample programs include the submission of blind samples that are carried through normal procedures. The following external or inter-laboratory check sample programs are the typical ones employed to demonstrate analytical proficiency for purposes of monitoring overall laboratory proficiency or to provide proof of acceptable performance for certification by outside agencies or regulatory bodies:

Water Pollution (WP) and Water Supply (WS) Semi-annual Performance Evaluations
The EPA Performance Evaluation is an extensive and comprehensive check sample program. The program is administrated by the EPA's Environmental Monitoring and Support Laboratory (EMSL). Participating laboratories receive reports detailing acceptability of their reported results and must provide corrective action responses to State Agencies regarding any results that are outside of the control limits.

The New York State Department of Health Environmental Laboratory Assessment Program
This program consists of check samples for metals, general chemistry and organic parameters. Samples for potable water, non-potable water, hazardous waste, CLP analysis, and air testing are submitted periodically throughout the year. Participating laboratories receive reports detailing acceptability of their reported results and must provide corrective action responses to the New York State Department of Health regarding any results that are outside of the control limits.

The Pennsylvania Department of Environmental Protection
This program consists of check samples for trace metals, Fluoride and cyanide; Organic Total Trihalomethanes, Volatile organic compounds, and Herbicide parameters. Samples for potable water are ordered through NIST approved PT providers once a year. Participating laboratories receive reports detailing acceptability of their reported results and must provide corrective action responses to the Pennsylvania Department of Environmental Protection regarding any results that are outside of the control limits.

NELAC NIST Approved PT Program
Under the terms of the agreement between the National Instituti of Standards and Technology (NIST) and the U.S. Environmental Protection Agency (USEPA), the National Voluntary Laboratory Accreditation Program (NVLAP) accredits laboratories for their competence to characterize samples and to conduct proficiency test programs. Accreditation is offered in those areas necessary to support environmental laboratory testing of drinking water and waste water.

Testing is divided into four major areas areas: inorganic chemical analysis; organic chemical analysis; biological and microbiological testing; and radiological testing and analysis. Participating laboratories receive reports detailing acceptability of their reported results and must provide corrective action responses to the Primary State regarding any results that are outside of the control limits.

28.0 Corrective Action

A nonconformance is typically defined as an unplanned deviation from an established protocol. An occurrence of a nonconformance may be the result of STL's actions, which would be rendered as a deficiency, or the result of events beyond STL's control, which would be termed an anomaly. All nonconformances are documented.

Deviations from the QAM or SOPs , deficiencies, errors, or out-of-control situations require corrective action. Documentation of the problem, identification of the cause and follow-up action to prevent recurrence is accomplished using a Corrective Action/Exception Report form. A copy of this form can be found in Appendix B.

Any individual who detects the need for corrective action is responsible for initiating the report. Corrective action procedures may be initiated and are often completed at all levels of the laboratory. If the person initiating the report is uncertain as to what would constitute appropriate corrective action or is unable to resolve the situation, they identify the problem and submit the incomplete report to their Section Supervisor, Laboratory Director and the QA Department who is then responsible for resolution.

All completed corrective action reports are submitted to the QA Department who is responsible for review and follow up to determine if the corrective action is sufficient, effective and fully implemented. Completed reports are maintained on file in the QA department. Copies of corrective action reports that are specific to a sample or set of samples will also be filed with the supportive documentation and discussed in each appropriate case narrative.

29.0 Correction of Erroneous Reports

The discovery that, for whatever reason, an erroneous result has been released initiates immediate corrective action to rectify the error. If the error is discovered internally then the client is immediately notified by the Project Manager to prevent use of the incorrect report for decision making. If a client or validator has a question or finds a deficiency concerning the data

submittal, the Project Manager is responsible for communicating and implementing the corrective action in the laboratory. The analytical results and all supportive documentation in question are submitted to the appropriate section for evaluation. Should a reanalysis be necessary, it is initiated if the sample is still available using a Corrective Action Report Form. If the re-analysis is out of holding time the result is qualified. If revisions to the report are necessary, corrections are made, initialed and dated; or if the complete new report (resubmission) is requested, all the pages with addendum are renumbered.

Hard copies and revised electronic deliverables (where applicable) are given to the Project Manager for re-submission to the client or validator. Revision of the case narrative, should it become necessary, is the responsibility of the Project Manager. In some instances, clients request that sample handling information, recalculations or qualitative judgments are re-checked in order to ensure data integrity. In this case, resubmission of the data may not be necessary unless a problem is detected.

The Project Manager brings customer problems that persist in the laboratory to the attention of the Laboratory Director and the QA Department.

30.0 Departures from Policies

Departures from laboratory Standard Operating Procedures are not permitted unless the approval of the General Manager, Laboratory Director or the QA Manager is obtained prior to implementation of the departure. These exceptions must be documented with a SOP and/or highlighted in the case narrative, which accompanies the analytical results. If a client requests a departure from the laboratory's policies or procedures, the Project Manager notifies the QA Department who then discusses the steps necessary to implement such a departure with the Laboratory Director and appropriate laboratory Section Supervisors. Additionally, method validation studies and method detection limit studies are performed as applicable.

31.0 Audits

Two types of audits are performed at the laboratory. Technical system audits are designed to assess the adequacy of a selected system in meeting STL objectives. Technical system audits may be performed by the QA Department as an internal audit or by a client or regulatory agency for certification or approval. Data audits are performed to assess the quality of results reported to clients. If the results of an audit (either internal or external) indicate that a client's analytical results are questionable the client is notified in writing by either the Project Manager or the QA

Department. The laboratory then works with the client and makes every attempt to resolve the issue (i.e., by revising a report, reanalysis of the sample, etc.).

Audits from Regulatory Agencies - As a participant in many state and federal certification programs, the laboratory is frequently audited by representatives of regulatory agencies. Any audit findings are formally documented by the QA Department and submitted to the laboratory for corrective action. The laboratory is required to respond with corrective action to the audit findings and recommendations of the regulatory agencies before certification for a particular program can be granted. The Laboratory QA Department conducts follow-up audits to verify that corrective actions have been implemented. Observations made during these follow-up audits are submitted to the appropriate representatives of the regulatory agency.

Internal Audits – At least annually, all laboratory sections are required to participate in periodic internal audits, which are administered by the QA Department. The findings of these audits are formally documented and submitted to the Laboratory Director and to the General Manager. The Laboratory Director has the responsibility for resolving points at issue or for effecting necessary changes to the laboratory's practices.

Data Audits- On a quarterly basis the QA Department validates a data set. If any error is detected the client is notified immediately and a revised report is submitted to the client. A written narrative accompanies the corrected report notifying the client of the error.

32.0 Quality System Review By Management

A review of the quality system is conducted annually. Management, including but not limited to the General Manager, Laboratory Director and QA Department, review all aspects of the laboratory's quality system. The purpose of this review is to ensure the suitability and effectiveness of STL's program as well as provide opportunity for improvements. The review includes the following topics:

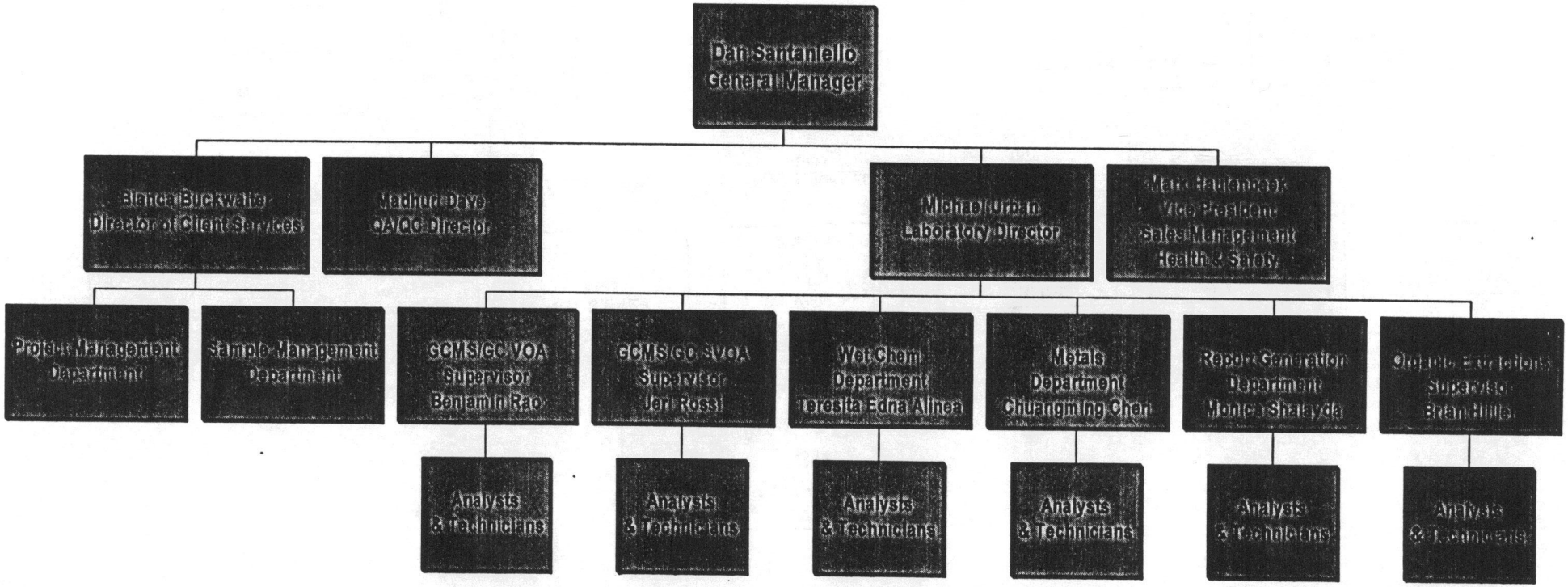
- Reports from audits by clients and regulatory agencies
- Reports from internal audits
- Results of proficiency studies
- Corrective actions from the past year and a review of their implementation
- Details of complaints from clients and their resolution
- Training goals and objectives
- Staff, facility and equipment resources
- Future plans and goals

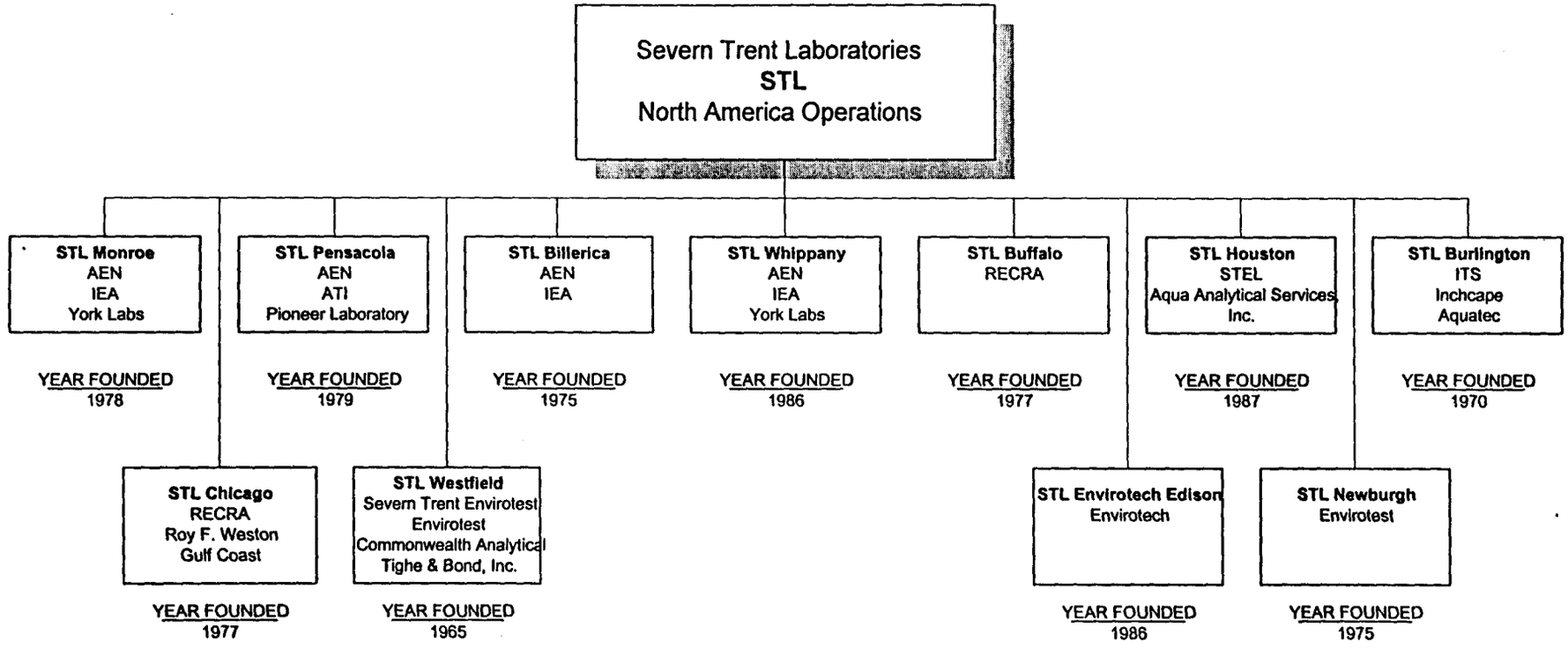
➢ Monthly Operations Report to Management

In addition to this annual review, a monthly report and meetings occur to communicate issues and needs which arise during the course of operations.

APPENDIX A:
Organization Charts, Qualifications of Personnel and Resumes

STL Edison Organization Chart





AEN - American Environmental Network
ATL - Analytical Technologies, Inc.
RECRA - RECRA Environmental, Inc. RECRA Lab Net
IEA - Industrial Environmental Analyst
ITS - Intertek Testing Services

Note: Envirotech & Envirotest were two different independent companies prior to becoming STL.

EMPLOYEE NAME	DEGREE	AREA OF STUDY	TITLE	DEPT	YRS / EXPER. TYPE
Daniel Santaniello	BS	Electrical Engineering	General Manager	ADA	12/EI
Michael Urban	BS	Chemistry	Lab/Technical Director	ADA	24/E
Mark Haulenbeek	MS	Environmental Eng.	Vice President Business Development & Marketing	SAM	24/EU
Madhuri R. Dave	BS	Microbiology/Chemistry	QA/QC Manager	ADA	14/E
David E. Boring	BA	Chemistry	Account Exec.	SAM	11/E
Theresa Jodoin	AA	Accounting	Account Exec.	SAM	13/E
Ralph A. Kocsis	BS	Biology	Account Exec.	SAM	15/E
Jules K. Thiessen	BS	Chemistry	Account Exec.	SAM	13/E
Arlene Briskin	BA	Education	HR Manager	ADA	16/IE
Margaret Tylek	AA	Accounting	Accounts Receivable	ADA	7/IE
Bianca R. Buckwalter	BS/MBA	Toxicology/Business	Client Services manager	PMG	19/E
Kimberly Norton	AS	Biology	Project Manager	PMG	12/E
Paul Simms	BS	Environmental	Project Manager	PMG	5/E
Judy Engelmann	AS	Biology	Project Manager	PMG	11/E
Seth Kreisler	BS	Environmental	Project Manager	PMG	1.5/EI
Brian Reddy	BS	Chemistry	Project Manager	PMG	9/E
Susan Lysy	HS	General	Project Mngm. Adm. Asst.	PMG	18/EI
Joy Kelly	BS	Chemistry	Asst.Project Manager	PMG	14/EI
Benjamin Rao	BA	Biology	VOA Supervisor	OVG	9/E
Mary Baron	BS	Biology	Data Reviewer	OVG	12/E
David R. Lissy	BA	Chemistry	Senior GC/MS Analyst	OVG	19/EI
Vivian Vu	BS	Chemistry	GC/MS Analyst	OVG	2/UE

EMPLOYEE NAME	DEGREE	AREA OF STUDY	TITLE	DEPT	YRS / EXPER. TYPE
Kathleen Schweitzer	BS	Marine Biology	GC/MS Analyst	OVG	13/E
Audberto Tupayachi	AA	Mech./Elec. Eng.	GC/MS Analyst	OVG	10/E
Catherine Kostcvicki	AA	Biotechnology	GC/MS Analyst	OVG	3/E
Chunxin Zhao	MS	Env. Science	GC/MS Analyst	OVG	9/E
Yannong Zhang	BS	Chemistry	GC/MS Analyst	OVG	4/EU
Jyoti Patel	BS	Chemistry	GC/MS Analyst	OVG	9/EI
Kenneth Boykin	AA	Chemistry	GC/MS Analyst	OVG	15/E
Lily Deng	MS	Env. Science	GC/MS Analyst	OVG	8/EI
Shailesh Patel	BS	Chemistry/Math	GC/MS Analyst	OVG	6/EI
Mahjabeen H. Riaz	MS	Env. Science/Biology	GC/MS Analyst	OVG	9/EI
Xing Zhang	MS	Chem.Eng./Chemistry	GC/MS Analyst	OVG	7/EU
Barbara Pritchard	AS	Chem. Technology	Data Reviewer	OVG	12/E
Jeri Rossi	BS	Env. Science	SVOC GC/MS Supervisor	OSVG	14/E
Patrick Zega	BS	Chemistry	SVOC GC/MS Night Supervisor	OSVG	13/EU
Rui Macieira	BS	Chemistry	GC/MS Analyst	OSVG	5/E
Christopher Pittman	BS	Chemistry	GC/MS Analyst	OSVG	9/EU
Li Zhang	MS	Chemistry	GC/MS Analyst	OSVG	5/EUI
Lisa Latorre	BS	Biology/Biochem.	GC/MS Analyst	OSVG	4.5/E
Wahied Bayoumi	AA	Chemistry	GC/MS Analyst	OSVG	14/E
Eddie Martinez	AS Env. Tech.	Env. Science	GC/MS Analyst	OSVG	3/E
Darren Syron	AS	Env. Science	GC/MS Analyst	OSVG	4.5/E
Shannon Rowe	BS	Biology	GC/MS Analyst	OSVG	4/EU
Irene Kohrmann	BS	Chemistry	Pest/PCB Supervisor	OPPG	13/E

EMPLOYEE NAME	DEGREE	AREA OF STUDY	TITLE	DEPT	YRS / EXPER. TYPE
Marcel Mol	BS	Env. Science	Pest/PCB Night Supervisor	OPPG	5/E
Catalina Dalangin	BS	Chemistry	Pest/PCB Analyst	OPPG	11/E
Shanthi Damarapu	MS	Env. Science	Pest/PCB Analyst	OPPG	10/E
Sita Kapoor	MS	Organic Chem.	Pest/PCB Analyst	OPPG	2/E
Randy Moncelsi	BS	Env. Chem.	Pest/PCB Analyst	OPPG	2/E
Martin McCarthy	BS	Env. Science	Pest/PCB Analyst	OPPG	1/E
Zhong Xin Zhai	BS	Chemistry	Pest/PCB Analyst	OPPG	1.5/E
Esohe Asemota	BS	Chemistry	Lab. Assistant	OPPG	0.5/E
Aleksander Berman	MS	Chemistry	Pest/PCB Analyst	OPPG	12/UE
Michael Shepsko	HS		Pest/PCB Technician	OPPG	11/E
Brian Hillier	AA/BA	Chemistry/History	Organic Prep. Supervisor	OPG	5/E
Stanislaw Orkusz	AA	Law Admn.	Lab. Technician	OPG	10/E
Orlando Feliciano	HS		Lab. Technician	OPG	5/E
Sexture Watts	HS		Lab. Technician	OPG	10/E
Shiv K. Sahni	BS	Chemistry	Lab. Technician	OPG	8/IE
Jose Silva	HS		Lab. Technician	OPG	10/E
Juan Romero	HS		Lab. Technician	OPG	6/E
Dilip Shukla	BA	Economics	Lab. Technician	OPG	6/E
Naresh Bhatt	HS		Lab. Technician	OPG	10/E
Phuc Nguyen	BS	Chem. Engineering	Lab. Technician	OPG	3/UE
Upendrakumar Vyas	AS	General Science	Group Leader	OPG	13/E
Chuangming Chen	MS	Soils and water Sciences	Metals Supervisor	MET	8.5/E
Kimberly F. Neuffer	BS	Biology	Data Reviewer	MET	5/E

EMPLOYEE NAME	DEGREE	AREA OF STUDY	TITLE	DEPT	YRS / EXPER. TYPE
Yixin Huang	MS	Chemistry	Metals Analyst	MET	3/E
Eric Helders	BS	Env. Studies	Lab. Tech.	MET	2/E
Paul Rojek	BS	Env. Science	Sr. Metals Analyst	MET	9/E
Donald Evans	HS	Chemistry	Sr. Metals Analyst	MET	6/E
Michael Polidori	AAS	Chemistry	Sr. metals Analyst	MET	14/E
Brian J. Racin	BS	Forest Genetics	Sr.Lab. Tech.	MET	13/E
Suguna U. Sanagavarapu	MS	Biology/Chemistry	Sr. Lab. Tech.	MET	7.5/E
Teresita Edna A. Alinea	BS	Chemistry	Wetchem Lab. Supervisor	GEN	19/E
Alla Aksentsova	BS	Organic Synthesis Tech.	Env. Chemist	GEN	11/EI
Zuzana Mezgova	BS	Chemistry	Lab. Technician	GEN	19/IE
Camille A. Retana	HS		Lab. Tech.	GEN	10/E
Emmylou Torres	AS	Chemisrty	Lab. Tech,	GEN	9.5/EU
Ian Magpantay	BS	Biology, Chemistry	Lab. Tech.	GEN	4.5/UE
Dana M. Nitu Solomon	BS	Ecology	Lab. Tech.	GEN	3/E
Huan T. Vu	AS	Chemistry	Lab. Tech.	GEN	1.5/E
Ana L. Chavez	BS	Biology	Lab. Tech.	GEN	12.5/EUH
Ronald M. Milke	BS	Oceanography	SR. Lab. Tech.	GEN	9/E
Paul J. Nadzan	BS	Biology	Sr. Lab. Tech.	GEN	8/E
Carmen Gonzalez	BA	General Science/Education	Report Prep. Tech.	RGG	3/UE
Geraldine Ann R. Cadiz	BS	Biology	Report Prep. Tech.	RGG	3/UE
Amanda Harford	BS	Biology	Report Prep. Tech.	RGG	1.5/UE
Barbara Hill	HS		Receptionist	RGG	12/E
Nicole Rabitz	HS		Report Prep. Tech.	RGG	4/E

PLOYEE NAME	DEGREE	AREA OF STUDY	TITLE	DEPT	YRS / EXPER. TYPE
Janet Guitierrez	BA	Spanish	Report Prep. Tech.	RGG	1.5/E
Jaclyn Colasanti	HS		Report Prep. Tech.	RGG	3/E
Conchita Mendoza	BS	Chem.Eng.	Report Prep. Tech.	RGG	19/IE
Rachel Stolte	BS	Biology	Report Prep. Tech.	RGG	1/E
Monica Shalayda	AS	Chem. Tech.	Data Review Supervisor	RGG	5/E
Christine Caffrey	HS	Liberal Arts	Report Prep. Tech.	RGG	12/E
Lucretia Mongal	BA	Biology	Report Prep. Tech.	RGG	
Princess Turla	HS		Report Prep. Tech.	RGG	2/E
Robert Prichard II	BS	Business	Log-in-Tech.	SMG	11/E
Ann Winters	HS		Log-in-Tech.	SMG	4/E
Lorraine Monaco	HS		Log-in-Tech.	SMG	5/E
Howard J. Schulze	BS	Business/Geology	Sample Management Supervisor	SMG	9/E
James J. Paluch	BS	Civil Eng.	Log-in-Tech.	SMG	26/E
Christopher Neale	BS	Network Eng/Data Commu.	Systems Admin.	ISG	11.5/EI

Experience Type:

U-University/Government Lab

H-Hospital

I-Industry

E-Environmental

Departments:

ADA-Administration Accounting

ADF-Administration Facilities

ADG-Administration General

ENC-Environmental Field Services

GEN-General Chemistry

RGG-Report Generation Group

ISG-Info.Systems Group

SAM-Sales & Marketing

SMG-Sample Management

OSVG-Organic Semivolatile Group

OPPG-Organic Pesticide/PCB Group

OVG-Organic Volatile Group

OPG-Organic Prep Group

PMG-Project Management Group

MET-Metals

Resumes

Resumes for the following specific personnel are included in the following pages. Concise educational and experience profiles for the entire laboratory are also provided. Additional resumes are available upon request.

Daniel Santaniello
General Manager

Madhuri R. Dave
Quality Assurance Manager

Arlene Briskin
Human Resources Manager

Bianca R. Buckwalter
Customer Service Manager

Benjamin Ting-Cho Rao
VOCs Lab. Supervisor

Chuangming Chen
Metals Laboratory Supervisor

Howard J. Schulze
Sample Login Supervisor

Monica Shalayda
Data Review Supervisor

Michael J. Urban
Laboratory Director/Technical Director

Mark S. Haulenbeek
Business Development & Marketing Manager

Deborah A. Loring
Corporate QA Manager

Jeri L. Rossi
SVOCs Lab. Supervisor

Irene B. Kohrmann
Pesticide/PCB Lab. Supervisor

Teresita Edna A. Alinea
Wet Chemistry Laboratory Supervisor

Brian Hillier
Organic Prep Lab Supervisor

DANIEL SANTANIELLO

Education: B.S. - Electrical Engineering, Rutgers University (1987)
Post Graduate Studies in Management Systems Analysis

Professional Experience:

STL Edison (04/2000-Present)
General Manager of STL New Jersey Region - Responsible for overall management of the Edison and Whippany facilities including personnel, finance, operations and laboratory information management.

Severn Trent Laboratories (10/1998-03/2000)
Director, Corporate Information Technology - Responsible for all corporate communications, internet-intranet development, LIMS development, and corporate IT standards.

Envirotech Research, Inc. (3/1993-10/1998)
Information Systems Manager - Responsible for all computing systems and software in the laboratory. Administer and maintain UNIX/SQL databases for report generation and Quality Control data.

John Brown EC
Berkeley Heights, New Jersey (7/1991-2/1993)
Programmer/Analyst - Responsible for software development and systems customization using UNIX/SQL databases. End user support and training. Database customization of reference and design data. Responsible for administration of an 80 node PC network.

ITT Corporation
Clifton, New Jersey (5/1988-7/1991)
Quality Control Engineer - Spearheaded R&D effort to automate Reliability/Maintainability engineering functions. Provide software and technical support. Develop, implement and teach user training sessions. Implemented a Unix Based Mechanical Engineering CAD system.

Publications:
"1990 IRD Technical Plan for RAMCAD" (9/1990)
"1989 IRD Technical Plan for RAMCAD" (9/1989)
"RAMCAD at ITT: The Overall Approach" (4/1989)
"16 Bit Trainer Instructor's Guide" (2/1988)

MICHAEL J. URBAN

Education: B.S. - Chemistry, Drexel University (1975)

Post Graduate studies in Mass Spectrometry
Glass Capillary Columns for High Resolution Gas Chromatography - Hewlett Packard (4/78)
Basic Interpretation of Mass Spectra - Finnegan (10/78)
RTE-6 Operators Course - Hewlett Packard (7/86)

Professional: American Society for Mass Spectrometry

Professional Experience: STL Edison, Formerly Envirotech Research, Inc. (3/86-present)
Laboratory Director - Manages all technical aspects of environmental testing activities. Responsible for final interpretation of GC/MS and GC data including pesticide residue and maintenance of instrumentation. Reviews data packages prior to delivery.

United States Environmental Protection Agency, Region II,
Edison, New Jersey (9/83-3/86)
Analytical Chemist, National Environmental Response Team - Directed the analytical efforts of EPA's National Environmental Emergency Response Team with an annual budget of over 8 million dollars. Specialized in the development of site-specific field testing procedures designed to quickly generate reliable analytical data during environmental emergency response episodes. Responsible for the Agency's technical evaluation, purchase and successful field application of a mobile direct air sampling, chemical ionization, MS/MS air monitoring laboratory.

United States Environmental Protection Agency, Region II,
Edison, New Jersey (9/79-9/83)
Analytical Chemist, EPA Region II Environmental Services Division - Supervisor of the EPA Region II GC/MS laboratory. Responsible for the operation and maintenance of five computerized GC/MS systems, supervision of five senior level chemists and the overall quality assurance of data generated by the regional MS laboratory.

United States Environmental Protection Agency, Region II,
Edison, New Jersey (3/75-9/79)
Analytical Chemist, EPA Industrial Environmental Research Laboratory - Served as senior chemist aboard EPA's first Environmental Emergency Response mobile analytical laboratory. Duties included field operation of Gas Chromatographs, Atomic Absorption, Fluorescence, and Infrared Spectrophotometers, training and supervision of chemists and technicians in instrumental analysis and general laboratory procedures.

MARK S. HAULENBEEK

Education: B.S. - Environmental Science, Rutgers University (1975)

M.S. - Environmental Engineering, New Jersey Institute of Technology (1980)

Professional Activities: NJ DEP Environmental Laboratory Advisory Committee

NJ DEP Site Remediation Program, Technical Advisory Committee

New Jersey Water Environment Association - Hazardous Waste Committee
(Formerly the New Jersey Water Pollution Control Association)

Professional Experience: **Vice President – STL Edison,,** Formerly Envirotech Research, Inc. (1985 to Present)
Coordinates laboratory service provided to both engineering consulting firms and directly to industry. Has corporate responsibility over activities that include Quality Assurance, Health and Safety, and Project Management to address laboratory services as a:

- New Jersey Certified Laboratory
- New York Certified Laboratory
- Pennsylvania Certified Laboratory
- Delaware Superfund (HSCA) Approved Laboratory
- U.S. Army Corps of Engineers Validated Laboratory
  (and other laboratory certifications programs)

United States Environmental Protection Agency, Region II
Edison, New Jersey Laboratory (10 Years, 1975 to 1985)

Chief, Site Mitigation Section - Supervised the clean-up of Superfund hazardous waste sites, response to oil and hazardous material spills and federal emergency management activities.

Regional Project Officer - Directed a seventy (70) person "Field Investigation Team" contractor conducting Superfund preliminary assessments, site inspections, remedial investigations, and feasibility studies to define remedial alternatives.

Staff Scientist - Conducted hundreds of field testing programs and regulatory audits to evaluate industrial compliance with NPDES Permits, RCRA, TSCA and other statutes including intensive environmental monitoring programs for various toxic pollutants (i.e. - PCBs, solvents, pesticides, heavy metals, dioxin, etc.).

MADHURI R. DAVE

Education: B.S. - Microbiology, Chemistry, Bombay University (1980)

Mass Spectral Interpretation, Hewlett Packard (1986)
Gas Chromatography Course, Perkin Elmer (1986)
Computer Courses-C, C++ under UNIX Environment, Oracle 8.0,
Visual Basic 6.0.

Professional Experience:

STL Edison
Edison, New Jersey (09/99 - present)
Quality Assurance Manager - Responsible for the quality control program of the Edison facility, and for interfacing with the corporate Quality Assurance Director to ensure adherence with the overall Quality Management Plan. Also responsible for implementing NELAP (National Environmental Laboratory Accreditation Program) in the Edison facility.

CDM Federal Programs Corp.
South Plainfield, New Jersey (1994 - 1999)
Environmental Scientist / Senior Data Validator - As senior data validator have worked in position of continuously increasing responsibility. Have performed data validation of organic data packages following approved statements of work, methodologies, and EPA data validation in Region I, II, III, IV and IX. Have assisted in laboratory audit procedures and quality assurance plans.

Laboratory Resources, Inc.
Teterboro, New Jersey (1990 - 1994)
Organic Laboratory Manager / Systems Manager - Responsible for day to day operation, training and providing technical support. Also was responsible for QA/QC operation and project management. Provided technical support to the sales and marketing personnel when evaluating potential programs and projects, and when responding to client inquiries.

Environmental Sciences & Engineering
Shelton, Connecticut (1988 - 1990)
Organic Laboratory Manager / Environmental Scientist - Responsible for day to day operation, training and providing technical support.

Princeton Testing Laboratory
Princeton New Jersey (1985-1988)
GC Supervisor – Responsible for overview of day to day operation and review the reports. Participated in analysis of PE samples as well as responsibility for all state and federal audit compliance for GC analysis.

DEBORAH A. LORING

Education: Bachelor of Science in Chemistry, Tufts University 1983

Specialized Training: Supervisory Skills Workshop, October 1997

Management Problems of the Technical Person in a Leadership Role, Fred Pryor Seminar, September 1997

Publications: Guiding Field Activities by Using Rapid, Cost Effective Screening Methods at a Fixed Laboratory, Rick Gomez, Deborah Loring, 1994. Presented at the US EPA Office of Solid Waste Conference, July 1994. Also presented at Fifth International FZK/TNO Conference on Contaminated Soil, Maastricht, The Netherlands, October 1995.

An Alternative Approach to RCRA Facility Investigations, Susan Chapnick, Deborah Loring, 1993. Presented at the US EPA Office of Solid Waste Conference, July 1993.

Developing a Uniform Approach for Complying with WPA Methods, Deborah Loring, Jerry Parr, Nancy Rothman, Peggy Sleevi, 1991. Presented at the US EPA Office of Solid Waste Conference, July 1991.

Professional Experience: **Corporate Quality Assurance Manager, STL, Colchester, Vermont, December 1998 to present.**

The Corporate Quality Assurance Manager is responsible for establishing and implementing a Quality Management System for STL, and for ensuring that the QMS is well documented and well communicated at all staff levels. Ms Loring is also responsible for monitoring implementation and compliance with the QMP, conducting annual management systems audits and data audits, as well as providing regulatory updates and technical assistance to the General Managers, Lab Directors and QA Managers.

The Corporate QA Manager is the final authority in all matters of data quality, and submits a monthly report to the COO. Ms. Loring assists in development of management plans and technical policies to be approved by the COO and/or President, and coordinates employee training within STL.

Laboratory Manager, STL, Colchester, Vermont, February 1997 to December 1998

Responsible for all aspects of day to day laboratory operations including production, data reporting and facility/technical aspects. Also provides technical support internally for laboratory analysts and as a technical liaison for clients.

President, Loring Environmental Associates, West Roxbury, MA, July 1992 to December 1995

Founded consulting firm involved in environmental project management and regulatory compliance. Responsible for start-up sales, financial and managerial oversight of all projects, client interaction, and day to day operation of the business. Also provided project plan and SOP writing services. Developed and conducted 3-day training seminars in CERCLA; including regulatory background, technical, and legal guidelines of data generation under Superfund program. Sold the company in 1995.

Chemistry Laboratory Manager, BHP Laboratories, Limerick, Ireland. January 1992 to July 1992.

Technical, managerial, and financial direction of full service chemistry laboratory. Supervised field operations such as on-site import shipboard testing of chemicals, and provided sampling and consulting services in Europe, including assessing environmentally friendly and sustainable alternative approaches to manufacturing techniques. Trained personnel in environmental analysis; responsible for client interaction, instrument maintenance and troubleshooting; developed an extensive quality assurance program to meet new European environmental regulations.

Quality Assurance Director, Enseco - Erco, Cambridge, MA, March 1988 to December 1989 and January 1990 to July 1991

Directed QA and Environmental Health and Safety programs and staff for the eastern region of an environmental laboratory network consisting of 200 employees at three locations. Functioned as QA representative with clients and federal and state regulatory agencies, ensured regulatory compliance, conducted internal and external audits, authored and negotiated project plans, maintained state and federal certifications, responded to inquiries and complaints, and responsible for final approval in all matters of data quality.

Manager, Organic Preparation Laboratory, ERCO, Cambridge, MA, September 1987 to March 1988

Shift Coordinator, GC/MS Laboratory, ERCO, Cambridge, MA, March 1987 to September 1987

Manager, GC/MS Laboratory, Aquatec, Inc., South Burlington, Vt. May 1985 to July 1986.

Chemist, GC/MS Laboratory, Aquatec, Inc., South Burlington, Vt. January 1984 to May 1985

ARLENE BRISKIN

EDUCATION

Kean University (formerly College) 1986-1987
Pursuing Master's degree in Psychology
Rowan University (formerly Glassboro State College) 1965-1969
B.A. in Education K-8th grades
Concentration in Mathematics

PROFESSIONAL EXPERIENCE

STL Edison (formerly Envirotech Research, Inc.)
1994-present
Administrative Assistant
Duties include administrative support for a laboratory of 125 employees, payroll and timekeeping functions, accounts payable, personnel administration, clerical functions, purchasing, banking, financial recordkeeping, administration of 401(k) plan, cafeteria plan and other company benefits, collection of past due invoices, human resources contact

Envirotech Research, Inc.
1986-1994
Bookkeeper
Duties include all of the above with the addition of accounts receivable and receptionist duties

Status Labels – parttime
1985-1986
general office work

Edison Public Schools
1984-1986
substitute teacher

Jonas Salk Middle School
1969-1972
Old Bridge, New Jersey
6th grade teacher
Mathematics, English and Science

BIANCA R. BUCKWALTER

Education: M. B. A. - Boston College GSM (1986)
B. S. - St. Johns University (1982)

Graduate courses in Biochemical Engineering
Massachusetts Institute of Technology

Professional: Water Environment Federation
Warren County Solid Waste Advisory Council

Professional Experience:

STL Edison (11/97 - Present)
Client Services Director - Responsible for the supervision of sample management, laboratory couriers, and project managers. Manage key client accounts and provide technical assistance to the project management department.

ICM Laboratories - Randolph, NJ (1989 - 10/97)
Director Sales & Marketing - Responsible for the management of the sales, marketing, client services and sample management departments. Managed key client accounts and provided technical support to client services department. Developed marketing plans to meet overall laboratory sales goals.

Intech Labs - East Brunswick, NJ (1986 - 1989)
Account Representative - Responsible for the maintenance and management of key accounts in northern New Jersey territory. Developed marketing plans for the industrial hygene laboratory.

Energy Resource - Cambridge, MA (1983 - 1984)
Chemist - Responsible for the analysis of environmental samples for the US EPA - CLP program. Assisted in method development for key projects.

JERI L. ROSSI

Education: B.S. - Environmental Science, Rutgers University (1993)

Mass Spectral Interpretation Seminar
presented by Bruce E. Wilkes, 4/90

Professional Experience:

STL Edison (Previously Envirotech Research, Inc.) 11/92 to present
Supervisor, GC/MS Semi-Volatile Organics Department - responsible for supervision of semi-volatile extraction laboratory and GC/MS department, including operation and maintenance of Hewlett-Packard GC-FID and GC/MS systems used for SW-846, CLP and 600 series method analysis of semi-volatile compounds. Method development and implementation of Zymark Benchmate GPC cleanup system for use prior to CLP analysis. Responsible for scheduling work, data technical validity, method compliance, employee training and review, the application of new method protocols, purchasing of necessary standards and supplies.

Envirotech Research, Inc. (10/90 - 11/92)
Team Leader, GC/MS Volatile Organics Department - Responsible for GC and GC/MS analysis of samples in the volatile organics department by SW-846, CLP, 500 and 600 series methods. Responsible for operation and maintenance of Hewlett-Packard GC/MS systems and GC systems with FID, PID and ELCD detectors. Also responsible for scheduling work, data technical validity, method compliance, employee training and review, the application of new method protocols, purchasing of necessary standards and supplies.

Envirotech Research, Inc. (4/89 - 10/90)
GC/MS Analyst - responsible for the analysis of environmental samples for both volatile and semi-volatile organic compounds department by SW-846, CLP, 500 and 600 series methods, data review and interpretation of mass spectra and maintenance of GC and GC/MS systems.

ETC Corporation
Edison, New Jersey (10/85 - 4/89)
GC/MS Analyst - responsible for the analysis of environmental samples for volatile and semi-volatile compounds, maintenance of GC/MS systems, data review and mass spectral interpretation. Also responsible for screening of samples prior to GC/MS analysis.

Skills: Knowledge of Hewlett-Packard instruments including Model 5880 & 5890A Series II GCs with a variety of GC and GC/MS detectors. Knowledge of Zymark

GPC with ISCO Fractionator and U.V. detector. Detailed instrument troubleshooting and maintenance skills. Proficiency in Aquarius and Target GC/MS acquisition software and experienced with PC-based applications (Microsoft Word, Excel, etc.)

BENJAMIN T. RAO

Education: B.A. - Biological Science, Rutgers University (1991)

Rutgers University - Graduate course work in environmental and instrumental analysis.

Professional Experience:

STL Edison (Previously Envirotech Research, Inc.) - Edison, NJ
Supervisor, Volatile Organics Analyses (VOA) Department (5/97 - present) Responsible for GC and GC/MS analysis of samples in the volatile organic department by SW-846, CLP, 500 and 600 series methods. Responsible for scheduling work and data review. Other responsibilities include employee review, methods development and compliance, GC/MS training and instrument maintenance.

Envirotech Research, Inc. (3/96 - 4/97)
Senior Analyst - VOA Department: Responsible for the analysis of environmental samples by GC and GC/MS using EPA and CLP methodologies. Perform maintenance and trouble shooting of instruments. Responsible for training of new employees in the GC and GC/MS departments.

Envirotech Research, Inc. (3/93 - 3/96)
Analyst - VOA Department: Responsible for sample screening GC and GC/MS analysis of environmental samples for volatile organics by SW-846, CLP, 500 and 600 series methods, data review and interpretation of mass spectra and maintenance of GC and GC/MS systems.

Envirotech Research, Inc. (7/91-3/93)
Sample Preparation Chemist: Coordinated activities of the sample extraction work group. Extracted samples for semi-volatile organics, Pesticide/PCBs and herbicide analysis. Prepared standards used to spike samples for MS/MSD and blank spike analysis and coordinated sample extract storage and handling.

General Testing Corporation - Hackensack, NJ (6/90 - 8/90)
Laboratory Technician: Performed BOD, Dissolved Oxygen, Oil & Grease and Fecal Coliform analyses.

Skills: Knowledge of Hewlett-Packard, OI and Tekmar instruments including HP model 5890 and 5890A GCs, model HP5970 and HP5971 Mass Spectrometers, Purge and Trap systems OI 4560, OI 4551, OI 4552 Tekmar LSC2000, Tekmar ALS2016/2032, Tekmar 3000, Headspace Analyzer Tekmar 7000, GC Detectors OI 4420 ELCD, OI 4330 PID, and FID detectors. Proficiency in HP based Chemstation and Aquarius software as well as UNIX based Target software.

IRENE B. KOHRMANN

Education: B.S. - Chemistry, University of New York at Oswego, NY (1986)

Gas Chromatography Seminar: Packed and Capillary Columns
A. C. S. Hands-On Short Course, Virginia Tech., 1990

Total Quality Management Program
ETC, Edison, NJ 1992.

Professional Member American Chemical Society

Professional Experience:

STL Edison_ (8/95- present)
Supervisor, Semi-volatile Organics Analysis (GC-EC) - Responsible for the scheduling of analyses in the GC-EC Department to meet customer deadlines, maintenance and operation of Hewlett-Packard GC Systems for CLP, TCLP, SW846 and 600 Series methods analysis for Pesticides, PCBs and Herbicides. Responsible for data technical validity, method compliance, employee training and review and the application of new method protocols.

Pace NJ (Formerly ETC) Edison, New Jersey (2/94-8/95)
GC Analyst IV, GC Supervisor - Responsible for all aspects of production and work flow in the GC department for CLP, TCLP SW846 and 600 Series methods including the training and review of GC analysts. Responsible for the adaptations of new method/protocols, instrument maintenance and purchases of necessary supplies. Provided technical support to project managers.

ETC Corporation Edison, New Jersey (12/86-2/94)
GC Analyst-I, Analyst-II, and Team Leader - Lead person in GC for CLP and RCRA Appendix 7, 8 & 9 testing work group. Specialized GC training in CLP and RCRA analysis. As a GC/HPLC Analyst-I, Performed EPA methodology on wastewater and soil samples by GC and HPLC analysis. As a GC Screening/HPLC Analyst, Performed QC screening on sample extracts for GC to avoid sample reanalysis. As a Sample Preparation Analyst, performed extractions, concentrations, cleanups of waste water and soil samples and followed protocols according to EPA specifications.

Skills: Knowledge of Hewlett-Packard instruments: GC Model 5880 & 5890A Series II with detailed troubleshooting and maintenance of both packed and capillary columns. Proficiency in Aquarius (Q-Chrom) Method Developments for private clients, NJDEP and USEPA protocols. Experienced with PC-based applications (Microsoft Word), as well as FormsMaster software for semi-volatile gas chromatography CLP packages.

TERESITA EDNA A. ALINEA

Education: B.S. - Chemistry, College of the Holy Spirit, 1964

Basic Gas Chromatography - Varian, 1979
User Training in GFAA - Perkin Elmer, 1984
Analytical Laboratory QC/ QA Program, Lancaster Labs, 1986
User Training in ICAP - TJA, 1987

Professional Experience:

STL Edison (Previously Envirotech Research, Inc.) 3/97 to present
Supervisor, Wet Chemistry Department - Responsible for the daily operation of wet chemistry, TPH and TCLP extraction laboratory. Duties include coordination of laboratory schedules, verification of reported data integrity and accuracy, method SOP revisions, maintenance of instrumentation, coordination and evaluation of staff training, purchasing standards and chemical supplies, and conducting all wet chemistry determinations offered by STL Edison.

Envirotech Research, Inc. (1/97 - 2/97)
Chemist, Wet Chemistry Department - Performed various EPA and SW846 methods analysis on drinking water, waste water and soil samples. Analyses include gravimetric, colorimetric, potentiometric methods and instrumental analyses.

Laboratory Resources, Inc. (6/96 - 12/96)
Chemist, Wet Chemistry Department - Performed various analytical methodologies on environmental samples. Analyses included testing of environmental samples and Performance Evaluation samples for laboratory certifications with federal and state regulatory agencies.

Laboratory Resources, Inc. (12/95 - 2/95)
Provided project management and technical support to define appropriate analytical methodologies and assist marketing and sales staff. Worked with the Quality Control officer in establishing a centralized technical library for three Laboratory Divisions.

Princeton Testing Laboratory (2/80 - 2/95)
Inorganic Laboratory Manager / VP - Responsible for the management of Wet Chemistry, Metals, Microbiology, and Bioassay Departments. Duties include the daily operations of the four departments; hiring and training of technical staff; evaluating new laboratory procedure and equipment; reviewing final reports; implementing quality control measures, corrective action, and participating in external and internal audits. Instrumental in setting up new laboratory procedures, obtaining new certifications and accreditations, and increasing analytical capabilities. Obtained FDA approval to perform microbiological testing on pharmaceutical products. Obtained bioassay laboratory certification to perform Acute Toxicity and Chronic Toxicity testing. Conducted all wet chemistry determinations offered by Princeton Testing Laboratory.

CHUANGMING CHEN

Education:

M.S. in Soil and Water Science, University of Arizona (1988)
Course Work: Soil Chemistry, Physical Chemistry, Chemical Analysis of Soils.

Rutgers University Graduate School.
Course Work: Soil Chemistry, Environmental Chemistry, Environmental Science, Analytical Techniques in Environmental Chemistry, X-Ray Spectroscopy

B.S. in Geology, Zhongshan University, P.R. of China (1982)

Flame AA Technical Training - Perkin Elmer, 12/93
Furnace AA Technical Training - Perkin Elmer, 12/93
ICP Principles and Applications - ThermoJarrel Ash Corp., 4/95

Professional Experience:

STL Edison (12/97 - present)
Metals Supervisor: Responsible for trace metals laboratory, the generation and review of data for CLP, SW-846 and 600 Series methods. Responsible for methods compliance and data technical validity, scheduling workflow to meet customer deadlines, employee review and training. Makes recommendations for new capital expenditures. Purchases necessary supplies and standards. Responsible for operation and maintenance of AA and ICP instruments.

Envirotech Research, Inc. (8/93 - 12/97)
Analyst - Metals Department: Responsible for analysis of soil, water, hazardous waste and leachates by CLP, SW-846 and 600 Series methods including flame and furnace AA and ICP techniques.

Envirotech Research, Inc. (5/91 - 8/93)
Analyst - VOA Department: Responsible for sample screening by GC; GC and GC/MS analysis of environmental samples for volatile organics by SW-846, CLP, 500 and 600 series methods, data review and interpretation of mass spectra and maintenance of GC and GC/MS systems.

Rutgers University (9/88-5/91)
Graduate Assistant: Responsible for analyzing soil samples for chemical content, particle separation and clay identification.

BRIAN J. HILLIER

Education: B.A. - History

A.A.S. - Legal Studies

A.A. - Chemical Technology 1994 - Middlesex County College

Professional Experience: STL Edison (January 1994 to Present)
Organic Extractions Supervisor: Responsible for day to day scheduling of work for the analysts, review organic prep worksheets and logbooks. Also responsible for ordering supplies, preparing stock standards. Update the LIMS system for completion of work. Co-ordinate with the department supervisors and project managers the day to day activities. Also responsible for review and update of SOPs.
As a Sample Preparation Analyst, performed extractions, concentrations, cleanups of drinking water, waste water and soil samples and followed protocols according to EPA specifications.

HOWARD J. SCHULZE

Education:

Rutgers University
BS
Major in Management with Geology Minor

Professional Experience:

STL Edison, Formerely Envirotech Research, Inc. (1/94 to Present)
Senior Login Technician - Oversee and train login personal. Assist in design and implementation of Login SOPs Enter job data in to LIM System.

Envirotech Research. (10/9l-1/94)
Login/Field Tech - Field Sampling OSHA 40 hour certified. Bottle Prep. Assisted in sample login.

Public School System, Kearny, NJ (1/89-10/91)
Substitute Teacher - Responsible for carrying out lesson plans assigned by regular teachers and for reporting day's activities to department head.

L&R Manufacturing Co, Kearny NJ (1/80-5/87)
Shipping Supervisor - Supervised department consisting of two foremen and about twenty workers. Responsible for scheduling incoming and outgoing deliveries, ordering supplies and materials, and assisting with production scheduling.

Skills;

OSHA 40 training. Experienced on Enviro-LIMs. Proficient in use of various word processing and spreadsheet programs.

MONICA T. SHALAYDA

Education: Chemical Technology – Middlesex County College

Professional Experience:

STL Edison (Nov 1997 - present)
Data Review Supervisor - Responsible for the generation of forms using Target and Envision systems for NJ reduced and Regulatory deliverables, CLP, Delware, NY, and Massechussettes DRO's.
Technical review of data deliverables troubleshooting to ensure the quality of the data packages being sent to the clients. Interface with department supervisors and project managers to meet the needs of the clients in a timely fashion.

Responsible for maintenance of directories in report production group by interfacing with MIS personnel.

Envirotech Research, Inc. (May 1996 – Nov 1997)
GC Analyst – Responsible for the preparation and screening of semi-volatile extracts prior to GC/MS analysis, and the analysis of fingerprints and DRO's.

Envirotech Researrch, Inc. (Feb 1995 – May 1996)
Laboratory Technician – Responsible for semi-volatile organic extractions and concentration of extracts for analysis by SW846, CLP, and 600 series methods.

APPENDIX B:
Forms

STL Edison

777 New Durham Road
Edison, New Jersey 08817
Phone: (732) 549-3900 Fax: (732) 549-3679

Page___of

Name (for report and invoice)	Samplers Name (Printed)	Client:
Company	P.O. #	State:
Address	**Analysis Turnaround Time**	**ANALYSIS REQUESTED** (ENTER "X" BELOW TO INDICATE REQUEST)
City State Zip	Standard Rush Charges Authorized For: 2 Week 1 Week Other	**Project No:** **Job No:**
Phone Fax		

Sample Identification	**Date**	**Time**	**Matrix**	**No. of. Cont.**										**Sample Numbers**
Preservation Used: 1 = ICE, 2 = HCl, 3 = H_2SO_4, 4 = HNO_3, 5 = NaOH					Soil:									
6 = Other _____, 7 = Other _____					Water:									

Special Instructions:

Water Metals Filtered (Yes/No)?

Relinquished by	Company	Date / Time	Received by	Company
1)			1)	
Relinquished by	Company	Date / Time	Received by	Company
2)			2)	

STL RECORD OF INDIVIDUAL TRAINING

Week Ending:

Individual employees are to submit this. Copies of all certificates, diplomas, transcripts, or other documentation should be attached.

Employee Name (Print)

Supervisor Name (Print)

THE ABOVE NAME PERFORMED
TRAINING OR INSTRUCTION ON THE DATES AND FOR THE HOURS INDICATED

Date	Hours	NATURE OF DUTIES, TRAINING OR INSTRUCTION	

I hereby certify that I have completed and understand the training listed above.

Employee Signature - Date

Trainer or Supervisor Signature / Date

Severn Trent Laboratories Edison
Corrective Action/Exception Report

Fraction:_____ **Client:**_____
Date:_____ **SDG:**_____
Initiated By:_____ **Job No.:**_____
Org./Inorg. Laboratory Supervisor: _____**(signature required for holding time violations)**

☐RE-PREP ☐HT VIOLATION ☐CLIENT CONCERN
☐GEN CORRECTIVE ACTION ☐DATA QC ISSUE

SUMMARY OF PROBLEM:

RESOLUTION, RECOMMENDED ACTION OR EXPLANATION:

SUMMARY OF INVESTIGATION AND FINDINGS:
(Include a summary of conclusions based upon results)

CORRECTIVE ACTION REQUIRED? ☐*YES* ☐*NO*
Description of Corrective Action:

Date implemented:_____ Initials:_____

QA USE ONLY	FOLLOW-UP

Date:_____ Follow-up by:_____

Original: QA Copies: Data Package Prep (if Re-prep only)

APPENDIX C:
Floor Plans and Capitol Equipment

The floor plan is being updated, the revised floor plan will be added to the next revision of QAM.

FLOOR PLAN – EXISTING CONDITIONS

Equipment Inventory

The following is a comprehensive list of major instrumentation available along with supporting and miscellaneous equipment.

LABORATORY EQUIPMENT
BNA

TYPE OF EQUIPMENT	MANUFACTURER	MODEL #	SERIAL #	ANALYTICAL METHOD
BNAMS1/GC	Hewlett Packard		3223A43511	600/8000/CLP
MS		5971	3188A02442	
Tower		7673	3013A21967	
Tray			3249A30680	
Controller			3249A30674	
BNAMS2/GC	Hewlett Packard		2618A07933	600/8000/CLP
MS		5971	3234A04110	
Tower		7673	2704A08875	
Tray			2611A01985	
Controller			2607A02892	
BNAMS3/GC	Hewlett Packard		3140A38366	600/8000/CLP
MS		5971	3188A02926	
Tower		7673	3228A31373	
Tray			2942A20025	
Controller			3018A21811	
BNAMS4/GC	Hewlett Packard		3108A34490	600/8000/CLP
MS		5971	3114A02077	
Tower		7673	2843A1263_	
Tray			2933A11253	
Controller			2803A11316	
BNAMS5/GC	Hewlett Packard		3336A59736	600/8000/CLP
MS		5972	3501A02565	
Tower		7673	3249A33228	
Tray			3021A21499	
Controller			3018A22063	
BNAMS6/GC	Hewlett Packard		3336A54722	600/8000/CLP
MS		5971	3234A04274	
Tower		7673	2638A04354	

TYPE OF EQUIPMENT	MANUFACTURER	MODEL #	SERIAL #	ANALYTICAL METHOD
Tray			2718A08680	
Controller			2720A07255	
BNAGC1/GC	Hewlett Packard	5890 II	2950A27321	600/8000/CLP
Tower (1)		7673	3432A39692	
(2)			3013A21129	
Tray			2942A20892	
Controller			3007A21044	
BNAGC2/GC	Hewlett Packard	5890 II	3336A55994	600/8000/CLP
Tower (1)		7673	2936A20142	
(2)			3226A31274	
Tray			3131A25914	
Controller			3244A30371	
BNAGC3/GC	Hewlett Packard	5890 II	2643A12162	600/8000/CLP
Tower (1)		7673	2829A10229	
(2)			2704A05765	
Tray			2718A04635	
Controller			2803A11211	
BNAGC4/GC	Hewlett Packard	5890	2728A14514	600/8000/CLP
Tower		7673	3114A25606	
Tray			3021A21938	
Controller			3113A24891	
BNAGC5/GC	Hewlett Packard	5890	2728A14513	600/8000/CLP
Tower (1)		7673	2704A05266	
(2)			2704A08154	
Tray			2718A10051	
Controller			2551A01866	
BNAGC6/GC	Hewlett Packard	5890 II	2413A05484	600/8000/CLP
Tower		7673	3013A22342	
Tray			3202A27453	
Controller			3202A27987	

LABORATORY EQUIPMENT
VOA

TYPE OF EQUIPMENT	MANUFACTURER	MODEL #	SERIAL #	ANALYTICAL METHOD
VOAMS1/MSD	Hewlett Packard	5970	2623A10294	600/8000/CLP/DW
GC	Hewlett Packard	5890	2623A08142	
ALS	Archon	5100	11756-695	
Concentrator	Tekmar	3000	95144007	
VOAMS2/MSD	Hewlett Packard	5970	2716A10839	600/8000/CLP/DW
GC	Hewlett Packard	5890 II	2750A15931	
ALS	Tekmar	2016	90088038	
Concentrator	Tekmar	2000	88084010	
VOAMS3/MSD	Hewlett Packard	5970	2923A12297	600/8000/CLP/DW
GC	Hewlett Packard	5890 II	2938A24776	
ALS	Tekmar	2016	89191011	
Concentrator	Tekmar	2000	89254002	
VOAMS4/MSD	Hewlett Packard	5970	3114A13079	600/8000/CLP/DW
GC	Hewlett Packard	5890 II	2938A25805	
ALS 1	Tekmar	2016	92344012	
ALS 2	Tekmar	2016	94027002	
Concentrator	Tekmar	2000	9008008	
VOAMS5/MSD	Hewlett Packard	5971	3234A04198	600/8000/CLP/DW
GC	Hewlett Packard	5890 II	3033A33368	
ALS	Archon	5100	11957-696A	
Concentrator	OI	4560	D316219	
VOAMS6/MSD	Hewlett Packard	5970	3004A12585	600/8000/CLP/DW
GC	Hewlett Packard	5890 II	3108A34432	
ALS	OI	4551	A349421	
Concentrator	OI	4560	I418460464	
VOAMS7/MSD	Hewlett Packard	5970	2716A10855	600/8000/CLP/DW
GC	Hewlett Packard	5890 II	3126A36323	
ALS	OI	4551	B516451613	
Concentrator	OI	4560	H417460064	

TYPE OF EQUIPMENT	MANUFACTURER	MODEL #	SERIAL #	ANALYTICAL METHOD
VOAMS8/MSD	Hewlett Packard	5971	3118A02630	600/8000/CLP/DW
GC	Hewlett Packard	5890 II	3126A36935	
ALS	Archon	5100	12206	
Concentrator	OI	4560	C3202089	
VOAMS9/MSD	Hewlett Packard	5971	3118A03332	600/8000/CLP/DW
GC	Hewlett Packard	5890 II	3203A40292	
ALS	Archon	5100	12207	
Concentrator	OI	4560	B243060	
VOAGC1/GC	Hewlett Packard	5890 II	3113A37296	600/8000/DW
ALS	Tekmar	2016	91276009	
Concentrator	Tekmar	2000	91261018	
VOAGC2/GC	Hewlett Packard	5890 II	2921A23492	600/8000/DW
ALS	OI	4551	A339387	
Concentrator	OI	4560	E330495	
VOAGC3/GC	Hewlett Packard	5890 II	3310A49242	600/8000/DW
ALS	Archon	5100	11780-795	
Concentrator	OI	4560	J437460274	
VSCREEN1/GC	Hewlett Packard	5890	2950A29246	Screening
ALS 1	Tekmar	7000	91163006	
ALS 2	Tekmar	7000	90255003	
VSCREEN2/GC	Hewlett Packard	5890	2908A21857	Screening
ALS 1	Tekmar	7000	91339015	
ALS 2	Tekmar	7000	91025010	
H-nu PID	H-nu	PI101	801023	Headspace

LABORATORY EQUIPMENT
Pest/PCB

TYPE OF EQUIPMENT	MANUFACTURER	MODEL #	SERIAL #	ANALYTICAL METHOD
GC 1/GC Mainframe	Hewlett Packard	5890A	2612A07669	600/8000/CLP
Injector Modules (1)		18593A	2546A02861	
(2)			2546A02864	
Controller Module		18594A	2621A03318	
Tray Module		18596A	2611A02280	
GC 2/GC Mainframe	Hewlett Packard	5890A	2750A15933	600/8000/CLP
Injector Modules (1)		18593A	2704A09728	
(2)			2704A08901	
Controller Module		18594A	2803A10202	
Tray Module		18596A	2718A07182	
GC3/Series II GC Mainframe	Hewlett Packard	5890A	3223A42873	600/8000/CLP
Injector Modules (1)		18593B	3228A31372	
Controller Module		18594B	3227A29129	
Tray Module		18596B	3228A29094	
GC 4/Series IIPlus GC Mainframe	Hewlett Packard	5890E	3336A54563	600/8000/CLP
Injector Modules (1)		18593B	3048A24475	
(2)			3013A22344	
Controller Module		18594B	3049A23890	
Tray Module		18596B	3050A23564	
GC5/GC Mainframe	Hewlett Packard	5890A	2750A15932	600/8000/CLP
Injector Modules (1)		18593A	2843A13105	
Controller Module		18594A	2929A15473	
Tray Module		18596A	2718A08934	
GC 6/GC Mainframe	Hewlett Packard	5890A	2950A26642	600/8000/CLP
Injector Modules (1)		18593A	2546A02596	
(2)			2704A06448	
Controller Module		18594A	2720A06791	
Tray Module		18596A	2718A05293	

TYPE OF EQUIPMENT	MANUFACTURER	MODEL #	SERIAL #	ANALYTICAL METHOD	AUDITOR CHECK
GC7/GC Mainframe	Hewlett Packard	5890A	3029A29927	600/8000/CLP	
Injector Modules (1)		18593A	2843A11440		
Controller Module		18594A	2551A01985		
Tray Module		18596A	2718A06604		
NPD4/GC Mainframe	Hewlett Packard	5890A	2728A14514	600/8000/CLP	
Injector Modules (1)		18593B	3228A31373		
Controller Module		18594B	3113A24891		
Tray Module		18596B	3021A21938		

LABORATORY EQUIPMENT

Extractions

TYPE OF EQUIPMENT	MANUFACTURER	MODEL #	SERIAL #	ANALYTICAL METHOD
N-EVAP	Organomation	N-EVAP 112	16686	600/8000/CLP
N-EVAP	Organomation	N-EVAP 112	10201	600/8000/CLP
Sonicator #1	Tekmar	TM500	7918	8000/CLP
Sonicator #2	Tekmar	TM500	8595	8000/CLP
ASE #1	Dionex	ASE200	96090216	8000
ASE#2	Dionex	ASE200	97070816	8000
Floor Shaker #1	Glass-Col	V5504		600/8000
Floor Shaker #2	Glass-Col	V5504		600/8000
Muffle Furnace #1	Thermolyne	F6010	40800875	600/8000/CLP
Muffle Furnace #2	Thermolyne	F6028C	53900629	600/8000/CLP
Centrifuge	Hereaus	4655	165813	600/8000/CLP
Vacuum Pump #1	Emerson Electric	S55NX	MLD-6711	600/8000/CLP
Vacuum Pump #2	Emerson Electric	S55NX	GTB-4142	600/8000/CLP

LABORATORY EQUIPMENT
Metals

TYPE OF EQUIPMENT	MANUFACTURER	MODEL #	SERIAL #	ANALYTICAL METHOD
ICP	TJA	61E TRACE	341490	200/6010/CLP
ICP	TJA	61E TRACE	493890	200/6010/CLP
ICP	TJA	61E	11290	200/6010/CLP
AA	Perkin Elmer	5100	130244	200/7000/CLP
Zeeman		5100	130244	
HGA		600	6128	
Autosampler		AS-60	6577	
Mercury Analyzer	Leeman Labs	PS 200	61691	200/7000/CLP
Microwave Digestion System	Milestone	MLS-1200 Mega	123099	Metals Prep

LABORATORY EQUIPMENT
Atomic Absorption Lamp List

TYPE OF EQUIPMENT	MANUFACTURER	MODEL #	SERIAL #	ANALYTICAL METHOD
Lamp-EDL	Perkin-Elmer	N305-0672	01258	Selenium
Lamp HCL	Perkin Elmer	N305-0157	S00000000DE9EE3	Lead
Lamp HCL	Perkin Elmer	N066-1284	01214	Tin
Lamp EDL	Photron	P957-5	0820	Thallium
Lamp-EDL	Perkin Elmer	N305-0605	722	Arsenic
Lamp-EDL	Perkin Elmer	N305-0605	251	Arsenic
Lamp-EDL	Perkin Elmer	N305-0615	158	Cadmium
Lamp-EDL	Perkin Elmer	N305-0615	162	Cadmium
Lamp-EDL	Perkin Elmer	N305-0672	247	Selenium
Lamp-EDL	Perkin Elmer	N305-0672	251	Selenium
Lamp-EDL	Perkin Elmer	N305-0683	149	Thallium
Lamp-HCL	Perkin Elmer	N066-1296	5324	Copper
Lamp-HCL	Perkin Elmer	N066-1287	3628	Beryllium
Lamp-HCL	Perkin Elmer	N066-1290	2527	Aluminum
Lamp-HCL	Perkin Elmer	N066-1249	4503	Cobalt
Lamp-HCL	Perkin Elmer	N066-1225	444472	Molybdenum
Lamp-EDL	Perkin Elmer	N305-0670	721	Antimony
Lamp-HCL	Perkin Elmer	N066-1284	01015	Antimony

TYPE OF EQUIPMENT	MANUFACTURER	MODEL #	SERIAL #	ANALYTICAL METHOD
Lamp-EDL	Perkin Elmer	N305-0683	1192	Thallium
Lamp-HCL	Perkin Elmer	N066-1299	0553028	Lead
Lamp-HCL	Perkin Elmer	N066-1299	642T	Lead
Lamp-HCL	Perkin Elmer	N066-1202	150	Thallium
Lamp-HCL	Perkin Elmer	N066-1202	535297	Thallium
Lamp-EDL	Perkin Elmer	N305-0655	126	Phosphorus
Lamp-HCL	Perkin Elmer	N303-6031	210969	Gold
Lamp-HCL	Perkin Elmer	N066-1297	485432	Chromium
Lamp-HCL	Perkin Elmer	N066-1297	481209	Chromium
Lamp-HCL	Perkin Elmer	N066-1202	537709	Thallium
Lamp-HCL	Perkin Elmer	N066-1244	22644	Cadmium
Lamp-HCL	Perkin Elmer	N066-1237	3012	Barium
Lamp-HCL	Perkin Elmer	N066-1295	5507	Zinc
Lamp-HCL	Perkin Elmer	N066-1207	12695	Nickel
Lamp-HCL	Perkin Elmer	N066-1207	3512	Nickel
Lamp-HCL	Perkin Elmer	N066-1278	5551	Titanium
Lamp-HCL	Perkin Elmer	N066-1221	3124	Vanadium
Lamp-HCL	Perkin Elmer	N066-1204	9459	Silicon
Lamp-HCL	Perkin Elmer	N066-1293	3812	Calcium
Lamp-HCL	Perkin Elmer	N066-1203	1049	Sodium
Lamp-HCL	Perkin Elmer	N066-1298	2575	Iron
amp-HCL	Perkin Elmer	N066-1292	5002	Magnesium
Lamp-HCL	Perkin Elmer	N066-1294	2606	Manganese
Lamp-HCL	Perkin Elmer	N066-1205	1008	Potassium
Lamp-HCL	Perkin Elmer	N066-1297	450832	Chromium
Lamp-HCL	Perkin Elmer	N066-1234	452844	Copper
Lamp-HCL	Perkin Elmer	N066-1281	546795	Silver

LABORATORY EQUIPMENT

General Chemistry

TYPE OF EQUIPMENT	MANUFACTURER	MODEL #	SERIAL #	ANALYTICAL METHOD
Spectrophotometer	Sequoia-Turner	340	007189TF	TP/OPO4/CR+6/ NO2-N/COD
Spectrophotometer	Sequoia-Turner	390	001804TN	Cr+6
Turbidimeter	Hach	2100-10	930900024026	Turbidity
Ion Selective Meter	Orion	720A	006825	NH3-N/F/pH
pH Meter	Orion	SA520	TX155A	TCLP pH

TYPE OF EQUIPMENT	MANUFACTURER	MODEL #	SERIAL #	ANALYTICAL METHOD
pH Meter	Cole Parmer	05669-20	613955	PH
pH Meter	Orion	SA720A	QU234	PH
Oven	ASP	DX-38	128001	TDS
Oven	ASP	DX-58	190005	TS
Oven	ASP	180		Gravimetric Methods
Oven	VWR	1330FD		TS
Oven	Fisher	230G		TS, TSS
Balance	Ohaus	EP400DX	1234	
Balance	ASP	TL2500S	19505	
Balance	ASP	Z410	09788	
Balance	Satorius	LC421	50709085	Solids
Balance	Ohaus	5200	4230	
Balance	Ohaus	GT8000	3418	
Steam Bath	Precision	66738	10AZ-1	TDS
Water Bath	Precision	50	9302-112	CR+6
Water Bath	Precision	50	9305-024	CR+6
Water Bath	Boekel		02169-39	TDS
Setaflash	Erdco	01SF	2189	Flashpoint
Water System (Metals)	Millipore		07348-C	
Water System (Log-in)	Millipore		03052-C	
FTIR	Perkin Elmer	1600	139038	TPHC
Printer	Epson	FX-870	61P107612	TPHC
TCLP Extraction Apparatus/Timer included	Assoc. Design and Mfg. Co.	3740-12 BRE	1249	TCLP/ZHE
TCLP Extraction Apparatus/Timer included	Assoc. Design and Mfg. Co.	3740-12 BRE	1053	TCLP/ZHE
COD reactor	Hach	45600	890900880	COD
COD reactor	Hach	45600	960800014651	COD
Auto-analyzer	Lachat	QUICKEM 8000	A83000	CN/Phenols/NO3 /NO2/TKN/NH3
Block Digester	Lachat	BD-46	1800-375	TKN Digestion
CN Distillation Apparatus	MIDI VAP	MCV 103	MCTVK-96285	CN Distillation
TOX Instrument	MCI	TOX-10	43032321	TOX
Centrifuge	Int'l. Equipment Co.	CL	AB-2260	TOX
Adsorption Module	XERTEX DOHRMANN	AD-3`	HF1648	TOX
Ultrasonic Cleaner	Baxter	ME4.6	111M14791	TOX
TOC Instrument	Shimadzu	TOC 5000	31242909	TOC
Solid Sample Module	Shimadzu	SSM-5000A	31303115	TOC

TYPE OF EQUIPMENT	MANUFACTURER	MODEL #	SERIAL #	ANALYTICAL METHOD
Autosampler	Shimadzu	ASI-5000	31816800	TOC
Printer	Epson	LQ570	41NE286786	TOC
BOD Meter	YSI	5000	97E0534AE	BOD
Incubator	GCA Precision Scientific			BOD
Hot Plate	Thermolyne	CIMAREC 3	817951023433	TPO4
Hot Plate	Corning	PC-40		TCLP
Hot Plate	Corning	PC-500		TOC
Conductivity Meter	Oakton		WD35607-10	Conductivity, Resistivity

Information Systems

Following is a list of COMPUTING CAPABILITIES.

HARDWARE

- 2 Hewlett Packard D-Class Servers
- 6 Hewlett Packard 9000 Unix Workstations
- 1 Sun Ultra Enterprise 350 Unix Server
- 1 Novell Netware 5.0 Server
- 3 Windows NT 4.0 Servers
- 75 + IBM - Type Personal Computers
- 25 Networked Laser Printers
- Cisco and Ascend Routers
- Fault-Tolerant RAID Disk Storage
- Digital Audio (DAT) based backup Hardware

SOFTWARE

Operating Environments

- Unix (HP-UX) Sun Solaries)
- DOS/Windows 3.1
- Windows 95
- Windows NT

Network Environments

- Novell Netware 3.12

- Unix
- Windows NT 4.0 Server

Network Topologies
- IPX
- TCPIP
- 10BaseT-Ethernet
- 100BaseTX-Ethernet
- ISDN
- Frame-Relay

Network Security
- EagleNT Firewall Software

Remote Computing
- ISDN Dial-Up
- Virtual Private Networking via Internet

Office Software
- Microsoft Office 97

Scientific Software
- HP GC Chemstation
- HP MS Chemstation
- Target 3.4
- Envision 3.4
- Ward Scientific

Development Software
- Power Builder 4.0
- Visual C++
- Sapphire/WEB

Database Management Software
- Informix
- Ingres

All laboratory personnel have access to the World Wide Web for additional resources.

APPENDIX D:
Analytical Methodologies

STL Edison performs analyses using EPA methodology and other published authoritative methods. A detailed description of our procedures for each method are found in our analytical standards operating procedures (SOP) manual.

The following analytical methods summary provides a listing of analytical methods routinely offered by STL Ediso Inc. In addition, this summary provides a listing of major groups of analyses and analytical packages routinely offer Additional methods are offered for special projects upon request.

The table provided below gives a summary of the pages that follow.

Methods and Parameters contents Summary

Priority Pollutant Major Groups and Packages

600 Series Methods for Water and Wastewater
SW-846 Methods for Soil and Solid Waste

Parameter	Method Water/Soil
Priority Pollutant Volatile Organics with Xylenes (PP-VOA)	624/8260B
Priority Pollutant Volatile Organics+l 5 with Xylenes (PP-VOA+ 15)	624/8260B
Priority Pollutant Volatile Organics + 15 with Xylenes, MTBE and TBA	624/8260B
Priority Pollutant Base/neutral Extractable Organics (PP-BN)	625/8260B
Priority Pollutant Polynuclear Aromatic Hydrocarbons (PAHS)	625/8270C
Priority Pollutant Base/neutral Extractable Organics +15 (PP-BN+15)	625/8270C
Priority Pollutant Base/neutral and Acid Extractable Organics (PP-BNA)	625/8270C
Priority Pollutant Base/neutral and Acid Extractable Organics +25 (PP-BNA+25)	625/8270C
Priority Pollutant Pesticides & PCBs (PP-Pest&PCB) ***WaterSamplesOnly***	608/ --
Priority Pollutant Pesticides & PCBs (PP-Pest & PCB) ***Soil Samples Only***	- - /8081A & 8082
Priority Pollutant Pesticides (PP-Pest)	608/8081A
Polychlorinated Biphenyls (PCBS)	608/8082
Priority Pollutant Metals (PP-Metals) 13 elements: As, Sb, Be, Cd, Cr, Cu, Ni, Pb, Hg, Se, Ag, TI, Zn.	200.7 & 245.1/6010B & 7471 A

Full Priority Pollutants + 40 (PP-VOA+l 5, PP-BNA+25, PP-Pest, PCB and PP-Metals

Target Compound List (TCL) Organics and
Target Analyte List (TAL) Metals Major Groups and Packages
600 Series Methods for Water and Wastewater
SW-846 Methods for Soil and Solid Waste

Parameter	Method Water/Soil
TCL Volatile Organics with Xylenes (TCL-VOA)	624/8260B
TCL Volatile Organics +10 with Xylenes (TCL-VOA+10)	624/8260B
TCL Volatile Organics +10 with Xylenes, MTBE and TBA	624/8260B
TCL Base/neutral Extractable Organics (TCL-BN)	625/8270C
TCL Base/neutral Extractable Organics +1 0 (TCL-BN+10)	625/8270C
TCL Base/neutral and Acid Extractable Organics	625/8270C
TCL Base/neutral and Acid Extractable Organics +20 (TCL-BNA+20)	625/8270C
TCL Pesticides & PCBs *Water* **Samples** *Only*	608/
TCL Pesticides & PCBs ***Soil Samples Only***	- - /8081A&8082
TCL Pesticides	608/8081 A
Polychlorinated Biphenyls	608/8082
TAL Metals: 23 elements Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, TI, V, Zn.	200.7 & 245.1/6010B & 7471 A
Cyanide	335.3/9012

Full TCL+30 Analysis Package (TCL: VOA+L 0, BNA+20, Pest, PCB)

Full TCL+30 & TAL Analysis Package (TCL: VOA+10, BNA+20, Pest, PCB, TAL Metals, CN)

USEPA Superfund, Contract Laboratory Program (CLP)

Organic analysis and reporting is provided as specified in EPAs OLM03.2/OLM04.1 CLP Statement Of Work Methodology for Organics Analysis Multi-Media, Multi-Concentration.

Metals and Cyanide analyses and reporting is provided as specified in EPAs ILM04.0 CLP Statement Of Work Methodology for Inorganic Analysis Multi-Media, Multi-Concentration.

Parameter	Method
CLP Target Compound List (TCL):	
CLP-TCL Volatile Organics +10	OLM04.2
CLP-TCL Semivolatile Organics +20	OLM04.2
CLP-TCL Pesticides & PCBs	OLM04.2
'arget Analyte List (TAL):	
Target Analyte List Metals 23 elements: Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, TI, V, Zn.	ILM04.1
Cyanide	ILM04.1

CLP-TCL +30 Organics Package

Full CLP-TAL & TCL +30 Package

CLP methods require site specific quality assurance samples. With each group of up to 20 environmental samples provided over a period of 14 days or less, a site specific matrix spike and matrix spike duplicate is required, resulting in two billable samples.

Holding time for CLP sample analysis begins at the Verified Time of Sample Receipt (VTSR). Turnaround time starts with delivery of the LAST sample in a Sample Delivery Group (SDG).

Waste Characteristic Testing

Parameter	Method
Toxicity Characteristic Leaching Procedure (TCLP):	
1. TCLP Zero Headspace Extraction	1311
2. TCLP Inorganic and Semivolatile Organic Extraction	1311
3. TCLP Volatile Organics Analysis	8260B
4. TCLP Base/neutral and Acid Extractable Organics Analysis	8270C
5. TCLP Metals Analysis	6010B & 7471A
6. TCLP Pesticides	8081 A
7. TCLP Herbicides	8151A
Other RCRA Characteristic Tests:	
8. Ignitability	1020A
9. Corrosivity	9045C
1 0. Reactivity (Cyanide and Sulfide)	SW-846 Chapter 7.3
Other Waste Classification Tests:	
1 1. Total Petroleum Hydrocarbons (PHC)	418.1
12. Polychlorinated Biphenyls (PCBS)	8082
13. Total Organic Halides (TOX) in water Extractable Organic Halides (EOX) in soil	9020B 9023
14. Paint Filter Test	9095A

Volatile Organic Profiles

Gas Chromatography

Parameter	Method Water/Soil
• Acrolein & Acrylonitrile (GC-FID)	603/ - -
• Acrylonitrile	- - /8031
• Alcohols or Glycols (GC-FID)	8015B/8015B
• Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) (GC-PID)	602/8021 B
• Methane, Ethane & Ethene	3810/ - -
• Purgeable Aromatics (GC-PID)	602/8021 B
• Purgeable Halocarbons (GC-ELCD)	601/8021 B
• Purgeable Halocarbons and Aromatics (GC-PID/ELCD)	601 &602/8021 B
• NY STARS Volatile Organic Analysis	8021 B/8021 B

Gas Chromatography/Mass Spectrometry

Parameter	Method Water/Soil
• Purgeable Organics in (Drinking) Water (Capillary GC/MS)	524.2/
• Priority Pollutant Volatile Organics with Xylenes	624/8260B
• Priority Pollutant Volatile Organics +1 5 with Xylenes	624/8260B
• Priority Pollutant Volatile Organics +1 5 with Xylenes, MTBE and TBA	624/8260B
• TCL Volatile Organics with Xylenes	624/8260B
• TCL Volatile Organics + 10 with Xylenes	624/8260B
• TCL Volatile Organics +10 with Xylenes, MTBE and TBA	624/8260B
• TCL Volatile Organics +10	CLP-SOW, OLM03.2/4.1

Other Organic Analyses

Parameter	Method Water/Soil
Total Petroleum Hydrocarbons (PHC)	418.1/418.1
PHCs by GC-FID:	
• Diesel Range Organics (DRO)	8015B/8015B
• Gasoline Range Organics (GRO)	8015B/8015B
• Semi-Volatile Petroleum Products,	NJDEP Method OQA-QAM-025
• Extractable Petroleum Hydrocarbons (EPH)	Massachusetts
• Volatile Petroleum Hydrocarbons (VPH) • Qualitative Hydrocarbon Identification (GC-FID):	Massachusetts
• GC-FID Fingerprint	8015B/8015B
• Priority Pollutant Polynuclear Aromatic Hydrocarbons (PAH)	625/8270C
• Polychlorinated Biphenyls (PCBS)	608/8082
• Chlorinated Herbicides	- - /8151A
• Organophosphorus Compounds	- - /8141 A
Extractable Organic Cleanup Procedures:	
• Acid-Base Partition Cleanup	-- /3650A
• Alumina Column Cleanup	-- /3611

Metals Analyses

Individual Metals

Parameter		Method	Parameter		Method
Al	Aluminum	200.7/601 OB	Mg	Magnesium	200.7/6010B
Sb	Antimony	200.7/601 OB	Hg	Mercury	245.1/7471
As	Arsenic	200.7/601 OB	Mo	Molybdenum	200.7/6010B
Ba	Barium	200.7/601 OB	Ni	Nickel	200.7/6010B
Be	Beryllium	200.7/601 OB	K	Potassium	200.7/6010B
Cd	Cadmium	200.7/6010B	Se	Selenium	200.7/6010B
Ca	Calcium	200.7/601 OB	Ag	Silver	200.7/6010B
Cr	Chromium, Total	200.7/601 OB	Na	Sodium	200.7/6010B
Co	Cobalt	200.7/601 OB	Tl	Thallium	200.7/6010B
Cu	Copper	200.7/601 OB	Sn	Tin	200.7/6010B
Fe	Iron	200.7/601 OB	Ti	Titanium	200.7/6010B
Pb	Lead	200.7/601 OB	V	Vanadium	200.7/6010B
Mn	Manganese	200.7/601 OB	Zn	Zinc	200.7/6010B

Metals Analysis Packages

Parameter	Matrix
RCRA Metals 8 elements: As, Ba, Cd, Cr, Pb, Hg, Se, Ag.	Water or Soil
Priority Pollutant Metals (PP-Metals) 13 elements: As, Sb, Be, Cd, Cr, Cu, Ni, Pb, Hg, Se, Ag, TI, Zn.	Water or Soil
Target Analyte List Metals (TAL-Metals) 23 elements: Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn.	Water or Soil

WATER
General Chemistry

Parameter	Method WATER Samples
Acidity (titrimetric)	305.1, 2310B
Alkalinity (titrimetric)	310.1, 2320B
Biochemical Oxygen Demand (BOD5)	405.1, 5210B
Carbon Dioxide, Total or Free (Calc. from Alkalinity) Carbon Dioxide, Free (titrimetric)	4500CO_2D 4500CO_2C
Chemical Oxygen Demand (calorimetric)	410.4, 5220D
Chloride (titrimetric)	4500CLB, 9253
Chlorine Residual (DPD-FAS) Chlorine Residual (DPD-colorimetric) field method	330.4, 4500CIF 330.5
Color (Platinum-Cobalt)	110.2, 2120B
Chromium, Hexavalent (Site Remediation) NJDEP Modified Chromium, Hexavalent (for NPDES)	3060-7196A USGS (11230-85-01032)
Cyanide, Total (Spectrophotometric) Cyanide, Total (Drinking Water)	335.2, 4500CNE, 9012A 335.4
Cyanide, Amenable to Chlorination	335.1
Cyanide, Reactive	SW-846 Chapter 7.3
Fluoride (Electrode)	340.2, 4500FC, 9214
Formaldehyde (Colorimetric)	NIOSH 3500
Hardness (Titrimetric) Hardness (Calculation)	130.2, 2340C 2340B
Ignitability, (Setaflash)	1020A

WA TER
General Chemistry

Parameter	Method WATER Samples
Nitrogen: Ammonia (NH3-N) - Phenate	350.1&.2, 4500NH3H
Nitrate (NO3-N) - Cd Reduction	353.2, 4500NO_3F
Nitrite (NO2-N) - Colorimetric	353.2
Nitrate & Nitrite (NO3-N & N02-N)	353.2, 4500NO_3E
Total Kjeldahl Nitrogen (TKN)	351.2
Organic Nitrogen	350.1 &351.2
Oil & Grease (Gravimetric)	413.1, 9070
Oil & Grease (IR)	413.2
Organic Carbon, Total (TOC)	415.1, 5310B
Organic Carbon, Total (TOC)	9060
Organic Halides, Total (TOX)	9020B
Oxidation Reduction Potential	SM2580
Oxygen, Dissolved (Electrode)	360.1, 4500OG
Petroleum Hydrocarbons, Total (PHC)	418.1
pH (Electrode)	150.1, 4500HB, 9040B
Phenols, Total (Colorimetric Automated)	420.2, 9066
Phosphate, Ortho (Colorimetric)	365.2, 4500PE
Phosphorous, Total (Colorimetric)	365.2, 4500PB&E
Residue: Total Dissolved Solids	160.1, 2540C
Total Suspended Solids	160.2, 2540D
Total Solids	160.3, 2540B
Total Volatile Solids	160.4, 2540G&E
Settleable Solids	160.5, 2540F

WATER
General Chemistry

Parameter	Method WATER Samples
Specific Conductance	120.1, 2510B, 9050A
Sulfate (Turbidimetric)	375.4, 9038
Sulfide, Total (Titrimetric)	376.1, 4500SE
Sulfide, Total (Colorimetric)	376.2, 4500SD
Sulfide, Reactive	SW-846 Chapter 7.3
Sulfite (Titrimetric)	377.1, 4500SO_3B
Turbidity (Nephelometric)	180.1, 2130B

SOIL
General Chemistry

Parameter	Method SOIL Samples
Acidity	305.1, 2310B
Alkalinity	310.1, 2320B
Cation Exchange Capacity	9081
Chemical Oxygen Demand (COD)	410.4, 5220D
Chloride	9253, 4500CLB
Chromium, Hexavalent (Cr+6)	NJDEP Modified 3060&7196A
Cyanide, Total	9012A
Cyanide, Reactive	SW-846 Chapter 7.3
Fluoride (Electrode)	340.2, 4500FC
Formaldehyde	NIOSH 3500
Ignitability	1020A
Nitrogen: Ammonia (NH3-N) - Phenate	350.1.2, 4500NH_3H
Nitrate (NO3-N) - Cd Reduction	353.2, 4500NO_3
Nitrite (NO2-N) - Colorimetric	353.2, 353.3, 4500NO_3F
Nitrate & Nitrite (NO3-N & N02-N)	353.2, 4500NO_3F
Total Kjeldahl Nitrogen (TKN)	351.2
Oil & Grease, Gravimetric	413.1
Oil & Grease, IR	413.2
Organic Carbon, Total- soil	EPA Kahn
Organic Hallides, Extractable (EOX)	9023
Oxidation Reduction Potential	SM 2580
Paint Filter Test	9095A
Petroleum Hydrocarbons, Total (PHC)	418.1
pH	9045C
Phosphate, Ortho (Colorimetric)	365.2, 4500PE
Phosphorous, Total (Colorimetric)	365.2, 4500PE
Phenols, Total (Automated)	9066
Residue: Percent Solids (Moisture)	ILM04.0 Part F
Total Solids	160.3, 2540B
Total Volatile Solids	160.4
Sulfate (Turbidimetric)	375.4
Sulfide, Total (Acid Soluble)	9030B&9034
Sulfide, Reactive	SW-846 Chapter 7.3
Sulfite	377.1, 4500SO_3

APPENDIX E:
Certifications

Certifications

The following is a list of the laboratory certifications and approvals that STL Edison holds. Full documentation of these governmental approvals is available upon request.

State of New Jersey Certification **(No. 12028)**
New Jersey Department of Environmental Protection and Energy
Certified for Inorganics and Organics in Water and Wastewater
Contact Person: Mr. Michael Miller
Phone Number: 609-633-2804

State of New York Certification **(No. 1 1452)**
Including CLP/Superfund (ASP) Approval
New York State Department of Health
Certified for Inorganics and Organics in Water and Wastewater
Certified for Inorganics and Organics in Air and Emissions, Solid and Hazardous Waste and CLP
Contact Person: Mr. Matthew Caruso
Phone Number: 518-485-5570

State of Pennsylvania Certification **(No. 68-522)**
State of Pennsylvania Department of Environmental Resources
Certified for Inorganics and Organics in Drinking Water
Contact Person: Mr. Edward Maser
Phone Number: 717-783-7150

State of Delaware DNREC Superfund Approval

State of Connecticut Approval **(No. PH-0200)**

State of Rhode Island License **(No. 132)**
State of Rhode Island and Providence Plantations Department of Health
Certified for Inorganics and Organics in Potable, Non-Potable, and Wastewater
Contact Person: Ms. Deborah Dehmel
Phone Number: 401-277-2566

U.S. Department of Agriculture Permit
(Permit to Receive International Shipments of Soil for Testing)

APPENDIX F:
Laboratory Waste Storage and Disposal

1.0 Introduction

The disposal of the hazardous waste generated at the STL Edison facility is the responsibility of the Company Safety and Hygiene Officer with assistance from Sample Management Supervisor. The laboratory handles and disposes of hazardous waste following U.S.EPA and the State of NJ guidelines. STL Edison has a Standby Emergency Response Contract Support from Onyx Environmental Services. Laboratory Hazardous Waste is generated at the facilities listed below:

Facilities: 777 New Durham Road
Edison NJ 08817
(732) 549 3900

U.S. EPA Generator ID: NJD982534810

2.0 Category

INVENTORY OF CHEMICALS AND HAZARDOUS WASTES:
This section provides information necessary to familiarize emergency responders and hospitals with the properties of hazardous waste and chemicals at STL Edison, Inc.
Chemical reagents and waste are addressed separately.

Hazardous Waste:

Hazardous wastes are separated into three groups for disposal at STL Edison, Inc. as follows:

1. Polychlorinated Biphenyl (PCB) Waste: All PCB waste including analyzed samples (soil, oil, sludge, etc.), waste sample extracts and waste laboratory standards are kept separate from all other waste, and are stored in a 55-gallon drum in Storage Room #3. PCB samples that have been analyzed and are of no further use typically range in volume from one to eight ounces. Sample extracts and standards that contain PCBs are in hexane solution. The volume of a waste PCB extract or standards is typically one milliliter or less. STL Edison, Inc. typically generates several containers of PCB waste each year. PCB waste is disposed of under manifest to a licensed hazardous waste incineration facility.

2. Waste Solvents:
Prior to disposal, waste solvents are accumulated in approved containers located in the Laboratories where solvents are used. Solvent waste accumulation containers are to be emptied daily into the designated waste drums in the chemical store room. All waste solvents are stored prior to disposal in 55-gallon drums in Store Room #3 (the chemical store room). Approximately four to six 55-gallon drums of waste solvents are typically generated every 90 days. All waste solvents are disposed of under manifest to a licensed hazardous waste incineration facility. The approximate composition of waste solvents is as follows:

Methylene chloride	60 to 75%
Acetone	10 to 15%
Hexane	5 to 10%
Water, Methanol, Isooctane, MIBK, Toluene, Oil (less than 1% each)	Balance

3. Other Non-PCB Hazardous Waste:
All laboratory hazardous waste, other than those described above are tored prior to disposal in a 55-gallon drum which is located in Storage room #3. For the most part this consists of hazardous solid, sludge or ediment samples that have been analyzed and are of no further use. These samples are disposed of under manifest to a licensed hazardous waste incineration facility.

Chemicals Used at STL Edison, Inc.:
Chemicals used at STL Edison are laboratory reagents predominately packaged in one gallon (4 liters) or smaller glass or plastic containers.
These chemicals used are generally of four types summarized below:

Solvents:	Major solvents used include methylene chloride, hexane , acetone and Freon 113 (trichlorotrifluoro-ethane).
Corrosives:	Strong acids and bases are grouped in this category. Major acids used include nitric acid, sulfuric acid and hydrochloric acid. The typical total inventory of corrosives is less than 20 gallons.
Dry Chemicals	Approximately 50 dry chemical reagents are inventoried, most in kilogram quantities or less.

	Sodium sulfate with an approximate inventory of approximately 100 kilograms is the onlydry chemical reagent with an inventory quantity in excess of 10 kilograms.
Compressed Gas:	Ten types of compressed gas are kept in inventory. Acetylene and Hydrogen the compressed gases used with the most notable fire hazard. The typical total inventory of these gases is several tanks (i.e.- one foot in diameter by four feet high each) .

In addition, various other compounds are used in small volumes and dilute solutions. A more complete listing that includes compounds used in small quantities and trace concentrations is presented in the 1993 and prior year N.J. DEP Right To Know Survey. In 1995 the NJDEP Right To Know Survey listed only materials I excess of a reporting threshold. Based upon our 1994 survey only five materials are present in excess of a reporting threshold (Acetone, Freon 113, Hexane, Methylene Chloride, Hazardous Waste Solvents). All of these materials are stored in the chemical store room.

Material Safety Data Sheets (MSDS) are available at STL Edison, Inc. for all chemicals described above. If any organization required to receive this plan also wishes to receive MSDS information, it will be provided upon request.

3.0 Personal Protective Equipment

Associates removing hazardous waste from the laboratory sections shall wear safety glasses, a laboratory coat and green nitrile gloves. Additional protective equipment, such as face shield and apron, shall be worn while transferring acidic and caustic solutions into drums. Respirators are available for use at the discretion of associates who have been approved. Before opening a drum, an associate shall place a four inch flex duct near the drum opening to draw vapors away. The blast gate for the flex duct that is in use must be open.

4.0 Storage and Disposal of Waste

1. SCOPE and APPLICATION

1.1. The following procedure describes the laboratory's storage and disposal of its waste.

2. APPARATUS

2.1. Gloves, goggles and labcoat

2.2. Appropriate waste container

2.3. Funnel

3. PROCEDURE

3.1. Laboratory waste is disposed of in one of several different ways depending upon its nature. The individual department supervisors are responsible for the disposal of hazardous waste. It is important that our hazardous waste be disposed of properly as this activity is regulated by several environmental laws. All of our waste falls into one of the categories given below:

3.1.1. Polychlorinated Biphenyl Waste (PCBs) - All PCB waste (solids, oils, sludges, solvents, etc.) must be kept separate from all other waste. A container designated for the storage of PCB waste prior to disposal is located in the chemical storeroom.

3.1.2. Waste Solvents - All waste solvents (except PCB waste solvent) are to be stored prior to disposal in a 55-gallon drum located in the chemical storage room. All solvent waste containers must be labeled with the words "Hazardous Waste" and must indicate the "Accumulation Start Date". Small quantities of waste solvent generated at the lab bench are temporarily stored in the portable hazardous waste cans located in the lab. The cans are transferred to the waste drum at the end of the work day or before. Under no circumstances are they to remain in the lab overnight. Always use grounding strap and turn on ventilation system prior to transfer.

3.1.3. Other Non-PCB Hazardous Waste - A container is located in the chemical storage room for all laboratory hazardous wastes, other than those described above. For the most part this will consist of hazardous solid, sludge or oil samples that have been analyzed and are of no further use. This waste container must be labeled with the words "Hazardous Waste" and must indicate the "Accumulation Start Date".

3.1.4. Nonhazardous Wastes - Other nonhazardous waste shall be either recycled or disposed of as general refuse. Recyclable materials include glass, cardboard, aluminum cans and newspapers. Glass and cardboard are stored prior to recycling at the rear overhead door area. Newspapers and aluminum cans are accumulated in containers provided in the lunch room.

3.2. A determination regarding the hazardous nature of a sample for disposal purposes will be made at the time that the analytical report is prepared. A sample may be determined to be hazardous based upon our analytical results, information about the sample provided by a client or its physical characteristics or appearance. Samples determined to be hazardous will be recorded on a "Disposal Record for Hazardous Samples". On a regular basis (approximately monthly) the samples listed as hazardous will be removed from the sample storage refrigerators and placed in one of the hazardous waste storage containers described above. The following requirements also apply to our hazardous waste storage activities:

3.2.1. Except during filling or emptying containers shall be securely closed.

3.2.2. All hazardous waste containers must be labeled with the words "Hazardous Waste" and the accumulation start date.

3.2.3. Hazardous waste identification labels must be clearly visible.

3.2.4. Containerized hazardous waste must be segregated by type and incompatible materials may not be placed in the same container.

3.2.5. Adequate aisle space shall be maintained to inspect containers and provide unobstructed movement in the event of a leak or other emergency.

3.2.6. Our hazardous waste will be picked up at regular intervals of less than 90 days by a licensed hazardous waste transporter and sent under manifest to a licensed hazardous waste incineration facility. It is important that we dispose of our hazardous waste properly. Please contact your supervisor any time you have a question or concern regarding your waste disposal.

APPENDIX
C

Appendix C
NYSDEC Guidance for the Development of Data Usability Summary Report

New York State Department of Environmental Conservation
Division of Environmental Remediation

Guidance for the Development of Data Usability Summary Reports

Background:

The Data Usability Summary Report (DUSR) provides a thorough evaluation of analytical data without the costly and time consuming process of third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use.

Though the substitution of a DUSR for a full third party data validation may seem to be a relaxation of the Division's quality assurance requirements, this is definitely not the case. The development of the DUSR must be carried out by an experienced environmental scientist, such as the project Quality Assurance Officer, who is fully capable of conducting a full data validation. Furthermore, the DUSR is developed from a full New York State Department of Environmental Conservation Analytical Services Protocol (NYSDEC ASP) Category B or a United States Environmental Protection Agency Contract Laboratory Protocol (USEPA CLP) deliverables package.

The DUSR and the data deliverables package will be reviewed by the Division's Quality Assurance Unit. In most cases, we expect that this review will result in agreement or with only minor differences that can be easily reconciled. If data validation is found to be necessary (e.g. pending litigation) this can be carried out at a later date on the same data package used for the development of the DUSR.

Personnel Requirements:

The Environmental Scientist preparing the DUSR must hold a Bachelors Degree in a relevant natural or physical science or field of engineering and must submit a resume to the Division's Quality Assurance Unit documenting experience in environmental sampling, analysis and data review.

Post-it® Fax Note 7671	Date 4/30	# of pages ▶ 2
To Dave Locke	From C. Hunt-Ecs	
Co./Dept. IT	Co. NYS DEC DER	
Phone #	Phone # 518-457-4928	
Fax # 732-549-3275	Fax # 518-457-3346	

Preparation of a DUSR:

The DUSR is developed by reviewing and evaluating the analytical data package. During the course of this review the following questions must be asked and answered:

1. Is the data package complete as defined under the requirements for the NYSDEC ASP Category B or USEPA CLP deliverables?

2. Have all holding times been met?

3. Do all the QC data: blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?

4. Have all of the data been generated using established and agreed upon analytical protocols?

5. Does an evaluation of the raw data confirm the results provided in the data summary sheets and quality control verification forms?

6. Have the correct data qualifiers been used ?

Once the data package has been reviewed and the above questions asked and answered the DUSR proceeds to describe the samples and the analytical parameters. Data deficiencies, analytical protocol deviations and quality control problems are identified and their effect on the data is discussed. The DUSR shall also include recommendations on resampling/reanalysis. All data qualifications must be documented following the NYSDEC ASP '95 Rev. guidelines.

Contact the Division of Environmental Remediation Quality Assurance Group at (518) 457- 9280, with any questions on the preparation of a DUSR.

Revised 09/97

IT CORPORATION
A Member of The IT Group

Health & Safety Plan
For
Remedial Investigation/Feasibility Study
Standard Motor Products Site

Site Code 2-43-014
37-18 Northern Boulevard
Long Island City, New York 11101

DRAFT

Prepared for:
Standard Motor Products, Inc.
37-18 Northern Boulevard
Long Island City, New York 11101

Prepared by:
IT Corporation
2200 Cottontail Lane
Somerset, New Jersey 08873

Paul A. Lawless, CIH
Sr. Industrial Hygienist

Reviewed by:

Kevin McMahon, M.S., CIH
Director, Health and Safety

August 25, 2000

IT Project 775699

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A Member of The IT Group

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Reviewed by:

Kevin McMahon, M.S., CIH
Director, Health and Safety

August 25, 2000

IT Project 775699

HEALTH-AND-SAFETY PLAN APPROVALS AND ACKNOWLEDGMENT

Approvals

I have read and approved this Health and Safety Plan (HASP) with respect to project hazards, regulatory requirements, and IT procedures (please indicate if CIH or CHP).

Project Name: Southeast Corner of Woodhaven Boulevard and Metropolitan Avenue Site	Project Number:

_____ _____

Project Manager / Date Project CIH / Date

Acknowledgments

The final approved version of this HASP has been provided to the Site Supervisor. I acknowledge my responsibility to provide the Site Supervisor with the equipment, materials and qualified personnel to implement fully all safety requirements in this HASP. I will formally review this plan with the Health & Safety Staff every six months until project completion.

_____

Project Manager / Date

I acknowledge receipt of this HASP from the Project Manager, and that it is my responsibility to explain its contents to all site personnel and cause these requirements to be fully implemented. Any change in conditions, scope of work, or other change that might affect worker safety requires me to notify the Project Manager and/or the Health & Safety Representative.

_____

Site Supervisor / Date

Site-Specific Health and Safety Plan Acknowledgment

I have read this Site-Specific Health and Safety Plan, I understand the contents, and I agree to abide by its requirements. I also have been properly trained, medically monitored, and fit tested for the work that I am to perform and those dates are provided below. Documentation will be placed in the Project Records.

Site-Specific Health and Safety Plan Acknowledgment

I have read this Site-Specific Health and Safety Plan, I understand the contents, and I agree to abide by its requirements. I also have been properly trained, medically monitored, and fit tested for the work that I am to perform and those dates are provided below. Documentation will be placed in the Project Records.

Date	Name (Printed)	Signature	Company Represented	40-hr Date	8-hr Date*	Medical Date	Fit Test Date

*If 40-hr training is less than one year old, then the 8-hr refresher training is not required. Indicate this with "NR".

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

1.0 Introduction

1.1 Objective

The field investigation for the SMP RI/FS will be conducted in a phased approach. The first phase of the investigation will involve the collection of soil samples using hand augers and via geoprobe drilling to delineate the nature and extent of soil contamination. Groundwater samples will also be collected during the geoprobe drilling. The second phase of the investigation will use the results of the geoprobe groundwater samples to determine the locations for placement of groundwater monitoring wells and the screened interval depths, if necessary.

The major objectives of the Phase I field investigation are the following:

- Determine the nature and extent of surface soil contamination in the vicinity of the loading dock on the south side of the SMP facility;
- Determine the nature and extent of subsurface soil contamination in the vicinity of the loading dock on the south side of the SMP facility;
- Determine if soil contamination may extend from the vicinity of the loading dock under the loading dock and SMP facility; and
- Determine if groundwater contamination exists in the vicinity of the loading dock and beneath the SMP facility.

The major objectives of the Phase II field investigation are the following:

- Install monitoring wells at locations and with screened intervals as determined via the results of the Phase I field investigation;
- Determine groundwater flow direction and characteristics;
- Further delineate groundwater contamination emanating from the soils in the vicinity of the loading dock on the south side of the SMP facility;
- Gather sufficient data to perform a qualitative human health exposure assessment; and
- Gather data to adequately evaluate remedial alternatives.

The objective of this plan is to provide a mechanism for the establishment of safe working conditions at the site. The safety organization and procedures have been established following an analysis of potential hazards at the site. Specific hazard control methodologies have been evaluated and selected in an effort to minimize the potential of accident or injury. This plan is dynamic and will change depending on activities performed.

1.2 Site and Facility Description

The SMP site is located at 37-18 Northern Boulevard in Long Island City, New York. The site is owned and operated by SMP and is located in an urban and industrial area. The property is approximately

rectangular in shape and occupies more than 1 acre of land. The site property contains a large, six-story, industrial building with approximately 42,000 square feet per floor that occupies most of the site. This Long Island City facility manufactures car parts and serves as SMP's corporate headquarters.

Bordering the site are Northern Boulevard to the north; Sunnyside Freight Railroad Yard to the south; 39th Street, an automobile dealership and a Merit gasoline filling station to the east; and commercial and industrial properties to the west. Various industrial, commercial, and residential properties are located across Northern Boulevard from the SMP site. A narrow strip of land on the south side of the property contains a loading dock and a dirt access path for vehicles. This strip of land is owned by the Metropolitan Transit Authority (MTA) and is part of a long-term lease to SMP. Contamination had been identified in the soil adjacent to the loading dock. This area is mostly dirt and gravel covered with some concrete remaining from a nearby road-paving project. Access to this area is limited to doors at the rear of the SMP building, a locked access gate at the adjacent automobile dealership, a railroad spur from 42nd Place to the east, and to railroad personnel by way of the Sunnyside Yard to the south. A highly industrialized area with a wide variety of activities ranging from small-scale assembly to large-scale manufacturing is located within the general vicinity of the SMP site.

1.3 Site History

The site was historically involved in industrial and manufacturing activities since 1919 (EnviroAudit, 1996). SMP has occupied the on-site building since the mid-1900s. S. Karpen & Brothers occupied the building prior to that time.

SMP maintained a small plating line for chrome plating of small machine parts from approximately 1975 to 1984. The wastes generated from the chrome plating process were temporarily stored on-site prior to off-site disposal. SMP was previously engaged in painting automobile parts prior to distribution. Until 1984, solvent-based paints were used, after which aqueous-based paints were used until all painting operations were gradually eliminated between 1990 and 1991. Several other processes that SMP performed in the past also generated hazardous wastes. These include die-casting that was stopped in the 1970s, rubber production that was eliminated around 1985, and degreasing, using chlorinated solvents, that was eliminated in 1990.

Currently, SMP's main activity is the production of automobile parts and components. The manufacturing operations include metal fabrication and machining, plastic injection molding, and assembly. SMP also operates a small photography laboratory for production of newsletters, brochures, etc. The only hazardous or toxic materials involved in plant operations are lubricating oils for machinery, caustics for degreasing, phenolics used in molding processes, epoxies for coil production, and water-based inks involved in their small scale printing. All wastes are temporarily stored on-site in secure containers prior to off-site disposal at a licensed treatment, storage, and disposal (TSD) facility.

1.4 Policy Statement

It is the policy of IT Corporation (IT) to provide a safe and healthful work environment for all its employees. IT considers no phase of operations or administration to be of greater importance than injury and illness prevention. Safety takes precedence over expediency or shortcuts. At IT we believe every accident and every injury is preventable, and will take every reasonable step to reduce the possibility of injury, illness, or accident.

This Health and Safety Plan (HASP) prescribes the procedures that must be followed during site activities. Operational changes which could affect the health or safety of personnel, the community, or the environment will not be made without the prior approval of the Project CIH.

Note: This HASP has been designed for the methods presently contemplated by IT Corporation (IT) for the execution of the proposed work. Therefore, this HASP may not be appropriate if the work is not performed by or using the methods presently contemplated by IT.

Although this plan focuses on the specific work activities planned for this site, it must remain flexible because of the nature of this work. Conditions may change and unforeseen situations may arise that require modifications from the original plan. Therefore IT only makes representations or warranties as to the adequacy of the HASP for currently anticipated activities and conditions. This flexibility allows modification by the IT supervisors and health and safety officials with approval from the Project CIH. All changes to procedures in this plan will be documented in writing using the form provided in Appendix F.

The provisions of this plan are mandatory for all IT personnel assigned to the project. IT requires all visitors to the work site to abide by the requirements of the plan.

1.5 References

This HASP complies with applicable Occupational Safety and Health Administration (OSHA) and IT Corp. (IT) regulations. This plan follows the guidelines established in the following:

- Standard Operating Safety Guides, EPA (June 1992)
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH, OSHA, USCG, EPA (86-116, October 1985)
- Title 29 of the Code of Federal Regulations (CFR), Part 1910.120 (Hazardous Waste Operations and Emergency Response).
- Pocket Guide to Chemical Hazards, DHHS, PHS, CDC, NIOSH, (1990).

- Quick Selection Guide to Chemical Protective Clothing, Forsberg, K. and S.Z. Mansdorf, 2nd Ed., (1993).

- IT Health & Safety Policies and Procedures.

2.0 Responsibilities

2.1 All Personnel

Each person is responsible for completing tasks in a safe manner, and reporting any unsafe acts or conditions to their Supervisor and/or the Site Supervisor. All personnel are responsible for continuous adherence to these health and safety (HS) procedures during the performance of their work. No person may work in a manner that conflicts with the letter or the intent of these procedures. After due warnings, IT will dismiss from the site any person who violates safety procedures. IT's employees are subject to progressive discipline and may be terminated for blatant or continued violations. All on-site personnel will be trained in accordance with 29 CFR 1910.120 and this document.

2.2 Project CIH

The Project Certified Industrial Hygienist (CIH) is Kevin McMahon. Inquiries regarding IT Corporate HS Procedures and other technical or regulatory items shall be addressed to the Project CIH. The CIH is responsible for the preparation and modification of this HASP. Any changes to the HASP must be approved by the CIH. The CIH will advise the Project Manager on HS issues, and will establish the project air monitoring program. The CIH is the designated regulatory contact on matters related to occupational HS.

2.3 Project Manager

The Project Manager (PM), Maria Watt, P.E., is ultimately responsible for ensuring that all project activities are completed in accordance with requirements set forth in this plan. The PM must perform at least one on-site safety review during the project. The PM is responsible for ensuring all accidents and incidents on the project are reported and thoroughly investigated. The PM must approve in writing any addenda or modifications of the HASP.

The PM is responsible for field implementation of the HASP. This includes communicating site requirements to all on-site project personnel and consultation with the CIH. As required by IT Policy HS022, the PM will be responsible for informing the CIH and the field personnel of any changes in the work plan, so that those changes may be properly addressed. Other responsibilities include:

- Stopping work, as required, to ensure personal safety and protection of property, or where life or property-threatening safety non-compliances are found

- Determining and posting routes to medical facilities and emergency telephone numbers and arranging emergency transportation to medical facilities

- Notifying local public emergency officers of the nature of the site operations, and posting of their telephone numbers in an appropriate location

- Observing project personnel for signs of chemical or physical trauma

- Ensuring that all site personnel have been given the proper medical clearance, have met appropriate training requirements, and have the appropriate training documentation available in the office

- Immediately informing the HS Department of any accident or injury. Immediately informing EMR (800-229-3674) of any accident or injury involving medical treatment other than field first aid.

2.4 Site Supervisor

The Site Supervisor (SS) is responsible for ensuring that site work is conducted in accordance with federal, state, and IT corporate requirements. The SS will also monitor workers leaving the work area for proper decontamination procedures, and will report all problems of an HS nature to the PM promptly. The CIH may be consulted by the SS and/or the PM to handle issues that cannot be resolved on site.

2.5 Alternate Site Supervisor

If the designated SS is not on site, the PM will be the alternate SS.

2.6 Subcontractors

If a subcontractor of this project chooses to adopt IT Corporation's Health and Safety Plan, the subcontractor shall acknowledge this with the signature of a designated representative on a letter accepting the plan or on the "Subcontractor Health and Safety Plan Acknowledgement" form in Appendix H. The letter (or signed form) must be provided prior to that subcontractor's commencing work activities at the site. The subcontractor must make an independent determination of the applicability of IT's HASP to his/her work and must comply with all applicable statutes, federal, state and local regulations and codes. IT Corporation does not warrant that IT's plan will be sufficient for the subcontractor's work.

If the subcontractor adopts the IT HASP, this HASP becomes their responsibility to implement as it pertains to their work. The subcontractor assumes all liabilities for such adoption and implementation. All subcontractor personnel will read and sign the IT Corporation HASP.

If a subcontractor chooses to develop its own HASP, the subcontractor will provide a copy for IT to review within five (5) days of award of this subcontract or at least 5 days prior to commencement of work activities at the site, which ever occurs last. The subcontractor will insure his/her HASP will be in compliance with IT's HASP, and all appropriate federal, state, and local regulations.

In any case the subcontractor will prepare a Job Safety Analysis (or Activity Hazard Analysis) for all major tasks they will perform on site and submit them to the IT Site Supervisor or his designee for review prior to the start of that task.

Prior to the starting of work on this project all subcontractor personnel will receive the site orientation from the SS or SSO. The Subcontractor Pre-job Safety Checklist will be completed and signed by the subcontractor field supervisor (see Appendix H). All subcontractor safety related incidents including near misses, shall be reported to the IT Site Safety Officer immediately.

Additionally the subcontractor is responsible for the following:

- Designating a safety representative to work with the SSO.
- Providing IT with written procedures for the specific tasks they will perform
- Issuing confined space entry permits, if necessary, to their employees and submitting copies to the SS/SSO for review.
- Performing all the necessary air monitoring to support confined space entry requirements.
- Ensuring, via daily inspections, that equipment is in good working order.
- Providing SSO with copies of material safety data sheets (MSDS) for all hazardous materials brought on-site.
- Providing all the required personal protective equipment for their employees.
- Participating in the daily safety meeting.

2.7 On-site Personnel and Visitors

All IT personnel are required to read and acknowledge their understanding of this HASP. All site project personnel are expected to abide by the requirements of the plan and cooperate with site supervision in ensuring a safe and healthful work site.

Site personnel will immediately report any of the following to the PM:

- Accidents and injuries, no matter how minor
- Unexpected or uncontrolled release of chemical substances
- Any symptoms of chemical exposure
- Any unsafe or malfunctioning equipment, and
- Any changes in site conditions that may affect the HS of project personnel.

3.0 Job Hazard Analysis

3.1 Scope of Work

The scope of work covered by this HASP includes:

- Drilling/Geoprobe Operations/Hand Auguring
- Monitoring Well Sampling
- Site Survey

Work at this site may expose workers to petroleum hydrocarbons, lead, and chlorinated solvents (1,1,1-trichloroethane, tetrachloroethene, methylene chloride, and trichloroethene). The primary routes of exposure are inhalation and skin contact with vapor or liquid adsorbed to air borne particulates. Exposure may also occur during site surveying, sampling and drilling/geoprobe activities.

CHEMICAL	*EXPOSURE ROUTES*	*PEL/TLV*	*HEALTH HAZARDS/ PHYSICAL HAZARDS*
1,1,1-trichloroethane (TCA)	Skin, eye, inhalation	350 ppm	An animal carcinogen; headache, dizziness, vertigo, narcosis, unconsciousness; a skin and eye irritant, defatts skin tissue; affects the CNS Hazardous chemical reactions with barium, lithium, berryllium
Perchloroethylene (PCE)	Skin, eye, inhalation	25 ppm	An animal carcinogen: headache, dizziness, vertigo, narcosis, unconsciousness; a skin and eye irritant, defatts skin tissue; affects the CNS Hazardous chemical reactions with barium, lithium, berryllium
Methylene chloride	Skin, eye, inhalation	50 ppm	An animal carcinogen; headache, dizziness, vertigo, narcosis, unconsciousness; a skin and eye irritant, defatts skin tissue; affects the CNS Hazardous chemical reactions with barium, lithium, berryllium
Trichloroethene (TCE)	Skin, eye, inhalation	50 ppm	An animal carcinogen; headache, dizziness, vertigo, narcosis, unconsciousness; a skin and eye irritant, defatts skin tissue; affects the CNS Hazardous chemical reactions with barium, lithium, berryllium
Lead	Skin, eye, inhalation	0.05 mg/m3	Reproductive Toxicity: Lead and other smelter emissions are human reproductive hazards. Carcinogenicity: For lead and inorganic lead . EPA / IRIS classification: Group B2 - Probable human carcinogen, sufficient animal evidence.

3.2 Job Hazard Assessment

The Job Hazard Analysis identifies potential safety, health, and environmental hazards and provides for the protection of personnel, the community and the environment. Because of the complexity and constant change of field operations, supervisors must continually inspect the work site to identify hazards that may harm site personnel, the community, or the environment. The PM must be aware of these changing conditions and discuss them with the CIH whenever these changes impact the health, safety, or performance of the project. The CIH will write addenda to change Job Hazard Analyses (see Appendix G) and associated hazard controls as necessary.

3.3 Site Survey

Personnel will walk the site to determine the locations of monitoring well and geoprobe installations as part of the site survey. The primary hazards associated with site surveying include uneven work surfaces, slip/trip/fall hazards and vehicular traffic. Prior to working adjacent to roadways, appropriate warning signs/cones will be placed on the road to warn oncoming traffic. All activities along roadways will conform to the NYSDOT Manual of Uniform Traffic Control Devices. Personnel will wear retro-reflective vests.

Personnel will use caution when walking on the site and will demarcate areas containing holes and other trip hazards.

3.4 Drilling/Geoprobe Operations

Prior to drilling the overhead/underground utility checklist must be completed (Appendix A). Prior to working adjacent to roadways, appropriate warning signs/cones will be placed on the road to warn oncoming traffic. All activities along roadways will conform to the NYSDOT Manual of Uniform Traffic Control Devices. Personnel will wear retro-reflective vests.

Drilling/Geoprobe Hazards

The primary physical hazards associated with drilling and geoprobe operations are the rig and supporting vehicles. Rig accidents can occur as a result of improperly placing the rig on uneven or unstable terrain, or failing to adequately secure the rig prior to the start of operations. Underground and overhead utility lines can create hazardous conditions if contacted by drilling equipment. Tools such as slips and tongs, and equipment such as elevators, cat lines, and wire rope have the potential striking, pinning, or cutting personnel.

Slips: Slips are toothed wedges positioned between the drill pipe and the master bushing/rotary table, to suspend the drill string in the well bore when it is not supported by the hoist. Most accidents associated with slip operations are related to manual materials handling; strained backs and shoulders are common.

Tongs: Tongs are large, counter-weighted wrenches used to break out the torqued couplings on drill pipe. Both sets of tongs have safety lines; when breakout force is put on the tongs, the tongs or the safety lines could break and injure an employee standing close to them. Another likely accident can occur when

the driller actuates the wrong tong lever and an unsecured tong swings across the rig floor at uncontrolled velocity. A common accident attributable to tongs can occur when an employee has his hand or finger in the wrong place as he attempts to swing and latch the tong onto the drill pipe, resulting in crushing injuries or amputation of the fingers.

Elevators: Elevators are a set of clamps affixed to the bails on the swivel below the traveling block. They are used to clamp each side of a drill pipe and hold the pipe as it is pulled from the well bore. Accidents and injuries can occur during the latching and unlatching tasks; fingers and hands can get caught and crushed in the elevator latch mechanism. If the pipe is overhead when the latching mechanism fails, then the pipe may fall on employees working on the drill floor.

Wire Rope: Worn or frayed wire rope presents a laceration hazard if loose wires protrude from the main bundle.

Cat Lines: Cat lines are used on drilling rigs to hoist material. Accidents that occur during cat line operations may injure the employee doing the rigging as well as injure the operator. Minimal hoisting control causes sudden and erratic load movements, which may result in hand and foot injuries.

Working Surfaces: Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls.

Derrick Operations: The derrick man on a well drilling operation performs his tasks from various elevated work platforms in the mast. He is exposed to falls when not utilizing fall protection equipment while climbing the derrick ladder, while working with the pipe stands, and while moving from the ladder to his platform station.

Materials Handling: The most common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects. Rolling stock can shift and/or fall from a pipe rack or truck bed.

Drilling/Geoprobe Safety Procedures

Work Crews: All drillers performing work must possess required state or local licenses to perform such work.

The driller shall be responsible for the safe operation of the drill rig as well as the crew's adherence to the requirements of this SSHP. The driller must ensure that all safety equipment is in proper condition and is properly used. The members of the crew shall follow all instructions of the driller, wear all personal protective equipment, and be aware of all hazards and control procedures. The drill crews shall participate in the Daily Safety Meetings and be aware of all emergency procedures.

Rig Inspection: Each day, prior to the start of work, the drill/geoprobe rig and associated equipment shall be inspected by the driller and/or drill crew. The following items shall be inspected:

- Vehicle condition
- Proper storage of equipment
- Condition of all wire rope
- Fire extinguisher
- First Aid Kit

Rig Set-Up: The drill rig shall be properly blocked and leveled prior to raising the derrick. The wheels which remain on the ground must be chocked. The leveling jacks shall not be raised until the derrick is lowered. The rig shall be moved only after the derrick has been lowered.

Site Drilling/Geoprobing Rules:

- Before drilling, the existence and location of underground pipe, electrical equipment and gas lines will be determined. This will be done, if possible, by contacting the appropriate client representative to mark the location of the lines. If the client's knowledge of the area is incomplete, an appropriate device, such as a magnetometer will be used to locate the line. Documentation that nearby utilities have been marked on the ground, and that the drill site has been cleared shall be in the possession of the Field Operations Manager prior to commencement of the intrusive investigation at that point of the site.

- No ignition sources are permitted if the ambient airborne concentration of flammable vapors exceeds 10% of the lower explosive limit (LEL) when drilling. A combustible gas indicator will be used to make this determination.

- Operations must be suspended and corrective action taken if the airborne flammable concentration reaches 10 percent of LEL in the immediate area (a one-foot radius) of the point of drilling.

- Combustible gas readings of the general work area will be made regularly.

- Under no circumstances will personnel be permitted to ride the traveling block or elevators, nor will the catline be used as a personnel carrier.

Overhead Electrical Clearances: If drilling is conducted in the vicinity of overhead power lines, the power to the lines must be shut off or the equipment must be positioned and blocked such that no part, including cables can come within the minimum clearances as follows:

NOMINAL SYSTEM VOLTAGE	MINIMUM REQUIRED CLEARANCE

0-50 kV	10 feet
51-100 kV	12 feet
101-200 kV	15 feet
201-300 kV	20 feet
301-500 kV	25 feet
501-750 kV	35 feet
751-1000 kV	45 feet

When the drill rig is in transit, with the boom lowered and no load, the equipment clearance must be at least 4 feet for voltages less than 50kV, 10 feet for voltages of 50 kV to 345 kV, and 16 feet for voltages above 345 kV.

Rig Set-Up:

- All well sites will be inspected by the driller prior to the location of the rig to ensure a stable surface exists. This is especially important along the river bank where soft, unstable terrain is common.

- All rigs will be properly blocked and leveled prior to raising the derrick. Blocking provides a more stable drilling structure by evenly distributing the weight of the rig. Proper blocking ensures that differential settling of the rig does not occur.

- Wooden blocks, at least 24" by 24" and 4" to 8" thick should be placed between the jack swivels and the ground. The emergency brake shall be engaged, and the wheels that are on the ground shall be chocked.

Hoisting Operations:

- Drillers should never engage the rotary clutch without watching the rotary table, and ensuring it is clear of personnel and equipment.

- Unless the drawworks are equipped with an automatic feed control, the brake should not be left unattended without first being tied down.

- Drill pipe, auger strings or casing should be picked up slowly.

- Drill pipe should not be hoisted until the driller is sure that the pipe is latched in the elevator, or the derrickman has signaled that he may safely hoist the pipe.

- During instances of unusual loading of the derrick or mast, such as when making an unusually hard pull, only the driller should be on the rig floor, and no one should be on the rig or derrick.

- The brakes on the drawworks of every drilling rig should be tested by each driller each day. The brakes should be thoroughly inspected by a competent individual each week.

- A hoisting line with a load imposed should not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically designed for line contact.

- Workers should never stand near the borehole whenever any wire line device is being run.

- Hoisting control stations should be kept clean and controls labeled as to their functions.

Catline Operations:

- Only experienced workers will be allowed to operate the cathead controls. The kill switch must be clearly labeled and operational prior to operation of the catline.

- The cathead area must be kept free of obstructions and entanglements.

- The operator should not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.

- Personnel should not stand near, step over, or go under a cable or catline which is under tension.

- Employees rigging loads on catlines shall:

  - keep out from under the load,
  - keep fingers and feet where they will not be crushed,
  - be sure to signal clearly when the load is being picked,
  - use standard visual signals only and not depend on shouting to coworkers,
  - make sure the load is properly rigged, since a sudden jerk in the catline will shift or drop the load.

Wire Rope:

- When two wires are broken or rust or corrosion is found adjacent to a socket or end fitting, the wire rope shall be removed from service or resocketed. Special attention shall be given to the inspection of end fittings on boom support, pendants, and guy ropes.

- Wire rope removed from service due to defects shall be cut up or plainly marked as unfit for further use as rigging.

- Wire rope clips attached with U-bolts shall have the U-bolts on the dead or short end of the rope; the clip nuts shall be re-tightened immediately after initial load carrying use and at frequent intervals thereafter.

- When a wedge socket fastening is used, the dead or short end of the wire rope shall have a clip attached to it or looped back and secured to itself by a clip; the clip shall not be attached directly to the live end.

- Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

- Except for eye splices in the ends of wires and for endless wire rope slings, wire rope used in hoisting, lowering, or pulling loads, shall consist of one continuous piece without knot or splice.

  - An eye splice made in any wire rope shall have not less that five full tucks.
  - Wire rope shall not be secured by knots except on haul back lines on scrapers.

- Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire clips or knots.

- Wire rope clips shall not be used to splice rope.

Pipe/Auger Handling:

- Pipe and auger sections shall be transported by cart or carried by two persons. Individuals should not carry auger or pipe sections without assistance.

- Workers should not be permitted on top of the load during loading, unloading, or transferring of pipe or rolling stock.

- Employees should be instructed never to try to stop rolling pipe or casing; they should be instructed to stand clear of rolling pipe.

- Slip handles should be used to lift and move slips. Employees should not be permitted to kick slips into position.

- When pipe is being hoisted, personnel should not stand where the bottom end of the pipe could whip and strike them.

- Pipe and augers stored in racks, catwalks or on flatbed trucks should be chocked or otherwise secured to prevent rolling.

Derrick Operations:

- The derrick climber should be used whenever climbing the derrick. Personnel on the derrick should be tied off, or otherwise protected from falling when working in an unguarded, elevated position.

- All stands of pipe and drill collars racked in a derrick should be secured with rope or otherwise adequately secured.

- Tools, derrick parts, or materials of any kind should not be thrown from the derrick.

- The elevators must be properly clamped onto all pipe joints prior to the driller engaging the load.

3.5 Monitoring Well Sampling

Personnel will collect samples from the monitoring wells. Potential exposure to chemicals, during sampling operations is possible, and personnel will wear appropriate PPE. Other hazards involve with sampling operations include material handling, uneven work surfaces, and slip/trip/falls.

Personnel will use caution when walking on the site and will demarcate areas containing holes and other trip hazards. Due to the presence of ticks, personnel may don tyvek suits and/or spray appropriate tick repellent. Personnel will receive assistance when lifting items over 60 lb.

3.6 Cold Stress

Most cold-related worker fatalities have resulted from failure to escape low environmental air temperatures, or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is a drop in the deep-core body temperature.

3.6.1 Signs and Symptoms

Employees should be protected from exposure too cold so that their deep-core body temperature does not fall below 99.6 degrees Fahrenheit (EF). A lower body temperature will very likely result in reduced mental alertness, reduction in rational decision-making, or loss of consciousness with the threat of fatal consequences.

Frostbite. Frostbite occurs when the extremities do not get sufficient heat from the central body stores. The fluids around the cells of the body tissues freeze from exposure to low temperatures. This condition can result in damage to, and loss of, tissue. The most vulnerable areas are the nose, cheeks, ears, fingers, and toes.

Damage from frostbite can occur in either the outer layers of skin, or in the tissue beneath these layers and can be serious, resulting in scarring, tissue death, permanent loss of movement, or amputation.

There are three degrees of frostbite:

- First Degree - Freezing without blistering or peeling
- Second Degree - Freezing with blistering or peeling
- Third Degree - Freezing with skin tissue death and possible deeper tissue damage.

Symptoms of frostbite include:

- Skin color changes to white or grayish-yellow, to reddish-violet, and finally black as the tissue dies
- Pain may be felt at first, but subsides
- Coldness or numbness of the affected part.

Hypothermia. This is the most severe form of cold stress and results from a drop in the body's core temperature. The symptoms of hypothermia are:

- First, uncontrollable shivering, develop severe pain in the extremities, and the sensation of cold
- Heartbeat slows and may become irregular
- Pulse weakens and the blood pressure changes
- As the body's core temperature drops, other signs may include cool skin, slow irregular breathing, and apparent exhaustion
- When core temperatures are in the mid-range, the victim may become listless and confused
- Final signs are a significant drop in blood pressure, fatigue, and shallow respiration.

3.6.2 Control Measures

When the ambient air temperature falls below 36 F (wind chill temperature), the following cold weather clothing requirements will be adhered to:

- If wind chill is a factor, the cooling effect of the wind shall be reduced by shielding the work area or providing employees an outer windbreak layer garment.
- Extremities, ears, toes, and nose shall be protected from extreme cold by protective clothing.

- Employees performing light work and whose clothing may become wet shall wear an outer layer of clothing which is impermeable to water.

- Employees performing moderate to heavy work and whose clothing may become wet shall wear an outer layer of clothing which is water repellent.

- Outer garments must provide for ventilation to prevent wetting of inner clothing by sweat.

- If clothing is wet, the employee shall change into dry clothes before entering a cold environment.

- Workers shall change socks and removable felt insoles at regular daily intervals or use vapor barrier boots.

- Workers who become immersed in water or whose clothing becomes wet shall immediately be provided a change of clothing and be treated for hypothermia if necessary. If the clothing becomes wet from sweating, the employee may finish the task which caused the sweating before changing into dry clothes.

Metal handles of tools and control bars will be covered by thermal insulating materials when temperatures fall below 30EF.

Whenever the site becomes covered with snow or ice, eyewear providing protection against ultraviolet light, glare, and blowing ice crystals will be worn by employees.

3.7 Heat Stress

Heat stress may be of concern during the execution of tasks associated with this project during the summer months. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and individual characteristics. Extreme hot weather can cause physical discomfort, loss of efficiency, or personal injury.

Individuals vary in their susceptibility to heat stress. Factors that may predispose individuals to heat stress include:

- Lack of physical fitness
- Insufficient acclimation
- Age
- Dehydration
- Obesity
- Alcohol and/or drug use

- Medical conditions
- Infection
- Sunburn
- Diarrhea
- Chronic disease.

Reduced work tolerance and the increased risk of heat stress are directly influenced by the amount and type of PPE worn. PPE adds weight and bulk and severely reduces the body's access to normal heat exchange mechanisms (evaporation, convection, and radiation), and increases energy expenditure.

3.7.1 Signs and Symptoms of Heat Stress

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur ranging from mild to fatal.

Heat related problems include:

- Heat rash - caused by continuous exposure to heat and humidity and aggravated by chafing clothes. Heat rash decreases the body's ability to tolerate heat as well as being a nuisance.

- Heat cramps - caused by profuse perspiration with inadequate electrolytic fluid replacement. Heat cramps cause painful muscle spasms and pain in the extremities and abdomen.

- Heat exhaustion - caused by increased stress on various organs to meet increased demand to cool the body. Heat exhaustion causes shallow breathing; pale, cool, moist skin; profuse sweating; and dizziness. Heat exhaustion can be alleviated by promptly moving the affected individual to a cool place to lie down and providing cool fluids to drink.

- Heat stroke - the most severe form of heat stress. Heat stroke symptoms include hot, dry skin; no perspiration; nausea; dizziness; confusion; strong, rapid pulse; and coma. The body must be cooled immediately to prevent severe injury or death.

3.7.2 Heat Stress Prevention

One or more of the following practices will help reduce the probability of succumbing to heat stress:

- Acclimate workers to heat conditions when field operations are conducted during hot weather.

- Provide plenty of liquids to replace the body fluids lost by perspiration. Fluid intake must be forced because, under conditions of heat stress, the normal thirst mechanism is not adequate to bring about a voluntary replacement of lost fluids.

- Provide cooling devices to aid natural body ventilation. However, these devices add weight and should be balanced against worker comfort.

- If possible, install mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.

- If possible, conduct field operations in the early morning.

- Train personnel to recognize the signs and symptoms of heat stress and its treatment.

- Rotate personnel to various job duties, if possible.

- Provide shade or shelter to relieve personnel of exposure to the sun during rest periods.

Individuals succumbing to the symptoms of heat stress will notify the PM or SS immediately. The onset of heat stress will preempt any of the aforementioned, halt activities and initiate treatment. Early detection and treatment of heat stress will prevent further serious illness or injury and lost work time. Proper and effective heat stress treatment can prevent the onset of more serious heat stroke or exhaustion conditions. Individuals that have succumbed to any heat related illness become more sensitive and predisposed to additional heat stress situations.

3.7.3 Acclimatization

The degree to which an employee's body has physiologically adjusted or acclimatized to working under hot conditions is extremely important. NIOSH recommends a progressive six-day acclimatization period for unacclimatized workers before allowing them to work at their full capacity. Under this regimen, the first day of work on site is begun using only 50 percent of the anticipated workload and exposure time, and 10 percent is added each day through day six. Six days should be considered the average time needed for worker acclimatization due to each individual's physical condition and their ability to adjust to hot and humid environments. It is important to note that employees can lose acclimatization in a matter of days and should be subjected to a short re-acclimatization period when returning from extended trips to cooler environments.

3.7.4 Training

Personnel (including subcontractor employees) potentially exposed to heat stress conditions will have the following training during the site-specific training session.

Employees

- Sources of heat stress, influence of protective clothing, and importance of acclimation.
- How the body handles heat.
- Heat-related illnesses.

- Preventive/corrective measures.
- First-aid procedures.

3.8 Noise

Exposure to noise over the OSHA action level is anticipated during drilling operations. Drilling personnel and others within 25 feet of the drill rig will be required to wear appropriate hearing protection devices.

3.9 Chemical Hazards

Chemical hazards associated with the project are related to inhalation, ingestion, and skin contact with tetrachloroethylene (PCE), a potential occupational carcinogen. These contaminants may pose a minor hazard, due to previous analytical results, and appropriate levels of personal protective equipment will be worn by personnel. Should unknown chemicals be present, the SS will incorporate the necessary level of PPE (see Table 1). Additional chemical information is available in the material safety data sheets in Appendix B.

3.10 Biological Hazards

Biological hazards, such as insects and ticks, are anticipated during the project. Personnel will don appropriate PPE and/or use tick repellent spray.

3.11 Environmental Hazards

Environmental hazards such as wild animals (rats or mice) may be present during the project. Personnel will be instructed to avoid all wild animals.

4.0 Hazard Control Program

4.1 General Practices

- At least one copy of this plan shall be available at the project site, in a location readily available to all personnel.
- Contaminated protective equipment, such as respirators, hoses, boots, etc., shall not be removed from the regulated area before being cleaned or properly packaged and labeled.
- Legible and understandable precautionary labels that comply with the hazard communication standard shall be affixed prominently to all containers of contaminated scrap, waste, debris, and clothing.
- Removal of contaminated materials from protective clothing, equipment, or building surfaces by blowing, shaking, or any other means that disperse contaminants into the air is prohibited. Dry sweeping is prohibited.
- No food or beverages shall be present or consumed in the regulated area.
- No tobacco products shall be present or used in the regulated area.
- Cosmetics shall not be applied within the regulated area.
- Contaminated materials shall be stored in tightly closed containers, in well-ventilated areas.
- Containers shall be moved only with the proper equipment, and shall be secured to prevent dropping or loss of control during transport.
- Emergency equipment shall be located outside storage areas in readily accessible locations that will remain minimally contaminated in an emergency.
- All areas that have been determined as uncontaminated inside the regulated area will be clearly marked as such. No personnel, equipment, etc., shall be in these areas until they have been decontaminated.
- All personnel on site shall use the buddy system (working in pairs or teams). If protective equipment or noise levels impair communications, then prearranged hand signals shall be used for communication. Visual contact shall be maintained between crewmembers at all times, and crewmembers must observe each other for signs of toxic exposure. Indication of adverse effects include, but are not limited to:
  - Changes in complexion and skin coloration
  - Changes in coordination
  - Changes in demeanor
  - Excessive salivation and pupillary response
  - Changes in speech pattern.
- Employees shall inform their partners or fellow team members of non-visible effects of overexposure to toxic materials. The symptoms of such overexposure may include:
  - Headaches
  - Dizziness
  - Nausea
  - Blurred vision
  - Cramps
  - Irritation of eyes, skin, or respiratory tract.

- Visitors to the site shall abide by the following:
  - All visitors shall be instructed to stay outside the contaminated zone, if any, (exclusion and decontamination zones) and remain within the clean zone during the extent of their stay. Visitors shall be cautioned to avoid skin contact with contaminated or suspected contaminated surfaces.
  - Visitors requesting to observe work conducted in the exclusion zone (EZ) must wear all appropriate PPE prior to entry into that zone. If respiratory protective devices are necessary, visitors who wish to enter the contaminated zone must:
    - be cleared for hazardous waste work as evidenced by a complete physical examination;
    - respirator trained, and fit tested for a respirator within the past 12 months;
    - have 40 hours of hazardous waste operations training; and
    - have 8 hours of refresher training within the past 12 months.
  - Visitor inspection of the contaminated area shall be at the discretion of the RM.

4.1.1 Buddy System

All on-site personnel shall use the buddy system. Personnel shall operate in teams, with each member of the team responsible for observing the other team members for:

- Signs and symptoms of chemical exposure
- Exposure to possible safety hazards
- Unsafe acts, or noncompliance with safety procedures.

No personnel will work on site if they are not within line of sight of another team member.

4.2 Spill Control Plan

All personnel must take every necessary precaution to minimize the potential for spills during site operations. Spills may be anticipated during the moving, handling, and sampling of containers. The sampling crew shall be instructed on the proper response in the event of a spill. During the project, all on-site personnel are obligated to immediately report any discharge, no matter how small, to the PM. To assist in detecting leaks/spills, personnel shall be instructed to inspect drums on a continuous basis and report any unusual condition.

A spill control apparatus will be located on site at any location which the PM foresees the potential for discharge to the ground. All absorbent materials used for the clean up will be containerized and labeled separately from other wastes, unless otherwise directed by the contracting officer. In the event of a spill, the PM will follow the provisions outlined in Chapter 12 to contain and control released materials and to prevent spread to off-site areas.

4.3 Lockout/Tagout Procedures

Maintenance procedures will only be performed by fully qualified and trained individuals. Before maintenance begins and if applicable, lockout/tagout procedures per IT HS Policy 315 and 29 CFR 1910.147 will be followed.

Lockout is the placement of a device that utilizes a positive means such as a lock to hold an energy isolating device ensuring that the equipment can not be operated until the lockout device is removed. If a device is not capable of being locked out, a tagout system will be utilized. Tagout is the placement of a tagout device on an energy isolating device indicating that the equipment controlled may not be operated until the tagout device is removed.

4.4 Sanitation

Sanitation will be maintained at the site according to OSHA and Department of Health requirements.

4.4.1 Break Area

Breaks will be taken in a clean zone away from the active work area. There will be no smoking, eating, drinking, or chewing gum or tobacco in the work area.

4.4.2 Potable Water

Potable water will be available at the site.

4.4.3 Sanitary Facilities

For long term field work, access to facilities for washing before eating, drinking, or smoking will be provided on site.

4.4.4 Lavatory

A portable toilet will be available on site.

4.4.5 Trash Collection

Trash generated during operations will be separated as routine from any hazardous materials/waste. Trash will be disposed as non-hazardous waste as appropriate.

5.0 Personal Protective Equipment

Personal protective equipment is required to safeguard site personnel from various hazards. Varying levels of protection may be required depending on the level of contaminants and the degree of physical hazard. This section presents the various levels of protection and defines the conditions of use for each level.

5.1 Respiratory Protection

Respiratory protection is an integral part of employee health and safety while working with hazardous materials.

5.1.1 Site-Specific Respiratory Protection Program

The site respiratory protection program will consist of the following:

- All site personnel who may use respiratory protection will have an assigned respirator.
- All site personnel who may use respiratory protection will have been fit tested and qualified in the use of an air purifying respirator within the past 12 months.
- All site personnel who may use respiratory protection must, within the past year, have been medically certified as being capable of wearing a respirator.
- Only properly cleaned, maintained, NIOSH-approved respirators are to be used on this site.
- If respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, or when load-up or breakthrough occurs.
- Contact lenses are not to be worn when a respirator is worn.
- All site personnel who may use respiratory protection will be clean shaven. Mustaches and side burns are permitted, but they must not touch the sealing surface of the respirator.
- Respirators will be inspected, and a positive, negative pressure test performed prior to each use.
- After each use, the respirator will be wiped with a disinfectant, cleansing wipe. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag.

5.2 Levels of Protection

Protection levels are determined based upon contaminants present in the work area.

5.2.1 Level D Protection

The minimum level of protection that will be required of IT personnel on the site will be Level D. The following equipment will be used:

- Work clothing as prescribed by weather
- Safety toe work boots, ANSI approved
- Safety glasses or goggles, ANSI approved
- Hard hat, ANSI approved
- Hearing protection (If noise levels exceed 85 dBA, then hearing protection with a U.S. EPA NRR of at least 20 dBA shall be used).

5.2.2 Modified Level D Protection

Modified Level D protection will be used by personnel who will be working in areas with potential splash hazards. The following equipment will be used for Modified Level D:

- Work clothing as prescribed by weather
- Safety toe work boots, ANSI approved
- Regular Tyvek® coveralls
- Nitrile or work gloves
- Safety glasses or goggles, ANSI approved
- Hard hat, ANSI approved
- Hearing protection (If noise levels exceed 85 dBA, then hearing protection with a U.S. EPA NRR of at least 20 dBA shall be used).

5.2.3 Level C Protection

Level C protection will be used by personnel who will be working in areas with potential or known chemical exposure. The following equipment will be used for Level C:

- Work clothing as prescribed by weather
- Safety toe work boots, ANSI approved
- Regular Tyvek® coveralls
- Nitrile or work gloves
- Full-face respirator with HEAP/organic vapor cartridges
- Hard hat, ANSI approved
- Hearing protection (If noise levels exceed 85 dBA, then hearing protection with a U.S. EPA NRR of at least 20 dBA shall be used).

5.2.4 Level B Protection

Level B protection is not anticipated for this project.

5.3 Using PPE

Depending upon the level of protection selected for this project, specific donning and doffing procedures may or may not be required. The following procedures are mandatory if Level C or higher PPE is selected.

All persons entering the EZ shall put on the required PPE in accordance with the requirements of this plan. When leaving the EZ, PPE will be removed in accordance with the procedures listed, in order to minimize the spread of contamination.

Personnel will be instructed to verify all PPE is in excellent condition prior to donning. All personnel shall visually inspect all PPE prior to and during donning procedures. The inspection will help ensure no holes, rips, or cuts are present. If present, seams will be inspected to verify being intact and not separated. Zippers will be inspect to verify they are operable. All damaged PPE shall not be used and disposed of.

During working operations, personnel shall be instructed to inspect PPE to verify the integrity is still intact. Should any holes, rips, cuts, or other unusual blemishes exist, personnel shall be instructed to either, decon/remove damaged PPE or perform appropriate actions to eliminate any potential of exposure while wearing the damaged PPE.

The limitations of PPE include permeation and penetration potential. Sampling operations and handling unknown liquids will present a potential splash hazard. Even though the predetermined protective suits and gloves will provide adequate protection, personnel will be instructed not to perform procedures which will provide continuous contact with the unknown liquids. Personnel will inspect contaminated PPE to verify that permeation or penetration has not occurred. Should permeation or penetration occur, personnel shall be instructed to remove the PPE and change into new PPE.

Personnel shall be informed of the limitations of wearing PPE during elevated temperatures. The predetermined protective suits and gloves, unfortunately, can have the potential to build-up heat inside the suits during elevated temperatures. Personnel shall be instructed on the potential of heat build-up while wearing protective suits and the signs/symptoms of heat stress/exhaustion. Should personnel experience signs/symptoms of heat stress, they shall perform adequate decontamination procedures and rest/drink plenty of fluids.

5.3.1 Donning Procedures

These procedures are mandatory, only if Level C or higher PPE is required for the project:

- Put on the required chemical protective coveralls.

- Put on the required chemical protective boots or boot covers.
- Tape the legs of the coveralls to the boots with duct tape.
- Put on the required chemical protective gloves.
- Tape the wrists of the protective coveralls to the gloves.
- Don the required respirator and perform appropriate fit check.
- Put hood or head covering over head and respirator straps.
- Tape the edges around the respirator and face.
- Don remaining PPE, such as hard hat.

If these procedures are instituted, one person shall remain outside the work area to ensure that each person entering has the proper protective equipment. No persons shall be allowed to enter an EZ if they are not wearing the required PPE.

5.3.2 Doffing Procedures

The following procedures are only mandatory if Level C or higher PPE is required for this project. The SS will determine the appropriate doffing procedures in relation to the type of contamination that may be present. Whenever a person leaves a Level C or higher work site, the following decontamination sequence may be followed:

- Upon entering the CRZ, remove contaminated materials from the boots or remove contaminated boot covers.
- Clean reusable protective equipment.
- Remove tape, protective garments, equipment, and respirator. All disposable clothing should be placed in plastic bags, which are labeled with contaminated waste labels.
- Proceed to clean area and dress in clean clothing.
- Clean and disinfect respirator for next use.
- Proceed to the sign-out point.

All disposable equipment, garments, and PPE shall be bagged in two 6 mil plastic bags, properly labeled for disposal. See Section 7.0 for detailed information on decontamination stations.

5.4 Selection Matrix

The level of personal protection selected will be based upon real-time air monitoring of the work environment and an assessment by the PM of the potential for skin contact with contaminated materials. The PPE selection matrix is given in Table 1. This matrix is based upon information that was available at the time this plan was written. The Airborne Contaminant Action Levels in Table 2 should be used to determine if the PPE prescribed in this matrix is still satisfactory.

6.0 Site Control

6.1 Authorization to Enter

Only personnel who have completed 40 hours of hazardous waste operations training as defined under OSHA Regulation 29 CFR 1910.120, have completed their 40-hour training or refresher training within the past 12 months, and have been certified as fit for hazardous waste operations by a physician within the past 12 months shall be allowed within a site area designated as an EZ or CRZ. Personnel without such training or medical qualification may enter the designated support zone. The PM will maintain a list of authorized persons. That list will be provided to each IT site representative. Only personnel on the authorized persons list will be allowed within the EZ or CRZ.

6.2 Hazard Briefing

No person will be allowed on any IT field sites during site operations without first being given a site hazard briefing which will review this HASP. In general, the briefing will consist of a review of the Tailgate Safety Meeting. All persons on the site, including visitors, must document their attendance at this meeting by signing the site-specific Tailgate Safety Meeting form.

6.3 Documentation of Certification

A training and medical file will be established for the project and kept on site during all site operations. The 40-hour training, update, and specialty training (first-aid/cardiopulmonary resuscitation [CPR]) certificates, as well as the current annual medical clearance for all project field personnel, will be maintained within that file. All IT personnel must provide their training and medical documentation to the PM prior to the start of field work.

6.4 Entry Log

The IT representative at the site shall record on their Field Activity Daily Log (FADL) all visitors to the site. The FADL may be used for recordkeeping. At the end of each shift, the log will be collected by the IT site representative for incorporation into the project file.

6.5 Entry Requirements

In addition to the entry requirements listed above, no personnel will be allowed on any IT field site unless they are wearing the minimum PPE as described in Chapter 5.0. Personnel entering the EZ or CRZ must wear the required PPE for those locations.

6.6 Emergency Entry and Exit

Persons who must enter the site on an emergency basis will be briefed of the hazards by the site supervisor. All hazardous activities will cease in the event of an emergency and any sources of emissions will be controlled, if possible.

Persons exiting the site because of an emergency will gather in a safe area for a head count. The site supervisor is responsible for ensuring that all persons who entered the work area have exited in the event of an emergency.

6.7 Equipment Security

All equipment will be secured and staged in the designated area during non-work hours.

7.0 Decontamination

7.1 Contamination Control Zones

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized persons from entering hazardous areas.

7.1.1 Exclusion Zone

The exclusion zone (EZ) consists of the entire area of suspected contamination. All employees entering the EZ will use proper personal protective equipment and will have the appropriate training for hazardous waste work. The EZ will be a defined area where there is a possible respiratory and/or contact health hazard. The location of exclusion zones will be identified by cones or other appropriate means.

7.1.2 Contamination Reduction Zone

The contamination reduction zone (CRZ) or transition area will be established to perform decontamination of personnel and equipment. All personnel entering or leaving the exclusion zone will pass through this area in order to prevent any cross-contamination and for the purpose of accountability. Tools and any equipment or machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed on site adjacent to the exclusion zone.

7.1.3 Support Zone

The support zone (SZ) is a clean area outside the CRZ located to prevent employee exposure to hazardous substances. Eating, drinking, or smoking will be permitted in the support area only after washing face and hands.

7.2 Posting

The support zone, contamination control zone, and the exclusion zone will be prominently marked and delineated prior to the start of the project.

7.3 Decontamination General Rules

All personnel working in the contaminated zone must undergo personnel decontamination prior to entering the support zone. Due to the changing conditions of site operations, the SS or designee will determine the appropriate decontamination procedures to follow.

The personnel decontamination area may consist of the following stations.

Station 1. At Station 1, personnel will remove their outer garment and gloves and deposit them in the lined waste receptacles. Personnel will wipe their respirators (if used), hard hats, and boots with clean, damp cloths and then remove those items. Those items are then hand carried to the next station.

Station 2. At this station, personnel will thoroughly wash their hands and face before leaving the decontamination zone. Respirators will be sanitized and then placed in a clean plastic ziplock bag.

7.4 Equipment Decontamination

Any vehicles that have entered the contaminated zone will be decontaminated prior to leaving the decontamination zone. If the level of contamination anticipated is low, decontamination for vehicles will be limited to rinsing of tires with water.

7.5 Personal Protective Equipment Decontamination

Where and whenever possible, single use, external protective clothing shall be used for work within the EZ or CRZ. This protective clothing shall be disposed of in marked containers. Depending upon subsequent analysis, that protective clothing may require disposal as hazardous waste.

Once the respirator has been removed from the CRZ, it will be thoroughly cleaned. The respirator face piece will be cleaned at the end of each work shift.

8.0 Site Monitoring

8.1 Air Monitoring

Air monitoring will be conducted to determine employee exposure to airborne contaminants. The monitoring results will dictate the selection and appropriateness of PPE. The monitoring device to be used, at a minimum, is a photo-ionization detector (PID), an explosivity (LEL) meter and colorimetric tubes for TCA and PCE.

PID and LEL readings will be conducted continuously during drilling operations. If action levels are exceeded, the appropriate action will be taken. Note that humid weather may have an adverse effect on the unit performance. A summary of air monitoring information is provided in the table below.

Monitoring Device	*Monitoring Location/ Personnel*	*Monitoring Frequency*	*Action Level*	*Action*
LEL/O_2	Exclusion Zone (EZ) , Drilling/ Geoprobe sampling area; Sample Tech (TC), Driller/ helper (DR)	Drilling/ Geprobe sampling	< 10 % LEL >10% LEL	Normal operations Evacuate area, ventilate, continue to monitor
PID	EZ Drilling/ Geoprobe sampling area/ TC, DR	Continuous during Drilling/ Geprobe sampling	< 1 ppm ≤ 25 ppm* > 25 ppm*	Level D+ Level C; monitor for PCE with colorimertric tubes Level B; Stop work; evacuate area, determine source of emissions, notify Project CIH
Colorimetric Tubes PCE	EZ Manhole Sampling, Drilling/ Geoprobe sampling area/ TC, DR	Periodic during Drilling when PID action levels are exceeded	< 25 ppm* ≥ 25 ppm ≥ 100 ppm *	Level D+ Level C Stop work; consult Project CIH

*Sustained levels in the breathing zone for 5 minutes

8.1.1 Initial Entry

Initial representative air monitoring for organics (PID) will be conducted during drilling operations. Action levels noted on Table 2 will be strictly followed.

8.2 Monitoring Equipment Maintenance and Calibration

All IT HNU PIDs will be calibrated in accordance with IT procedures (ITC PRO 9521.2). Preventive maintenance and repairs will be conducted in accordance with the respective manufacturers' procedures.

All other IT air monitoring equipment (e.g., combustible gas/oxygen meters) will be maintained and calibrated in accordance with manufacturers' procedures.

All direct reading instrumentation calibrations should be conducted under the approximate environmental conditions the instrument will be used. All air monitoring equipment calibrations and maintenance activities shall be documented on the IT Field Activity Daily Log or equivalent. All completed HS documentation/forms shall be reviewed by the CIH and maintained by the Site Supervisor.

If an instrument is found to be inoperative or suspected of giving erroneous readings, the IT PM shall be responsible for immediately removing the instrument from service and obtaining a replacement unit. The specific IT operation for which this equipment is essential shall cease until an appropriate replacement unit is obtained. The PM will be responsible for ensuring a replacement unit is obtained and/or repairs are initiated on the defective equipment.

When applicable, only manufacturer-trained and/or authorized IT personnel will be allowed to perform instrument repairs or preventive maintenance (e.g., electrical components of an organic vapor analyzer).

9.0 Employee Training

9.1 General

All on-site project personnel, working in the exclusion zone, shall have completed at least 40 hours of hazardous waste operations-related training, as required by OSHA Regulation 29 CFR 1910.120. All field employees receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Those personnel who completed the 40-hour training more than 12 months prior to the start of the project shall have completed an 8-hour refresher course within the past 12 months. The PM shall have completed an additional 8 hours of relevant HS training and shall have a first-aid/CPR certificate.

IT provides each employee who completes the required 40 hours of classroom training and 3 days of field experience with a certificate signed by the instructor. A copy of the certificate is maintained in the employee's home office training files.

9.2 Basic 40-Hour Course

The following is a list of the topics covered in IT's 40-hour training course:

- General safety procedures
- Physical hazards (fall protection, noise, heat stress, cold stress)
- Names and job descriptions of key personnel responsible for site HS
- Safety, health, and other hazards typically present at hazardous waste sites
- Use, application, and limitations of PPE
- Work practices by which employees can minimize risks from hazards
- Safe use of engineering controls and equipment on site
- Medical surveillance requirements
- Recognition of symptoms and signs which might indicate overexposure to hazards
- Worker right-to-know (Hazard Communication OSHA 1910.1200)
- Routes of exposure to contaminants
- Engineering controls and safe work practices
- Components of the site HS program and HASP
- Decontamination practices for personnel and equipment
- Confined-space entry procedures
- General emergency response procedures.

9.3 Supervisors Course

Management and supervisors receive an additional eight hours of training which includes:

- General site safety and health programs
- PPE programs
- Air monitoring techniques.

9.4 Site-Specific Training

Site-specific training will be accomplished through a review of this HASP before work begins. In addition, the daily Tailgate Safety Meetings (TSMs) will cover the work to be accomplished, the hazards anticipated, the procedures and personal protective equipment required to minimize site hazards, and emergency procedures. No work will be performed before the TSM has been held.

9.5 First Aid and CPR

At least one employee current in first aid/CPR will be assigned to the work crew and will be on the site whenever operations are ongoing. First-aid and CPR training courses are offered to all IT employees. Refresher training in first aid (tri-annually) and CPR (annually) is required to keep the certificate current.

10.0 Medical Surveillance

10.1 Medical Examination

All personnel on site shall have successfully completed a pre-placement or annual physical examination, which is provided free-of-charge to the employee. This medical surveillance program complies with OSHA 29 CFR 1910.120.

In addition to pre-employment, annual, and exit physicals, personnel may be examined:

- At employee request after known or suspected exposure to toxic or hazardous materials;
- At the discretion of the client, an IT HS professional, or IT occupational physician after known or suspected exposure to toxic or hazardous materials; and
- At the discretion of the IT occupational physician.

All on-site project personnel shall have completed a comprehensive medical examination within the past 12 months that meets the requirements of OSHA Regulation 29 CFR 1910.120. The annual medical examination typically includes the following elements:

- Medical and occupational history questionnaire
- Physical examination
- Complete blood count, with differential
- Liver enzyme profile
- Chest X-ray, once every three years, for non-asbestos workers
- Pulmonary function test
- Audiogram
- Electrocardiogram for persons older than 45 years of age, or if indicated during the physical examination
- Visual acuity
- Follow-up examinations, at the discretion of the corporate medical director.

All employee medical records are maintained by the HS group, within the worker's home profit center. The examining physician provides the employee with a letter summarizing his findings and recommendations. Each employee also has the right to inspect and copy his medical records.

The examining physician provides the employer with a letter confirming the worker's fitness for work and ability to wear a respirator. A copy of this letter for all project workers will be kept on site during all project site work.

10.1.1 Pre-placement Examination

All employees will receive a placement medical examination prior to assignment to field operations.

10.1.2 Annual Exam

Each year, subsequent to the placement examination, all employees must undergo an annual examination, similar in scope to the placement examination. Employees hired prior to 1985 are not required to submit to drug screening. Chest X-rays are taken every third year. The medical and occupational history is updated with each examination.

10.1.3 Exit Exam

IT employees receive an exit examination upon leaving the company if they have not been examined within the previous six months. The exit examination consists of the annual examination without drug screen. The employee's immediate supervisor is to notify the home office HS Assistant within a reasonable time before the termination to allow for the necessary arrangements.

10.2 First Aid and Medical Treatment

All persons on site must report any near-miss incident, accident, injury, or illness to their immediate supervisor or the PM. First aid will be provided by the designated site first aider. Injuries and illnesses requiring medical treatment will be accompanied by an "Authorization for Treatment Form." The employee's supervisor or the PM will complete the "Supervisor's Employee Injury Report" and conduct an accident investigation as soon as emergency conditions no longer exist and first-aid and/or medical treatment has been ensured. The investigation should follow the Accident/Injury Investigation Report. These two reports must be completed and submitted to the HS Manager within 24 hours after the incident.

If first-aid treatment is required, first aid kits are kept at the CRZ and in all IT vehicles. If treatment beyond first aid is required, the injured should be transported to the medical facility. If the injured is not ambulatory, or shows any sign of not being in a comfortable and stable condition for transport, then an ambulance/paramedics should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

10.3 Medical Restriction

When the examining physician identifies a need to restrict work activity, the employee's home office supervisor will communicate the restriction to the employee and the H&S Manager. The terms of the restriction will be discussed with the employee and this supervisor. Every attempt will be made to keep the employee working, while not violating the terms of the medical restriction.

10.4 Medical Records

Medical records are continually reviewed and updated. Continuum Healthcare, Inc. in Atlanta, GA will maintain all medical records in accordance with 29 CFR 1010.120. EMR will maintain all medical records for a period of 30 years, and a copy of these records will be made available to any employee for either review or copying upon request and completion of a written release order.

10.5 Occupational Physician

Kew Gardens Medical Associates
a Long Island Medical Care Center
80-02 Kew Gardens Road
Kew Gardens, NY 11415
Contact: Beth Kavic
Phone: 718-793-0300

Site Hospital map and directions are located in Appendix C.

11.0 Exposure Control Plan

This Exposure Control Plan presents health and safety guidelines for voluntary and designated first aid and cardiopulmonary resuscitation (CPR) care providers. In order to meet the requirements of Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) §1910.151, during day shift operations, at least one person on site will be adequately trained in first aid and CPR, in the requirements of the Bloodborne Pathogens Standard as listed in 29 CFR §1910.1030, IT Procedure HS512, and in the contents of this plan.

11.1 Definitions

Bloodborne pathogens are those agents (i.e., bacteria, virus, fungi) found in blood, blood components, certain body fluids, and other materials, objects, or surfaces that have had contact with blood that are capable of causing human disease or death to unprotected people who came into contact with blood or blood-affected items. Diseases caused by bloodborne pathogens include, but are not limited to, hepatitis B virus (HBV), human immunodeficiency virus (HIV), hepatitis C, malaria, and syphilis. The most significant and of greatest concern are HBV and HIV.

11.1.1 Hepatitis B Virus

HBV is the major bloodborne pathogen hazard that first aid/CPR care providers are more likely to encounter. The HBV can remain infectious for up to 10 days even in dried blood. The virus adversely affects 8,000 to 10,000 workers annually resulting in approximately 200 deaths each year.

11.1.1.1 HEPATITIS EXPOSURE SYMPTOMS

Hepatitis means "inflammation of the liver" causing severe liver damage or cirrhosis. Exposure symptoms include fever, fatigue, nausea, vomiting, muscle aches, loss of appetite, and jaundice (yellowing of the eyes or skin). Hepatitis diagnosis is difficult because some symptoms are similar to the flu and may remain mild for an extended period of time.

Presently, no cure exists for hepatitis, but it can be prevented with a vaccination.

11.1.2 Human Immunodeficiency Virus

HIV attacks and deteriorates the body's immune system and eventually weakens it to the point that infection sets in causing the disease Acquired Immune Deficiency Syndrome (AIDS). HIV is primarily transmitted through sexual contact, but may also be transmitted through contact with blood and body fluids. HIV is not transmitted by touching or working with people who are HIV-positive.

11.1.2.1 HUMAN IMMUNODEFICIENCY VIRUS EXPOSURE SYMPTOMS

HIV leads to AIDS-related illnesses that eventually cause neurological problems, cancer, pneumonia, and death. People carry the virus for many years of their lives without experiencing any symptoms. Upon

development, symptoms may include weight loss, skin lesions, dry cough, fever, fatigue, diarrhea, or swelling of the lymph glands.

Presently, no cure exists for HIV or AIDS and no vaccination is currently available.

11.2 Exposure Determination

The guidelines in this plan are designed to limit occupational exposure of site workers to infectious blood materials which could result in disease and possible death. The contents of this plan are intended to protect the IT employees trained in first aid and CPR that are responsible for administering medical assistance to site workers.

11.2.1 Means of Transmission

The major activity that may expose any of these IT employees to bloodborne pathogens is their response and care to on-site personal injuries or decontamination of equipment/surfaces contaminated by blood or other potentially infectious materials during the incident.

These IT employees could be subject to bloodborne pathogens during rendering of first aid or CPR by accidental exposure due to:

- Punctures through the skin with a contaminated sharp object (i.e., scissors)
- Contact or absorption of blood or blood-contaminated objects through open or broken skin (i.e., cuts, scratches, rashes)
- Blood splashes to their eyes, nose, or mouth or other mucous membranes.

Workers can reduce their risk of contacting HBV or HIV by implementing the work practices outlined in this plan before, during, and after responding to emergency medical incidents involving personal injuries.

11.3 Measures for Prevention

The establishment of work practice controls is an integral part of an effective exposure control plan in preventing accidental infection of employees. These work practices are designed to protect employees from reasonably foreseeable occupational exposures to bloodborne pathogens from blood and other potentially infectious material. The work practice controls outlined in this section are applicable to the administration of first aid in emergency situations and subsequent cleanup only.

11.3.1 Universal Precautions

Universal precautions is an approach to infection control which operates on the assumption that all human blood and bodily fluids are to be treated as if they are known to be contaminated with HIV, HBV, or other infectious diseases. Universal precautions shall be implemented whenever there exists a foreseeable potential for contact with blood or bodily fluids.

11.3.2 Engineering Controls

Due to the remote location of the worksite, the nature of work in outdoor locations with potential exposure to airborne chemical contaminants, and the potential for exposure being limited to emergency situations, the implementation of engineering controls is not feasible. Exposure control shall be accomplished through implementation of work practice controls and use of personal protective equipment.

11.3.3 Work Practice Controls

Work practice controls shall be instituted whenever foreseeable potential contact with, or exposure to, blood and bodily fluid exists. Examples of situations in which these controls are to be implemented include, but are not limited to, accidents or injuries in which administration of first aid is required, application of bandages to minor cuts and abrasions of another person, and contact with sores, wounds, or broken skin.

Following are specific work practice controls that shall be implemented:

- Open wounds or cuts will be promptly bandaged.
- Wash hands and face as soon as possible after administering first aid or CPR. If wash facilities are not readily available, stock disposable one-time use towelettes.
- No eating, drinking, or smoking is allowed in any work area where a potential exists for occupational exposure to blood borne pathogens.
- Non-disposable equipment or materials that have or may have blood or infectious fluid contact must be washed immediately after their use. (A 1 to 10 solution of bleach and water is recommended proper decontamination.)
- Any clothing that becomes contacted with blood or infectious fluids shall be removed as soon as possible after administering first aid or CPR.
- No personal clothing that becomes contacted with blood or infectious fluids shall be laundered off-site.
- Ensure that first-aid kits on-site are equipped with a pair of surgical gloves and CPR mouth pieces.

11.3.3.1 MINIMIZATION OF CONTACT

Direct contact with blood and bodily fluids should be kept to an absolute minimum, as required in a particular situation. In situations where direct contact is likely, personal protective equipment shall be worn to help prevent infection.

Based upon professional judgment, an employee may choose to temporarily forego the use of PPE if he determines that the use of PPE will further jeopardize his well-being or that of the injured worker. This limited application must be carefully evaluated by the employee.

If this does occur, IT is obligated to investigate and document the circumstances in an effort to provide alternative means to avoid further occurrence.

11.3.4 Personal Protective Equipment

The following are specific personal protective equipment items that shall be implemented:

- Always wear hand (i.e. latex or nitrile surgical gloves) and eye (i.e. safety glasses, goggles) protection to administer or apply first aid or CPR.
- Always use CPR mouthpieces or ventilation devices.
- Inspect PPE prior to use to ensure it is in good working order and without flaws.
- Do not reuse gloves once removed.
- After use, remove gloves from top to bottom inside-out, not allowing unprotected skin to contact the exterior of the gloves.

11.3.5 Waste Handling

Disposable items that have or may have blood contact must be bagged separately from other trash. These wastes must be placed in leak proof containers or bags and labeled.

A collection container for contaminated articles will be available on-site. Wastes used in medical emergency treatment (i.e. gloves, towels, gauze) shall be disposed in the infectious waste container(s). The container will be replaced as needed and not be overfilled.

11.3.6 Waste Disposal

The waste will remain on site in approved container(s) until an approved disposal facility capable of receiving medical wastes is identified. Disposal of the infectious waste container(s) shall be in accordance with applicable local, state, and federal regulations.

11.4 Medical Requirements

The medial requirements of the exposure control plan include provision of a Hepatitis B vaccination to all exposed employees and post-exposure procedures and evaluation.

11.4.1 Hepatitis B Vaccination

All potentially exposed employees will have made available to them at no cost a Hepatitis B vaccination. The employee will also receive training as to the vaccine's efficacy, safety, benefits, and consequences prior to administration. For designated first aid providers, the vaccination series shall be initiated prior to assignment and shall be administered under the supervision of a licensed physician. For voluntary first aid providers, the vaccination series shall be initiated within 24 hours of providing first aid/CPR in an incident and shall be administered under the supervision of a licensed physician. Employees may at their own discretion decline the vaccination, in which case documentation of declination will be completed and employees may be assigned immediately. If an employee covered by this exposure plan decides to accept the vaccination at a later date, the vaccination will be offered at that time at no cost to the employee.

11.4.2 Post-Exposure Procedures and Evaluation

Subsequent to all reported exposure incidents, a confidential medical evaluation and follow-up shall be made available to each employee exposed in the incidents.

11.4.2.1 DOCUMENTATION PROCEDURES

Documentation of the exposure incident shall be recorded as soon as possible, and include the route(s) of exposure, the circumstances surrounding the incident, and the identification of the source individual. Additionally, each incident involving voluntary first aid providers shall be placed on the "first aid incident list" attached to the location OSHA Log of Occupational Injuries and Illnesses.

11.4.2.2 BLOOD TESTING

Source Individuals

As soon as feasible, the source individual in an exposure incident will be asked to consent to a blood test to determine HBV and HIV infectivity. Where applicable laws require employee consent, documented consent shall be obtained prior to testing. If an employee refuses the blood test, documentation of the refusal will be made. Documentation of the test results shall be made available to the exposed employee(s). All results should be kept confidential, as criminal and civil penalties may be charged against persons negligently or willfully releasing such information, depending on local laws.

Exposed Employees

Exposed employees will be asked to consent to a blood test for HBV and HIV serological status. If consent to HIV testing is denied, the blood sample will be preserved for 90 days, within such time the employee may elect to consent to the HIV test.

11.4.3 Post-Exposure Medical Evaluations

Exposed employees shall receive a healthcare professional's written opinion for post-exposure evaluations. The written opinion shall include the results of the evaluation and any medical conditions resulting from the exposure incident which requires further medical treatment.

11.5 Hazard Communication

11.5.1 Warning Labels

Containers used for disposal of blood contaminated supplies and waste will be labeled in accordance with the word "biohazard."

11.5.2 Warning Signs

There are no designated areas for medical treatment on site, since first aid will be provided on an emergency basis only, and therefore warning signs are not applicable. In cases of potential exposure observers and non essential personnel should be verbally warned to keep a safe distance from injured personnel.

11.5.3 Employee Training Program - Voluntary Providers

All associates who are first aid/CPR trained and may provide assistance shall be trained in the requirements for voluntary providers as described in HS512 and this HASP, and the general provisions of HS512.

11.5.4 Employee Training Program - Designated Providers

Employee training will be provided at the time of initial assignment and annually thereafter. Additional training will be given as changes in or modification to procedures occur.

The training program includes the following elements:

- A copy of 29 CFR §1910.1030 for review
- Explanations of epidemiology of bloodborne diseases, modes of transport, symptoms of infection
- Explanation of the exposure control plan, methods used to recognize tasks with potential exposure
- Explanations of use and limitations of control measures
- Information on the Hepatitis B vaccination, medical evaluation, post-exposure follow-up
- Explanation of warning signs and labels.

11.6 Recordkeeping

11.6.1 Training Records

All employees selected to attend the training program that covers the contents of this plan shall sign the Acknowledgement Form and the Training Attendance Form.

The training record will contain the date, training outline, name, and qualifications of the trainer, and names and job titles of attendees.

At the completion of the training program, all participants must take and pass the training quiz.

The training records will be maintained by the IT Training Department for at least three years from the training date.

11.6.2 Medical Records

Medical records necessary for IT employees must include documentation on HBV vaccination status, medical follow-up, post-exposure testing, and a medical professional's written evaluation.

11.6.2.1 CONFIDENTIALITY

The employee medical records will be forwarded to Continuum Healthcare, Inc. for inclusions in the employee's medical file:

Continuum Healthcare, Inc.
3850 Holcomb Bridge Road
Suite 300
Norcross, GA 30092
770-209-9088

11.6.2.2 MAINTENANCE AND TRANSFER OF RECORDS

IT Corporation shall maintain the employee medical records for the duration of the employee's employment plus 30 years thereafter.

If, for whatever reason, IT Corporation no longer does business and no successor exists, IT Corporation will notify the Director of NIOSH in writing three months prior to the disposal of records. If so directed, the records shall be transferred to the Director of NIOSH.

11.6.3 Incident Recording

An incident that occurs as a result of rendering emergency medical care will be recorded on the OSHA 200 log as OSHA defines work-related injuries and illnesses.

Tables

Tables

Table 1
PPE Selection Matrix

Task	Protection Level
Site Mobilization	D
Site Survey/Manhole Sampling Activities	D
Drilling Operations	D/Modified D/C
Support Zone Work	D
Monitoring Well Sampling	Modified D/D

APPENDIX A

APPENDIX A
OVERHEAD/UNDERGROUND UTILITY CHECKLIST

UNDERGROUND/OVERHEAD UTILITY CHECKLIST

Project Name/Number_____ **Date**_____

Location_____

This checklist must be completed for any intrusive subsurface work such as excavating or drilling. It records the fact that all underground and overhead structures and utilities in the work area are identified and located. The Project Manager must request utility markouts before the start of field operations to allow the client and utility companies time to complete them. If complete information is not available, a magnetometer survey must be performed to locate obstacles prior to excavating or drilling.

PROCEDURE

A diagram of the project area depicting the proposed location of excavation or drilling sites must be attached to this Health and Safety Plan. The diagram must clearly indicate the areas checked for underground structures/utilities and overhead power lines. This form and the diagram must be signed by the Project Manager, the IT Field Supervisor, and the client representative (if applicable).

CHECKLIST

TYPE OF STRUCTURE	PRESENT	NOT PRESENT	METHOD OF MARKOUT
Electric Power Line			
Natural Gas Line			
Telephone Line			
Water Line			
Product Line			
Steam Line			
Sewer Line			
Drain Line			
Underground Tank			
Overhead Power Line			
Overhead Product Line			
Septic Tank/Drain			

Client Representative_____ _____
(If applicable) (Signature) (Date)

IT Project Manager_____ _____
(Signature) (Date)

IT Field Supervisor_____ _____
(Signature) (Date)

APPENDIX
B

APPENDIX B
MATERIAL SAFETY DATA SHEETS

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

1,1,1-TRICHLOROETHANE

MSDS Number: T4914 --- *Effective Date: 07/15/99*

1. Product Identification

Synonyms: Methyl chloroform; trichloroethane; chloroetene
CAS No.: 71-55-6
Molecular Weight: 133.40
Chemical Formula: CH3CCl3
Product Codes: 5381, 9435, 9437, W509, W510

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl Chloroform	71-55-6	96 - 100%	Yes
Dioxane	123-91-1	< 3%	Yes
1,2-Epoxybutane	106-88-7	< 0.5%	Yes
Actual concentrations proprietary			

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, AND CARDIOVASCULAR SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD.

CONTAINS DIOXANE WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Inhalation of vapors will irritate the respiratory tract. Affects the central nervous system. Symptoms include headache, dizziness, weakness, nausea. Higher levels of exposure (> 5000 ppm) can cause irregular heart beat, kidney and liver damage, fall in blood pressure, unconsciousness and even death.
Ingestion:
Harmful if swallowed. Symptoms similar to inhalation will occur along with nausea, vomiting. Aspiration of material into the lungs can cause chemical pneumonitis which can be fatal. If aspirated, may be rapidly absorbed through the lungs and result in injury to other body systems.
Skin Contact:
Causes mild irritation and redness, especially on prolonged contact. Repeated contact may cause drying or flaking of the skin.
Eye Contact:
Liquids and vapors cause irritation. Symptoms include tearing, redness, stinging, swelling.
Chronic Exposure:
Prolonged or repeated skin contact may cause dermatitis. Chronic exposure may affect the kidneys and liver. Dioxane is a suspected human carcinogen based on animal data.
Aggravation of Pre-existing Conditions:
Personnel with CNS, kidney, liver or heart disease may be more susceptible to the effects of this substance. Use of alcoholic beverages may aggravate symptoms.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Autoignition temperature: 500C (932F)
Flammable limits in air % by volume:
lel: 7.0; uel: 16.0
Vapors in containers can explode if subjected to high energy source.
Dioxane has a flash point below 16C (60F).
Explosion:
Can react with strong caustic, such as potash to form a flammable or explosive material. Air/vapor mixtures may explode when heated. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! Do not use aluminum, magnesium or zinc metal for storage container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do not use aluminum equipment or storage containers. Contact with aluminum parts in a pressurized fluid system may cause violent reactions.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
350 ppm (TWA) for trichloroethane
100 ppm (TWA) skin for dioxane
-ACGIH Threshold Limit Value (TLV):
350 ppm (TWA), 450 ppm (STEL) for trichloroethane
20 ppm (TWA) skin, A3 - Animal Carcinogen for dioxane
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. This substance has questionable warning properties.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Viton is a recommended material for personal protective equipment.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Mild chloroform-like odor.
Solubility:
4,400 ppm in water @ 20C (68F)
Specific Gravity:
1.34 @ 20C/4C

pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
74C (165F)
Melting Point:
-32C (-26F)
Vapor Density (Air=1):
4.63
Vapor Pressure (mm Hg):
100 @ 20C (68F)
Evaporation Rate (BuAc=1):
12.8

10. Stability and Reactivity

Stability:
Requires inhibitor content to prevent corrosion of metals. Slowly hydrolyzes in water to form hydrochloric and acetic acid.
Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition. Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Hazardous polymerization can occur in contact with aluminum trichloride.
Incompatibilities:
Open flames, welding arcs, nitrogen tetroxide, oxygen, liquid oxygen, sodium, sodium hydroxide, and sodium-potassium alloy, strong alkalis, oxidizers, aluminum and other reactive metals.
Conditions to Avoid:
Insufficient inhibitor, incompatibles, heat, flame and ignition sources

11. Toxicological Information

Oral rat LD50: 9600 mg/kg; inhalation rat LC50: 18000 ppm/4H; investigated as a mutagen, tumorigen, reproductive effector; irritation eye rabbit, Standard Draize, 2mg/24H severe.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methyl Chloroform (71-55-6)	No	No	3
Dioxane (123-91-1)	No	Yes	2B
1,2-Epoxybutane (106-88-7)	No	No	3

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material is not expected to significantly bioaccumulate. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released to the atmosphere, this material has an average global half-life of 6.0 - 6.9 years. When released into the air, this material may adversely affect the ozone layer.
Environmental Toxicity:
This material is expected to be slightly toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: 1,1,1-TRICHLOROETHANE
Hazard Class: 6.1
UN/NA: UN2831
Packing Group: III
Information reported for product/size: 20L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Methyl Chloroform (71-55-6)	Yes	Yes	Yes	Yes
Dioxane (123-91-1)	Yes	Yes	Yes	Yes
1,2-Epoxybutane (106-88-7)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Methyl Chloroform (71-55-6)	Yes	Yes	No	Yes
Dioxane (123-91-1)	Yes	Yes	No	Yes
1,2-Epoxybutane (106-88-7)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methyl Chloroform (71-55-6)	No	No	Yes	No
Dioxane (123-91-1)	No	No	Yes	No
1,2-Epoxybutane (106-88-7)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Methyl Chloroform (71-55-6)	1000	U226	No
Dioxane (123-91-1)	100	U108	No
1,2-Epoxybutane (106-88-7)	100	No	No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2[Z]
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, AND CARDIOVASCULAR SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. CONTAINS DIOXANE WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.
Label Precautions:
Avoid breathing vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Avoid contact with eyes, skin and clothing.

Label First Aid:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 3, 8.

Disclaimer:

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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TETRACHLOROETHYLENE

MSDS Number: T0767 --- *Effective Date: 08/02/00*

1. Product Identification

Synonyms: ethylene tetrachloride; tetrachloroethene; perchloroethylene; carbon bichloride; carbon dichloride
CAS No.: 127-18-4
Molecular Weight: 165.83
Chemical Formula: Cl2C:CCl2
Product Codes:
J.T. Baker: 9218, 9360, 9453, 9465, 9469
Mallinckrodt: 1933, 8058

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Tetrachloroethylene	127-18-4	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER

AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Irritating to the upper respiratory tract. Giddiness, headache, intoxication, nausea and vomiting may follow the inhalation of large amounts while massive amounts can cause breathing arrest, liver and kidney damage, and death. Concentrations of 600 ppm and more can affect the central nervous system after a few minutes.
Ingestion:
Not highly toxic by this route because of low water solubility. Used as an oral dosage for hookworm (1 to 4 ml). Causes abdominal pain, nausea, diarrhea, headache, and dizziness.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
May cause liver, kidney or central nervous system damage after repeated or prolonged exposures. Suspected cancer risk from animal studies.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance. The use of alcoholic beverages enhances the toxic effects.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention

immediately.
Skin Contact:
Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard but becomes hazardous in a fire situation because of vapor generation and possible degradation to phosgene (highly toxic) and hydrogen chloride (corrosive). Vapors are heavier than air and collect in low-lying areas.
Explosion:
Not considered to be an explosion hazard. Containers may explode when involved in a fire.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Store in a cool, dry, ventilated area away from sources of heat or ignition. Isolate from flammable materials. Protect from direct sunlight. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure

levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA), 200 ppm (ceiling),
300 ppm/5min/3-hour (max)

-ACGIH Threshold Limit Value (TLV):
25 ppm (TWA), 100 ppm (STEL); listed as A3, animal carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Ethereal odor.
Solubility:
0.015 g in 100 g of water.
Specific Gravity:
1.62 @ 20C/4C
pH:
No information found.

% Volatiles by volume @ 21C (70F):
100
Boiling Point:
121C (250F)
Melting Point:
-19C (-2F)
Vapor Density (Air=1):
5.7
Vapor Pressure (mm Hg):
18 @ 25C (77F)
Evaporation Rate (BuAc=1):
0.33 (trichloroethylene = 1)

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Slowly decomposed by light. Deteriorates rapidly in warm, moist climates.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition. Hydrogen chloride gas and phosgene gas may be formed upon heating. Decomposes with moisture to yield trichloroacetic acid and hydrochloric acid.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong acids, strong oxidizers, strong alkalis, especially NaOH, KOH; finely divided metals, especially zinc, barium, lithium. Slowly corrodes aluminum, iron and zinc.
Conditions to Avoid:
Moisture, light, heat and incompatibles.

11. Toxicological Information

Oral rat LD50: 2629 mg/kg; inhalation rat LC50: 34.2 g/m3/8H; investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Tetrachloroethylene (127-18-4)	No	Yes	2A

12. Ecological Information

Environmental Fate:

When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into water, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals.

Environmental Toxicity:

The LC50/96-hour values for fish are between 1 and 10 mg/l. The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be toxic to aquatic life.

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13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

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14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1897
Packing Group: III
Information reported for product/size: 20L

International (Water, I.M.O.)

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1897
Packing Group: III
Information reported for product/size: 20L

International (Air, I.C.A.O.)

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1897
Packing Group: III
Information reported for product/size: 20L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Tetrachloroethylene (127-18-4)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Tetrachloroethylene (127-18-4)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Tetrachloroethylene (127-18-4)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Tetrachloroethylene (127-18-4)	100	U210	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2[Z]
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.

Do not breathe vapor or mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:

Laboratory Reagent.

Revision Information:

No changes.

Disclaimer:

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****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

METHYLENE CHLORIDE

MSDS Number: M4420 --- *Effective Date: 06/30/98*

1. Product Identification

Synonyms: MC; Dichloromethane (DCM); Methylene dichloride; Methylene bichloride; Methane dichloride
CAS No.: 75-09-2
Molecular Weight: 84.93
Chemical Formula: CH2Cl2
Product Codes: 9264, 9266, 9295, 9315, 9324, 9329, 9330, 9341, 9348, 9350, 9965, Q480

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methylene Chloride	75-09-2	> 99%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, CARDIOVASCULAR SYSTEM, AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD.

MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Causes irritation to respiratory tract. Has a strong narcotic effect with symptoms of mental confusion, light-headedness, fatigue, nausea, vomiting and headache. Causes formation of carbon monoxide in blood which affects cardiovascular system and central nervous system. Continued exposure may cause increased light-headedness, staggering, unconsciousness, and even death. Exposure may make the symptoms of angina (chest pains) worse.

Ingestion:
May cause irritation of the gastrointestinal tract with vomiting. If vomiting results in aspiration, chemical pneumonia could follow. Absorption through gastrointestinal tract may produce symptoms of central nervous system depression ranging from light headedness to unconsciousness.

Skin Contact:
Causes irritation, redness and pain. Prolonged contact can cause burns. Liquid degreases the skin. May be absorbed through skin.

Eye Contact:
Vapors can cause eye irritation. Contact can produce pain, inflammation and temporal eye damage.

Chronic Exposure:
Can cause headache, mental confusion, depression, liver effects, kidney effects, bronchitis, loss of appetite, nausea, lack of balance, and visual disturbances. Can cause dermatitis upon prolonged skin contact. Methylene chloride may cause cancer in humans.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye problems, impaired liver, kidney, respiratory or cardiovascular function may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Autoignition temperature: 556C (1033F)
Flammable limits in air % by volume:
lel: 12; uel: 23

Forms flammable vapor-air mixtures above 100C (212F).
Explosion:
Concentrated can be ignited by a high intensity ignition source. Vapor may form flammable mixture in atmosphere that contains a high percentage of oxygen. Sealed containers may rupture when heated.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

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6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb

with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Outside or detached storage is recommended. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. To minimize decomposition, all storage containers should be galvanized or lined with a phenolic coating. This material may corrode plastic and rubber. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Odor Threshold: 205 - 307 ppm. The odor threshold only serves as a warning of exposure; not smelling it does not mean you are not being exposed.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Methylene Chloride (Dichloromethane):
- OSHA Permissible Exposure Limit (PEL) -
25 ppm (TWA), 125 ppm (STEL), 12.5 ppm (8-hour TWA - Action Level)
- ACGIH Threshold Limit Value (TLV) -
50 ppm (TWA), A2 - suspected human carcinogen.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. The cartridges recommended for this material have a predicted service of less than 30 minutes at concentrations of ten times (10x) the exposure limits. Actual service life will vary considerbly, depending on concentration levels, temperature, humidity, and work rate. This substance has poor warning properties.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or

coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment. Natural rubber and polyvinyl chloride ARE NOT recommended materials for personal protective equipment.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:

Do not use closed circuit rebreathing system employing soda lime or other carbon dioxide absorber because of formation of toxic compounds capable of producing cranial nerve paralysis. See OSHA Standard for medical surveillance, record keeping, and reporting requirements for methylene chloride (29 CFR 1910.1052).

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9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Chloroform-like odor.
Solubility:
1.32 gm/100 gm water @ 20C.
Specific Gravity:
1.33 @ 15C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
39.8C (104F)
Melting Point:
-97C (-143F)
Vapor Density (Air=1):
2.9
Vapor Pressure (mm Hg):
350 @ 20C (68F)
Evaporation Rate (BuAc=1):
27.5

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Emits highly toxic fumes of phosgene when heated to decomposition. Decomposes in a flame or hot surface to form toxic gas phosgene and corrosive mists of hydrochloric acid. Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:

Will not occur.

Incompatibilities:

Strong oxidizers, strong caustics, plastics, rubber, nitric acid, water + heat, and chemically active metals, such as aluminum and magnesium powder, sodium, potassium, and lithium. Avoid contact with open flames and electrical arcs. Liquid methylene chloride will attack some forms of plastics, rubber, and coatings.

Conditions to Avoid:

Moisture, heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:

Dichloromethane: Oral rat LD50: 1600 mg/kg; inhalation rat LC50: 52 gm/m3; investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

Dichloromethane has been linked to spontaneous abortions in humans.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methylene Chloride (75-09-2)	No	Yes	2B

12. Ecological Information

Environmental Fate:

When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of greater than 30 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

Environmental Toxicity:

The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal

disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III
Information reported for product/size: 52L

International (Water, I.M.O.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III
Information reported for product/size: 52L

International (Air, I.C.A.O.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III
Information reported for product/size: 52L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------

Ingredient	TSCA	EC	Japan	Australia
Methylene Chloride (75-09-2)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Methylene Chloride (75-09-2)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\---------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methylene Chloride (75-09-2)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\---------

	-RCRA-	-TSCA-

Ingredient	CERCLA	261.33	8(d)
Methylene Chloride (75-09-2)	1000	U080	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2Z
Poison Schedule: S5
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, CARDIOVASCULAR SYSTEM, AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:
Do not breathe vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.
Do not get in eyes, on skin, or on clothing.
Label First Aid:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 1, 2.
Disclaimer:
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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TRICHLOROETHYLENE

MSDS Number: T4940 --- *Effective Date: 03/23/98*

1. Product Identification

Synonyms: Trichloroethene; TCE; acetylene trichloride; Ethinyl trichloride
CAS No.: 79-01-6
Molecular Weight: 131.39
Chemical Formula: C2HCl3
Product Codes:
J.T. Baker: 5376, 9454, 9458, 9464, 9473, 9474
Mallinckrodt: 8598, 8600, 8633

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Trichloroethylene	79-01-6	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer

depends on level and duration of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Vapors can irritate the respiratory tract. Causes depression of the central nervous system with symptoms of visual disturbances and mental confusion, incoordination, headache, nausea, euphoria, and dizziness. Inhalation of high concentrations could cause unconsciousness, heart effects, liver effects, kidney effects, and death.

Ingestion:
Cases irritation to gastrointestinal tract. May also cause effects similar to inhalation. May cause coughing, abdominal pain, diarrhea, dizziness, pulmonary edema, unconsciousness. Kidney failure can result in severe cases. Estimated fatal dose is 3-5 ml/kg.

Skin Contact:
Cause irritation, redness and pain. Can cause blistering. Continued skin contact has a defatting action and can produce rough, dry, red skin resulting in secondary infection.

Eye Contact:
Vapors may cause severe irritation with redness and pain. Splashes may cause eye damage.

Chronic Exposure:
Chronic exposures may cause liver, kidney, central nervous system, and peripheral nervous system effects. Workers chronically exposed may exhibit central nervous system depression, intolerance to alcohol, and increased cardiac output. This material is linked to mutagenic effects in humans. This material is also a suspect carcinogen.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, cardiovascular disorders, impaired liver or kidney or respiratory function, or central or peripheral nervous system disorders may be more susceptible to the effects of the substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

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5. Fire Fighting Measures

Fire:
Autoignition temperature: 420C (788F)
Flammable limits in air % by volume:
lel: 8; uel: 12.5
Explosion:
A strong ignition source, e. g., a welding torch, can produce ignition. Sealed containers may rupture when heated.
Fire Extinguishing Media:
Use water spray to keep fire exposed containers cool. If substance does ignite, use CO2, dry chemical or foam.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

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6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Trichloroethylene:
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA), 200 ppm (Ceiling),
300 ppm/5min/2hr (Max)

-ACGIH Threshold Limit Value (TLV):
50 ppm (TWA) 100 ppm (STEL);
listed as A5, not suspected as a human carcinogen.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. This substance has poor warning properties.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Chloroform-like odor.

Solubility:
Practically insoluble in water. Readily miscible in organic solvents.
Specific Gravity:
1.47 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
87C (189F)
Melting Point:
-73C (-99F)
Vapor Density (Air=1):
4.5
Vapor Pressure (mm Hg):
57.8 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Will slowly decompose to hydrochloric acid when exposed to light and moisture.
Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong caustics and alkalis, strong oxidizers, chemically active metals, such as barium, lithium, sodium, magnesium, titanium and beryllium, liquid oxygen.
Conditions to Avoid:
Heat, flame, ignition sources, light, moisture, incompatibles

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11. Toxicological Information

Toxicological Data:
Trichloroethylene: Oral rat LD50: 5650 mg/kg; investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
This material has been linked to mutagenic effects in humans.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category

Trichloroethylene (79-01-6)	No	No	2A

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.
Environmental Toxicity:
The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be slightly toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1710
Packing Group: III
Information reported for product/size: 5GL

International (Water, I.M.O.)

Proper Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1710
Packing Group: III
Information reported for product/size: 5GL

International (Air, I.C.A.O.)

Proper Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1710
Packing Group: III
Information reported for product/size: 5GL

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Trichloroethylene (79-01-6)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Trichloroethylene (79-01-6)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Trichloroethylene (79-01-6)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Trichloroethylene (79-01-6)	100	U228	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: No information found.
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**

Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician. Note to physician: Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 3, 16.
Disclaimer:
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Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

LEAD, 1,000 ug/mL or 10,000 ug/mL

MSDS Number: L2353 --- *Effective Date: 05/15/99*

1. Product Identification

Synonyms: None
CAS No.: Not applicable to mixtures.
Molecular Weight: Not applicable to mixtures.
Chemical Formula: Not applicable. (> 95% water)
Product Codes: 5732, 5765

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Nitric Acid	7697-37-2	< 4%	Yes
Lead	7439-92-1	0.1 - 1%	Yes
Water	7732-18-5	> 95%	No

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE! LIQUID AND MIST CAUSE SEVERE BURNS TO EVERY AREA OF CONTACT. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. MAY AFFECT THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD, REPRODUCTIVE SYSTEM, AND RESPIRATORY TRACT (Lead

component). INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Life)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison. The following hazards are for concentrated solutions. Hazards of less concentrated solutions may be reduced. Degree of hazard for reduced concentrations is not currently addressed in the available literature.

Inhalation:
Corrosive. Effects should be less severe than from exposure to higher concentrations where symptoms may include irritation of the nose and throat, labored breathing, as well as lung edema, damage to the mucous membranes and upper respiratory tract.

Ingestion:
Corrosive. Effects should be less severe than from exposure to higher concentrations where symptoms may include severe burns of the mouth, throat, and stomach. May cause sore throat, vomiting, diarrhea. The symptoms of lead poisoning include abdominal pain and spasms, nausea, vomiting, headache. Acute poisoning can lead to muscle weakness, "lead line" on the gums, metallic taste, definite loss of appetite, insomnia, dizziness, high lead levels in blood and urine with shock, coma and death in extreme cases.

Skin Contact:
Corrosive. Effects should be less severe than from exposure to higher concentrations where symptoms may include redness, pain, and burns to the skin.

Eye Contact:
Corrosive. Effects should be less severe than from exposure to higher concentrations where symptoms may include blurred vision, redness, pain, and burns to eye tissue and possible permanent eye damage.

Chronic Exposure:
Lead is a cumulative poison and exposure even to small amounts can raise the body's content to toxic levels. The symptoms of chronic exposure are like those of ingestion poisoning; restlessness, irritability, visual disturbances, hypertension and gray facial color may also be noted. Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.
Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not combustible, but concentrated material is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.
Explosion:
Concentrated material reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!

J. T. Baker NEUTRASORB(R) or TEAM(R) 'Low Na+' acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL) -
Nitric Acid: 2 ppm (TWA),
Lead: 0.05 mg/m3 (TWA), 0.03 mg/m3 (Action Level).

- ACGIH Threshold Limit Value (TLV) -
Nitric Acid: 2 ppm (TWA), 4 ppm (STEL),
Lead: 0.05 mg/m3 (TWA), A3 - Animal carcinogen.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Canister-type respirators using sorbents are ineffective.

Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:
Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing lead compounds are handled, processed, or stored. See OSHA substance-specific standard for more information on personal protective equipment, engineering and work practice controls, medical surveillance, record keeping, and reporting

requirements. (29 CFR 1910.1025).

9. Physical and Chemical Properties

Appearance:
Clear, colorless solution.
Odor:
Odorless.
Solubility:
Infinitely soluble.
Specific Gravity:
ca. 1.0
pH:
No information found.
% Volatiles by volume @ 21C (70F):
99
Boiling Point:
ca. 100C (ca. 212F)
Melting Point:
ca. 0C (ca. 32F)
Vapor Density (Air=1):
Essentially the same as water.
Vapor Pressure (mm Hg):
Essentially the same as water.
Evaporation Rate (BuAc=1):
Essentially the same as water.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Toxic metal fumes may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.
Conditions to Avoid:
Incompatibles.

11. Toxicological Information

Toxicological Data:
For nitric acid: Investigated as a mutagen, reproductive effector.
Reproductive Toxicity:
Lead and other smelter emissions are human reproductive hazards. (Chemical Council on Environmental Quality; Chemical Hazards to Human Reproduction, 1981).
Carcinogenicity:
For lead and inorganic lead compounds:
EPA / IRIS classification: Group B2 - Probable human carcinogen, sufficient animal evidence.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Nitric Acid (7697-37-2)	No	No	None
Lead (7439-92-1)	No	No	2B
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (NITRIC ACID)
Hazard Class: 8
UN/NA: UN3264
Packing Group: III
Information reported for product/size: 500ML

International (Water, I.M.O.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (NITRIC ACID)
Hazard Class: 8
UN/NA: UN3264
Packing Group: III
Information reported for product/size: 500ML

International (Air, I.C.A.O.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (NITRIC ACID)
Hazard Class: 8
UN/NA: UN3264
Packing Group: III
Information reported for product/size: 500ML

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes
Lead (7439-92-1)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Nitric Acid (7697-37-2)	Yes	Yes	No	Yes
Lead (7439-92-1)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\---------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Lead (7439-92-1)	No	No	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\---------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Nitric Acid (7697-37-2)	1000	No	No
Lead (7439-92-1)	10	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No

Reactivity: No (Mixture / Liquid)

WARNING:
THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 2R
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE! LIQUID AND MIST CAUSE SEVERE BURNS TO EVERY AREA OF CONTACT. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. MAY AFFECT THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD, REPRODUCTIVE SYSTEM, AND RESPIRATORY TRACT (Lead component). INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 3, 8, 11, 15.
Disclaimer:
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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7615

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

HYDROCHLORIC ACID, 33 - 40%

MSDS Number: H3880 --- *Effective Date: 11/17/99*

1. Product Identification

Synonyms: Muriatic acid; hydrogen chloride, aqueous
CAS No.: 7647-01-0
Molecular Weight: 36.46
Chemical Formula: HCl
Product Codes:
J.T. Baker: 5367, 5537, 5575, 5800, 5814, 5839, 6900, 7831, 9529, 9530, 9534, 9535, 9536, 9537, 9538, 9539, 9540, 9544, 9548
Mallinckrodt: 2062, 2612, 2624, 2626, 5587, H611, H613, H987, H992, H999, V078, V628

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Hydrogen Chloride	7647-01-0	33 - 40%	Yes
Water	7732-18-5	60 - 67%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR

INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.
Ingestion:
Corrosive! Swallowing hydrochloric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea. Swallowing may be fatal.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and discolor skin.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Extreme heat or contact with metals can release flammable hydrogen gas.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
If involved in a fire, use water spray. Neutralize with soda ash or slaked lime.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving hydrochloric acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB(R) or TEAM(R) 'Low Na+' acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. When opening metal containers, use non-sparking

tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
5 ppm Ceiling
-ACGIH Threshold Limit Value (TLV):
5 ppm Ceiling

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Colorless, fuming liquid.
Odor:
Pungent odor of hydrogen chloride.
Solubility:
Infinite in water with slight evolution of heat.
Density:
1.18
pH:
For HCL solutions: 0.1 (1.0 N), 1.1 (0.1 N), 2.02 (0.01 N)
% Volatiles by volume @ 21C (70F):

100
Boiling Point:
53C (127F) Azeotrope (20.2%) boils at 109C (228F)
Melting Point:
-74C (-101F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
190 @ 25C (77F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A strong mineral acid, concentrated hydrochloric acid is incompatible with many substances and highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde.
Conditions to Avoid:
Heat, direct sunlight.

11. Toxicological Information

Inhalation rat LC50: 3124 ppm/1H; oral rabbit LD50: 900 mg/kg (Hydrochloric acid concentrated); investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Hydrogen Chloride (7647-01-0)	No	No	3
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater.
Environmental Toxicity:
This material is expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN/NA: UN1789
Packing Group: II
Information reported for product/size: 475LB

International (Water, I.M.O.)

Proper Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN/NA: UN1789
Packing Group: II
Information reported for product/size: 475LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Hydrogen Chloride (7647-01-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
Hydrogen Chloride (7647-01-0)	Yes	Yes	No	Yes

Water (7732-18-5)	Yes	Yes	No	Yes

\Federal, State & International Regulations - Part 1\

Ingredient	-SARA 302- RQ	TPQ	-----SARA 313----- List	Chemical Catg.
Hydrogen Chloride (7647-01-0)	5000	500*	Yes	No
Water (7732-18-5)	No	No	No	No

\Federal, State & International Regulations - Part 2\

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Hydrogen Chloride (7647-01-0)	5000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2R
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Store in a tightly closed container.
Remove and wash contaminated clothing promptly.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.

Revision Information:
No changes.
Disclaimer:
****

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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

SULFURIC ACID, 52 - 100 %

MSDS Number: S8234 --- *Effective Date: 07/13/00*

1. Product Identification

Synonyms: Oil of vitriol; Babcock acid; sulphuric acid
CAS No.: 7664-93-9
Molecular Weight: 98.08
Chemical Formula: H2SO4 in H2O
Product Codes:
J.T. Baker: 5030, 5137, 5374, 5802, 5815, 5889, 5960, 5961, 5971, 6902, 9673, 9674, 9675, 9676, 9679, 9680, 9681, 9682, 9684, 9687, 9691, 9693, 9694
Mallinckrodt: 2468, 2876, 2878, 2900, 2904, 3780, 4222, 5524, 5557, H644, H976, H996, V344, V651

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sulfuric Acid	7664-93-9	52 - 100%	Yes
Water	7732-18-5	0 - 48%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR

CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Water Reactive)
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Inhalation produces damaging effects on the mucous membranes and upper respiratory tract. Symptoms may include irritation of the nose and throat, and labored breathing. May cause lung edema, a medical emergency.
Ingestion:
Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow ingestion or skin contact. Circulatory shock is often the immediate cause of death.
Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow skin contact or ingestion. Circulatory shock is often the immediate cause of death.

Eye Contact:
Corrosive. Contact can cause blurred vision, redness, pain and severe tissue burns. Can cause blindness.
Chronic Exposure:
Long-term exposure to mist or vapors may cause damage to teeth. Chronic exposure to mists containing sulfuric acid is a cancer hazard.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult,

give oxygen. Call a physician immediately.
Ingestion:
DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Excess acid on skin can be neutralized with a 2% solution of bicarbonate of soda. Call a physician immediately.
Eye Contact:
Immediately flush eyes with gentle but large stream of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Call a physician immediately.

5. Fire Fighting Measures

Fire:
Concentrated material is a strong dehydrating agent. Reacts with organic materials and may cause ignition of finely divided materials on contact.
Explosion:
Contact with most metals causes formation of flammable and explosive hydrogen gas.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Do not use water on material. However, water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving this material. Stay away from sealed containers.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB(R) or TEAM(R) 'Low Na+' acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, always add the acid to water; never add water to the acid. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Sulfuric Acid:
-OSHA Permissible Exposure Limit (PEL):
1 mg/m3 (TWA).
-ACGIH Threshold Limit Value (TLV):
1 mg/m3 (TWA), 3 mg/m3 (STEL)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with an acid gas cartridge and dust/mist filter may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear oily liquid.
Odor:
Odorless.
Solubility:

Miscible with water, liberates much heat.
Specific Gravity:
1.84 (98%), 1.40 (50%), 1.07 (10%)
pH:
1 N solution (ca. 5% w/w) = 0.3; 0.1 N solution (ca. 0.5% w/w) = 1.2; 0.01 N solution (ca. 0.05% w/w) = 2.1.
% Volatiles by volume @ 21C (70F):
No information found.
Boiling Point:
ca. 290C (ca. 554F) (decomposes at 340C)
Melting Point:
3C (100%), -32C (93%), -38C (78%), -64C (65%).
Vapor Density (Air=1):
3.4
Vapor Pressure (mm Hg):
1 @ 145.8C (295F)
Evaporation Rate (BuAc=1):
No information found.

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Concentrated solutions react violently with water, spattering and liberating heat.
Hazardous Decomposition Products:
Toxic fumes of oxides of sulfur when heated to decomposition. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas, and with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Water, potassium chlorate, potassium perchlorate, potassium permanganate, sodium, lithium, bases, organic material, halogens, metal acetylides, oxides and hydrides, metals (yields hydrogen gas), strong oxidizing and reducing agents and many other reactive substances.
Conditions to Avoid:
Heat, moisture, incompatibles.

---

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 2140 mg/kg; inhalation rat LC50: 510 mg/m3/2H; standard Draize, eye rabbit, 250 ug (severe); investigated as a tumorigen, mutagen, reproductive effector.
Carcinogenicity:
Cancer Status: The International Agency for Research on Cancer (IARC) has classified

"strong inorganic acid mists containing sulfuric acid" as a known human carcinogen, (IARC category 1). This classification applies only to mists containing sulfuric acid and not to sulfuric acid or sulfuric acid solutions.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sulfuric Acid (7664-93-9)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released into the air, this material may be removed from the atmosphere to a moderate extent by dry deposition.
Environmental Toxicity:
LC50 Flounder 100 to 330 mg/l/48 hr aerated water/Conditions of bioassay not specified;
LC50 Shrimp 80 to 90 mg/l/48 hr aerated water /Conditions of bioassay not specified;
LC50 Prawn 42.5 ppm/48 hr salt water /Conditions of bioassay not specified.
This material may be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: SULFURIC ACID (WITH MORE THAN 51% ACID)
Hazard Class: 8
UN/NA: UN1830
Packing Group: II
Information reported for product/size: 440LB

International (Water, I.M.O.)

Proper Shipping Name: SULPHURIC ACID (WITH MORE THAN 51% ACID)
Hazard Class: 8
UN/NA: UN1830
Packing Group: II
Information reported for product/size: 440LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Sulfuric Acid (7664-93-9)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sulfuric Acid (7664-93-9)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sulfuric Acid (7664-93-9)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sulfuric Acid (7664-93-9)	1000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: Yes (Pure / Liquid)

Australian Hazchem Code: 2P
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **2** Other: **Water reactive**
Label Hazard Warning:
POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS

TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

Label Precautions:

Do not get in eyes, on skin, or on clothing.
Do not breathe mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Do not contact with water.

Label First Aid:

In all cases call a physician immediately. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before re-use. Excess acid on skin can be neutralized with a 2% bicarbonate of soda solution. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 1.

Disclaimer:

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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

NITRIC ACID ULTREX II

MSDS Number: N3661 --- *Effective Date: 05/08/00*

1. Product Identification

Synonyms: Aqua Fortis; Azotic Acid
CAS No.: 7697-37-2
Molecular Weight: 63.00
Chemical Formula: HNO3
Product Codes: 6901

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Nitric Acid	7697-37-2	65 - 71%	Yes
Water	7732-18-5	29 - 35%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Yellow (Reactive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison.

Inhalation:
Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.
Ingestion:
Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

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4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.
Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.

Explosion:

Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.

Fire Extinguishing Media:

Water spray may be used to keep fire exposed containers cool. Do not get water inside container.

Special Information:

Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB(R) or TEAM(R) 'Low Na+' acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage.

Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA), 4 ppm (STEL)
-ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4 ppm (STEL)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal. Canister-type respirators using sorbents are ineffective.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Colorless to yellowish liquid.
Odor:
Suffocating, acrid.
Solubility:
Infinitely soluble.
Specific Gravity:
1.41

pH:
1.0 (0.1M solution)
% Volatiles by volume @ 21C (70F):
100 (as water and acid)
Boiling Point:
122C (252F)
Melting Point:
-42C (-44F)
Vapor Density (Air=1):
2-3
Vapor Pressure (mm Hg):
48 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate. Will react with water or steam to produce heat and toxic and corrosive fumes.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.
Conditions to Avoid:
Light and heat.

11. Toxicological Information

Nitric acid: Inhalation rat LC50: 244 ppm (NO2)/30M; Investigated as a mutagen, reproductive effector. Oral (human) LDLo: 430 mg/kg.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NITRIC ACID (WITH MORE THAN 70% NITRIC ACID)
Hazard Class: 8, 5.1
UN/NA: UN2031
Packing Group: I
Information reported for product/size: 500ML

International (Water, I.M.O.)

Proper Shipping Name: NITRIC ACID (WITH MORE THAN 70% NITRIC ACID)
Hazard Class: 8, 5.1
UN/NA: UN2031
Packing Group: I
Information reported for product/size: 500ML

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.

Nitric Acid (7697-37-2)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

\Federal, State & International Regulations - Part 1\

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

\Federal, State & International Regulations - Part 2\

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Nitric Acid (7697-37-2)	1000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2PE
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0** Other: **Oxidizer**
Label Hazard Warning:
POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep from contact with clothing and other combustible materials.
Do not store near combustible materials.
Store in a tightly closed container.
Remove and wash contaminated clothing promptly.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not

breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 14.

Disclaimer:

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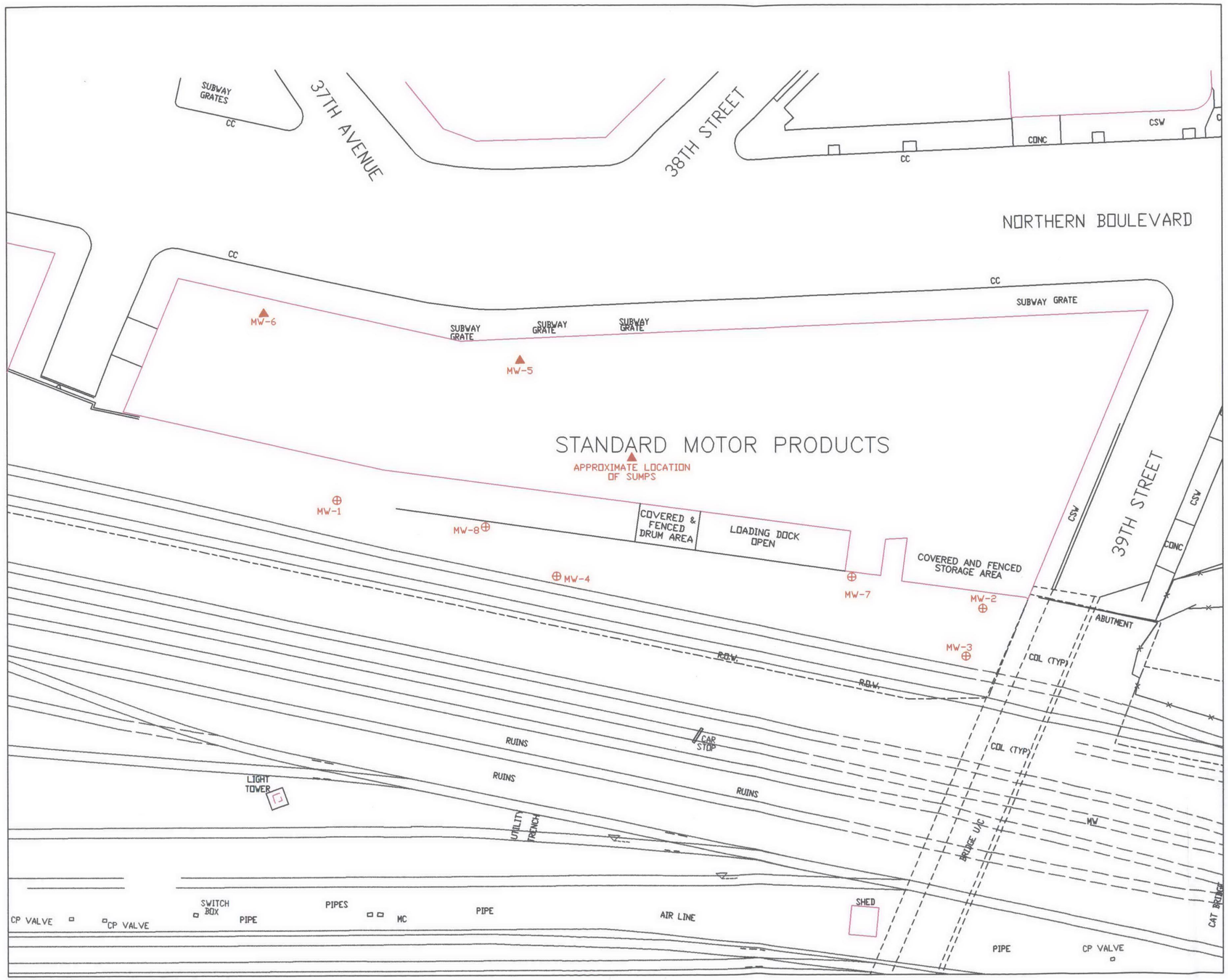
Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

APPENDIX
C

APPENDIX C
HOSPITAL MAP



LEGEND:

MW-7 ⊕ PREVIOUS MONITORING WELLS THAT CAN NOT BE LOCATED

MW-5 ▲ EXISTING WELL/SUMP

25 0 25 50

SCALE OF FEET

REV. NO.	DATE	DESCRIPTION OF REVISION	REV. BY	ENG	CHKD BY	APPVD BY
0	-/--/--	DEVELOPED DRAWING	-.-.-			

PROJECT MANAGER: M. WATT | DRAWN BY: J.R.D. | DATE: 5/11/00

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE C-1
SITE PLAN
HEALTH AND SAFETY PLAN

Prepared For:
STANDARD MOTOR PRODUCTS
LONG ISLAND CITY, NEW YORK

PROJECT NO.	FILE NO.	CHK'D: ENG. APPVD.	DRAWING NUMBER	REV. NO.
775699	B3		775699-B3	

775699-B3.dwg 05/22/00 2:03pm J.R.D.

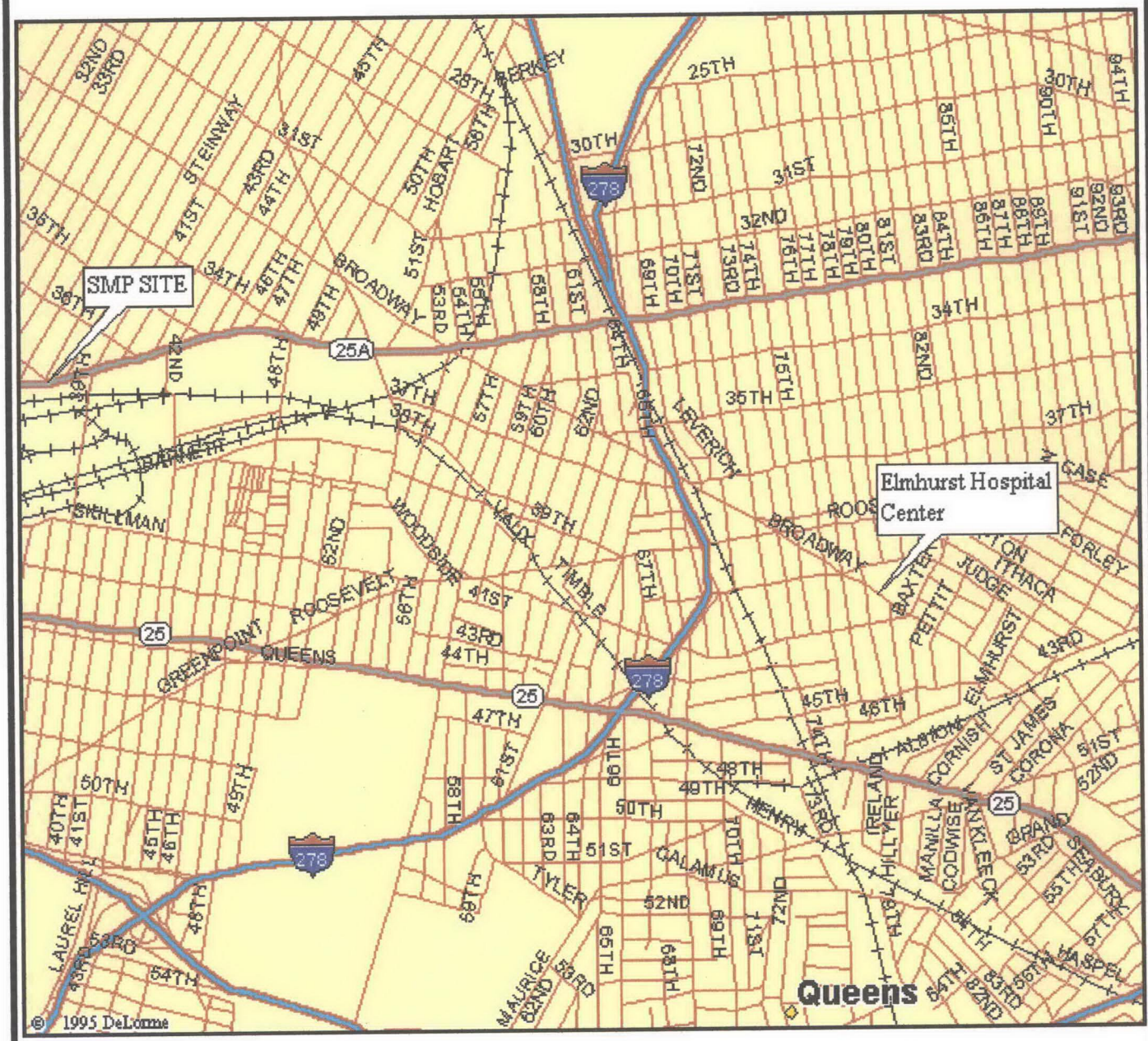


FIGURE C-2
HOSPITAL ROUTE

STANDARD MOTOR PRODUCTS, INC.
37-18 NORTHERN BOULEVARD
LONG ISLAND CITY, NEW YORK

IT CORPORATION A Member of The IT Group	Prepared by: JLF	Date: 5/12/00
	Approved by:	Scale: 1"=2,000'
	Project Mgr:	Revision No.: 0
	File name: locationfigure.xls	Project No.: 775699

APPENDIX
D

APPENDIX D
ACCIDENT PREVENTION PROGRAM: REPORTING, INVESTIGATION AND REVIEW

Approved by: WARREN HOUSEMAN Warren Houseman

PROCEDURE

Subject: ACCIDENT PREVENTION PROGRAM: REPORTING, INVESTIGATION, AND REVIEW

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to establish the requirements for incident reporting, investigation, and review. This procedure is an integral part of the company's overall accident prevention program and aids in the determination of causal factors and corrective actions necessary to prevent incident re-occurrence. Key elements of this procedure include:

- **All occupational injuries/illnesses, vehicle accidents, and near miss incidents must be promptly reported and investigated.**
- All Occupational Safety and Health Administration (OSHA) recordable injuries/illnesses and chargeable vehicle accidents must be reviewed by an Accident Review Board. The Accident Review Board report is submitted/approved up through management to the appropriate business line Vice President.
- All incidents involving a fatality, major injury/illness, or resulting in significant property damage will be immediately reported to the business line Health and Safety Manager; Vice President, Health and Safety; business line Vice President; Vice President, Legal Department; and President.
- All business lines are required to submit a Monthly Loss Report summarizing all incidents that took place during the previous reporting period.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Company - All wholly-owned subsidiaries of The IT Group, Inc.

OSHA Recordable Case - All work-related deaths and illnesses, and those work-related injuries which result in loss of consciousness, restriction of work or motion, transfer to another job, or require medical treatment beyond first aid (see Attachment 7).

Lost Workday Case - Cases which involve days away from work or days of restricted work activity or both. Days away from work are the number of workdays (consecutive or not), excluding the date of injury, the employee **would have worked**, but could not because of occupational injury or illness; and/or the number of workdays (consecutive or not), excluding the date of injury, on which, because of injury or illness:

- The employee was assigned to another job on a temporary basis, or
- The employee worked at a permanent job less than full time, or
- The employee worked at a permanently-assigned job, but could not perform all duties normally connected with it.

Near Miss Incident - Any incident where no injury occurred, but where the potential for injury existed.

Chargeable Vehicle Accident - Any **at-fault** vehicle accident meeting any **one** of the following criteria:

- An individual other than an employee of the company is a party in the accident
- Property owned by a person or entity other than the company is damaged
- When only company employees, company owned or leased (**not** rented) vehicles, and company property is involved and damage exceeds $1,000.00.

Vehicle - Any passenger vehicle, including trucks, used upon the highway or in private facilities for transporting passengers and/or property. For the purpose of this procedure, off-road vehicles such as earthmoving equipment, forklifts, non-highway use trucks, etc., are not considered vehicles.

5.0 TEXT

5.1 Incident Reporting Process

Employees are required to immediately report to their direct supervisor all occupational injuries, illnesses, accidents, and near miss incidents having the potential for injury. Any supervisor (but preferably the supervisor directly responsible for the involved employees) with first-hand knowledge of an incident is required to:

- Immediately arrange for appropriate medical attention and notify the responsible health and safety representative.
- Inform Continuum Healthcare of all incidents requiring medical attention by calling 1-800-229-3674, Extension 303, and providing the following information:
  - Employee name
  - Name of treating medical facility and phone number
  - Brief description of incident.

  Continuum Healthcare's role is to interface with the treating physician to ensure that appropriate care is provided to the injured employee.
- Complete Continuum Healthcare's *Authorization for Treatment, Release of Medical Information*, and *Return to Work* (Attachment 8) for all cases requiring medical attention. The employee or his/her supervisor is to ensure that these completed forms are faxed to Continuum Healthcare at (770) 454-1280 prior to leaving the medical facility or as soon as reasonably possible.

- Prior to an injured employee returning to his/her job duties, a follow-up call to Continuum Healthcare must be made. The purpose of this call is to ensure work restrictions are clarified and planned work activities are consistent with medical recommendations.

- The supervisor is to initiate/complete the appropriate company documentation in accordance with the following incident classifications:

  - <u>OSHA Recordable Cases</u>
    a. Supervisor's Employee Injury Report (Attachment 2)
    b. Incident Investigation Report (Attachment 5)
    c. Accident Review Board (Attachment 6)

  - <u>First Aid Cases</u>
    a. Supervisor's Employee Injury Report (Attachment 2)
    b. Incident Investigation Report (Attachment 5)

  - <u>Chargeable Vehicle Accidents</u>
    a. Vehicle Accident Report (Attachment 3)
    b. Incident Investigation Report (Attachment 5)
    c. Accident Review Board (Attachment 6)
    d. Driving Record Certification (Procedure HS800)

  - <u>Non-Chargeable Vehicle Accidents</u>
    a. Vehicle Accident Report (Attachment 3)
    b. Incident Investigation Report (Attachment 5)

  - <u>Near Miss</u>
    a. Incident Investigation Report (Attachment 5)

  - <u>Property Damage/General Liability</u>
    a. General Liability, Property Damage, and Loss Report (Attachment 4).

All forms, with the exception of the Accident Review Board and Incident Investigation Report, must be completed and forwarded to the appropriate health and safety representative within **one** business day of the incident.

All incidents involving a fatality, major injury/illness, or resulting in significant property damage are to be reported to the appropriate business line Vice President; Vice President, Health and Safety; Vice President, Legal Department; and President as soon as possible, but not later than the close of business on the day of the incident.

5.2 Supervisor's Employee Injury Report

The Supervisor's Employee Injury Report (Attachment 2) is to be completed for all incidents that result in an employee occupational injury or illness. It is to be initiated by the supervisor of the injured employee and forwarded to the project/location manager for comments. The appropriate health and safety representative must receive a copy of the report within one business day of the incident.

5.3 Vehicle Accident Report

The Vehicle Accident Report (Attachment 3) must be completed for any vehicle accident in which a company vehicle is involved. This includes company-owned or leased vehicles, rental vehicles, and personal vehicles being used for company business. This report is to be initiated by the employee involved in the accident or his/her direct supervisor, then forwarded to the appropriate health and safety representative.

5.4 General Liability, Property Damage, and Loss Report

The General Liability, Property Damage, and Loss Report is to be used for all losses or damage to company property in excess of $1,000.00. This form must be completed for all third party property, regardless of value, damaged as a result of company activities. The employee most familiar with the events that contributed to the loss or damage will complete the form, then forward it to the project/location manager. The Corporate Risk Management Department must receive a copy of the report within one business day of the incident.

5.5 Incident Investigation Report

All injuries, illnesses, accidents, and near miss incidents will be investigated. Once arrangements for immediate medical care have been made, the employee's direct supervisor, with assistance from the health and safety representative and/or business line Health and Safety Manager, will:

- Reconstruct the conditions which led to the incident (collect the facts)
- Describe and document (include sketch, photos, etc.) how the incident occurred
- List witnesses and collect written statements when possible
- Identify and discuss the causative factors
- Identify the unsafe act or unsafe condition that contributed to the incident
- Identify possible systematic/management deficiencies
- List the corrective actions which are to be taken to prevent re-occurrence of the incident, the person responsible for the corrective action, and the date by which action is to be completed.

The investigation will be started as soon as possible after the incident and a written report (Attachment 5) submitted to the appropriate health and safety representative within 72 hours. In addition to the previous information, reports from external sources (police, insurance carriers, testing laboratories, etc.) are to be obtained as soon as they become available and forwarded to the recipients of the investigation report.

5.6 Accident Review Board

Each manager whose project/location experiences an OSHA recordable or a chargeable vehicle accident is required to convene an Accident Review Board within **10 days** of the accident. The purpose of the Accident Review Board is to review the information gathered for each incident and take appropriate action to prevent its recurrence. The Accident Review Board shall be composed of the project/location manager, the employee's direct supervisor, a health and safety representative, and the employee(s) involved in the incident. When appropriate, a representative of other internal sources of expertise should be involved.

It is generally not acceptable to discipline an employee for having an accident. However, if the Accident Review Board determines that the accident resulted from an unsafe act or violation of company procedure on the employee's part, the employee should be subject to disciplinary action in accordance with the company's progressive disciplinary action system (see Human Resources Procedure HR207).

5.7 Insurance Notification

The business line Health and Safety Manager or his/her designee is to report all employee injuries/illnesses requiring outside medical treatment to Constitution State Service Company (CSSC), a subsidiary of Travelers Insurance, within 24 hours of injury/illness occurrence. This may be accomplished by calling CSSC at 1-800-243-2490.

Some states (i.e., Ohio, Nevada, Washington, and West Virginia) have specific reporting requirements that differ from those previously discussed. Assistance for the reporting of incidents that occur in these states can be obtained through the Corporate Risk Management Department office at (412)-380-4097.

All vehicle accidents involving third party individuals or property, with the exception of company-rented Hertz automobiles, will be reported to CSSC by calling 1-800-243-2490 within 24 hours of the accident.

5.8 Monthly Loss Report

Each business line Health and Safety Manager is responsible to submit a Monthly Loss Report summarizing incidents that took place within their business line during the previous month. The business line Health and Safety Manager is responsible for submitting a consolidated package for the entire business line to the corporate health and safety office for **receipt no later than the 5th working day of the following month.**

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HR207 Disciplinary Action
HS013 Health and Safety Procedure Variances
HS800 Motor Vehicle Operations - General Requirements
HS810 Commercial Motor Vehicles

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Supervisor's Employee Injury Report
3. Vehicle Accident Report
4. General Liability, Property Damage, and Loss Report
5. Incident Investigation Report
6. Accident Review Board Report
7. Injury/Illness Classification Guidelines
8. Continuum Healthcare Forms

ATTACHMENT 1

ACCIDENT PREVENTION PROGRAM: REPORTING, INVESTIGATION, AND REVIEW RESPONSIBILITY MATRIX

Action	Procedure Section	*Responsible Party*					
		Employee	Supervisor	Project/ Location Manager	Health and Safety Representative	Business Line Health and Safety Manager	Vice President, Health and Safety
Issue, Revise, and Maintain Procedure	3.1						X
Report All Incidents to Supervisor	5.1	X					
Notify Health and Safety Representative	5.1		X				
Arrange Medical Care	5.1		X		X		
Notify Continuum Healthcare of Incident	5.1		X		X		
Complete Continuum Healthcare Forms	5.1	X	X				
Initiate/Complete Company Forms	5.1		X				
Contact Continuum Healthcare Prior to Employee Returning to Job Duties	5.1		X		X		
Complete Investigation of Incident	5.5		X	X	X		
Conduct Accident Review Board	5.6		X	X	X		
Report Injury/Accident to CSSC	5.7				X	X	
Complete Monthly Loss Report	5.8					X	

ATTACHMENT 2

SUPERVISOR'S EMPLOYEE INJURY REPORT

This report is to be initiated by the employee's supervisor. Please answer all questions completely. This report must be forwarded to the appropriate health and safety representative within 24 hours of the injury/illness.

EMPLOYEE

Injured's Name _____ Sex ____ S.S. No. _____ Birth Date _____

Home Address _____

City _____ State _____ Zip _____ Phone (____) _____

Job Title _____ Hire Date _____ Hourly Wage _____

SUPERVISOR

Date of Incident _____ Time _____ Time Reported _____ To Whom? _____

Project/Location Name _____ Address _____

Project No. _____ Time Shift Began _____ Did the Employee Leave Work? ☐ No ☐ Yes When _____

Has employee returned to work? ☐ No ☐ Yes When _____ Did employee miss a regularly scheduled shift? ☐ No ☐ Yes

Doctor/Hospital Name _____ Address _____

Witness Name(s) _____ Statement Attached? ☐ No ☐ Yes

Nature of Injury _____ Exact Body Part _____

Medical Attention: ☐ None ☐ First Aid On Site ☐ Doctor's Office ☐ Hospital ER ☐ Hospitalized

Job Assignment at Time of Incident _____

Describe Incident _____

What Unsafe Condition and/or Act Contributed to the Incident? _____

What Corrective Action Has Been Taken to Prevent Recurrence? _____

Supervisor _____ (Print) _____ Signature _____ Date

MANAGER

Comments on Incident and Corrective Action _____

Project/Location Mgr. _____ (Print) _____ Signature _____ Date

HEALTH AND SAFETY

Concur With Action Taken? ☐ No ☐ Yes Remarks _____

OSHA Classification:

☐ First Aid ☐ Recordable, No Lost/Restricted Workdays ☐ Recordable, Lost Workdays ☐ Recordable, Restricted Activity ☐ Fatality

Days Away From Work _____ Days Restricted Work _____

All injuries/illnesses requiring outside medical treatment must be reported to CSSC by calling 1-800-243-2490 within 24 hours of the incident. Contact Corporate Risk Management at (412) 380-4097 for cases occurring in Ohio, Nevada, Washington, or West Virginia.

Workers' Compensation Claim Number (if applicable) _____

Health and Safety Representative:

_____ (Print) _____ Signature _____ Date

ATTACHMENT 3

VEHICLE ACCIDENT REPORT

This report is to be initiated by the employee involved in the accident or his/her direct supervisor. Please answer all questions completely. This report must be forwarded to the appropriate health and safety representative within 24 hours of the accident.

ACCIDENT DESCRIPTION

ACCIDENT DATE _____ TIME _____ A.M. or P.M.
LOCATION OF ACCIDENT (CITY, STATE) _____
DESCRIPTION OF ACCIDENT _____
_____
_____
WITNESS _____ PHONE NO. (___) _____
ADDRESS _____ CITY _____ STATE _____ ZIP _____
POLICE OFFICER'S NAME _____ DEPARTMENT _____

CL NY VEHICLE

DRIVER _____ DRIVERS LICENSE _____ STATE _____
ADDRESS _____ CITY _____ STATE _____ ZIP _____
WORK PHONE NO. (___) _____ S.S. NO. _____ PROJECT NAME/NO. _____
VEHICLE NO. _____ YEAR _____ MAKE _____ MODEL _____ LICENSE PLATE NO. _____
STATE _____ VEHICLE OWNER: ☐ COMPANY ☐ LEASED/RENTED ☐ PRIVATE VEHICLE
VEHICLE TYPE: ☐ COMMERCIAL MOTOR VEHICLE ☐ NON-COMMERCIAL
IF NOT COMPANY-OWNED: OWNER _____ PHONE NO. (___) _____
ADDRESS _____ CITY _____ STATE _____ ZIP _____
VEHICLE DAMAGE _____
NO. OF VEHICLES TOWED FROM SCENE _____ NUMBER OF INJURIES _____ NUMBER OF FATALITIES _____
WERE HAZARDOUS MATERIALS RELEASED? ☐ YES ☐ NO IF YES, DESCRIBE MATERIALS _____
_____
_____

OTHER VEHICLE

DRIVER _____ DRIVERS LICENSE _____ STATE _____
ADDRESS _____ CITY _____ STATE _____ ZIP _____
PHONE NO. (___) _____ S.S. NO. _____
OWNERS NAME (CHECK IF SAME AS DRIVER ☐) _____
ADDRESS _____ CITY _____ STATE _____ ZIP _____
INSURANCE COMPANY _____ POLICY NO. _____
AGENT'S NAME _____ PHONE NO. (___) _____
ADDRESS _____ CITY _____ STATE _____ ZIP _____
VEHICLE: YEAR _____ MAKE _____ MODEL _____ PLATE NO. _____ STATE _____
VEHICLE I.D. NO. _____
VEHICLE DAMAGE _____
PASSENGERS: ☐ YES ☐ NO INJURIES: ☐ YES (List names and telephone numbers below) ☐ NO
_____
_____
_____

VEHICLE ACCIDENT REPORT (continued)

WEATHER: ☐ Clear ☐ Cloudy ☐ Fog ☐ Rain ☐ Sleet ☐ Snow Other _____

PAVEMENT: ☐ Asphalt ☐ Steel ☐ Concrete ☐ Wood ☐ Gravel/Dirt ☐ Brick/Stone Other _____

CONDITION: ☐ Dry ☐ Wet ☐ Icy ☐ Pot Holes Other _____

TRAFFIC CONTROL: ☐ Traffic Light ☐ Stop Sign ☐ Railroad ☐ No Intersection ☐ No Control

ROADWAY: Number of Lanes Each Direction: _____ ☐ Residential ☐ Divided Highway ☐ Undivided Highway

Draw and name roadways showing each vehicle, direction of travel, and point of impact. Indicate travel before the accident with a solid line and post-accident movement with a broken line.

SYMBOLS:

Your Vehicle ①

Other Vehicle(s) ② ③

Pedestrian ♀

Stop Sign ⌂

Yield ▽

Railroad ‡

ADDITIONAL INFORMATION: _____

All vehicle accidents involving third party individuals or property, with the exception of accidents involving only company-rented Hertz automobiles, must be reported to CSSC by calling 1-800-243-2490 within 24 hours of the accident.

WAS VEHICLE ACCIDENT REPORTED TO CSSC? ☐ YES ☐ NO CLAIM NUMBER _____

EMPLOYEE	_____ (Print)	_____ (Signature)	_____ (Date)
SUPERVISOR	_____ (Print)	_____ (Signature)	_____ (Date)
HEALTH & SAFETY REP.	_____ (Print)	_____ (Signature)	_____ (Date)

REPORT MUST BE CALLED IN OR FAXED TO:
CORPORATE HEALTH AND SAFETY (PHONE: 412-372-7701, FAX: 412-858-3976)
AND CORPORATE RISK MANAGEMENT (PHONE: 412-380-4097, FAX: 412-380-6218)
WITHIN 24 HOURS, OR NOT LATER THAN NEXT BUSINESS DAY

ATTACHMENT 4

GENERAL LIABILITY, PROPERTY DAMAGE, AND LOSS REPORT

This report is to be completed for all losses or damage to company property in excess of $1,000.00 and all third party damage, regardless of value, resulting from company activities.

PROJECT/LOCATION _____ PROJECT NO. _____ DATE _____

ADDRESS _____

HOW DID DAMAGE OR LOSS OCCUR: _____

_____

_____

DESCRIPTION AND VALUE ($) OF DAMAGED/LOST/STOLEN PROPERTY: _____

_____

LOCATION OF DAMAGED/LOST/STOLEN PROPERTY (Before Loss): _____

_____

DATE AND TIME OF DAMAGE, LOSS, OR THEFT: Date: _____ Time: _____ a.m./p.m.

OWNER OF DAMAGED/LOST/STOLEN PROPERTY:

Name _____ Phone No. ( ) _____

Address _____ City _____

Employer and Address _____

INJURED PARTIES (Also complete a Supervisor's Employee Injury Report if a Company Employee):

Name _____ Phone No. ( ) _____

Address _____ City _____

Employer and Address _____

Description of Injury _____

WITNESSES:

1. Name _____ Phone No. ( ) _____
   Address _____ City _____
   Employer and Address _____
2. Name _____ Phone No. ( ) _____
   Address _____ City _____
   Employer and Address _____

WERE PICTURES TAKEN? ☐ YES ☐ NO

WERE POLICE NOTIFIED? ☐ YES ☐ NO DEPT. _____ REPORT NO. _____

COMPLETED BY:

_____ _____ _____

(Print Name) (Signature) (Date)

PROJECT/LOCATION MANAGER:

_____ _____ _____

(Print Name) (Signature) (Date)

REPORT MUST BE CALLED IN OR FAXED TO:
CORPORATE RISK MANAGEMENT (PHONE: 412-380-4097, FAX: 412-380-6218)
WITHIN 24 HOURS, OR NOT LATER THAN NEXT BUSINESS DAY

ATTACHMENT 5

INCIDENT INVESTIGATION REPORT

*** MUST BE COMPLETED WITHIN 72 HOURS ***

Investigation Date _____ Date of Incident _____

Employee Name _____

Supervisor Name _____

Project Number/Name _____ / _____

Location of Incident _____

- Incident Classification

  Injury ☐ First Aid ☐ OSHA Recordable ☐ Lost Workday ☐ Restricted Workday

  Vehicle ☐ Chargeable ☐ Non-chargeable

  DOT ☐ DOT Vehicle ☐ DOT Reportable

  Near Miss ☐

  General Liability ☐

- Description (Provide facts, describe how incident occurred, provide diagram [on back] or photos)

_____

_____

- Analysis 1 (What unsafe acts or conditions contributed to the incident?)

_____

_____

- Analysis 2 (What systematic or management deficiencies contributed to incident?)

_____

_____

- Corrective Action(s) (List corrective action items, responsible person, scheduled completion date)

_____

_____

- Witnesses (Attach statements or indicate why unavailable)

_____

_____

Investigated By _____ (Print Name) _____ (Signature) _____ (Date)

Project/Location Mgr. _____ (Print Name) _____ (Signature) _____ (Date)

(Attach Additional Pages if Needed)

ATTACHMENT 6

ACCIDENT REVIEW BOARD

DATE:	LOCATION:
BOARD MEMBERS:	
ACCIDENT DATE:	EMPLOYEE(S) INVOLVED IN INCIDENT:
INVESTIGATION COMPLETE: YES ☐ NO ☐	ACCIDENT CLASSIFICATION:

THE FOLLOWING INFORMATION MUST BE PROVIDED BY THE REVIEW BOARD FOR THIS INCIDENT (PRINT):

SUPERVISOR: _____ **PROJECT/LOCATION MGR.:** _____

CAUSE OF ACCIDENT:

ACTION BY BOARD*:

* ALL ACTIONS BY THE ACCIDENT REVIEW BOARD ARE SUBJECT TO FINAL REVIEW BY THE HUMAN RESOURCES AND LEGAL DEPARTMENTS.

ACCEPTED:

_____ EMPLOYEE SIGNATURE

_____ SUPERVISOR SIGNATURE

APPROVED: _____ PROJECT/LOCATION MANAGER

REJECTED FOR: _____

APPROVED: _____ BUSINESS LINE HEALTH AND SAFETY MANAGER OR DESIGNEE

REJECTED FOR: _____

APPROVED: _____ BUSINESS LINE VICE PRESIDENT

REJECTED FOR: _____

ATTACHMENT 7

INJURY/ILLNESS CLASSIFICATION GUIDELINES

Medical Treatment - The following are generally considered medical treatment. Work-related injuries for which this type of treatment was provided or should have been provided are almost always recordable.

- Treatment of **INFECTION**
- Application of **ANTISEPTICS during second or subsequent visit** to medical facility
- Treatment of **SECOND OR THIRD DEGREE BURN(S)**
- Application of **SUTURES** (stitches)
- Application of **BUTTERFLY ADHESIVE DRESSING(S) or STERI STRIP(S)** in lieu of sutures
- Removal of **FOREIGN BODIES EMBEDDED IN EYE**
- Removal of **FOREIGN BODIES FROM WOUND**; if procedure is **COMPLICATED** because of depth of embedment, size, or location
- Use of **PRESCRIPTION MEDICATIONS** (except a single dose administered on first visit for minor injury or discomfort)
- Use of hot or cold **SOAKING THERAPY during second or subsequent visit** to medical facility
- Application of hot or cold **COMPRESS(ES) during second or subsequent visit** to medical facility
- **CUTTING AWAY DEAD SKIN** (surgical debridement)
- Use of **WHIRLPOOL BATH THERAPY during second or subsequent visit** to medical facility
- **POSITIVE X-RAY DIAGNOSIS** (fractures, broken bones, etc.)
- **ADMISSION TO A HOSPITAL** or equivalent medical facility **FOR TREATMENT**

First Aid Treatment - The following are generally considered first aid treatment (i.e., one-time treatment and subsequent observation of minor injuries) and should not be recorded if the work-related injury does not involve loss of consciousness, restriction of work or motion, or transfer to another job:

- Application of **ANTISEPTICS during first visit** to medical facility
- Treatment of **FIRST DEGREE BURN(S)**
- Application of **BANDAGE(S)** during any visit to medical facility
- Use of **ELASTIC BANDAGE(S) during first visit** to medical facility
- Removal of **FOREIGN BODIES NOT EMBEDDED IN EYE** if only irrigation is required
- Removal of **FOREIGN BODIES FROM WOUND**; if procedure is **UNCOMPLICATED**, and is, for example, removed by tweezers or other simple technique.

- Use of **NON-PRESCRIPTION MEDICATIONS AND** administration of **single doses of PRESCRIPTION MEDICATION** on first visit for minor injury or discomfort
- **SOAKING THERAPY on initial visit** to medical facility or removal of bandages by **SOAKING**
- Application of hot or cold **COMPRESS(ES) during first visit** to medical facility
- Application of **OINTMENTS** to abrasions to prevent drying or cracking
- Use of **WHIRLPOOL BATH THERAPY during first visit** to medical facility
- **NEGATIVE X-RAY DIAGNOSIS**
- **OBSERVATION** of injury during visit to medical facility

The following procedure, by itself, is not considered medical treatment:

- Administration of TETANUS SHOT(S) or BOOSTER(S). However, these shots are often given in conjunction with more serious injuries; consequently, injury requiring these shots may be recordable for other reasons.

Loss of Consciousness - If an employee loses consciousness as the result of a work-related injury/ illness, the case must be recorded no matter what type of treatment was provided. The rationale behind this recording requirement is that loss of consciousness is generally associated with the more serious injuries.

Restriction of Work or Motion - Restricted work activity occurs when the employee, because of the impact of a job-related injury, is physically or mentally unable to perform all or any part of his or her normal assignment during all or any part of the workday or shift. The emphasis is on the employee's ability to perform normal job duties. Restriction of work or motion may result in either a lost worktime injury or a non-lost worktime injury, depending upon whether the restriction extended beyond the day of injury.

Transfer to Another Job - Injuries requiring transfer of the employee to another job are also considered serious enough to be recordable regardless of the type of treatment provided. Transfers are seldom the sole criterion for recordability because injury cases are almost always recordable on other grounds, primarily medical treatment or restriction of work or motion.

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CASE*Trac* CASE MANAGEMENT SERVICES AUTHORIZATION FOR TREATMENT OF OCCUPATIONAL INJURY/ILLNESS

Continuum Healthcare

Employee Name: _____

Social Security #: _____ Injury: ☐ Illness: ☐

Job Title: _____ Incident Date: _____

Project/Location _____ Location of Accident/Exposure:

Telephone #: _____ _____

H&S Representative: _____

Body Part(s) Injured: _____

Describe in detail how incident occurred: _____

TO TREATING PHYSICIAN:

In the case of occupational injury/illness, please examine the employee and render necessary conservative treatment directly related to the occupational injury/illness.

Light Duty Work:
It is the policy of our company to provide work assignments, whenever possible, for employees with physical activity restrictions resulting from an occupational injury/illness. If the employee will be subject to a restriction, please contact **CASE*Trac*** Case Management before releasing the employee, so that a light duty assignment may be arranged.

Medically Unfit to Return to Work:
It is the policy of our company to assist employees unable to return to work, due to an injury/illness, in obtaining needed medical care and other available benefits. Medical findings are also used to help evaluate unsafe conditions that may have led to the incident. Please help us assist our employees by contacting **CASE*Trac*** Case Management with your findings as soon as possible, preferably before the employee leaves your office, but not later than the close of business on the day of initial treatment.

CASE*Trac* Case Management: Telephone: 1-800-229-3674, Ext. 303 Fax: 1-770-209-8963

Please Send Reports To: **CASE*Trac*** Case Management Services
3850 Holcomb Bridge Road, Suite 300
Norcross, Georgia 30092

Please Send Bills To: Workers' Compensation Claims Administrator
Constitution State Service Company (Travelers)

DOCTOR, Please provide:

Medical Diagnosis: _____

Treatment Provided: _____

_____

Recommended Work Limitation/Restriction: _____

Return Visit Needed: No ☐ Yes ☐ if yes, date _____ First Aid Only ☐

Physician Name: _____ Physician Telephone: _____

Physician Signature: _____ Date: _____

YOU MUST CALL CASE*Trac* CASE MANAGEMENT FOR ALL OCCUPATIONAL INJURIES/ILLNESSES REQUIRING OUTSIDE MEDICAL TREATMENT: 1-800-229-3674, EXTENSION 303. FAX COMPLETED FORM TO CASE*Trac* (770) 209-3963.

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CASE*Trac* CASE MANAGEMENT SERVICES AUTHORIZATION FOR RELEASE OF MEDICAL INFORMATION

Continuum Healthcare

I, _____, grant authorization to _____
(Print Full Name) *(Treating Physician's Name)*
for the release of any information concerning my occupational injury/illness to:

CASE*Trac* CASE MANAGEMENT SERVICES
3850 Holcomb Bridge Road, Suite 300
Norcross, Georgia 30092
Phone: (800) 229-3674, Extension 303
Fax: (770) 209-8963

for the purpose of disability follow-up and return to work authorization.

Please provide the following information:

EMPLOYEE INFORMATION:

Full Name: _____
Date of Birth: _____
Social Security #: _____
Home Address: _____
_____
Home Phone: _____
Work Phone: _____

MEDICAL INFORMATION:

Treating Physician's Name: _____
Physician's Address: _____
_____
Phone Number: _____
Fax Number: _____

Employee Signature: _____ Date: ___/ / __

ATTACHMENT 8

CONTINUUM HEALTHCARE FORMS

CASE*Trac* CASE MANAGEMENT SERVICES RETURN-TO-WORK EXAMINATION FORM

Continuum Healthcare

Exam Date: _____/_____/_____ **Employee Name:** _____

Birth Date: _____/_____/_____ **Social Security #:** _____ - _____ - _____

Job Title: _____ **Sex:** ❑ Male ❑ Female

Examining Provider: **Please complete this form and fax to CASE*Trac* CASE MANAGEMENT SERVICES at (770) 454-1280. Please contact CASE*Trac* CASE MANAGEMENT SERVICES at (800) 229-3674 to report status of employee post-treatment.**

DIAGNOSIS: _____

TREATMENT PLAN: _____

MEDICATIONS: _____

PHYSICAL THERAPY: _____

OTHER: _____

❑ May return to full duty work effective ___/___/___

❑ May return to limited duty from ___/___/___ to ___/___/___

❑ Unable to return to work from ___/___/___ to ___/___/___

WORK LIMITATIONS:

❑ Restricted lifting/pushing/pulling: maximum weight in lbs: _____ (company limits all lifting < = 60 lbs).

❑ Work only with right/left hand.

❑ Restricted repetitive motion right/left hand.

❑ Sitting job only.

❑ Restricted operation of moving equipment.

❑ Other: _____

FOLLOW-UP PLAN:

❑ Release from care.

❑ Schedule for follow-up appointment on ___/___/___.
Time _____ AM/PM

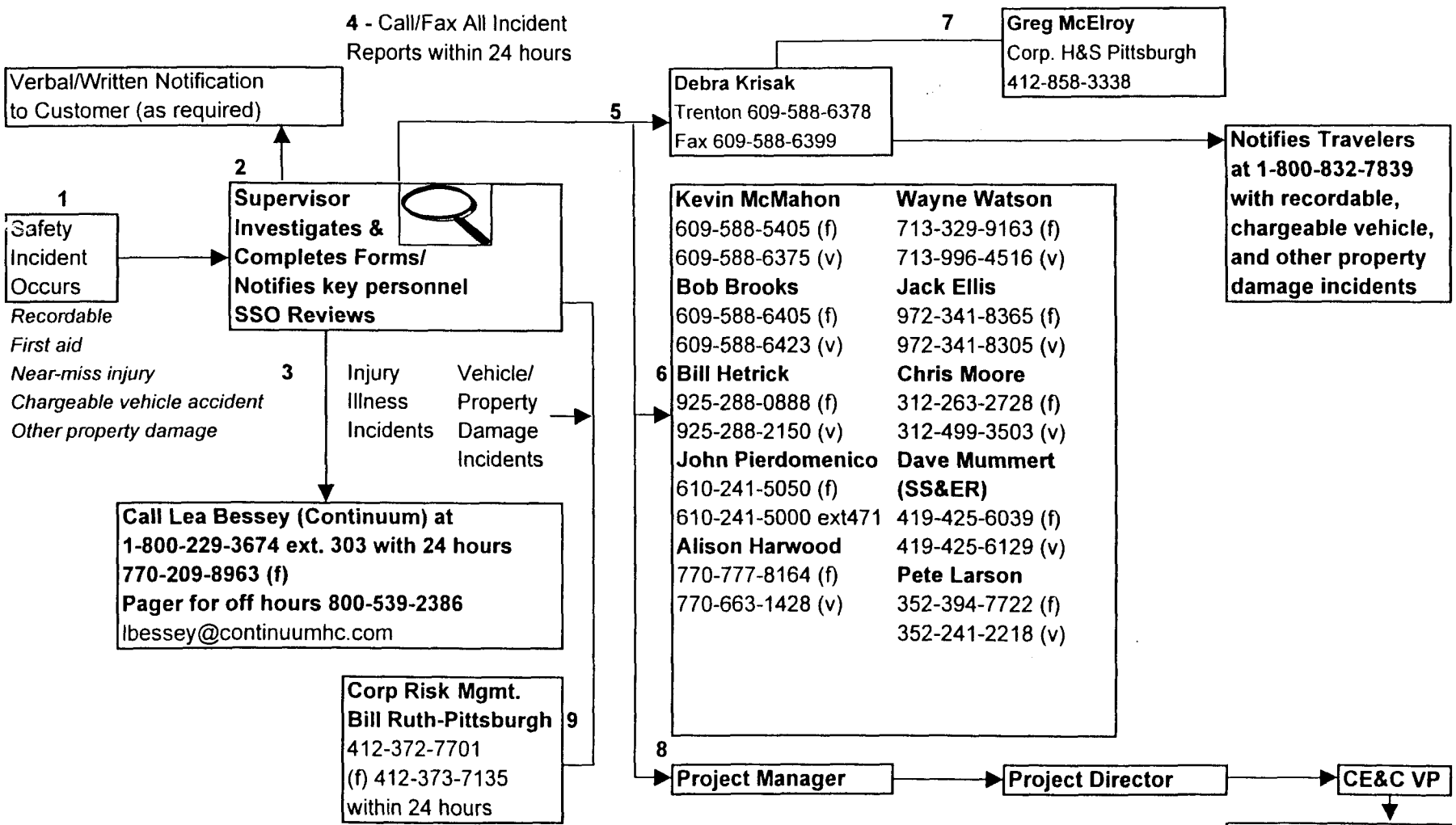
❑ Referral to _____
Appointment date ___/___/___ Time _____ AM/PM

Comments: _____

_____

Examiner's Name (*print*) Examiner's Signature Date

Incident Reporting Flow Chart
COMMERCIAL ENGINEERING & CONSTRUCTION PROJECTS



(1) See definitions in attached procedure.
(2) See attached procedure for required forms for type of incident.
(3) Must send Case Trac Forms with injured to clinic (including first aid treatment).
(4) Accept Accident Review Board report due within 10 days.
(5) Debra Krisak has primary responsibility for notifying Travelers.
(6) Send all incident reports to Kevin McMahon and area H&S managers for local projects. See attached chart for specific coverage territories.
(7) Debra Krisak will send reports to Greg McElroy in Pittsburgh.
(8) Notify Project Manager and Project Director immediately. Send incident report and accident review board form for signatures.
(9) Notify Corporate Risk Management within 24 hours for all vehicle/property damage incidents.

APPENDIX

E

APPENDIX E
PROJECT SAFETY INSPECTION REPORT

ATTACHMENT 2

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

BUSINESS LINE: _____ PROJECT NAME/NUMBER: _____
PROGRAM MANAGER: _____ PROJECT MANAGER: _____
GENERAL PROJECT DESCRIPTION: _____
SITE ACTIVITIES AT TIME OF INSPECTION: _____

_____

INTERVIEWED EMPLOYEE: _____
SAFETY ISSUE: _____
CORRECTIVE ACTION: _____

_____

ASSIGNED TO: _____ FOLLOW-UP DATE: _____
CORRECTION VERIFIED BY: _____ DATE: _____

INTERVIEWED EMPLOYEE: _____
SAFETY ISSUE: _____
CORRECTIVE ACTION: _____

_____

ASSIGNED TO: _____ FOLLOW-UP DATE: _____
CORRECTION VERIFIED BY: _____ DATE: _____

INSPECTION COMPLETED BY: _____ DATE: _____

HEALTH AND SAFETY REVIEW BY: _____ DATE: _____

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

	YES	NO	N/A
FIRST AID			
1. Are first aid kit locations identified and accessible?			
2. Are emergency eye wash/safety showers available and inspected monthly?			
3. Are first aid kits inspected weekly?			
4. Is a qualified first aid/CPR provider on site?			
PERSONAL PROTECTIVE EQUIPMENT			
1. Have levels of personnel protection been established?			
2. Are respirators decontaminated, inspected, and stored according to standard procedures?			
3. Have employees been fit-tested?			
4. Is defective personal protective equipment tagged and taken out of service?			
5. Does compressed breathing air meet CGA Grade "D" minimum?			
6. Are there sufficient sizes and quantities of protective equipment?			
7. At a minimum, are employees utilizing safety glasses, hard hats, and steel toe boots?			
FIRE PREVENTION			
1. Are employees smoking only in designated outdoor areas?			
2. Are fire lanes established and maintained?			
3. Are flammable liquid dispensing systems bonded?			
4. Are approved safety cans available for storage of flammable liquids?			
5. Has the local fire department been contacted?			
6. Are fire extinguishers available and inspected monthly?			
7. Are flammables and combustibles properly stored?			
8. Are flammable storage cabinets available and used when needed?			
AIR MONITORING			
1. Is required air monitoring being conducted?			
2. Are air monitoring instruments calibrated daily?			
3. Are air monitoring logs up to date?			
4. Are instrument user manuals available?			
5. Are instruments being maintained?			
6. Are employees notified of personal sampling results within 5 days of receipt?			
WELDING AND CUTTING			
1. Are fire extinguishers present at welding and cutting operations?			
2. Are confined spaces evaluated prior to and during cutting and welding operations?			
3. Have Hot Work Permits been completed?			
4. Are proper helmets, goggles, aprons, and gloves available for welding and cutting operations?			
5. Are welding machines properly grounded?			
6. Are oxygen and fuel gas cylinders stored a minimum of 20 feet apart?			
7. Are only trained personnel permitted to operate welding and cutting equipment?			
8. Are gas cylinders transported in a secured vertical position with caps in place?			

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

	YES	NO	N/A
HAND AND POWER TOOLS			
1. Are defective hand and power tools tagged and taken out of service?			
2. Is eye protection available and used when operating power tools?			
3. Are guards and safety devices in place on power tools?			
4. Are power tools inspected before each use?			
5. Are nonsparking tools available when necessary?			
6. Is the correct tool being used for the job?			
MOTOR VEHICLES			
1. Are vehicles regularly inspected?			
2. Are personnel licensed for the vehicles they operate?			
3. Are unsafe vehicles tagged and reported to supervision?			
4. Is vehicle's safety equipment operating properly?			
5. Are loads secure?			
6. Are vehicle occupants using safety belts?			
7. Are current insurance cards and blank accident report forms located in vehicles?			
EMERGENCY PLANS			
1. Are emergency telephone numbers posted?			
2. Have emergency escape routes been designated?			
3. Are employees familiar with the emergency signal?			
4. Has the emergency route to the hospital been established and posted?			
5. Is a vehicle on site that can transport injured employees to the hospital?			
MATERIALS HANDLING			
1. Are materials stacked and stored to prevent sliding or collapsing?			
2. Are tripping hazards identified?			
3. Are semi-trailers chocked?			
4. Are fixed jacks used under semi-trailers?			
5. Are riders prohibited on materials handling equipment?			
6. Are approved manlifts provided for the lifting of personnel?			
7. Are personnel in manlifts wearing approved fall protection devices?			
FIRE PROTECTION			
1. Has a fire alarm system been established?			
2. Do employees know the location and use of all fire extinguishers?			
3. Are fire extinguisher locations posted?			
4. Are combustible materials segregated from open flames?			
5. Have fire extinguishers been professionally inspected during the last year?			
6. Are fire extinguishers visually inspected monthly?			
ELECTRICAL			
1. Is electrical equipment and wiring properly guarded and maintained in good condition?			
2. Are extension cords kept out of wet areas?			
3. Is damaged electrical equipment tagged and taken out of service?			
4. Have underground electrical lines been identified by proper authorities?			
5. Has a lockout/tagout system been established?			
6. Are GFCIs being used on all temporary electrical systems and as needed?			

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

	YES	NO	N/A
ELECTRICAL (continued)			
7. Are extension cords being inspected daily (i.e., group pin in place, no unapproved splices)?			
8. Are warning signs exhibited on high voltage equipment (250V or greater)?			
9. Is adequate distance maintained from overhead electrical lines?			
10. Are switches, circuit breakers, and switchboards installed in wet locations enclosed in weatherproof enclosures?			
CRANES AND RIGGING			
1. Are cranes inspected daily prior to use?			
2. Are crane swing areas barricaded or demarked?			
3. Is all rigging equipment tagged with an identification number and rated capacity?			
4. Is rigging equipment inspection documented?			
5. Are slings, chains, and rigging inspected before each use?			
6. Are damaged slings, chains, and rigging tagged and taken out of service?			
7. Are slings padded or protected from sharp corners?			
8. Do employees keep clear of suspended loads?			
9. Are rated load capacities and special hazard warnings posted on crane?			
10. Are the records of annual crane inspection available?			
11. Has accessible areas within the swing radius of the rear of the crane been barricaded?			
12. Do crane operators have required training/certification?			
COMPRESSED GAS CYLINDERS			
1. Are breathing air cylinders charged only to prescribed pressures?			
2. Are like cylinders segregated and stored in well ventilated areas?			
3. Is smoking prohibited in cylinder storage areas?			
4. Are cylinders stored secure and upright?			
5. Are cylinders protected from snow, rain, etc.?			
6. Are cylinder caps in place before cylinders are moved?			
7. Are fuel gas and oxygen cylinders stored a minimum of 20 feet apart?			
8. Are propane cylinders stored and used only outside of buildings?			
SCAFFOLDING			
1. Is scaffolding placed on a flat, firm surface?			
2. Are scaffold planks free of mud, ice, grease, etc.?			
3. Is scaffolding inspected before each use?			
4. Are defective scaffold parts taken out of service?			
5. Have employees completed scaffold user training?			
6. On scaffolds where platforms are overlapped, is planking overlapped a minimum of 12 inches?			
7. Does scaffold planking extend over end supports between 6 to 18 inches (dependent upon platform length)?			
8. Are employees restricted from working on scaffolds during storms and high winds?			
9. Are all pins in place and wheels locked?			
10. Is required perimeter guarding (top rail, mid rail, and toe board) present?			
11. Has a competent person been designated to oversee scaffold construction?			
12. Are employees prohibited from moving mobile scaffold horizontally while employees are on them?			
13. Are all scaffold components manufactured by the same company?			

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

	YES	NO	N/A
WALKING AND WORKING SURFACES			
1. Are ladders regularly inspected?			
2. Are accessways, stairways, ramps, and ladders clean of ice, mud, snow, or debris?			
3. Are ladders being used in a safe manner?			
4. Are ladders kept out of passageways, doors, or driveways?			
5. Are broken or damaged ladders tagged and taken out of service?			
6. Are metal ladders prohibited in electrical service?			
7. Are stairways and floor openings guarded?			
8. Are safety feet installed on straight and extension ladders?			
9. Is general housekeeping being maintained?			
10. Are ladders tied off?			
11. Are handrails and siderails installed along the unprotected sides of stairways having 4 or more risers or rising more than 30 inches?			
SITE SAFETY PLAN			
1. Is a site safety plan available on site or accessible to all employees?			
2. Does the safety plan accurately reflect site conditions and tasks?			
3. Have potential hazards been described to employees on site?			
4. Is there a designated safety official on site?			
5. Have all employees signed the safety plan acknowledgment form?			
SITE POSTERS			
1. Are the following posters displayed in a prominent and accessible area?			
A. Minimum Wage			
B. OSHA Job Protection			
C. Equal Employment Opportunity			
2. Are all required state-specific posters displayed?			
SITE CONTROL			
1. Are work zones clearly marked?			
2. Are support trailers located to minimize exposure from a potential release?			
3. Are support trailers accessible for approach by emergency vehicles?			
4. Is the site properly secured during and after work hours?			
5. Is an exclusion zone sign-in/sign-out log maintained?			
6. Are only employees with current training and physicals permitted in exclusion zone?			
HEAVY EQUIPMENT			
1. Is heavy equipment inspected as prescribed by the manufacturer?			
2. Is defective heavy equipment tagged and taken out of service?			
3. Are project roads and structures inspected for load capacities and proper clearances?			
4. Is heavy equipment shut down for fueling and maintenance?			
5. Are backup alarms installed and working on mobile equipment?			
6. Have qualified equipment operators been designated?			
7. Are riders prohibited on heavy equipment?			
8. Are guards and safety appliances in place and used?			
9. Are operators using the "three point" system when mounting/dismounting equipment?			

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

	YES	NO	N/A
EXCAVATION			
1. Has a "competent person" been designated to oversee excavation activities?			
2. Prior to opening excavations, are utilities located and marked?			
3. Has a professional engineer evaluated all excavations greater than 20 feet deep?			
4. Is there rescue equipment on site and accessible to the excavation area?			
5. Is excavated material placed a minimum of 24 inches from the excavation?			
6. Are the sides of excavations sloped or shored to prevent cave ins?			
7. Have excavations greater than 4 feet deep been monitored for hazardous atmospheres (i.e., LEL/O_2 deficiency)?			
8. Are ladders or ramps used in excavations over 4 feet deep?			
9. Are means of egress available so as to require no more than 25 feet of lateral travel?			
10. Are barriers, i.e., guardrails or fences, placed around excavations near pedestrian or vehicle thoroughfares?			
11. Is excavation inspected daily by competent persons and documented?			
CONFINED SPACES			
1. Have employees been trained in the hazards of confined spaces?			
2. Are confined space permits posted at entrance to confined space?			
3. Is a copy of the confined space entry procedure available?			
4. Has a rescue plan been established?			
5. Is an entry supervisor present at each permit-required entry?			
6. Are required extraction/fall protection devices being used?			
DECONTAMINATION			
1. Are decontamination stations set up on site?			
2. Is decontamination water properly contained and disposed of?			
3. Are all pieces of equipment inspected for proper decontamination before leaving the site?			
4. Are shin/metatarsal guards being used during power washing activities?			
HAZARD COMMUNICATION			
1. Is there a copy of the HAZCOM procedure on site?			
2. Are there MSDSs for required materials/chemicals present on site?			
3. Are all containers properly labeled, as to content, hazard?			
4. Have employees been trained in accordance with the HAZCOM procedure?			
5. Do employees (including subcontractors) know and understand the effects of exposure from the chemicals on site?			
6. Have all personnel signed the HAZCOM acknowledgment form?			
7. Is there an updated list of chemicals maintained on site?			
TRAINING			
1. Are tailgate safety meetings being conducted daily?			
2. Are current training/medical records maintained on site?			
DOCUMENTATION			
1. Is an OSHA 200 Log maintained on site and posted during the month of February?			
2. Are accident report forms available?			
3. Is a copy of health and safety policy and procedures available on site?			

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

ALL NEGATIVE RESPONSES	CORRECTIVE ACTION	ASSIGNED TO	DATE ASSIGNED	DATE COMPLETED	VERIFIED BY

DESCRIBE POSITIVE SAFETY OBSERVATIONS

APPENDIX

F

APPENDIX F
HEALTH & SAFETY PLAN AMENDMENT DOCUMENTATION FORM

Site Specific Health & Safety Plan
Amendment Documentation

Project Name: _____ **Project No.** _____

Amendment No. _____ **Date:** _____

Amendment Revises: Page:_____ **Section:** _____

Task(s) Amendment Affects*: _____

_____

*(*Attach new/revised Job Safety Analyses*)

Reason For Amendment:

_____

_____

_____

_____

Amendment:
(Attach separate sheet(s) as necessary)

_____

_____

_____

_____

_____

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_____

_____

Completed by: _____ **Approved by:** _____

_____

_____

APPENDIX
G

APPENDIX G
JOB HAZARD ANALYSES

Appe G
Job Hazard Analysis
Standard Motor Products Site

JOB SAFETY ANALYSIS FOR WELL DRILLING/GEOPROBE SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Drilling/ Geoprobe Sampling	Struck by/ Against Heavy Equipment, Flying Debris, Protruding Objects	X Wear reflective warning vests when exposed to vehicular traffic X Isolate equipment swing areas X Make eye contact with operators before approaching equipment X Barricade or enclose the drilling area X Restrict entry to the work area to authorized personnel during drilling activities X Wear hard hats, safety glasses with side shields, or splash/face shields and goggles, and steel-toe safety boots at all times X Understand and review hand signals	Warning vests, Hard hat, Safety glasses, Goggles, Face shield, steel toe work boots	
	Sharp Objects	X Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects X Maintain all hand and power tools in a safe condition X Keep guards in place during use	Leather gloves	
	Underground/ Overhead Utilities	X Identify all utilities around the site before work commences X Cease work immediately if unknown utility markers are uncovered X Use manual excavation within 3 feet of known utilities X Utility clearance shall conform with 29 CFR 1926.955 (high voltage >700 kv) 15 feet phase to ground clearance; 31 feet phase to phase clearance		
	Handling Heavy Objects	X Observe proper lifting techniques X Obey sensible lifting limits (60 lb. maximum per person		

JOB SAFETY ANALYSIS FOR WELL DRILLING/GEOPROBE SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
		manual lifting) X Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads		
Drilling/ Geoprobe Sampling (Continued)	High Noise Levels	X Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Ear plugs	Sound Level Meter
	General Drilling Not Following Safe Work Practices	X Driller and helper must be present during all active operations and TEST KILL SWITCH DURING EACH STARTUP X Driller helper and other site personnel must know location of emergency shutoff switch X Ensure jewelry is removed, loose clothing is buttoned X Unauthorized personnel must be kept clear of drilling rig. X Area of drilling operation must be cordoned off/barricaded X When hazardous conditions are deemed present, operation must be shut down. X Do not allow drillers to climb to mast while it is erected X Pipe, drill rods, casing, augers, and similar drilling tools should be orderly stacked on racks or sills to prevent spreading, rolling or sliding X Work areas, platforms, and walkways should be kept free of materials, debris, and obstructions such as ice, grease or oil that could cause a surface to become slick or		

Appe: G
Job Hazard Analysis
Standard Motor Products Site

JOB SAFETY ANALYSIS FOR WELL DRILLING/GEOPROBE SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
		otherwise hazardous. X Shut down drill rig to make repairs or adjustments to drill rigor to lubricate fittings. Release all pressure on the hydraulic systems, the drilling fluid system, and the air pressure systems of the drill rig prior to performing maintenance. X Before raising the mast, check for overhead obstructions		
Drilling/ Geoprobe Sampling (Continued)	Caught In/ Between Moving Parts	X Identify and understand parts of equipment which may cause crushing, pinching, rotating or similar injuries X Assure guards are in place to protect from these parts of equipment during operation X Provide and wear proper work gloves when the possibility of crush, pinch, or other injury may be caused by moving/stationary edges or objects X Maintain all equipment in a safe condition X Keep all guards in place during use X De-energize and lock-out machinery before maintenance or service		
	Inhalation and Contact with Hazardous Substances	X Provide workers proper skin, eye and respiratory protection based on the exposure hazards present X Review hazardous properties of site contaminants with workers before operations begin X Monitor breathing zone air to determine levels of contaminants	Tyvek coveralls, nitrile gloves, latex or neoprene boots (see Section 5.0 HASP)	
	Fire/ Explosion	X Test well-head atmosphere with combustible gas meter X Eliminate sources of ignition from the work area	Portable fire extinguishers	LEL/O_2

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Job Hazard Analysis
Standard Motor Products Site

JOB SAFETY ANALYSIS FOR WELL DRILLING/GEOPROBE SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
		X Prohibit smoking X Provide ABC (or equivalent) fire extinguishers in all work areas, flammable storage areas, generator and compressor locations X Store flammable liquids in well ventilated areas X Prohibit storage, transfer of flammable liquids in plastic containers X Post "NO SMOKING" signs X Store combustible materials away from flammables X Store all compressed gas cylinders upright, caps in place when not in use X Separate Flammables and Oxidizers by 20 feet minimum		
Drilling/ Geoprobe Sampling (Continued)	Slips, Trips, Falls	X Clear walkways, work areas of equipment, drilling overburden, debris and other materials X Mark, identify, or barricade other obstructions		
	High/Low Ambient Temperature	X Monitor for Heat/Cold stress in accordance with IT Health and Safety Procedures # HS400, HS401 X Provide fluids to prevent worker dehydration X Follow work/rest schedule in Section 3.3.1/3.3.2 of the HASP	Insulated Clothing (subject to ambient temperature)	Meteorological Equipment

APPENDIX H

APPENDIX H
SUBCONTRACTOR HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT
SUBCONTRACTOR PRE-JOB SAFETY CHECKLIST

SUBCONTRACTOR HEALTH & SAFETY PLAN ACKNOWLEDGEMENT

As a duly authorized representative of _____, under
(name of subcontractor)
contract with IT Corporation, I have reviewed and adopt the use of the IT Corporation Site -Specific Health & Safety Plan* at the _____
(name of project)
project.

_____ _____
(name of subcontractor representative/supervisor) (date)

_____
(signature of subcontractor representative/supervisor)

*Note: The Site Specific Health & Safety Plan (SSHASP) referred to above has been designed for the methods presently contemplated by IT Corporation for the execution of the proposed work. Therefore, this SSHASP may not be appropriate if the work is not performed by or using the methods presently contemplated by IT. Therefore, IT only makes representations or warranties as to the adequacy of the SSHASP for currently anticipated activities and conditions.

INTERNATIONAL TECHNOLOGY CORPORATION

SUBCONTRACTOR PRE-JOB SAFETY CHECKLIST

JOB:	SUBCONTRACTOR:
LOCATION:	PROJECT NO.

		Yes	No
1.	Standard emergency signals fully understood?	☐	☐
2.	Subcontractor responsibility in time of emergency understood?	☐	☐
3.	Fire and ambulance telephone numbers known?	☐	☐
4.	Areas for possible evacuation designated?	☐	☐
5.	Special safety rules for the plant or area known? (IT will provide printed special rules where available)	☐	☐
6.	Nature of Chemical or special hazards for area reviewed with safety officer?	☐	☐
7.	Special safety equipment for the area of job known?	☐	☐
8.	Safety shower and eye wash locations known?	☐	☐
9.	Smoking area designated?	☐	☐
10.	Have you been advised of potential hazards, protective Measures and availability of hazard information? e.g. Health & Safety Plan	☐	☐
11.	Do you understand you are required to provide your employees with the information in (10) above?	☐	☐
12.	Have you provided MSDSs to IT for any hazardous material you intend to bring on site?	☐	☐
13.	Have you submitted training/medical certification records?	☐	☐
14.	Are your subcontractors aware of the above rules?	☐	☐

Remarks: (Explain all No Answers) _____

_____

_____

_____ _____

Subcontractor's Supervisor **Date**

_____ _____

IT Project Manager **Date**

_____ _____

IT Project Supervisor **Date**

_____ _____

IT Safety Officer **Date**