REMEDIAL ACTION WORK PLAN
for the
FORMER ADAMS BRUSH MANUFACTURING SITE
94-02 104th STREET
BOROUGH OF QUEENS, NEW YORK

SCA LLW NO.: 022714
SCA CONTRACT NO.: C000008615
SCHOOL DISTRICT: 78
SCA JOB NO.: 14983

CONSULTANT PROJECT NO.: 842150

July 14, 2003

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY

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July 14, 2003
Project No. 842150

Ioana Munteanu-Ramnic
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Division of Environmental Remediation
Hunters Point Plaza
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RECEIVED

Re: Former Adams Brush Manufacturing Facility
94-02 104th Street, Queens, NY

Dear Ms. Munteanu-Ramnic:

On behalf of the New York City School Construction Authority (NYCSCA), Shaw Environmental and Infrastructure (Shaw) is pleased to provide you with the revised Remedial Action Workplan (RAW) for the Former Adams Brush Manufacturing Facility.

This work plan has been revised pursuant to the Department's June 30, 2003 correspondence, and conference calls between the Department, NYCSCA, New York State Department of Health, and Shaw.

Based on our discussions, specific revisions to the RAW include in the following.

- A statement indicating that the remedial measures described in the document, are only considered a partial remedy at this time, and that pending Department review and subsequent subsurface testing proposed at the Site, additional remedial actions may be required.

- A statement to the effect that the Remedial Action Objective proposed for the Site during this phase of the remedy is to ensure that on-Site contaminant levels in the soil gas are protective for use of the Site for a school. An additional RAO will be to achieve NYSDEC Technical and Administrative Guidance Memorandum (TAGM) levels for on-site soils to the extent practical.

- The post excavation soil sampling plan will include Toxicity Characteristic Leaching Procedure (TCLP), Target Analyte List (TAL) metals, and Semi-volatile Organic Compound (SVOC) testing, in addition to the Volatile Organic Compound (VOC) testing as originally proposed.

- A description of the future high school, including plans describing the school layout and recreational areas.

- An additional figure and table to enhance the historical evaluation of the groundwater quality characteristics at the Site.

If you have any questions, please do not hesitate to call.

Sincerely,

SHAW ENVIRONMENTAL AND INFRASTRUCTURE

Steven P. Goldberg, Ph.D., CPG
Program Manager

cc: Lee Guterman, NYCSCA
Gary Litwin, NYSDOH
Bridget Callaghan, NYSDOH
Dave Smith, NYSDEC, Albany

EXECUTIVE SUMMARY

Introduction

Shaw Environmental and Infrastructure has been retained by the New York City School Construction Authority to prepare a Remedial Action Workplan (RAW) for the Adams Brush Manufacturing Site (hereafter referred to as the "Site") located at 94-02 104th Street in Queens, New York.

In developing this RAW, Shaw reviewed available environmental investigation reports and relevant correspondence for the Site. Shaw also completed a Supplemental Phase II Environmental Site Investigation Report (September 2002), a Pre-Construction Environmental Site Investigation Report (September 2002), and a Supplemental Soil Sampling and Soil Gas Investigation (January 2003). Based on this collective information, Shaw has proposed a remedial plan for the Site.

A Health and Safety Plan has been prepared that accompanies the RAW and covers the proposed remedial activities at the Site.

Conclusions

The following significant conclusions have been drawn from a review of the historical records and from the recent investigations completed at the Site:

- Two underground storage tanks (USTs) are present on the Site which will require closure pursuant to applicable NYSDEC requirements.
- Several semi-volatile organic compounds (SVOCs) and metals are present in the vicinity of these USTs above NYSDEC Technical and Administrative Guideline Memorandum (TAGM) 4046 values. While the presence of these constituents is not due to a specific release from the USTs (the exceedances are attributable to historic fill materials at the Site), soils exhibiting these elevated constituents will be removed during the UST closure activities.
- At other locations across the Site there were sporadic detections of SVOCs and metals above TAGM values. These are also attributable to the nature of the fill material as opposed to a specific source area(s).
- Low levels of chlorinated volatile organic compounds (VOCs) tetrachloroethene (PCE) and trichloroethane (TCE) are present in the groundwater above New York State (NYS) Groundwater Quality Standards.
- Historical concentrations of PCE and TCE were considerably higher relative to present day concentrations (hundreds versus tens of parts per billion) indicating a potential of a prior release from the Site that is no longer contributing to the groundwater contamination.

- No source of the VOCs could be identified based on the multiple investigations completed at the Site.
- PCE and TCE vapors have been detected at elevated concentrations primarily in the locations beneath the basement slabs of the existing buildings. Concentrations generally increase with depth, with the highest concentrations detected 18-22 feet below grade. These vapors may have been attributable to residual VOCs on the Site.

Proposed Remedy

The Remedial Action Objective (RAO) proposed for the Site during this phase of the remedy is to ensure that on-Site contaminant levels in the soil gas are protective for the use of the Site for a school. An additional RAO will be to achieve NYSDEC TAGM levels for on-Site soils to the extent practical. The proposed remedial action for the Site described herein is considered to be the initial phase of a remedy for the Site. Following completion of the present remedy, additional remedial activities may be required which will be detailed in a Supplemental Remedial Action Work Plan. The need for a subsequent remedial phase at the Site will be based on concurrence from NYSDEC and NYSDOH.

A remedial strategy has been developed to support the proposed use of the Site for a public school, without the need for long term remedial action. The following remedial actions are proposed which are part of the planned construction activities for the proposed school.

- Removal of the existing USTs and closure pursuant to applicable NYSDEC regulatory criteria.
- During the demolition of the existing buildings and prior to construction of the school, the building slabs will be removed and soils will be excavated to a depth of 18 feet below grade across a significant portion of the Site. All existing utility and sewer lines will be removed. During the demolition of the buildings, all underground structures and utilities will also be removed. It is anticipated that in the process of completing these activities, residual soil vapors will dissipate, and that any remaining vapors will be at levels that do not pose a risk to human health or the environment.
- Post-excavation soil borings and sampling will be performed across the Site to verify the absence of a source of VOCs to the observed groundwater contamination, and to confirm that residual soil vapors have dissipated to levels that do not pose a threat to human health or the environment.
- As an added safeguard to any residual soil vapors emanating from the subsurface in the future, a vapor barrier and passive ventilation system will be constructed beneath the school.

1.0 Introduction and Purpose

Shaw Environmental & Infrastructure, Inc. (Shaw) has been retained by the New York City School Construction Authority (NYCSCA) to prepare this Remedial Action Workplan (RAW) for the Adams Brush Site (the "Site") located in Ozone Park, Queens, New York. The Site is the proposed location of a future New York City public school. In developing this workplan, Shaw reviewed all available environmental investigation reports prepared by various consultants for the Site. Shaw has recently completed a Supplemental Phase II Environmental Site Investigation Report (September 2002), a Pre-Construction Environmental Site Investigation Report (September 2002), and a Supplemental Soil Sampling and Soil Gas Investigation (January 2003). This RAW summarizes the investigative work performed to date, presents pertinent conclusions, and proposes a remedial plan for the Site. In support of the text, 4 appendices are included. Appendix A includes plans and specifications associated with the removal of underground storage tanks; Appendix B contains the resume of the Quality Assurance/Quality Control officer for data validation associated with the remedy; Appendix C provides Quality Assurance Manuals for the analytical laboratories that are going to be used for this project and; Appendix D are plans of the future high school.

A Health and Safety Plan for the performance of work associated with the remedy accompanies this RAW.

1.1 Site Description and History

The Site is located at 94-02 104th Street in Queens, New York. It is bordered by 94th Avenue and 95th Avenue to the north and south, and 104th and 102nd Streets to the east and west. (Figure 1 is a Site Location Map). It is occupied by a former brush manufacturing facility. The property is developed with a structure consisting of two adjoining buildings: a four-story, flat-roofed structure built sometime around 1927 and a single story masonry structure built at a later date. The buildings form a "C" shape, creating a courtyard in the center of the Site. The courtyard is partially paved with asphalt. The western building consists of former administrative offices and the northern and eastern portions of the structure consist of former manufacturing areas. The area between the western building wall and 102nd Street is vacant and is covered by grass. Figure 2 provides a Site Plan. Sanitary waste from the building is discharged to the municipal sewer. Potable water is provided by the New York City Department of Environmental Protection water supply system.

Development of the property began circa 1927, when the western building was erected. All buildings were completed sometime before 1954. Records of previous Site usage include a hosiery business, the manufacturing, repair or storage of knitting machines, and brush manufacturing.

Adjacent land uses include a strip mall to the north across 94th Avenue, apartment buildings and private residences across 95th Avenue to the south, private residences and commercial properties (including an auto repair business) to the east across 104th Street, and mixed residential, commercial, public, and auto repair uses to the west across 102nd Street. The surrounding neighborhood is a mix of similar uses.

Areas of environmental concern identified on the property include petroleum storage tanks, an access vault to the facility's sewer discharge pipe, and several pits of unknown origin in the basement slab floor. The storage tanks include two underground storage tanks (USTs) and one aboveground storage tank (AST). The USTs consist of one 2,000 gallon fuel oil UST located in the courtyard, and one 10,000 gallon fuel oil UST, located beneath the basement floor. Both tanks are inactive and are reported to be abandoned-in-place. The AST is 1,080 gallons in size and is located in a concrete block vault (as required by New York City Fire Department regulations) in the basement. The AST also stored fuel-oil and was installed to replace the abandoned USTs.

1.2 Physical Setting

The Site is located in the southwestern portion of Long Island, New York, at an elevation of approximately 20 feet above mean sea level. Site topography is relatively level. The geomorphic setting is within a glacial outwash plain adjacent to the Harbor Hill Terminal Moraine. The outwash plain deposits consist of sand and gravel, and have generally high hydraulic conductivity. A general stratigraphic sequence consists of a thin veneer of recent sediments of alluvial and marine origin, underlain by the Upper Glacial Aquifer composed of glacial till and outwash. The Magothy Aquifer, a thick deposit of sand, silty sand, and clay lenses of Cretaceous age underlies the Upper Glacial Aquifer at the Site location at a depth of approximately 350 feet. Underlying the Magothy are other Cretaceous unconsolidated formations including the Raritan Formation and the Lloyd Sand. Bedrock underlies the Lloyd Sand at the Site location at a depth of approximately 800 feet below grade.

Site soils are composed of a layer of fill materials consisting of ash, cinder, glass, concrete, glass, and asphalt, overlying native soils consisting of fine sand and silt, clays, and gravel. Depth to groundwater is approximately 33 to 35 feet below grade. Groundwater flow direction is to the south/southwest in the direction of the nearest surface water bodies, the tributary creeks to Jamaica Bay. Figure 3, a groundwater contour map, is based on groundwater gauging data collected by Shaw on August 8, 2002.

1.3 Summary of Previous Investigations

1.3.1 Initial Investigations

The following is a synopsis of the early investigation activities at the Adams Brush site. These investigations, in general, were of limited scope:

January 1999-Sear-Brown Group conducted a Phase I Environmental Site Assessment which identified the presence of closed 10,000 gallon and 2000 gallon underground storage tanks (USTs) at the site.

March 1999-An investigation was completed by P.W. Grosser which included the installation and sampling of 5 monitoring wells, investigation of the suspected USTs (discussed above), and soil sampling by geoprobe. Results indicated the presence of chlorinated solvents tetrachloroethene (PCE) and trichloroethene (TCE) above NYS groundwater quality standards, but a source could not be identified. The report recommended an additional round of groundwater sampling.

July 1999-Groundwater sampling of the 5 monitoring wells was performed by Anderson, Mulholland & Associates, Inc. (AMAI). Results confirmed that PCE and TCE were above the NYS groundwater quality standards.

September 1999-A workplan was prepared by P.W. Grosser which described a subsurface investigation to identify potential source areas. The proposed investigation was subsequently approved by the NYSDEC and included the installation of soil borings and additional monitoring wells.

1.3.2 Focused Investigations

1.3.2.1 Underground Storage Tanks

A June 2000 Phase II Environmental Site Assessment performed by Camp, Dresser & McKee investigated soil conditions in the vicinity of the USTs. Several semi-volatile organic compounds (SVOCs) and RCRA metals were detected in shallow subsurface soil samples around the USTs at concentrations that exceed the NYSDEC clean-up criteria. These shallow samples consisted of historic fill materials including coal, ash, brick, concrete, and asphalt.

SVOCs were detected in boring SB-03 (near the 10,000 gallon UST). SVOCs were also detected in borings SB-5 and SB-6 (near the 2,000-gallon UST) above the NYSDEC soil cleanup criteria. Figure 4 illustrates the boring locations. Samples at SB-5 were collected at a depth of 3 to 4 feet and two samples at SB-6 were collected at depths less than two feet below grade. However these compounds were not detected in a deeper sample collected at 11 to 12 feet from SB-6. RCRA metals (arsenic, chromium, lead, and mercury) were also detected in the soil samples collected from these locations at concentrations exceeding the NYSDEC soil cleanup criteria. The results of the TCLP testing performed on two samples taken around the 2,000 gallon UST and near the 10,000 gallon UST indicate that the soils are not characteristically hazardous and can be disposed of as non-hazardous. No volatile organic compounds (VOCs) were detected above method detection limits (MDLs). A Data table summarizing the June 2000 soil sampling event is attached as Table 1.

1.3.2.2 Soil Investigation in Additional Areas of Concern

The June 2000 Phase II ESA consisted of the advancement of 12 soil borings to depths ranging from 7 feet to 41 feet below grade. Seven of the 10 borings were completed to depths of 39 feet or greater, and four borings were used as temporary wells to collect groundwater samples. Eight of the soil borings were advanced in the vicinity of the USTs (previous section), and the four temporary well borings were advanced on the north, south, east, and west sides of the buildings, serving as "perimeter" soil and groundwater sampling points. Figure 4 illustrates the boring locations.

The results of the borings in the vicinity of the USTs were discussed in the above section. The soil samples from the temporary well borings were analyzed for VOCs for EPA Method 8260B, for SVOCs by EPA Method 8270, and for Total RCRA Metals by EPA Method 6010B. VOCs were reported below MDLs in all samples. SVOCs were reported either below Technical and Administrative Guidance Memorandum (TAGM) 4046 values or below Method Detection Limits (MDLs). Metals were reported below TAGM values, except for chromium, reported slightly above its guidance value in sample TW-01 from 2.0 to 2.5 feet. Table 1 provides a data summary.

The September 2002 Supplemental Phase II Environmental Site Investigation was performed according to the 1999 P.W. Grosser workplan (which has been approved by NYSDEC), and focused on possible source areas for the PCE and TCE detected in site groundwater. Soil borings SB-1 and SB-2 were completed adjacent to the sewer vault that previous investigations suggested could be a source of contamination. Soil samples were collected from two additional soil borings that were completed as monitoring wells MW-6 and MW-7. Figure 5 illustrates the boring locations. Analysis of the soil samples reported PCE and TCE below MDLs in all samples. SVOCs were detected above MDLs in MW-7 in a sample collected from 20 feet below grade. Two SVOCs were reported above TAGM 4046 guidance values. The 20-foot samples were also analyzed for RCRA metals and PCBs. The analyses reported chromium at 12 parts per million (ppm), a concentration exceeding the TAGM guidance value, however this concentration is within the range of background concentrations of chromium detected in urban soils according to TAGM 4046. PCBs were not detected above MDLs. A data summary table is included as Table 2.

A Pre-Construction ESA was also performed in **September 2002**. The Pre-Construction ESA investigated soil quality at 22 soil boring locations (see Figure 6). Concentrations of SVOCs of up to 2,900 ppb were detected in the vicinity of the 2,000 gallon UST, and several SVOCs exceeded TAGM guidance values. Concentrations of arsenic, chromium, cadmium, and mercury slightly exceeded guidance values. In the vicinity of the 10,000-gallon UST, SVOC concentrations of up to 600 ppb were detected. Concentrations of arsenic, cadmium, and chromium slightly exceeded TAGM values. Table 3 provides a data summary table for the Pre-Construction ESA.

Elsewhere onsite, VOCs were reported above MDLs in soil samples collected from four borings. All reported concentrations were below guidance values. SVOC concentrations in borings remote from the USTs exceeded guidance values in only one sample, at only a minor exceedance. Results of the TCLP metals analysis reported concentrations below hazardous levels. Concentrations of PCBs in four soil samples were below MDLs.

In January 2003, soil samples were collected from 15 soil borings advanced according to the Supplemental Sampling and Analysis Plan (SAP) prepared by STV Incorporated (STV) for the NYCSCA in March 2002 and revised November 25, 2002 (see Figure 7). Soil samples were analyzed for Target Compound List (TCL), VOCs by EPA Method 8260, SVOCs by EPA Method 8270, and TCLP for RCRA metals using EPA Method 6010/7000.

There were only sporadic and very minor detections of VOCs in the soil borings. There were no exceedances of TAGM values in any of the samples. Tetrachloroethene (PCE) and trichloroethene (TCE) were the only VOCs detected, and concentrations were approximately 5 ug/kg or less. Tables 4, 5, and 6 provide data summary tables for this sampling event.

There were several borings that exhibited SVOCs above the TAGM values namely SB-02, and SB-03 at the 0-4 foot interval, and SB-07 at the 16-20 foot interval. These exceedances were generally associated with polycyclic aromatic hydrocarbons or PAHs (e.g. benzo(a)pyrene at 3300 ug/kg in SB-03 versus a TAGM value of 61 ug/kg, and benzo(a)anthracene at 3600 ug/kg versus a TAGM value of 224 ug/kg). One boring, SB-07 at the 16-20 foot interval, exhibited a detection of di-n-butylphthalate at 26,000 ug/kg versus a TAGM value of 8,100 ug/kg.

Results of the TCLP RCRA metals analysis indicated concentrations well below hazardous waste levels.

1.3.2.3 Groundwater Investigations

The results of the March 1999 P.W. Grosser investigation indicated the presence of PCE and TCE in groundwater in monitoring wells MW-1, MW-2, and MW-3 above the NYS groundwater quality standards of 5 ppb for each compound. The investigation did not identify a source area, therefore an additional round of groundwater sampling was recommended. The additional sampling was performed in July 1999, and yielded results confirming that PCE and TCE exceeded standards. PCE was detected at concentrations ranging from non-detect to 16 ppb in the March and July 1999 rounds; TCE was detected at concentrations ranging from non-detect to 510 ppb in these two sampling rounds. Groundwater samples were collected again in November 1999; analysis of samples collected from three geoprobe borings (GP-1, GP-2, GP-3-Figure 5A) reported PCE ranging from non-detect to 55 ppb, and TCE ranging from non-detect to 1,300 ppb.

Groundwater samples were collected from the four temporary wells and two soil borings installed during the June 2000 ESA. Analytical results reported TCE at 17.5 ppb in TW-02 on the western portion of the Site, and PCE at 111 ppb in SB-5 adjacent to the 2,000 gallon UST in the courtyard. Four SVOCs were detected in groundwater at concentrations below NYS Groundwater Quality Standards. Barium and chromium were detected at concentrations below. NYS Groundwater Quality Standards

Monitoring wells MW-6 and MW-7 were installed as part of the September 2002 Supplemental Phase II soil investigation. Analysis of samples collected from all Site monitoring wells reported PCE at concentrations of 14 ppb and 22 ppb in MW-1 and MW-2 respectively. TCE was reported at 16 ppb in MW-3. PCE and TCE concentrations were reported as non-detect, or at estimated concentrations below MDLs in samples from the remaining wells.

Table 7, and Table 7A summarize the groundwater data discussed in this section.

1.3.2.4 Soil Gas Studies

CDM conducted a soil gas survey in June 2000 as part of the Phase II Environmental Site Assessment. The broken areas of concrete in the basement floors were the primary focus of the survey. Soil gas sampling points were driven into the subsurface and vapors were screened in the field using a photoionization detector (PID). Vapors at all 12 sampling points produced background level PID responses. Figure 8 illustrates the soil gas sampling locations.

The January 2003 sampling event included the collection of soil gas samples. The soil gas samples were collected from separate borings advanced adjacent to the borings for the soil sample analysis described above. Soil gas samples were collected on sorbent tubes using a low-flow sampling pump. The samples were analyzed for chlorinated VOCs (tetrachloroethene, trichloroethene, dichloroethene, and vinyl chloride) and the NYSDEC Spills Technology and Remediation Series (STARS) list of VOCs using EPA Method 8260, and for the NYSDEC STARS list of SVOCs using EPA Method 8270. VOC detections included several of the STARS VOCs such as benzene, xylenes, toluene, and methyl tertiary butyl ether (MTBE) at concentrations less than 100 micrograms/cubic meter. PCE and TCE were also detected in a number of the borings and at relatively higher concentrations than the STARS VOC detections. PCE concentrations ranged from less than 100 micrograms/cubic meter (e.g. SG-3 at the 22-26 foot interval at 27 micrograms/cubic meter) to 13,000 micrograms/cubic meter at SG-7 at the 18-22 foot interval). The highest TCE concentration was 5,300 micrograms/cubic meter at the 18-22 foot interval at SG-10. There were no detections of SVOCs in any of the soil gas samples. Table 8 summarizes the January 2003 soil gas sampling results.

1.4 Summary of Environmental Conditions

Data collected from soil borings in the vicinity of the two closed USTs have detected SVOCs and several metals at concentrations that marginally exceed TAGM guidance values. The presence of these compounds is due to the presence of a layer of fill materials overlying the native soils. Samples collected from numerous soil borings during the course of several site investigations have documented the nature of the fill, consisting of cinder, ash, brick, concrete, and asphalt. The thickness of the fill deposits ranges from approximately 1 foot in some areas to approximately 10 feet elsewhere onsite.

Minor concentrations of VOCs have been detected in soil samples at levels below TAGM guidance values. The compounds detected are not petroleum-related. Due to the low concentrations of SVOCs detected, the shallow depths of detection, and the very low levels of VOCs in site soils, it has been concluded that there is no evidence of any petroleum releases from the USTs to the surrounding soils.

The initial 1999 site investigation established the presence of groundwater contamination by the chlorinated hydrocarbons PCE and TCE, and subsequent investigations were performed in an effort to find the source of this contamination. From 1999 through 2003, numerous soil borings were advanced throughout the site, including areas beneath the building. Analysis of soil samples for adsorbed-phase chlorinated hydrocarbons detected only minor concentrations of these compounds. Dissolved-phase concentrations of these two compounds in groundwater were reported at concentrations of up to 1,300 ppb in 1999. However, concentrations have significantly declined since that time to levels generally less than 30 ppb. Samples collected from permanent monitoring wells in September 2002 confirmed the presence of PCE and TCE at concentrations of 22 ppb and lower.

Searches of regulatory databases performed as part of the site investigations did not produce any records of PCE or TCE releases at adjacent and nearby properties. The detectable PCE and TCE concentrations are found in monitoring wells closest to and downgradient of the onsite building. A soil gas survey performed in 2003 detected PCE and TCE vapors in soils primarily in locations beneath the building basement, and at concentrations generally proportional to increasing depth with the highest concentrations generally detected at 18-22 feet below grade. The very low levels of chlorinated hydrocarbons in on-Site soils, the concentration of PCE and TCE vapors beneath the building basement, and the low levels of these compounds in Site groundwater suggest a potential of a prior release from the Site that is no longer contributing to the groundwater contamination.

1.5 Remedial Action Evaluation

The Remedial Action Objective (RAO) proposed for the Site during this phase of the remedy is to ensure that on-Site contaminant levels in the soil gas are protective for the use of the Site for a school. An additional RAO will be to achieve NYSDEC Technical and Administrative Guidance Memorandum (TAGM) levels for on-Site soils to the extent practical. The proposed remedial action for the Site described herein is considered to be the initial phase of a remedy for the Site. Following completion of the present remedy, additional remedial activities may be required which will be detailed in a Supplemental Remedial Action Work Plan. The need for a subsequent remedial phase at the Site will be based on concurrence from NYSDEC and NYSDOH.

1.6 Contemplated Use and Summary of Remedy

The contemplated use for the Site is unrestricted use for a school. Construction of the new school is being performed under two distinct contracts; a demolition contract and a construction contract. Each contract entails specific soil excavation components, and it is within this context that residual site contamination will be remediated. The demolition contract entails removal of the existing buildings and foundation slabs, and the clean closure of a 2,000 gallon and 10,000 gallon UST. This will require removal of the tanks and closure in accordance with applicable New York State regulatory criteria (Petroleum Bulk Storage, 6NYCRR Part 613.9) and closure sampling guidance (SPOTS #14).

The construction contract on the other hand will entail further soil excavation work to prepare the site for actual construction of the school building. Soils will be excavated and removed to a depth of approximately 18 feet over a significant portion of the Site. All existing utilities and sewer lines will be removed. It is anticipated that in the process of completing this excavation program, residual soil vapors (that had been trapped beneath the building slabs and in the subsurface soils) will dissipate, and that any remaining vapors will be at levels that do not pose a risk to human health or the environment. Once the excavation to 18 feet has been completed, post excavation soil borings and sampling will be performed across the Site. Soil samples will be analyzed to verify the absence of any chlorinated VOCs that may be or may have contributed to the residual groundwater contamination. To confirm that the RAO has been met, soil gas samples will be taken to confirm that any residual vapors trapped in the soils have dissipated as a result of the excavation activities. The procedures and other activities associated with this sampling is provided in Section3.0.

As an added safeguard to any residual soil vapors emanating from the subsurface in the future, a vapor barrier and passive ventilation system will be constructed beneath the school.

1.7 Description of Future High School

The proposed building has a rectangular shaped plan with one continuous cellar level (EL 21'-8"), which is 15-'4" below the exterior grade/ground floor (EL 37'- 0"). The cellar level comprises an area of 37,100 square feet. The excavation depth will be about 16-'8" deep at cellar slab areas and about 17'-8" deep at cellar footings. There are two elevator pits which will be excavated to a depth of 21'-0". The floor elevations are as follows:

Cellar floor	EL 21'-8"
First floor	EL 37'-0"
Second floor	EL 51'-4"
Third floor	EL 65'-8"
Fourth floor	EL 80'-0"
Roof level	EL 95'-4"

The building will be a four-story steel frame structure with a metal deck and concrete floors and roof. The exterior walls will be non-bearing masonry. The building will be supported on concrete foundation walls and concrete spread footings.

All exterior areas (approximately 23,000 square feet) will be paved. The exterior area to the west will be a fenced outdoor play area. The exterior area to the east will be an outdoor plaza area for use as a gathering area for students. Appendix D provides drawings of the proposed school.

2.0 Project Plans and Specifications

2.1 UST Removal

In preparation for construction of the new school, the existing structure will be demolished. The remedial component associated with the demolition phase of the project is the removal of the existing building slabs (which may be in contact with contaminated soils), and the removal of the 2 underground storage tanks and any associated contaminated soils. Plans and specifications for this activity are included in Appendix A. Specifically, these plans show removal of the 2000 gallon UST and 10,000 gallon UST and any associated contaminated soils from "Quadrants F and I shown on the Plans. Specifications for these removal activities are provided as No. 02091 (Storage, Handling, Transportation and Disposal of Petroleum-Contaminated Material and/or Hazardous Waste) and No.02115 (Underground and Aboveground Storage Tank Removal). This work will be conducted by the selected contractor pursuant to applicable New York State Department of Environmental Conservation UST closure requirements.

2.2 Removal of Residual Soil Vapors

The previous investigation completed at the Site in January 2003 indicated the presence of elevated PCE and TCE vapors with the highest concentrations generally at 18-22 feet bgs. Removal of the building slabs during the demolition, and excavation of the soil to 18feet below ground surface during the initial construction phase of the project, should result in the dissipation of the residual soil vapors. Confirmatory soil gas sampling will be performed following the excavation to verify the reduction of residual soil gas concentrations. In addition, soil samples will be obtained and analyzed for VOCs to verify the absence of any source areas of VOCs. Also, the soils will be analyzed for SVOCs, Target Analyte List (TAL) metals and TCLP. Figure 9 shows the proposed soil boring locations.

3.0 Quality Assurance/Quality Control

This section, the Quality Assurance Project Plan (QAPP), presents the sampling and analysis methods to be utilized in following the excavation programs at the Site. It also outlines the responsibilities and procedures for data quality assurance, specific to the project.

NYCSCA is responsible for the remediation and associated sampling at the Site. NYCSCA has retained Shaw Environmental and Infrastructure for the implementation and reporting. Shaw personnel will perform the field investigations, review the data generated, and prepare the associated reports for submittal to NYSDEC. In this capacity, Shaw is responsible for the project management of the remediation.

3.1 Project Management Responsibility

As directed by NYCSCA, Shaw will provide all project management and staffing for this project. The Shaw Program Manager will be responsible for overall project implementation and coordination with NYCSCA. The Project Manager has overall responsibility for ensuring that the project objectives and schedule are met. In addition, he/she is responsible for technical quality control and project oversight and will provide qualified site personnel and laboratory services for this Monitoring Program. The Project Manager has the authority to commit the resources necessary to meet project objectives and requirements, and to ensure that technical and scheduling objectives are achieved successfully.

The project staff are responsible for implementing the field investigation in order to meet the project objectives and requirements. The project staff will report directly to the Shaw Project Manager. Figure 10 provides a personnel organizational chart for this project.

Quality Assurance Responsibility

QA responsibilities for the project are summarized below.

QAPP Review/Approval

The Project Quality Assurance/Quality Control (QA/QC) Officer is responsible for review and approval of the QAPP and will provide QA technical assistance to the project personnel. The QA/QC Officer will not be directly involved in the day-to-day operations of the project but will be available to resolve any QA/QC discrepancies. Appendix B contains the resume of the QA/QC Officer.

Data Assessment

It will be the responsibility of the Project QA/QC Officer, the Project Manager, and their staff to evaluate the analytical data to determine if the data generated have met the project data quality objectives and are sufficient to meet the projects monitoring objectives.

Field Operation Responsibility

Field Sampling

Each post excavation sampling event will be headed by a designated Field Operations Leader (FOL) who will be responsible for leading and coordinating all field activities. The FOL, who will report directly to the Shaw Project Manager, will be responsible for the implementation of the field program, keeping field activities on schedule, and coordination and oversight of any subcontractors assisting the Shaw field team. The FOL will also be responsible for identifying any problems in the field and/or any changes to the monitoring program and initiating the appropriate corrective action with the Project Manager to resolve them.

Laboratory Responsibilities

A copy of the analytical laboratory subcontractor's Quality Assurance (QA) Manual program is provided in Appendix C.

3.2 QA Objectives for Data Measurement

The overall Quality Assurance (QA) objective of the monitoring programs associated with the implementation of the remedial action is to develop and implement procedures for field sampling, chain of custody, laboratory analysis and reporting, and to provide reliable analytical results. Specific procedures to be used for sampling, chain of custody, laboratory analysis, reporting, internal quality control, audits, preventative maintenance, and corrective actions are described in other sections of this QAPP. The purpose of this section is to address the Data Quality Objectives with respect to accuracy, precision, completeness, representativeness, and comparability.

Data Quality Objectives

Data quality objectives (DQO) are based on the concept that different data uses require different levels of data quality. Data quality can be defined as the degree of uncertainty in the data with respect to precision, accuracy and completeness. The 5 general levels of data quality are:

Level 1 – field screening or analysis using portable instruments. Results are often not compound-specific and not quantitative, but results are available in real-time. It is often used for health and safety monitoring and initial site characterization.

Level II – field analyses using more sophisticated portable analytical instruments; in some cases, the instruments may be set up in a mobile laboratory. There is a wide range in the quality of data that can be generated, depending on the use of suitable calibration standards, reference materials, and sample preparation equipment, and the training of the operator. Results are available in real-time or several hours.

Level III – USEPA routine analytical services. All analyses are performed in an off-site NYSDOH ELAP-certified analytical laboratory following standard USEPA protocols. Level III is characterized by rigorous QA/QC protocols and documentation.

Level IV – analytical analysis by pre-approved, non-standard methods. All analyses are performed in an off-site approved analytical laboratory. Method development or method modification may be required for specific constituents or detection limits. Level IV will be characterized by rigorous QA/QC protocols and documentation.

Level V – physical property and engineering material analysis by approved standard or non-standard methods. All analyses are performed in an off-site laboratory. QA/QC protocols and documentation may be required for some analyses.

Data generated as part of the remedial program at the Site will include both Level I and Level III.

Field blank, trip blank and duplicate samples will be analyzed to assess the quality of the data resulting from the field sampling program.

The level of Quality Control (QC) provided by the laboratory will be as required by the applicable USEPA methods. Deliverables for the project associated with the sampling at the 18-foot excavation level will conform to NYSDEC Analytical Services Protocol (ASP) Category B.

Completeness is defined as the measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Completeness is expressed as the percentage of valid data obtained from a measurement system. For data to be considered valid, it must meet all the acceptance criteria including accuracy and precision, as well as any other criteria specified by the analytical method used. Samples for which the critical data points fail accuracy or precision data quality objectives, and therefore completeness objectives, will require reanalysis of samples until the quality objectives are met. Sufficient sample volume will be collected to ensure that reanalysis can occur as needed.

Representativeness is the extent to which the database reflects the conditions in the study area. Representativeness is a function of the analytes evaluated and sampling locations. The sampling program is designed to maximize the collection of representative data. The historical database that has been compiled through site investigation, implementation of the remedial program, and the ongoing monitoring program has demonstrated that the contaminant plume is delineated and that the sampling program is adequate in monitoring concentration changes over time. Representativeness will be satisfied by ensuring that the sampling plan is followed, proper sampling techniques are used, proper analytical procedures are followed, and holding times of the samples are not exceeded.

Comparability expresses the degree of confidence with which one data set can be compared to another. Key factors promoting comparability are use of standard field and laboratory techniques, consistency in reporting (e.g., units) and collection of representative data. Because of the use of standard methods and the development of a formal QAPP, data generated as part of this monitoring program are anticipated to have high comparability with other data collected under this program.

3.3 Field Sampling and Analysis Plan

The Field Sampling Plan (FSP) presents methods and procedures for the collection of soil and soil gas samples for laboratory chemical analysis.

Procedures pertaining to the collection of these samples are as follows:

3.3.1 Geoprobe Soil Boring Samples

- Soil will be penetrated using standard drilling rods. The lead rod will be equipped with a 1.5" diameter dedicated macrocore soil sampler.
- When the desired depth is reached, the bottom end of the sampler will be opened, and the core will be driven through the span of the sample depth interval. The sampler and rods will then be withdrawn and the macrocore will be opened for inspection.
- The recovered soil samples will be evaluated for visual or olfactory evidence of contamination, and described in a written log for the following: percent of recovered sample in the sample spoon, soil color, soil texture, and general classification under the Unified Soil Classification System.
- Headspace analysis for the presence of organic vapors will be performed on all soil samples using a photoionization detector (PID) calibrated with an isobutylene standard calibration gas immediately prior to the start of each sampling shift.
- A single soil sample from each boring will be submitted to Chemtech for laboratory analysis of VOCs, SVOCs, TAL metals, and TCLP. Soil samples will be selected for lab analysis according to the following criteria: the sample exhibiting the highest PID response will be selected, or if sample PID responses do not exceed background levels, then the sample immediately above the soil/groundwater interface will be selected. All

soil samples will be placed in method-specific laboratory supplied glassware, and secured on ice in a cooler. The cooler will be shipped under a chain-of-custody to a New York State Department of Health-certified laboratory for analysis.

3.3.2 Soil Gas Sampling

- Soil gas samples will be collected from a separate boring adjacent to the geoprobe borings for the soil sample analysis
- At each boring location a 1-foot screen with a fitted drive point will be advanced at 4 foot increments from the 18-foot excavation depth to the water table.
- At the requisite depth a ¼ inch polyethylene tube will be attached for the collection of the soil gas.
- Following 3 minutes of purging, samples for VOC analysis will be collected on mixed bed (Charcoal/Poropak) sorbent tubes using calibrated portable battery operated SKC pumps (provided by the analytical laboratory) at a pumping rate of 1 liter per minute.
- A 10 liter sample will be collected which will result in a detection limit of 10 micrograms/cubic meter.
- Soil gas samples will be analyzed by Ecotest for the chlorinated VOCs by EPA Method 8260. Soil gas samples will be selected for lab analysis at the approximate 18-22 foot interval, consistent with the depth of elevated readings during historical investigations at the Site.

3.4 Recordkeeping and Chain of Custody

Field Logs

Field records must be documented in the field logbook and must contain must be documented in the field logbook and must contain sufficient information such that someone else can reconstruct the sampling event without reliance on the sample collector's memory. The logbook is a controlled document which records all major on-site activities. The logbook is a bound notebook with pages that cannot be removed without cutting or tearing pages. Daily entries into the logbook may contain a variety of information. At the beginning of each day the following information must be recorded:

- Date
- Start time (arrival)
- Weather
- All field personnel present
- Any visitors present

- End time (departure)

Entries in the field logbook will include, as applicable:

- Start and completion time of activities at each sample location.
- Sampling point name and description.
- Sample depth interval for each soil or soil gas sample.
- Sample collection procedure and equipment.
- Type and number of sample containers used.
- Collector's sample identification numbers.
- Modifications to health and safety protocols, (e.g., level of protection).
- Work performed.
- Deviations from established protocols, if any.

Upon return to the office, individual field data sheets will be completed and signed, and placed in the project file. Photocopies will be made of all field logbook pages and placed in the project file. This ensures a record exists in the office of all field and sampling activities, and limits the potential loss of field notes due to the loss or destruction of the log book in the field.

Chain-of-Custody

Chain-of-custody records for all samples will be maintained. A sample will be considered to be "in custody" of an individual if said sample is either in direct view of or otherwise directly controlled by that individual. Storage of samples during custody will be accomplished according to established preservation techniques, in appropriately sealed storage containers. Chain-of-custody will be accomplished when the samples or sealed sample coolers are directly transferred from one individual to the next, with the first individual witnessing the signature of the recipient upon the chain-of-custody record.

If samples are to be sent via a courier (e.g., Federal Express), signed Chain-of-Custody Forms will be included in each cooler documenting sample content. Chain-of-Custody Forms will be placed in a zip-lock bag or equivalent sealable pouch and attached to the inside lid of the sample cooler. A copy will be kept by the sampling personnel.

The chain-of-custody records will contain the following information:

- Respective sample numbers of the laboratory and Shaw, if available.
- Signature of collector.

- Date and of time of collection.
- Sample type (soil or soil gas).
- Identification of well or sampling point.
- Number of containers.
- Parameters requested for analysis, if appropriate.
- Signature of person(s) involved in the chain of possession.
- Description of sample bottles and their condition.
- Problems associated with sample collection (i.e., breakage, no preservatives), if any.

Laboratory Chain-of-Custody Procedures

The purpose of the chain-of-custody procedure is to document in a legally defensible manner, the transfer of custody for each sample from collection through analysis to analytical data reports. The sample custody procedures to be used by the laboratory will conform to the guidelines of the NYSDEC Analytical Services Protocol (ASP), and are performed under the supervision of the Sample Coordinator. The Sample Coordinator will have primary responsibility for ensuring that chain-of-custody procedures are followed and all documentation is properly executed.

Sample Receiving and Log-In

When samples arrive at the laboratory, the sample coordinator from the laboratory documents the condition of the locked or sealed shipping box on the custody form. He/she then checks the sample label information against the custody record, notes the conditions of the samples and verifies proper container and preservative procedures. Samples are then logged in by assigning laboratory identification numbers in serialized ascending sequence. The sample log-in record will include the cooler temperature, sample number, date of receipt, condition of sample when received, the assigned laboratory number, sample preparation, sample distribution and other pertinent information. A sample distribution sheet will be generated.

Sample Storage

Prior to preparation and analysis, all samples will be secured in a refrigerator maintained at approximately 4°C. Samples obtained for volatile organic analysis will be stored in a secured refrigerator used for the storage of volatile organic samples only.

Tracking During Sample Preparation and Analysis

Analysts will sign for the receipt of all samples to be processed and maintain the samples in their possession or in view at all times when the samples are outside of the storage area. At all times when custody is transferred, both the issuing and receiving parties will verify that information in the sample label is properly recorded.

3.5 Calibration Procedures

This section describes procedures for maintaining the accuracy of all instruments and measuring equipment to be used for field measurements and laboratory analysis.

Field Instruments

All instruments used in the field to gather, generate, or measure environmental data will be calibrated in accordance with procedures consistent with those recommended by the manufacturer to provide Level I field screening quality data. All equipment to be used during the field work will be examined to verify that it is in proper operating condition. Field notes from previous sampling work will also be reviewed to ensure any previous equipment problems are not overlooked and that all necessary repairs have been carried out.

Calibration of field instruments will be performed at intervals specified by the manufacturer or more frequently as conditions warrant.

Laboratory Instruments

This section describes the calibration procedures and frequency for the instrumentation which will be used in the determination of the parameters of interest. All materials used for instrument calibration, internal standards and surrogate standards will be of the highest purity available and will be obtained through the USEPA Pesticide and Industrial Chemicals Repository, or a suitable commercial source. The procedures used and frequency of calibration for all analytical instruments will satisfy the NYSDEC ASP requirements. The calibration procedures for laboratory instruments are presented in Appendix C, the SOP for the analytical laboratory subcontractors, (Chemtech and Ecotest).

3.6 Sample Preparation and Analytical Procedures

All samples collected for chemical analysis at the 18-foot excavation will be analyzed by laboratories certified by the New York State Department of Health's Environmental Laboratory Approval Program (ELAP) to perform laboratory services in the State of New York. A copy of the laboratory certification for Chemtech and Ecotest is provided in Appendix C.

Photoionization Detector (PID) measurements will be made in the field with a 11.2eV lamp.

All analytical procedures will be USEPA Methods as specified in Table 9. The samples will be managed in the laboratory in accordance with the procedures specified in the laboratory QA Manual (Appendix C).

3.7 Data Reduction, Validation and Reporting

Data Reduction

Analytical results will be reduced to the concentration units specified in the analytical procedures. All calculations will be independently checked by senior laboratory staff.

Data from field measurements and sample collection activities will be recorded in the field log book. Field data sheets will be prepared for each sampling location from the field log book and will include any field measurements made, sample collection technique, analysis to be performed and any other relevant information with regard to each sample.

Data Validation

Data evaluation will be performed by the specific analytical task leader, the Laboratory QC Offcer, and the Laboratory QA Manager. Validation will be accomplished through routine audits of the data collection and flow procedures, and monitoring of sample results. Data collection and flow audits include:

- Review of sample documents for completeness by the analyst(s) at each step of the analysis scheme.
- Daily review of instrument logs, performance test results, and analyst performance by the analytical task manager.
- Unannounced audits of report forms, notebooks, and other data sheets by the Laboratory QA Manager.
- Daily review of performance indicators such as blanks, surrogate recoveries, duplicate analyses, matrix spike analyses, etc. by the analytical task manager.
- Checks on a random selection of calculations by the Laboratory QA Manager.
- Review by the Laboratory QA Manager of all reports prior to, and subsequent to, computerized data entry.
- Review and approval of final report by the Laboratory QA Manager.

Results from the analysis of project and blind audit QC samples will be calculated and evaluated as reported. If these results indicate data quality problems, immediate corrective action will be taken, and all data collected since previous QC audits will be carefully reviewed for validity.

Validation of field data will be performed on two different levels. All data will be validated at the time of collection by following standard procedures and QC checks. Data will also be validated by supervisory personnel who will review the data for anomalous values. Any inconsistencies discovered will be resolved immediately, if possible, by seeking clarification from the field personnel responsible for data collection, or by performing the measurement over again. The supervisory personnel are also responsible for ensuring that justifiable data is obtained by following the field objectives described below:

- Adherence to the approved Field Sampling and Analysis Plan.
- Equipment and instruments are properly calibrated and in working order.
- Samples are collected according to written standard operating procedures.
- Sufficient sample volume is collected to maintain sample integrity and conduct all required analysis/
- All applicable field QC samples are provided with each sample set.
- Compete chain-of-custody documentation is maintained throughout the duration of the field effort, and copies are included with each sample shipment.
- Field samples will arrive at the laboratory in good condition.

Data Reporting

The UST closure investigation will be prepared by the selected Demolition contractor pursuant to NYSDEC regulatory criteria.

Laboratory reports will be Category B deliverables for the 18-foot post excavation sampling and will include the preparation of a Data Usability Summary Report.

3.8 Internal Quality Control Checks

Quality control methods used in field activities and in the laboratory ensure that the data generated meet all the precision and accuracy objectives. In addition, these procedures provide a check of the integrity of sampling equipment and decontamination procedures, as well as possible sources of sample contamination in the laboratory.

Field Sampling Collections

Quality control procedures for the field sampling activities will include the following measures:

- Field blanks
- Trip blanks
- Field duplicates
- Matrix spike/matrix spike duplicates (MS/MSDs)

Field and trip blanks are used as control or external QA/QC samples to detect contamination that may be introduced in the field (either atmospheric or from sampling equipment), in transit to or from the sampling site, or in the bottle preparation, sample log- in, or sample storage stages within the laboratory.

Field blank samples, prepared in the field, are analyzed to check for procedural contamination at the site that may cause sample contamination. Field blanks are collected for soil samples by pouring laboratory-supplied water through the sampling equipment. Trip blanks, prepared in the laboratory, are unopened VOC jars filled with laboratory-supplied water or sealed canisters that accompany the samples. Trip blanks are used to assess the potential for contamination of water or air samples due to volatile contaminant migration during sample shipment and storage. Duplicates are pairs of identical samples collected in the field to check variability in sampling, analysis and, as applicable, matrix.

Field blanks will be analyzed at a rate of one per matrix per day. One trip blank per matrix (soil or soil gas) will accompany each shipment. Duplicates will be collected at a rate of one per twenty samples. Method-related QC samples (spikes, duplicates, method blanks, etc.) will be performed by the laboratory as required by the analytical method.

The trip blanks are samples of analyte-free water, prepared at the same location and time as the preparation of bottles that are to be used for sampling. They remain with the sample bottles while in transit to the site, during sampling, and during the return trip to the laboratory. One trip blank (for VOC analysis) will accompany each cooler of samples each day of sampling. At no time during these procedures are they opened. Upon return to the laboratory, they are analyzed as if they were another sample, receiving the same QA/QC procedures as ordinary field samples. If these samples are accidentally opened, it will be noted on the chain of custody.

Field blanks are prepared in the field (at the sampling location) using empty bottles and analyte-free water obtained from the laboratory. Field blanks are performed by pouring the analyte-free water over or through the decontaminated sampling equipment, and then into the empty sample bottles supplied for the field blank. One field blank will be performed each day that samples are obtained.

MS/MSDs are used to determine the effects of matrix interference on analytical results. Spikes of analytes are added to aliquots of sample matrix. Samples re spiked to determine accuracy as a percentage recovery of the analyte from the sample matrix. A matrix duplicate is prepared in the same manner as the matrix spike sample. One MS/MSD will be performed for the soil samples obtained.

Field Measurements

Quality control procedures for measurements made in the field will include following the proper calibration specified by the manufacturer to ensure proper working order and performing all field measurements in duplicate

All duplicate field measurements must be within 10 percent of each other. Field measurements outside of this limit will require a third measurement. The deviating measurement will then be crossed out and initialed in the field log. If measurements within this limit cannot be obtained, the instrument will be recalibrated or replaced.

Laboratory Analysis

Laboratory quality control procedures will follow the applicable USEPA method requirements. These procedures will include at a minimum, the following where applicable:

- Method blanks
- Surrogate spikes/recovery
- Matrix spikes/Matrix spike duplicates (MS/MSD)
- Internal standards
- Instrument calibration

Method blanks provide a check for residual contamination in the analytical instrument and are performed for each sample delivery group. Surrogates are non-target analytes that are added to samples and QA/QC samples to evaluate the effectiveness of the analyses. MS/MSD analysis may be on a sample aliquot associated with the monitoring program, or it may be performed on another sample run in the same batch.

3.9 Performance and Systems Audits

Performance and systems audits are conducted as a check to determine the quality of operations and to monitor the capability and performance of the measurement system. Performance auditsare quantitative in nature and use data from performance evaluation samples such as blanks and matrix spikes to assess the data being collected. Systems audits are more qualitative. They consist of a review of the entire data production process, taking into consideration both sample acquisition procedures and analytical systems within the laboratory.

Internal Laboratory Audits

System audits are performed quarterly by the laboratory to evaluate the various components of the laboratory's measurement system to assess proper selection and use. These audits consist of an on-site review of a laboratory's quality assurance systems and physical facilities for sampling, calibration, and measurements. In addition to the laboratory's own internal system of periodc, system audits are performed on a regular basis by the USEPA and NYSDOH.

Performance audits are also performed regularly by laboratory personnel. Performance audits provide a systematic check of laboratory operations and measurement systems. For maximum usefulness, two types of performance evaluation (PE) samples are employed: A single-blind and a double-blind:

> Single-blind – A sample which is known by all concerned to be a PE, with only the values unknown; the results of these samples are useful in determining technical systemic problems within the operating group.

Double-blind – A sample which appears to be a routine client sample; both identity and values are unknown to the laboratory. Double-blind samples are useful in identifying technical systemic problems, random analytical problems, and non-technical systemic problems.

3.10 Preventative Maintenance

Preventative maintenance is carried out to minimize downtime of field and laboratory instruments and field sampling devices. All field sampling equipment are checked and monitoring instruments are calibrated before the sampling event to ensure they are in proper working order. Laboratory instrument maintenance procedures are described in Appendix C.

3.11 Corrective Actions

Corrective actions are those measures taken to rectify a laboratory or field measurement system that is out of control. Corrective action may be initiated by any person performing work in support of the monitoring program at any time.

The need for corrective action may be identified by system or performance audits or by standard QC procedures. The essential steps in the corrective action system are:

1. Identification and definition of the problem.
2. Assignment of responsibility for investigating the problem.
3. Investigation and determination of the cause of the problem.
4. Determination of a corrective action to eliminate the problem.
5. Assigning and accepting responsibility for implementing the corrective action.
6. Implementing the corrective action and evaluating its effectiveness.
7. Verifying that the corrective action has eliminated the problem.

The QA/QC Officer will ensure that these steps are taken and that the problem, which led to the corrective action, has been resolved.

Field Sample Collection

In the field, unforeseen conditions or circumstances can arise which may make it necessary to revise or deviate from the approved QAPP. Any nonconformance to the QAPP, resulting from conditions in the field requiring changes to approved procedures, will be documented in the field logbook. Field personnel are required to notify the FOL of any field activity which might require a corrective action. It is the responsibility of the FOL and/or the Project Manager to identify any nonconformance, and initiate and develop a corrective action to address each nonconformance. Once a corrective action is developed, it is the responsibility of the project manager to review and approve the corrective action. The approved corrective action will then be implemented by the FOL and the field team.

The sampling personnel are responsible for ensuring that corrective actions are initiated for all non-conformances with field sampling activities. These duties include: evaluating all reported non-conformances, controlling additional work on non-conforming activities and any work dependent on those activities, determining actions to be taken, maintaining a log of non-conformances, reviewing nonconformance reports and corrective actions taken. The FOL is also responsible for ensuring that nonconformance reports are placed in project file.

When changes become necessary to the field program to accommodate site-specific needs, the FOL will notify the Project Manager for approval. When modifications to the sampling program are required, the change will be documented in the field logbook.

Field Measurements

Most problems related to instrument and equipment malfunction will be avoided by checking out field equipment prior to entering the field and by keeping sufficient spare parts and batteries on site to limit downtime. Any deviations from the QAPP will be documented in the field logbook by field personnel and the FOL and will require corrective actions.

Laboratory Analysis

Failure to meet established analytical controls, such as the quality control objectives, prompts corrective action. In general, corrective action may take several forms and may involve a review of the calculations, a check of the instrument maintenance and operation, a review of analytical technique and methodology, and reanalysis of quality control and field samples. If a potential problem develops that cannot be solved directly by the responsible analyst, the supervisor, the department manager and/or the quality assurance coordinator, may examine and pursue alternative solutions. In addition, the appropriate project chemist may be notified in order to ascertain if contact with the client is necessary.

Corrective action due to a performance audit or a check sample problem is initiated by the quality assurance coordinator, the affected laboratory personnel are promptly informed, as are the laboratory supervisors and managers.

3.12 Quality Assurance Reports to Management

The Project Manager will be kept apprised of the QA/QC aspects related to the ongoing monitoring program to ensure the established objectives may be met. Reports to management will include:

- An assessment of measurement data accuracy, precision, and completeness.
- Significant QA/QC problems and recommended solutions.
- Resolutions of previously stated problems.

Status reports will be submitted to describe the progress of the project. These will include field progress reports, compiled field data sets, and corrective action documentation at appropriate intervals. Situations requiring immediate corrective action measures will be brought to the attention of the Project Manager.

The Laboratory Director will provide QA update as part of the laboratory data package for each sampling episode to describe any QA/QC problems and corrective actions.

4.0 Implementation Schedule

This schedule for the proposed remedial action is as follows:

Excavation Activities	3.5 months
Confirmatory Sampling and Reporting	1.0 months
	4.5 months

Excavation activities include removal of building floor slabs; underground structures and utilities; above ground and underground storage tanks; potentially impacted soils associated with the USTs; and, additional soil excavation to a total depth of approximately 18 feet below gradeacross a significant portion of the Site.

5.0 Conclusions and Recommendations

Conclusions and recommendations based on Shaw's assessment of the Site environmental data are as follows:

- Data collected from soil borings in the vicinity of the USTs have detected SVOCs and several metals at concentrations that marginally exceed TAGM guidance values. These detections are not associated with a release from the USTs but are attributable to historic fill materials.
- Groundwater is contaminated with low levels of VOCs (PCE and TCE). Concentrations have decreased considerably since investigations completed in the late 1990s. Levels of PCE or TCE have decreased from a high of up to 1300 ppb in 1999 to less than 25 ppb in 2003.
- From 1999 through 2003, numerous soil borings were advanced throughout the Site including areas beneath the buildings. No source area of VOCs that resulted in the groundwater contamination could be identified.
- A soil gas survey performed in 2003 detected PCE and TCE vapors at elevated concentrations generally at locations beneath the building slabs, and at depths corresponding to 18-22 feet below grade. These vapors are thought to be vapors trapped in the subsurface soil layers, and attributable to residual VOCs on the Site.
- Remedial actions will entail removal of the existing USTs and closure pursuant to applicable NYSDEC regulatory criteria.
- During the demolition of the existing buildings and the planned construction of the school, the building slabs and underlying soils will be removed. It is anticipated that in the process of completing these activities, residual soil vaporswill dissipate, and that any remaining vapors will be at levels that do not pose a risk to human health or the environment.
- Although significant removal of the residual soil vapors is anticipated as a result of soil excavation activities, inclusion of a vapor barrier and passive ventilation system under the school building will be implemented as an added safeguard.

The proposed remedial action for the Site described herein is considered to be the initial phase of a remedy for the Site. Following completion of the present remedy, additional remedial activities may be required which will be detailed in a Supplemental Remedial Action Work Plan. The need for a subsequent remedial phase at the Site will be based on concurrence from NYSDEC and NYSDOH.

6.0 Bibliography

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5. Camp Dresser and McKee (CDM) (2000), Preliminary Phase I Environmental Site Assessment
6. CDM (2000), Phase II Environmental Site Assessment
7. Shaw Environmental and Infrastructure (Shaw) 2002, Supplemental Phase II Environmental Site Investigation Report.
8. Shaw (2002), Pre-Construction Environmental Site Investigation Report
9. Shaw (2003), Results of Supplemental Sampling and Analysis Plan

7.0 Signatures of Environmental Professionals

Shaw Environmental and Infrastructure has prepared this Remedial Action Work Plan (RAW) for the Former Adams Brush manufacturing Site located at 94-02 104th Street, Borough of Queens, New York.

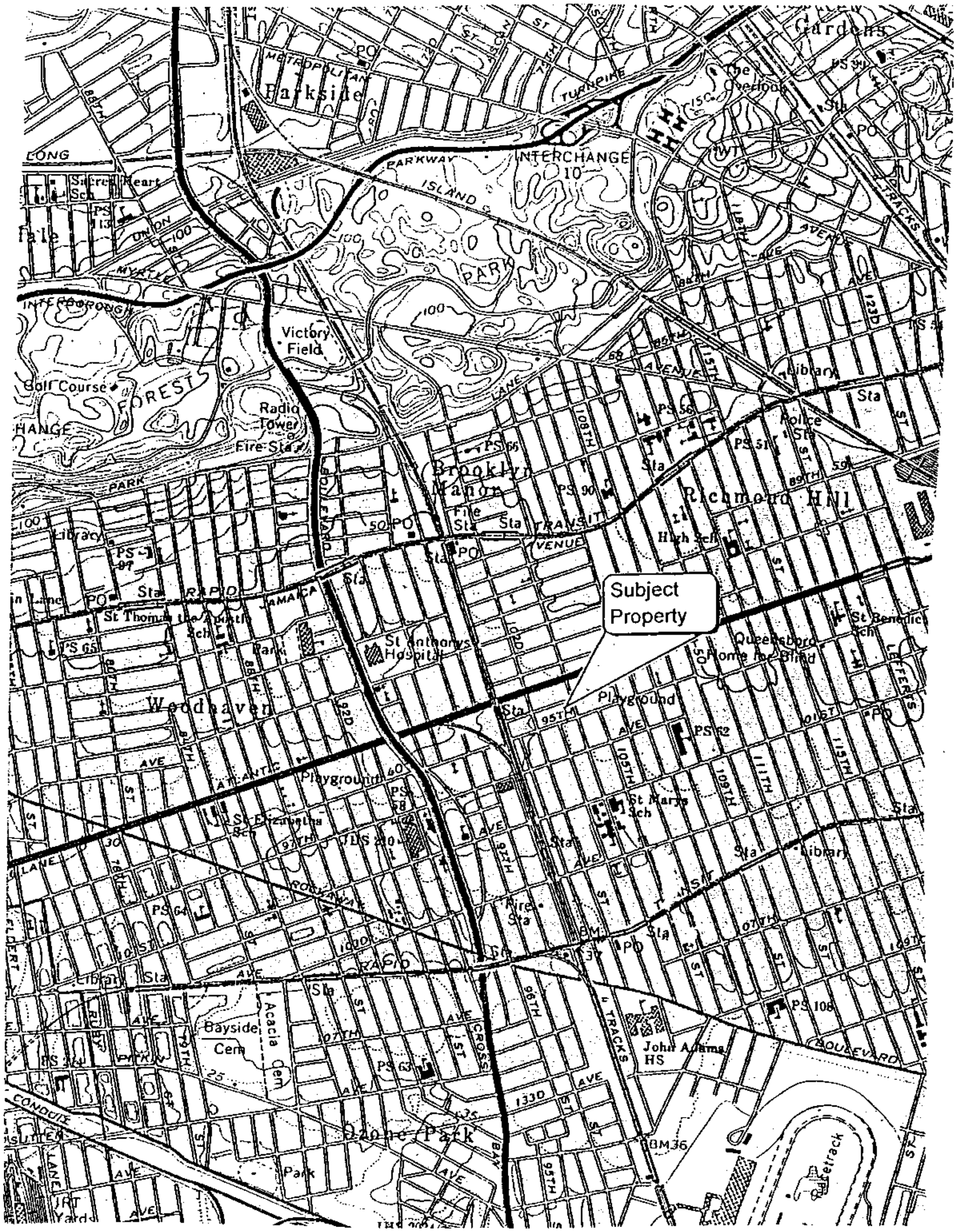
SHAW ENVIRONMENTAL AND INFRASTRUCTURE

Saul Ash, CPG
Project Manager

Ajay Chandwani, P.E.
Senior Engineer
License No. 076594

Steven Goldberg, Ph.D., CPG
Program Manager

FIGURES



94-02 104th Street
Queens, NY

APPROXIMATE SCALE
0 24,000 48,000 FEET

Shaw
Shaw E & I, Inc.

101-1 COLIN DRIVE
HOLBROOK, NEW YORK 11741
(631) 472-4000

FIGURE 1
SITE LOCATION MAP
ADAMS BRUSH MANUFACTURING
94-02 104TH STREET
QUEENS, NEW YORK

OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Holbrook, ny	E. Dunseath 08/27/02	E. Gustafson 09/11/02	E. Gustafson 09/11/02	842150-FIG1

XREF Files: IMAGE Files: USGS_11.jpg
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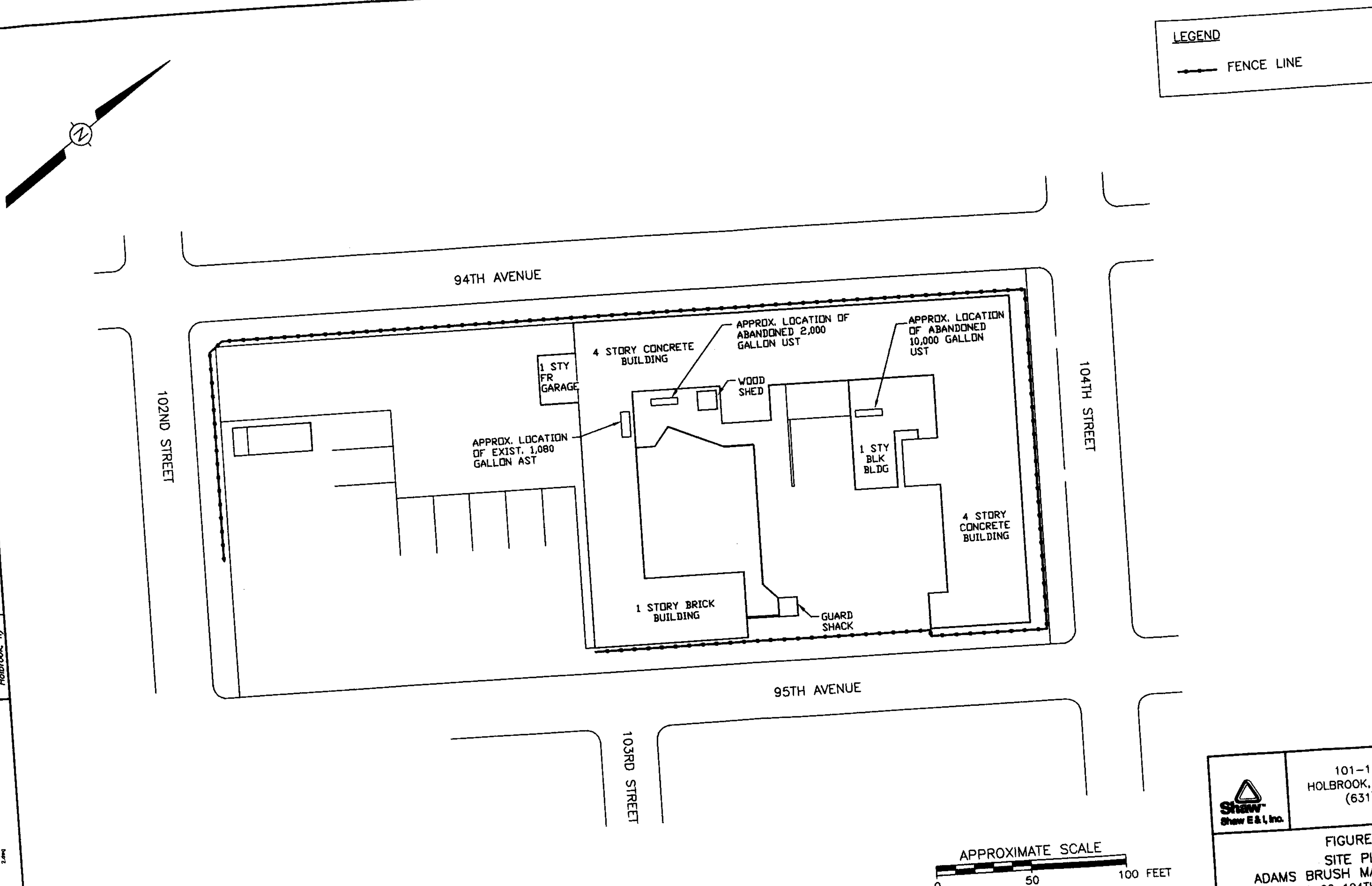
Plotted By: randy.logoff

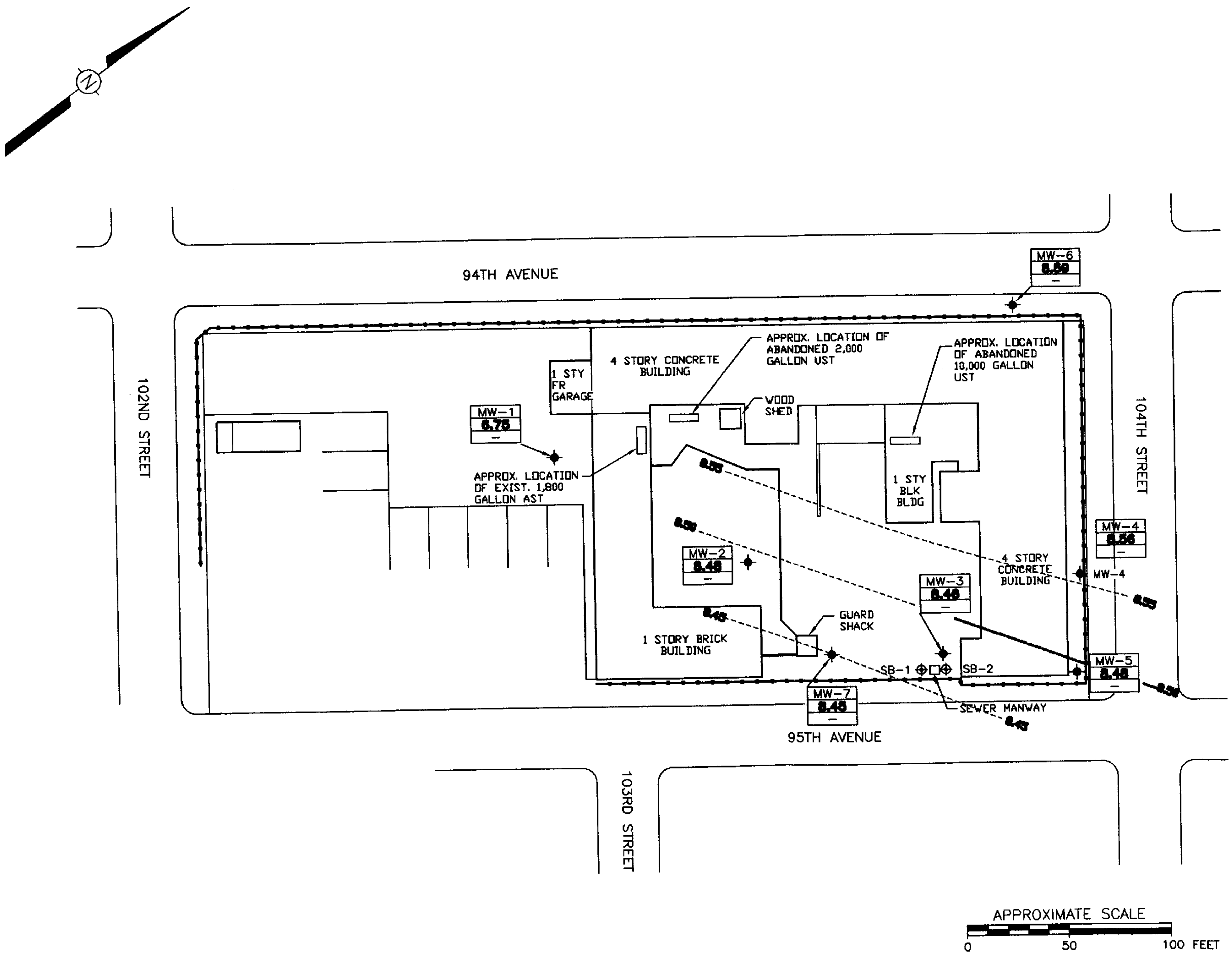


Shaw E & I, Inc.

101-1 COLIN DRIVE
HOLBROOK, NEW YORK 11741
(631) 472-4000

FIGURE 2
SITE PLAN
ADAMS BRUSH MANUFACTURING
94-02 104TH STREET
QUEENS, NEW YORK

CE	N B		HECK Y		AF ED		D IG NUMBER
Holbrook, ny	E. Dunseath	08/27/02	E. Gustafson	09/11/02	E. Gustafson	09/11/02	842150-FIG2



LEGEND

- FENCE LINE
- MONITORING WELL
- SOIL BORING
- WELL ID / GROUNDWATER ELEVATION / PRODUCT THICKNESS

NOTES:
MW-1 NOT UTILIZED IN GENERATING GROUNDWATER SCHEME.

Shaw Shaw E & I, Inc.

101-1 COLIN DRIVE
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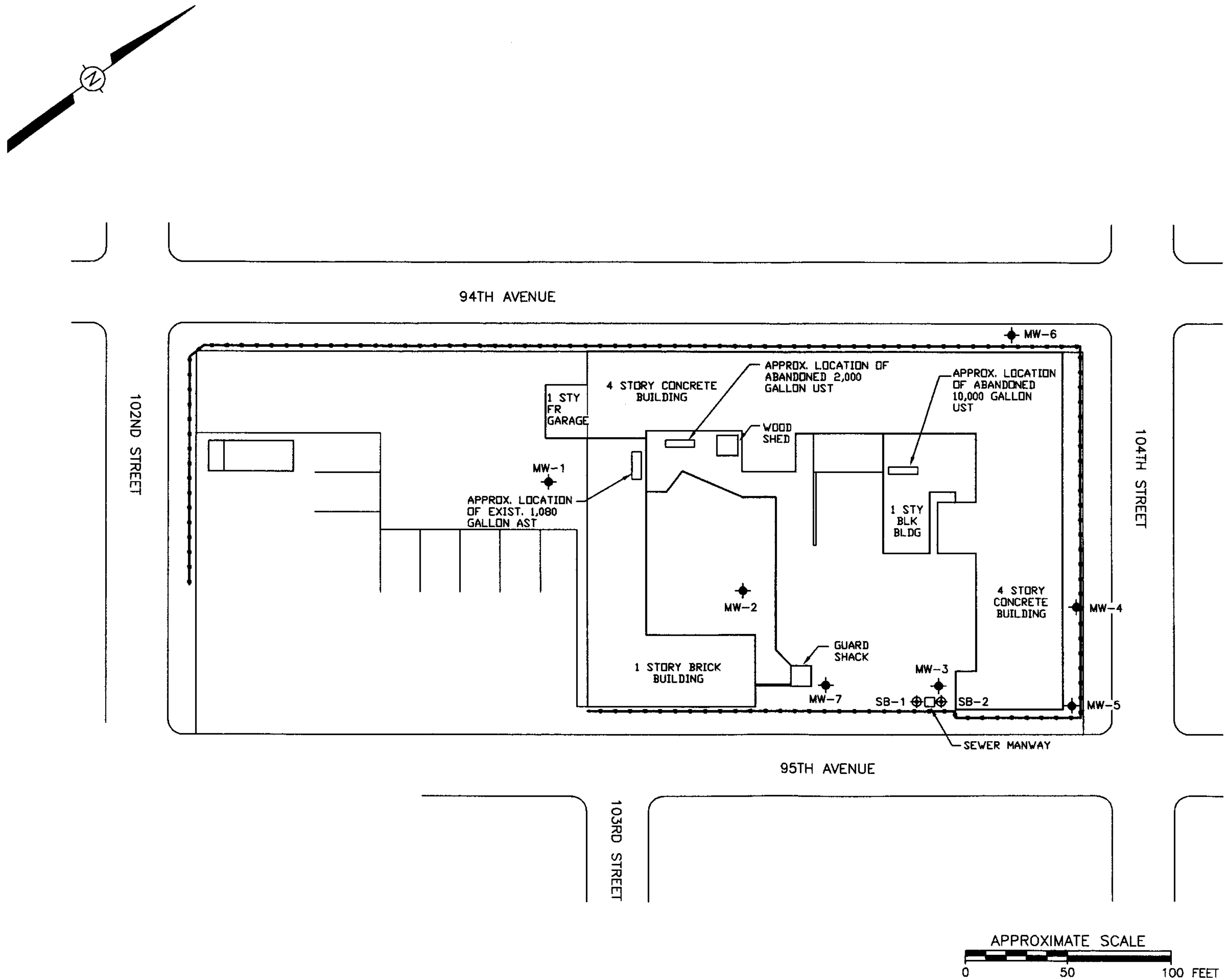
FIGURE 3
GROUNDWATER CONTOUR MAP
AUGUST 8, 2002
ADAMS BRUSH MANUFACTURING
94-02 104TH STREET
QUEENS, NEW YORK



LEGEND

- FENCE LINE
- MONITORING WELL
- SOIL BORING

OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
Holbrook, ny	E. Dunseath	08/27/02	E. Gustafson	09/11/02	E. Gustafson	09/11/02	842150-FIG5

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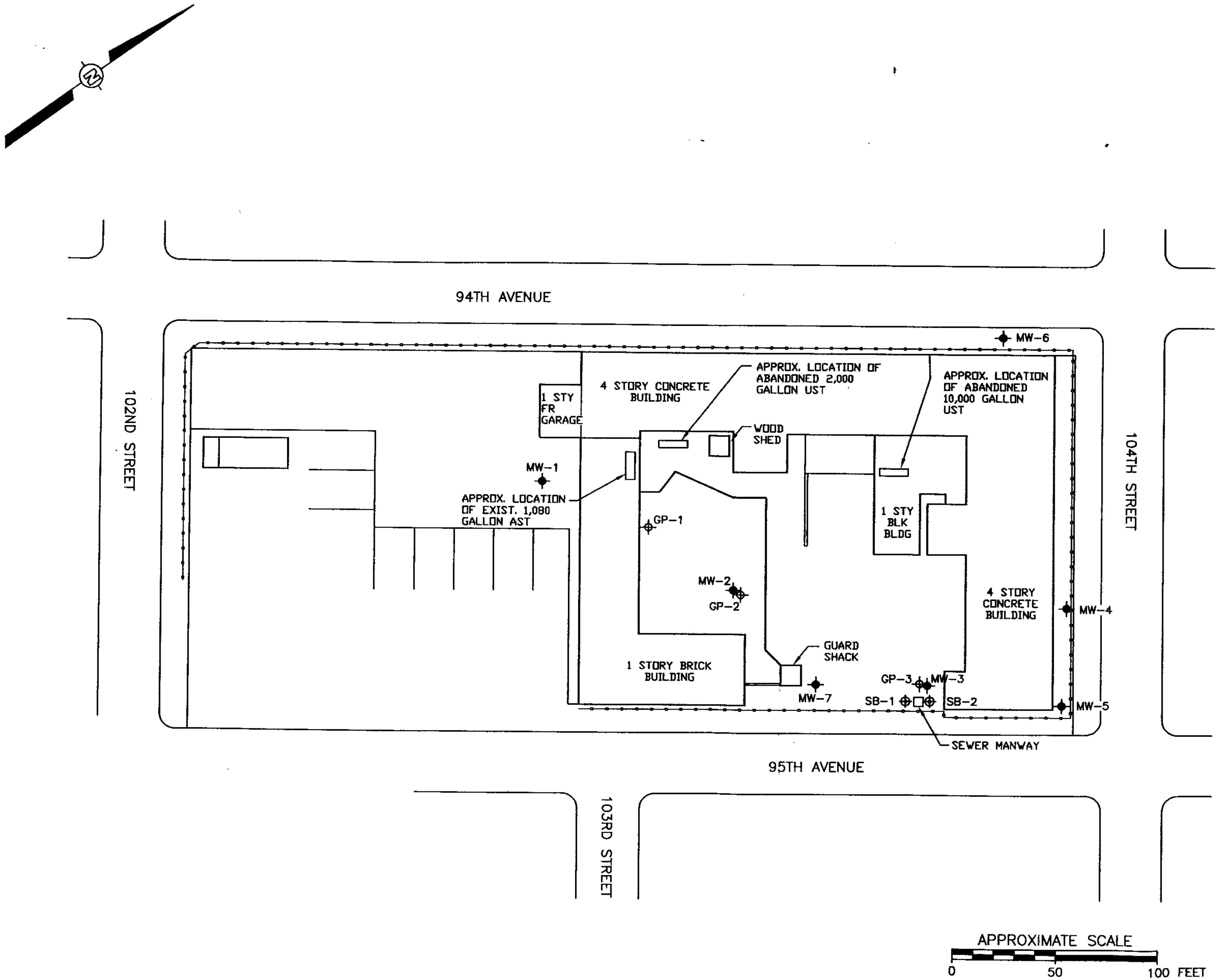
FIGURE 5
SUPPLEMENTAL PHASE II SAMPLING PLAN
SEPTEMBER 2002
94-02 104TH STREET
QUEENS, NEW YORK

OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER	842150-FIG5
Holbrook, ny	E. Dunseath	08/27/02	E. Gustafson	09/11/02	E. Gustafson	09/11/02		



LEGEND

- FENCE LINE
- MONITORING WELL
- SOIL BORING
- GEOPROBE

Note: GP-1, GP-2 and GP-3 are historical Geoprobe borings completed in 1999 by P.W. Grosser.

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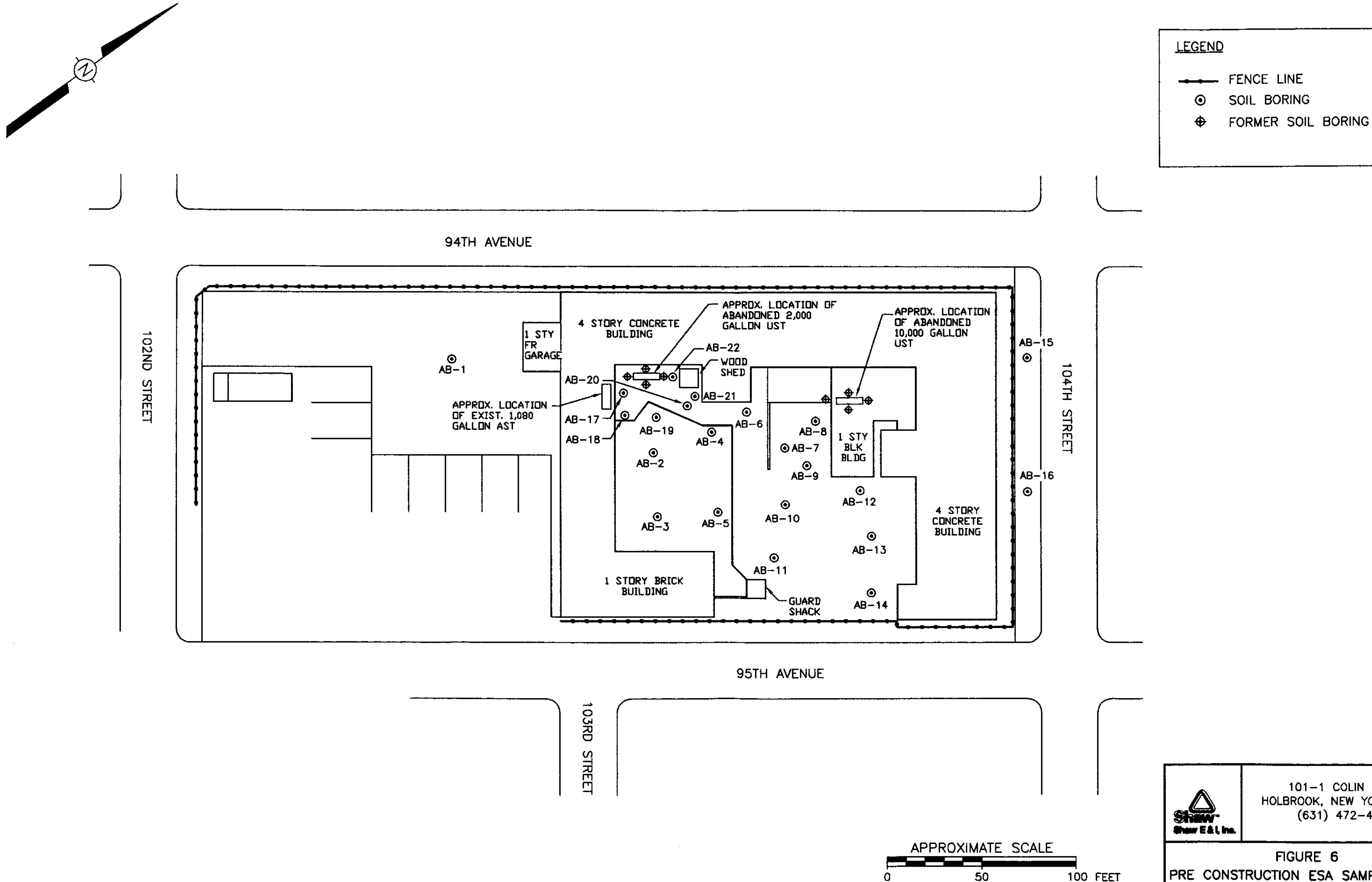
FIGURE 5A
SUPPLEMENTAL PHASE II SAMPLING PLAN
SEPTEMBER 2002
94-02 104TH STREET
QUEENS, NEW YORK



OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
Holbrook, ny	E. Dunseath	08/27/02	E. Gustafson	09/11/02	E. Gustafson	09/11/02	842150-FIG6

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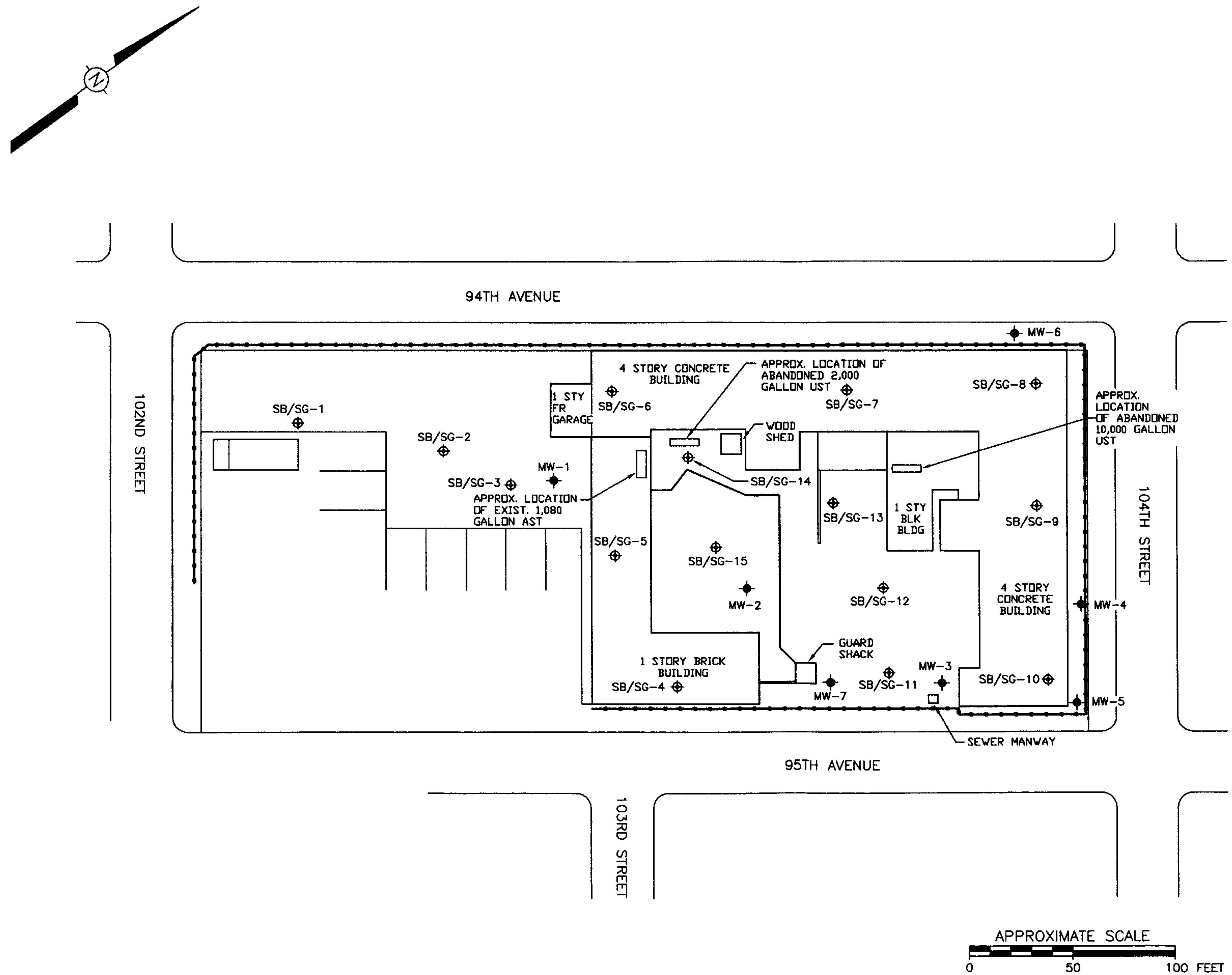
FIGURE 6
PRE CONSTRUCTION ESA SAMPLING PLAN
ADAMS BRUSH MANUFACTURING
94-02 104TH STREET
QUEENS, NEW YORK

OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
Holbrook, ny	E. Dunseath	01/24/03	E. Gustafson	01/24/03	E. Gustafson	01/24/03	842150-FIG7



LEGEND

- FENCE LINE
- MONITORING WELL
- SOIL BORING

NOTE

BORING LOCATIONS COMPLETED PER STV SUPPLEMENTAL SAMPLING AND ANALYSIS PLAN REVISED 11/25/02.

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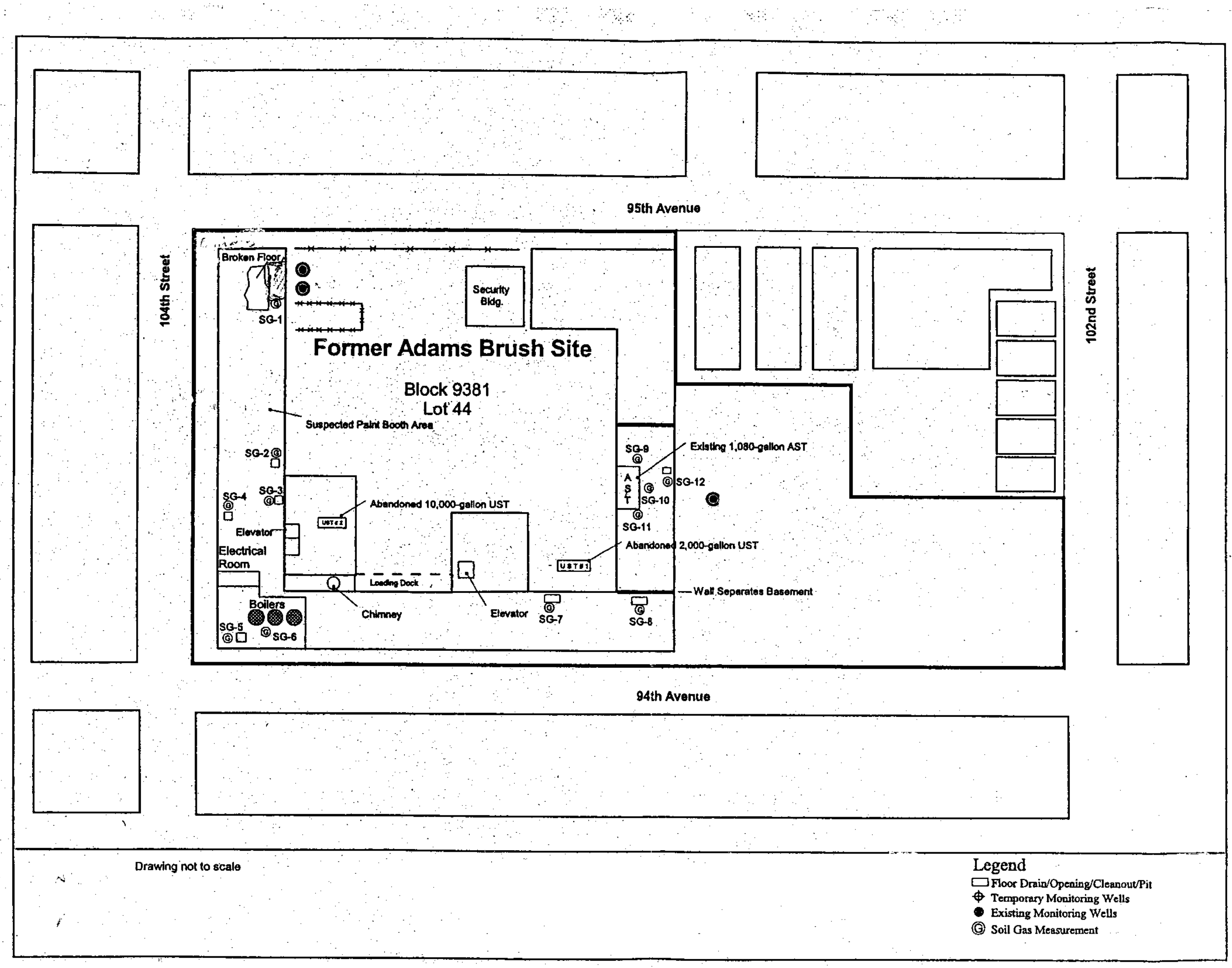
FIGURE 7
SOIL BORING AND SOIL GAS SURVEY LOCATION PLAN, JANUARY 2003
ADAMS BRUSH MANUFACTURING
STV SUPPLEMENTAL INVESTIGATION
94-02 104TH STREET
QUEENS, NEW YORK



SOURCE: PHASE II ENVIRONMENTAL SITE ASSESSMENT OF ADAMS BRUSH MANUFACTURING, CAMP DRESSER & MCKEE, REVISED 9/28/00

OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
Holbrook, ny	E. Dunseath	08/27/02	E. Gustafson	09/11/02	E. Gustafson	09/11/02	842150-FIG8

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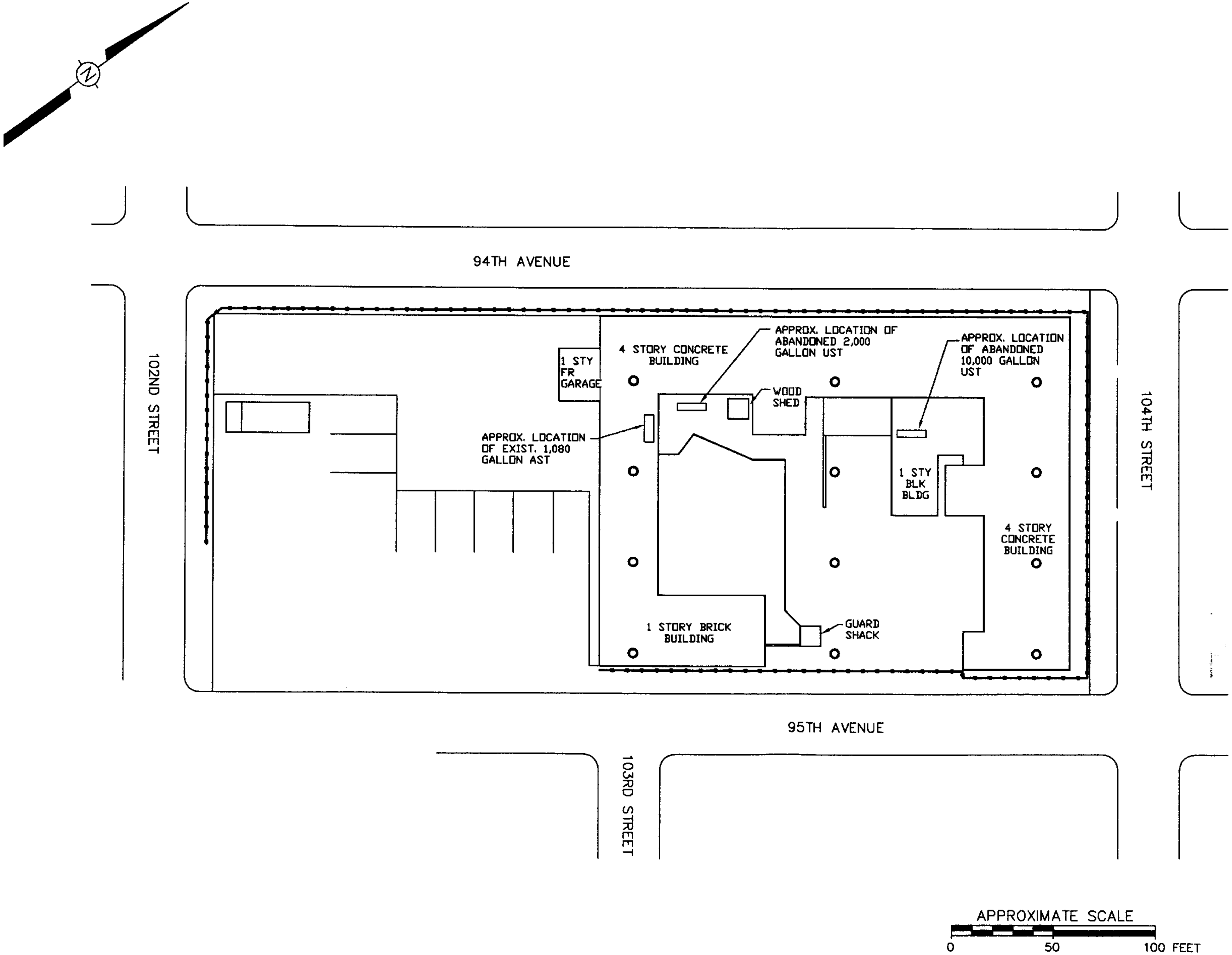
FIGURE 8
SOIL GAS SURVEY POINTS
JUNE 2000
ADAMS BRUSH MANUFACTURING
94-02 104TH STREET
QUEENS, NEW YORK



LEGEND

FENCE LINE

PROPOSED POST-EXCAVATION SOIL SAMPLE LOCATION

Note: Proposed locations represent both soil and soil gas sample locations.

OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
Holbrook, ny	E. Dunseath	08/27/02	E. Gustafson	09/11/02	E. Gustafson	09/11/02	842150-FIG9

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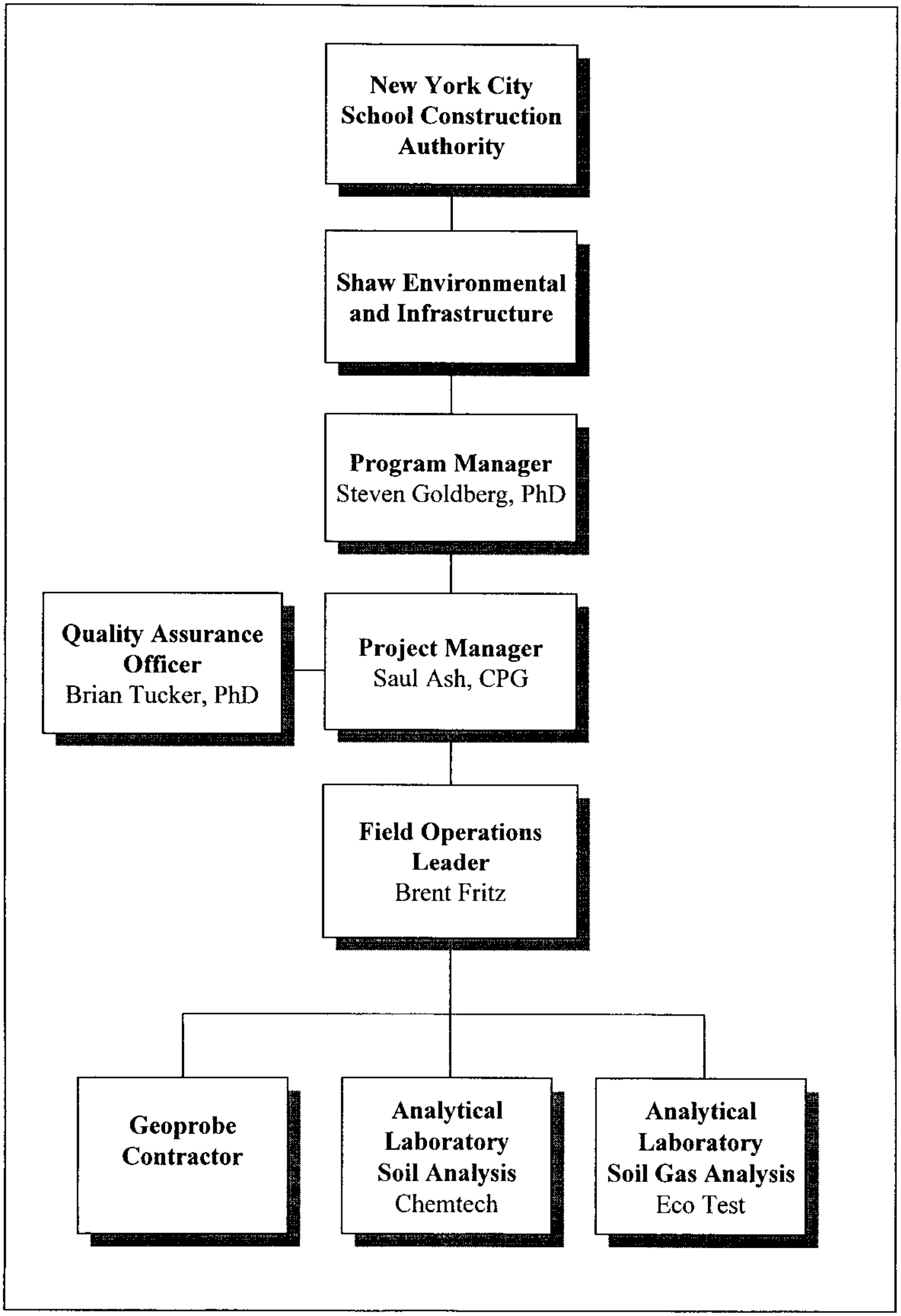
FIGURE 9
PROPOSED POST-EXCAVATION SAMPLING PLAN
ADAMS BRUSH MANUFACTURING
94-02 104TH STREET
QUEENS, NEW YORK

Figure 10
Organizational Chart
Quality Assurance Project Plan
Former Adams Brush Manufacturing Site



N:\proj\nyc-sca\adams brush\raw\org chart.ppt

TABLES

Table 1

Analytical Results of Soil Boring Samples
Adams Brush Manufacturing

	Units	NYSDEC Soil Cleanup Criteria*	AB-TW-01	AB-TW-02	AB-TW-03	AB-TW-04	Trip Blank	AB-FB-01(S)**	AB-SB-03	AB-SB-5	AB-SB-6A	AB-SB-6B	AB-SB-6C	AB-SB-7
Date			5/30/00	5/30/00	5/31/00	5/31/00	5/26/00	5/30/00	6/8/00	6/9/00	6/9/00	6/9/00	6/9/00	6/9/00
Sample Depth			2.0'-2.5'	37'-37.5'	34.5'-35'	34.5'-35'	N/A	N/A	2.0'-7.0'	3.5'-4.0'	0.0'-0.5'	1.5'-2.0'	11'-12'	10'-11'
Volatile Organics (EPA 8260B)														
Benzene	ug/Kg	60	ND	ND	ND	ND	ND	ND	11.4	ND	ND	ND	ND	ND
Chlorobenzene	ug/Kg	1,700	ND	ND	ND	ND	ND	ND	12.5	ND	ND	ND	ND	ND
Methylene Chloride	ug/Kg	100	ND	ND	ND	ND	ND	ND	32.5	ND	ND	ND	ND	ND
Toluene	ug/Kg	1,500	ND	ND	ND	ND	ND	7.5	12.1	ND	ND	ND	ND	ND
Trichloroethylene	ug/Kg	700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TICs	ug/Kg	NS	ND	ND	ND	ND	ND	ND	ND	1,555	ND	ND	ND	ND
Semivolatile Organics (EPA 8270)														
Anthracene	ug/Kg	50,000	ND	ND	ND	ND	-	ND	ND	-	ND	1,000	ND	ND
Benzo(a)anthracene	ug/Kg	224	ND	ND	ND	ND	-	ND	784	2,860	835	3,000	ND	ND
Benzo(a)pyrene	ug/Kg	61	ND	ND	ND	ND	-	ND	1,400	2,290	734	2,000	ND	ND
Benzo(b)fluoranthene	ug/Kg	1,100	ND	ND	ND	ND	-	ND	1,480	ND	673	2,000	ND	ND
Benzo(g,h,i)perylene	ug/Kg	50,000	ND	ND	ND	ND	-	ND	964	1,260	461	1,000	ND	ND
Benzo(k)fluoranthene	ug/Kg	1,100	ND	ND	ND	ND	-	ND	755	ND	605	2,000	ND	ND
bis(2-Ethylhexyl)phthalate	ug/Kg	50,000	1,900	ND	ND	ND	-	ND	ND	ND	757	ND	ND	ND
Butyl Benzyl Phthalate	ug/Kg	50,000	ND	ND	ND	ND	-	ND	ND	ND	184	ND	ND	ND
Chrysene	ug/Kg	400	ND	ND	ND	ND	-	ND	884	3,050	875	3,000	ND	ND
Dibenzo(a,h)Anthracene	ug/Kg	14	ND	ND	ND	ND	-	ND	194	930	ND	ND	ND	ND
Diethyl Phthalate	ug/Kg	7,100	ND	ND	ND	ND	-	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate	ug/Kg	8,100	ND	ND	ND	ND	-	ND	9,700	ND	177	ND	ND	ND
2,4 Dinitrotoluene	ug/Kg	NS	ND	ND	ND	ND	-	1.0	ND	ND	ND	ND	ND	ND
Fluoranthene	ug/Kg	50,000	ND	ND	ND	ND	-	ND	944	5,850	1,600	6,000	ND	ND
Indeno(1,2,3-cd)Pyrene	ug/Kg	3,200	ND	ND	ND	ND	-	ND	819	1,080	357	ND	ND	ND
Isophorone	ug/Kg	4,400	ND	ND	ND	ND	-	13.4	ND	ND	ND	ND	ND	ND
Phenanthrene	ug/Kg	50,000	ND	ND	ND	ND	-	ND	658	4,550	1,230	4,000	ND	ND
Pyrene	ug/Kg	50,000	ND	ND	ND	ND	-	ND	1,850	7,160	1,800	7,000	ND	ND
TICs	ug/kg	NS	ND	500	ND	ND	-	18.0	5,397	105,360	ND	ND	ND	ND
Total RCRA Metals (6010B, SW-846)														
Arsenic	mg/Kg	7.5	ND	ND	ND	ND	-	-	4.91	-	8	7.32	-	-
Barium	mg/Kg	300	57.4	16.9	16.4	9.44	-	-	77.9	-	221	238	-	-
Chromium	mg/Kg	10	21.8	8.63	6.6	5.45	-	-	15.8	-	29.3	27	-	-
Lead	mg/Kg	SB	ND	ND	ND	ND	-	-	180	-	753	409	-	-
Mercury (Method 7471, EPA 1986)	mg/Kg	0.1	ND	ND	ND	ND	-	-	0.24	-	0.5	1.01	-	-

SOIL NOTES:

-	Not analyzed for
[shaded box]	Value Exceeds Criteria
ND	Not Detected
NS	No Standard
N/A	Not Applicable
SB	**Site Background or Eastern Regional Background (4 to 61 mg/kg for lead)**
FB	Field Blank
TICs	Tentatively Identified Compounds
* Source:	NYSDEC TAGM HW94-4046 (January 24, 1994 revised): Recommended Soil Cleanup Objectives
**	TB and FB Units are in ug/L for organics and mg/L for metals
***	Sample taken 6"-12" below basement floor

Table 1

Analytical Results of Soil Boring Samples
Adams Brush Manufacturing

	Units	NYSDEC Soil Cleanup Criteria*	AB-SB-8A	AB-SB-8B	AB-SB-10	Trip Blank	AB-FB-01(S)**	BS-1	Trip Blank
Date			6/9/00	6/9/00	6/8/00	6/7/00	6/8/00	6/1/00	5/31/00
Sample Depth			9.0'-9.5'	33.0'-33.5'	39'-41'	N/A	N/A	***	N/A
Volatile Organics (EPA 8260B)									
Benzene	ug/Kg	60	ND	ND	15.1	ND	ND	ND	ND
Chlorobenzene	ug/Kg	1,700	ND	ND	13.0	ND	ND	ND	ND
Methylene Chloride	ug/Kg	100	ND	ND	31.6	ND	ND	ND	ND
Toluene	ug/Kg	1,500	ND	ND	15.0	ND	ND	ND	ND
Trichloroethylene	ug/Kg	700	ND	ND	17.1	ND	ND	ND	ND
TICs	ug/Kg	NS	ND	ND	ND	ND	ND	ND	ND
Semivolatile Organics (EPA 8270)									
Anthracene	ug/Kg	50,000	ND	ND	ND	-	ND	ND	-
Benzo(a)anthracene	ug/Kg	224	ND	ND	ND	-	ND	ND	-
Benzo(a)pyrene	ug/Kg	61	ND	ND	ND	-	ND	ND	-
Benzo(b)fluoranthene	ug/Kg	1,100	ND	ND	ND	-	ND	ND	-
Benzo(g,h,i)perylene	ug/Kg	50,000	ND	ND	ND	-	ND	ND	-
Benzo(k)fluoranthene	ug/Kg	1,100	ND	ND	ND	-	ND	ND	-
bis(2-Ethylhexyl)phthalate	ug/Kg	50,000	ND	ND	ND	-	2.9	ND	-
Butyl Benzyl Phthalate	ug/Kg	50,000	ND	ND	ND	-	ND	ND	-
Chrysene	ug/Kg	400	ND	ND	ND	-	ND	ND	-
Dibenzo(a,h)Anthracene	ug/Kg	14	ND	ND	ND	-	ND	ND	-
Diethyl Phthalate	ug/Kg	7,100	ND	ND	ND	-	1.8	ND	-
Di-n-butylphthalate	ug/Kg	8,100	ND	ND	ND	-	ND	ND	-
2,4 Dinitrotoluene	ug/Kg	NS	ND	ND	ND	-	ND	ND	-
Fluoranthene	ug/Kg	50,000	ND	ND	ND	-	ND	ND	-
Indeno(1,2,3-cd)Pyrene	ug/Kg	3,200	ND	ND	ND	-	ND	ND	-
Isophorone	ug/Kg	4,400	ND	ND	ND	-	ND	ND	-
Phenanthrene	ug/Kg	50,000	ND	ND	ND	-	ND	ND	-
Pyrene	ug/Kg	50,000	ND	ND	ND	-	ND	ND	-
TICs	ug/kg	NS	ND	ND	ND	-	222	820	-
Total RCRA Metals (6010B, SW-846)									
Arsenic	mg/Kg	7.5	-	-	-	-	-	ND	-
Barium	mg/Kg	300	-	-	-	-	-	127	-
Chromium	mg/Kg	10	-	-	-	-	-	11.0	-
Lead	mg/Kg	SB	-	-	-	-	-	136	-
Mercury (Method 7471, EPA 1986)	mg/Kg	0.1	-	-	-	-	-	0.21	-

SOIL NOTES:

-	Not analyzed for
[box]	Value Exceeds Criteria
ND	Not Detected
NS	No Standard
N/A	Not Applicable
SB	**Site Background or Eastern Regional Background (4 to 61 mg/kg for lead)**
FB	Field Blank
TICs	Tentatively Identified Compounds
* Source:	NYSDEC TAGM HW94-4046 (January 24, 1994 revised): Recommended Soil Cleanup Objectives
**	TB and FB Units are in ug/L for organics and mg/L for metals
***	Sample taken 6"-12" below basement floor

Table 2
Summary of Soil Analytical Data
New York City School Construction Authority
Adams Brush Manufacturing
94-02 104th Street, Queens, New York
September 2002 Investigation

Compound	TAGM 4046* Value (ppb) <5 ft.	>5 ft.	Boring/Sample ID SB-1 22' bgs	SB-2 22' bgs	MW-6 10' bgs	MW-6 20' bgs	MW-6 35' bgs
Volatile Organic Compounds					(ppb)		
Acetone	200	200	7.4	11	9.2	10	9.2
Methylene Chloride	100	100	11	20	18	14	21
Semi-Volatile Organic Compound					(ppb)		
Naphthalene	5,200	13,000	NA	NA	ND	ND	ND
Acenaphthene	36,800	50,000	NA	NA	ND	ND	ND
Flourene	50,000	50,000	NA	NA	ND	ND	ND
Phenanthrene	50,000	50,000	NA	NA	ND	ND	ND
Anthracene	50,000	50,000	NA	NA	ND	ND	ND
Flouranthene	50,000	50,000	NA	NA	ND	ND	ND
Pyrene	50,000	50,000	NA	NA	ND	ND	ND
Benzo(a)anthracene	224	224	NA	NA	ND	ND	ND
Chrysene	160	400	NA	NA	ND	ND	ND
Benzo(b)fluoranthene	61	61	NA	NA	ND	ND	ND
Benzo(k)fluoranthene	440	610	NA	NA	ND	ND	ND
Benzo(a)pyrene	61	61	NA	NA	ND	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	NA	NA	ND	ND	ND
Benzo(g,h,i)perylene	50000	50000	NA	NA	ND	ND	ND
Compound	**TAGM 4046*** <1 ft	>1 ft.	**Boring/Sample ID** **SB-1 22' bgs**	**SB-2 22' bgs**	**MW-6 10' bgs**	**MW-6 20' bgs**	**MW-6 35' bgs**
Polychlorinated Biphenyls					(ppm)		
Total PCBs	1.0	10	NA	NA	ND	ND	ND
Compound	**TAGM 4046* Value (ppm)**		**Boring/Sample ID** **SB-1 22' bgs**	**SB-2 22' bgs**	**MW-6 10' bgs**	**MW-6 20' bgs**	**MW-6 35' bgs**
Inorganics					(ppm)		
Arsenic	7.5 or SB		NA	NA	1.9	0.72 B	0.67 B
Barium	300 or SB		NA	NA	49.9	19.0 B	53.0
Cadmium	1 or SB		NA	NA	0.12 B	ND	0.12 B
Chromium	10 or SB		NA	NA	**12**	7.9	8.6
Lead	SB		NA	NA	44.7	0.60	0.74
Mercury	0.1		NA	NA	0.02	ND	ND
Selenium	2 or SB		NA	NA	0.45 B	0.42 B	0.71

Notes:
*TAGM Values for VOCs, SVOCs and PCBs are for soil samples obtained less than 5ft. or greater than 5ft. to groundw
NA - Sample Not Analyzed
SB - Site Background
D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.
J - Indicates and estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.
B - (Organics) Indicates the analyte was found in the blank as well as the sample.
B - (Inorganics) If the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).
ND - Not detected
Bold face and shaded values indicates exccedance of TAGM value
Lead levels were below typical metropolitan background levels of 200-500 ppm (TAGM 4046)

Table 2
Summary of Soil Analytical Data
New York City School Construction Authority
Adams Brush Manufacturing
94-02 104th Street, Queens, New York
September 2002 Investigation

Compound	TAGM 4046* Value (ppb) <5 ft.	TAGM 4046* Value (ppb) >5 ft.	Boring/Sample ID MW-7 10' bgs	MW-7 20' bgs	MW-7 35' bgs	Field Blank	Trip Blank
Volatile Organic Compounds					(ppb)		
Acetone	200	200	19	9.9	9.1	ND	ND
Methylene Chloride	100	100	12	14	15	ND	ND
Semi-Volatile Organic Compounds					(ppb)		
Naphthalene	5,200	13,000	ND	69 J	ND	NA	NA
Acenaphthene	36,800	50,000	ND	67 J	ND	NA	NA
Flourene	50,000	50,000	ND	60 J	ND	NA	NA
Phenanthrene	50,000	50,000	ND	400	ND	NA	NA
Anthracene	50,000	50,000	ND	87 J	ND	NA	NA
Flouranthene	50,000	50,000	ND	450	ND	NA	NA
Pyrene	50,000	50,000	ND	420	ND	NA	NA
Benzo(a)anthracene	224	224	ND	210 J	ND	NA	NA
Chrysene	160	400	ND	210 J	ND	NA	NA
Benzo(b)fluoranthene	61	61	ND	**180 J**	ND	NA	NA
Benzo(k)fluoranthene	440	610	ND	160 J	ND	NA	NA
Benzo(a)pyrene	61	61	ND	**210 J**	ND	NA	NA
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	130 J	ND	NA	NA
Benzo(g,h,i)perylene	50000	50000	ND	140 J	ND	NA	NA
Compound	**TAGM 4046*** <1 ft	>1 ft.	**Boring/Sample ID** **MW-7 10' bgs**	**MW-7 20' bgs**	**MW-7 35' bgs**	**Field Blank**	**Trip Blank**
Polychlorinated Biphenyls					(ppm)		
Total PCBs	1.0	10	ND	ND	ND	NA	NA
Compound	**TAGM 4046* Value (ppm)**		**Boring/Sample ID** **MW-7 10' bgs**	**MW-7 20' bgs**	**MW-7 35' bgs**	**Field Blank**	**Trip Blank**
Inorganics					(ppm)		
Arsenic	7.5 or SB		0.48 B	0.46 B	0.66 B	NA	NA
Barium	300 or SB		22.6	17.2 B	14.3 B	NA	NA
Cadmium	1 or SB		0.13 B	0.10 B		NA	NA
Chromium	10 or SB		7.7	6.9	5.4	NA	NA
Lead	SB		ND	0.22 B	0.36	NA	NA
Mercury	0.1		ND	ND	ND	NA	NA
Selenium	2 or SB		ND	ND	ND	NA	NA

Notes:
*TAGM Values for VOCs, SVOCs and PCBs are for soil samples obtained less than 5ft. or greater than 5ft. to groundwa
NA - Sample Not Analyzed
SB - Site Background
D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.
J - Indicates and estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.
B - (Organics) Indicates the analyte was found in the blank as well as the sample.
B - (Inorganics) If the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).
ND - Not detected
Bold face and shaded values indicates exccedance of TAGM value
Lead levels were below typical metropolitan background levels of 200-500 ppm (TAGM 4046)

Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Semi Volatile Organics
September 2002 Investigation

Compound	TAGM 4046* Value (ppb)		Boring/Sample ID			
			AB-1	AB-2	AB-3	AB-4
	<5 ft.	>5 ft.	8-12' bgs	8-12' bgs	8-12' bgs	8-12' bgs
Semi-Volatile Organic Compounds						
Acenaphthylene	41,000	41,000	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	ND	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND
2,6-Dinitrotoluene	1,000	1,000	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	ND
Phenanthrene	50,000	50,000	ND	ND	ND	ND
Anthracene	50,000	50,000	ND	ND	ND	ND
Carbazole	-	-	ND	ND	ND	ND
Flouranthene	50,000	50,000	ND	ND	ND	ND
Pyrene	50,000	50,000	ND	ND	ND	ND
Benzo(a)anthracene	224	224	ND	ND	ND	ND
Chrysene	160	400	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	ND	48 J	42 J	70 J
Benzo(b)fluoranthene	61	61	ND	ND	ND	ND
Benzo(k)fluoranthene	440	610	ND	ND	ND	ND
Benzo(a)pyrene	61	61	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	ND
Isophorone	4,400	4,400	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	ND	ND

Notes:

*TAGM Values (for VOCs and SVOCs) are for soil samples obtained less than (<) 5ft. or greater than (>) 5ft. to groundwater

NA - Sample Not Analyzed

ND - Not Detected

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

J - Indicates and estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B - (Organics) Indicates the analyte was found in the blank as well as the sample.

Bold face and shaded values indicates exccedance of TAGM value

Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Semi Volatile Organics
September 2002 Investigation

Compound	TAGM 4046* Value (ppb)		Boring/Sample ID			
	<5 ft.	>5 ft.	AB-4RE 8-12' bgs	AB-5 8-12' bgs	AB-5 DUP 8-12' bgs	AB-6 8-12' bgs
Semi-Volatile Organic Compounds						
Acenaphthylene	41,000	41,000	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	ND	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND
2,6-Dinitrotoluene	1,000	1,000	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	ND
Phenanthrene	50,000	50,000	ND	270 J	280 J	ND
Anthracene	50,000	50,000	ND	69 J	72 J	ND
Carbazole	-	-	ND	ND	ND	ND
Flouranthene	50,000	50,000	ND	530	600	ND
Pyrene	50,000	50,000	ND	460	490	ND
Benzo(a)anthracene	224	224	ND	**300 J**	**310 J**	ND
Chrysene	160	400	ND	320 J	360	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	130 J	900	730	93 J
Benzo(b)fluoranthene	61	61	ND	**350**	**350**	ND
Benzo(k)fluoranthene	440	610	ND	190 J	230 J	ND
Benzo(a)pyrene	61	61	ND	**280 J**	**310 J**	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	83 J	96 J	ND
Isophorone	4,400	4,400	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	100 J	120 J	ND

Notes:

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Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Semi Volatile Organics
September 2002 Investigation

Compound	TAGM 4046* Value (ppb)		Boring/Sample ID			
	<5 ft.	>5 ft.	AB-6RE 8-12' bgs	AB-7 0-4' bgs	AB-7 4-8' bgs	AB-7 DUP 0-4' bgs
Semi-Volatile Organic Compounds						
Acenaphthylene	41,000	41,000	ND	ND	ND	110 J
Naphthalene	5,200	13,000	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	110 J
Dibenzofuran	6,200	6,200	ND	ND	ND	66 J
Diethylphthalate	7,100	7,100	ND	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND
2,6-Dinitrotoluene	1,000	1,000	ND	ND	ND	ND
Flourene	50,000	50,000	ND	43 J	ND	100 J
Phenanthrene	50,000	50,000	ND	280 J	ND	750
Anthracene	50,000	50,000	ND	76 J	ND	250 J
Carbazole	-	-	ND	ND	ND	95 J
Flouranthene	50,000	50,000	ND	300 J	ND	1400
Pyrene	50,000	50,000	ND	210 J	ND	1100
Benzo(a)anthracene	224	224	ND	120 J	ND	**790**
Chrysene	160	400	ND	140 J	ND	**820**
bis(2-Ethylhexyl)phthalate	50,000	50,000	98 J	88 J	45 J	59 J
Benzo(b)fluoranthene	61	61	ND	**90 J**	ND	**700**
Benzo(k)fluoranthene	440	610	ND	ND	ND	**640**
Benzo(a)pyrene	61	61	ND	**98 J**	ND	**740**
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	280 J
Isophorone	4,400	4,400	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	ND	300 J

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TCL Semi Volatile Organics
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Compound	TAGM 4046* Value (ppb)		Boring/Sample ID			
	<5 ft.	>5 ft.	AB-08 0-4' bgs	AB-08 4-8' bgs	AB-09 0-4' bgs	AB-09 4-8' bgs
Semi-Volatile Organic Compounds						
Acenaphthylene	41,000	41,000	ND	ND	160 J	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	ND	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND
2,6-Dinitrotoluene	1,000	1,000	ND	260 J	ND	ND
Flourene	50,000	50,000	ND	ND	ND	ND
Phenanthrene	50,000	50,000	110 J	ND	49 J	80 J
Anthracene	50,000	50,000	ND	ND	ND	ND
Carbazole	-	-	ND	ND	ND	ND
Flouranthene	50,000	50,000	180 J	53 J	550	230 J
Pyrene	50,000	50,000	120 J	42 J	530	210 J
Benzo(a)anthracene	224	224	74 J	37 J	430	130 J
Chrysene	160	400	110 J	ND	500	160 J
bis(2-Ethylhexyl)phthalate	50,000	50,000	47 J	38 J	51 J	ND
Benzo(b)fluoranthene	61	61	**81 J**	47 J	**600**	**93 J**
Benzo(k)fluoranthene	440	610	ND	ND	410	120 J
Benzo(a)pyrene	61	61	**71 J**	ND	**590**	**130 J**
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	260 J	ND
Isophorone	4,400	4,400	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	290 J	ND

Notes:

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September 2002 Investigation

Compound	TAGM 4046* Value (ppb) <5 ft.	TAGM 4046* Value (ppb) >5 ft.	Boring/Sample ID AB-09RE 4-8' bgs	AB-10 4-5' bgs	AB-10RE 4-5' bgs	AB-11 8-12' bgs
Semi-Volatile Organic Compounds						
Acenaphthylene	41,000	41,000	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	ND	ND	ND	340 J
di-n-butylphthalate	8,100	8,100	50 J	ND	ND	53 J
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND
2,6-Dinitrotoluene	1,000	1,000	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	ND
Phenanthrene	50,000	50,000	99 J	ND	ND	ND
Anthracene	50,000	50,000	ND	ND	ND	ND
Carbazole	-	-	ND	ND	ND	ND
Flouranthene	50,000	50,000	220 J	ND	ND	ND
Pyrene	50,000	50,000	270 J	ND	ND	ND
Benzo(a)anthracene	224	224	140 J	ND	ND	ND
Chrysene	160	400	180 J	ND	ND	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	120 J	57 J	99 J	37 J
Benzo(b)fluoranthene	61	61	**170 J**	ND	ND	ND
Benzo(k)fluoranthene	440	610	ND	ND	ND	ND
Benzo(a)pyrene	61	61	**140 J**	ND	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	ND
Isophorone	4,400	4,400	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	52 J	ND	ND	ND

Notes:

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September 2002 Investigation

Compound	TAGM 4046* Value (ppb)		Boring/Sample ID			
			AB-12	AB-12	AB-12RE	AB-13
	<5 ft.	>5 ft.	0-4' bgs	4-8' bgs	4-8' bgs	8-12' bgs
Semi-Volatile Organic Compounds						
Acenaphthylene	41,000	41,000	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	42 J	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND
2,6-Dinitrotoluene	1,000	1,000	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	ND
Phenanthrene	50,000	50,000	ND	64 J	79 J	ND
Anthracene	50,000	50,000	ND	ND	ND	ND
Carbazole	-	-	ND	ND	ND	ND
Flouranthene	50,000	50,000	58 J	96 J	96 J	ND
Pyrene	50,000	50,000	43 J	61 J	82 J	ND
Benzo(a)anthracene	224	224	ND	ND	ND	ND
Chrysene	160	400	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	48 J	ND	98 J	41 J
Benzo(b)fluoranthene	61	61	ND	ND	ND	ND
Benzo(k)fluoranthene	440	610	ND	ND	ND	ND
Benzo(a)pyrene	61	61	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	ND
Isophorone	4,400	4,400	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	ND	ND

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Compound	TAGM 4046* Value (ppb)		Boring/Sample ID			
			AB-14	AB-15	AB-16	AB-17
	<5 ft.	>5 ft.	8-12' bgs	8-12' bgs	8-12' bgs	0-4' bgs
Semi-Volatile Organic Compounds						
Acenaphthylene	41,000	41,000	ND	ND	ND	54 J
Naphthalene	5,200	13,000	ND	ND	ND	70 J
Acenaphthene	36,800	50,000	ND	ND	ND	180 J
Dibenzofuran	6,200	6,200	ND	ND	ND	72 J
Diethylphthalate	7,100	7,100	ND	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND
2,6-Dinitrotoluene	1,000	1,000	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	140 J
Phenanthrene	50,000	50,000	ND	ND	ND	1,600
Anthracene	50,000	50,000	ND	ND	ND	500
Carbazole	-	-	ND	ND	ND	180 J
Flouranthene	50,000	50,000	ND	ND	ND	ND
Pyrene	50,000	50,000	ND	ND	ND	ND
Benzo(a)anthracene	224	224	ND	ND	ND	**2,900**
Chrysene	160	400	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	ND	ND	ND	78 J
Benzo(b)fluoranthene	61	61	ND	ND	ND	ND
Benzo(k)fluoranthene	440	610	ND	ND	ND	**1,600**
Benzo(a)pyrene	61	61	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	840
Isophorone	4,400	4,400	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	**100 J**
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	ND	1,100

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Summary of Soil Analytical Data
TCL Semi Volatile Organics
September 2002 Investigation

Compound	TAGM 4046* Value (ppb) <5 ft.	TAGM 4046* Value (ppb) >5 ft.	Boring/Sample ID AB-17DL 0-4' bgs	AB-17 4-8' bgs	AB-18 8-12' bgs	AB-19RE 4-8' bgs
Semi-Volatile Organic Compounds						
Acenaphthylene	41,000	41,000	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	370 JD	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND
2,6-Dinitrotoluene	1,000	1,000	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	ND
Phenanthrene	50,000	50,000	2,100 D	ND	ND	ND
Anthracene	50,000	50,000	520 JD	ND	ND	ND
Carbazole	-	-	ND	ND	ND	ND
Flouranthene	50,000	50,000	5,700 D	ND	ND	ND
Pyrene	50,000	50,000	4,200 D	ND	ND	ND
Benzo(a)anthracene	224	224	**3,300 D**	ND	ND	ND
Chrysene	160	400	**3,800 D**	ND	ND	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	ND	ND	ND	87 J
Benzo(b)fluoranthene	61	61	**3,900 D**	ND	ND	ND
Benzo(k)fluoranthene	440	610	**2,300 D**	ND	ND	ND
Benzo(a)pyrene	61	61	**3,300 D**	ND	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	1,900 D	ND	ND	ND
Isophorone	4,400	4,400	1,200 JD	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	1,900 D	ND	ND	ND

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Semi-Volatile Organic Compounds						
Acenaphthylene	41,000	41,000	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	ND	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND
2,6-Dinitrotoluene	1,000	1,000	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	ND
Phenanthrene	50,000	50,000	ND	100 J	ND	ND
Anthracene	50,000	50,000	ND	ND	ND	ND
Carbazole	-	-	ND	ND	ND	ND
Flouranthene	50,000	50,000	ND	190 J	ND	ND
Pyrene	50,000	50,000	ND	160 J	ND	ND
Benzo(a)anthracene	224	224	ND	88 J	ND	ND
Chrysene	160	400	ND	110 J	ND	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	43 J	82 J	ND	84 J
Benzo(b)fluoranthene	61	61	ND	**110 J**	ND	ND
Benzo(k)fluoranthene	440	610	ND	ND	ND	ND
Benzo(a)pyrene	61	61	ND	**84 J**	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	ND
Isophorone	4,400	4,400	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	ND	ND

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	<5 ft.	>5 ft.	AB-21 0-4' bgs	AB-21 4-8' bgs	AB-22 0-4' bgs	AB-22 4-8' bgs
Semi-Volatile Organic Compounds						
Acenaphthylene	41,000	41,000	ND	ND	100 J	ND
Naphthalene	5,200	13,000	ND	ND	49 J	ND
Acenaphthene	36,800	50,000	43 U	ND	160 J	ND
Dibenzofuran	6,200	6,200	ND	ND	84 J	ND
Diethylphthalate	7,100	7,100	ND	42 J	ND	53 J
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	48 J	ND
2,6-Dinitrotoluene	1,000	1,000	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	210 J	ND
Phenanthrene	50,000	50,000	330 J	78 J	1,800	110 J
Anthracene	50,000	50,000	88 J	ND	520	ND
Carbazole	-	-	43 J	ND	160 J	ND
Flouranthene	50,000	50,000	590	210 J	2,100	220 J
Pyrene	50,000	50,000	450	180 J	2,000	180 J
Benzo(a)anthracene	224	224	**290 J**	100 J	**1,300**	100 J
Chrysene	160	400	310 J	140 J	**1,400**	140 J
bis(2-Ethylhexyl)phthalate	50,000	50,000	46 J	66 J	140 J	120 J
Benzo(b)fluoranthene	61	61	**320 J**	**120 J**	**1,100**	**95 J**
Benzo(k)fluoranthene	440	610	230 J	ND	750	ND
Benzo(a)pyrene	61	61	**250 J**	**100 J**	**1,100**	**95 J**
Indeno(1,2,3-cd)pyrene	1,280	3,200	110 J	ND	350 J	ND
Isophorone	4,400	4,400	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	120 J	52 J	440	57 J

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Compound	TAGM 4046* Value (ppb)		Boring/Sample ID
	<5 ft.	>5 ft.	AB-22RE 4-8' bgs
Semi-Volatile Organic Compounds			
Acenaphthylene	41,000	41,000	ND
Naphthalene	5,200	13,000	ND
Acenaphthene	36,800	50,000	ND
Dibenzofuran	6,200	6,200	ND
Diethylphthalate	7,100	7,100	54 J
di-n-butylphthalate	8,100	8,100	45 J
2-Methylnaphthalene	36,400	36,400	ND
2,6-Dinitrotoluene	1,000	1,000	ND
Flourene	50,000	50,000	ND
Phenanthrene	50,000	50,000	120 J
Anthracene	50,000	50,000	ND
Carbazole	-	-	ND
Flouranthene	50,000	50,000	210 J
Pyrene	50,000	50,000	220 J
Benzo(a)anthracene	224	224	110 J
Chrysene	160	400	150 J
bis(2-Ethylhexyl)phthalate	50,000	50,000	200 J
Benzo(b)fluoranthene	61	61	**140 J**
Benzo(k)fluoranthene	440	610	ND
Benzo(a)pyrene	61	61	**100 J**
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND
Isophorone	4,400	4,400	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND
Benzo(g,h,i)perylene	50,000	50,000	ND

Notes:

*TAGM Values (for VOCs and SVOCs) are for soil samples obtained less than (<) 5ft. or greater than (>) 5ft. to groundwater

NA - Sample Not Analyzed

ND - Not Detected

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

J - Indicates and estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B - (Organics) Indicates the analyte was found in the blank as well as the sample.

Bold face and shaded values indicates exccedance of TAGM value

Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Volatile Organics
September 2002 Investigation

Compound	TAGM 4046* Value (ppb)		Boring/Sample ID			
	<5 ft	>5 ft	AB-1 8-12' bgs	AB-2 8-12' bgs	AB-3 8-12' bgs	AB-4 8-12' bgs
Methylene Chloride	100	100	ND	ND	ND	ND
Acetone	200	200	ND	ND	ND	ND
Trichloroethene	700	700	ND	ND	ND	ND

Notes:

*TAGM values for VOCs are for soil samples obtained less than (<) 5 ft. or greater than (>) 5 ft. to groundwater.

J-Indicates estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B-Indicates the analyte was found in the blank as well as the sample.

ND -Not Detected

Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Volatile Organics
September 2002 Investigation

	TAGM 4046* Value (ppb)		Boring/Sample ID			
Compound	<5 ft	>5 ft	AB-5 8-12' bgs	AB-5 DUP 8-12' bgs	AB-6 8-12' bgs	AB-10 4-8' bgs
Methylene Chloride	100	100	ND	ND	ND	ND
Acetone	200	200	ND	ND	ND	ND
Trichloroethene	700	700	ND	ND	ND	1.1 J

Notes:

*TAGM values for VOCs are for soil samples obtained less than (<) 5 ft. or greater than (>) 5 ft. to groundwater.

J-Indicates estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B-Indicates the analyte was found in the blank as well as the sample.

ND -Not Detected

Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Volatile Organics
September 2002 Investigation

	TAGM 4046* Value (ppb)		Boring/Sample ID			
Compound	<5 ft	>5 ft	**AB-11** 11-12' bgs	**AB-13** 11-12' bgs	**AB-14** 11-12' bgs	**AB-15** 11-12' bgs
Methylene Chloride	100	100	ND	ND	ND	ND
Acetone	200	200	ND	ND	ND	8.5
Trichloroethene	700	700	ND	ND	ND	ND

Notes:

*TAGM values for VOCs are for soil samples obtained less than (<) 5 ft. or greater than (>) 5 ft. to groundwater.

J-Indicates estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B-Indicates the analyte was found in the blank as well as the sample.

ND -Not Detected

Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Volatile Organics
September 2002 Investigation

	TAGM 4046* Value (ppb)		Boring/Sample ID		
Compound	<5 ft	>5 ft	AB-16 11-12' bgs	AB-18 11-12' bgs	AB-19 11-12' bgs
Methylene Chloride	100	100	ND	5.4	11 B
Acetone	200	200	ND	7.1	ND
Trichloroethene	700	700	ND	ND	ND

Notes:

*TAGM values for VOCs are for soil samples obtained less than (<) 5 ft. or greater than (>) 5 ft. to groundwater.

J-Indicates estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater

B-Indicates the analyte was found in the blank as well as the sample.

ND -Not Detected

Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
RCRA Metals
September 2002 Investigation

Compound	TAGM 4046* Value (ppm)	Boring/Sample ID AB-7 0-4' bgs	AB-7 4-8' bgs	AB-7 DUP 0-4' bgs	AB-8 0-4' bgs	AB-8 4-8' bgs
Inorganics						
Arsenic	7.5 or SB	3.5	2.0	6.1	**13.9**	2.4
Barium	300 or SB	80.3	36.3	162	**621**	39.0
Cadmium	1 or SB	0.35 B	0.18 B	**2.1**	2.3	0.28 B
Chromium	10 or SB	**13.1**	**12.1**	**16.7**	**32.9**	**16.4**
Lead	SB	69.5	12.1	189	**770**	6.0
Mercury	0.1	**0.25**	0.05	**0.14**	0.04	ND
Selenium	2 or SB	0.95	ND	1.3	1.0	0.50 B
Silver	SB	ND	ND	ND	ND	ND

Notes:
SB - Site Background

B - (Inorganics) If the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).
Bold face and shaded values indicates exccedance of TAGM value
Lead levels were below typical metropolitan background levels of 200-500 ppm (TAGM 4046) except at AB-8 at the 0-4' sampling depth
ND - Not Detected

Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
RCRA Metals
September 2002 Investigation

Compound	TAGM 4046* Value (ppm)	Boring/Sample ID				
		AB-09 0-4' bgs	AB-9 4-8' bgs	AB-12 0-4' bgs	AB-12 4-8' bgs	AB-17 0-4' bgs
Inorganics						
Arsenic	7.5 or SB	1.6	4.7	2.6	4.6	6.8
Barium	300 or SB	41.0	96	53.7	48.2	202
Cadmium	1 or SB	0.12 B	0.5 B	0.27 B	0.31 B	**1.3**
Chromium	10 or SB	**12.2**	**17.9**	**13.5**	**23.1**	**15.0**
Lead	SB	11.2	185	57.3	6.5	236
Mercury	0.1	0.04	**0.53**	0.09	0.03	**0.30**
Selenium	2 or SB	0.47 B	ND	0.48 B	0.75	0.76
Silver	SB	ND	ND	ND	ND	ND

Notes:

SB - Site Background

B - (Inorganics) If the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).

Bold face and shaded values indicates exccedance of TAGM value

Lead levels were below typical metropolitan background levels of 200-500 ppm (TAGM 4046) except at AB-8 at the 0-4' sampling depth

ND - Not Detected

Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
RCRA Metals
September 2002 Investigation

Compound	TAGM 4046* Value (ppm)	Boring/Sample ID				
		AB-17 4-8' bgs	AB-20 0-4' bgs	AB-20 4-8' bgs	AB-21 0-4' bgs	AB-21 4-8' bgs
Inorganics						
Arsenic	7.5 or SB	2.9	**8.8**	2.2	4.2	**9.9**
Barium	300 or SB	32	109	30.7	63.3	168
Cadmium	1 or SB	0.3 B	0.74	0.27 B	0.23 B	**1.2**
Chromium	10 or SB	**15.9**	**19.8**	**10.8**	9.5	**10.4**
Lead	SB	7	218	5.8	103	401
Mercury	0.1	0.03	**0.56**	0.04	0.15	**0.22**
Selenium	2 or SB	0.40 B	2.0	1.1	0.41 B	0.92
Silver	SB	ND	ND	ND	ND	ND

Notes:
SB - Site Background

B - (Inorganics) If the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).
Bold face and shaded values indicates exccedance of TAGM value
Lead levels were below typical metropolitan background levels of 200-500 ppm (TAGM 4046) except at AB-8 at the 0-4' sampling depth
ND - Not Detected

Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
RCRA Metals
September 2002 Investigation

Compound	TAGM 4046* Value (ppm)	Boring/Sample ID	
		AB-22 0-4' bgs	AB-22 4-8' bgs
Inorganics			
Arsenic	7.5 or SB	7.0	**10.4**
Barium	300 or SB	271	143
Cadmium	1 or SB	0.83	3.1
Chromium	10 or SB	**12.5**	**16.7**
Lead	SB	342	367
Mercury	0.1	**0.21**	**0.54**
Selenium	2 or SB	0.62	1.6
Silver	SB	ND	ND

Notes:

SB - Site Background

B - (Inorganics) If the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).

Bold face and shaded values indicates exccedance of TAGM value

Lead levels were below typical metropolitan background levels of 200-500 ppm (TAGM 4046) except at AB-8 at the 0-4' sampling depth

ND - Not Detected

Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
September 2002 Investigation

Compound	TCLP* Value (ppb)		Boring/Sample ID									
			AB-1 8-12' bgs		AB-2 8-12' bgs		AB-3 8-12' bgs		AB-4 8-12' bgs		AB-5 8-12' bgs	
Inorganics												
Arsenic	5000		ND		ND		ND		ND		ND	
Barium	100000		1,190	B	219	B	291	B	197	B	1610	B
Cadmium	1000		ND		ND		ND		ND		ND	
Chromium	5000		ND		ND		17.9	B	8.8	B	ND	
Lead	5000		ND		ND		ND		ND		222	
Mercury	200		ND		ND		ND		ND		ND	
Selenium	1000		ND		ND		ND		ND		ND	
Silver	5000		ND		ND		ND		ND		ND	

Notes:
*Toxicity Characteristic Leaching Procedure
B - (Inorganics) If the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL)
ND - Not Detected

Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
September 2002 Investigation

Compound	TCLP* Value (ppb)	Boring/Sample ID				
		DUP 8-12' bgs	AB-6 8-12' bgs	AB-10 4-8' bgs	AB-11 8-12' bgs	AB-13 8-12' bgs
Inorganics						
Arsenic	5000	ND	ND	ND	ND	ND
Barium	100000	1780 B	218 B	202 B	258 B	108 B
Cadmium	1000	ND	ND	ND	ND	ND
Chromium	5000	ND	17.1 B	8.3 B	ND	ND
Lead	5000	277	ND	ND	ND	ND
Mercury	200	ND	ND	ND	ND	ND
Selenium	1000	ND	ND	ND	ND	21.8 B
Silver	5000	ND	ND	ND	ND	ND

Notes:
*Toxicity Characteristic Leaching Procedure
B - (Inorganics) If the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL)
ND - Not Detected

Table 3
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
September 2002 Investigation

Compound	TCLP* Value (ppb)	Boring/Sample ID				
		AB-14 8-12' bgs	AB-15 8-12' bgs	AB-16 8-12' bgs	AB-18 8-12' bgs	AB-19 4-8' bgs
Inorganics						
Arsenic	5000	ND	ND	ND	67.7 B	ND
Barium	100000	164 B	302 B	183 B	1630 B	634 B
Cadmium	1000	ND	ND	ND	ND	ND
Chromium	5000	ND	16.2 B	32.9 B	13.6 B	14.4 B
Lead	5000	ND	ND	ND	ND	41.5
Mercury	200	ND	ND	ND	ND	ND
Selenium	1000	12.9 B	ND	ND	29.9 B	ND
Silver	5000	ND	ND	ND	ND	ND

Notes:
*Toxicity Characteristic Leaching Procedure
B - (Inorganics) If the reported value was obtained from a reading that was less than the Contract Required (CRDL), but greater than or equal to the Instrument Detection Limit (IDL)
ND - Not Detected

Table 4
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
	< 5 ft.	> 5 ft.	SB-01 0-4 FT.	SB-01 4-8 FT.	SB-01 8-12 FT.	SB-01 12-16 FT.	SB-01 16-20 FT.	SB-01 20-24 FT.	SB-02 0-4 FT.	SB-02 4-8 FT.
Volatile Organic Compounds										
Trichloroethene	280	700	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	560	1400	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
*TAGM Values are for soil samples obtained less than (<) 5ft. or greater than (>) 5ft. to groundwater

NA - Sample Not Analyzed

ND - Not Detected

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

J - Indicates an estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B - (Organics) Indicates the analyte was found in the blank as well as the sample.

Bold face and shaded values indicates exccedance of TAGM value

Table 4
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
	< 5 ft.	> 5 ft.	SB-02 12-16 FT.	SB-02 16-20 FT.	SB-02 20-24 FT.	SB-03 0-4 FT.	SB-03 4-8 FT.	SB-03 8-12 FT.	SB-03 12-16 FT.	SB-03 16-20 FT.
Volatile Organic Compounds										
Trichloroethene	280	700	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	560	1400	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
*TAGM Values are for soil samples obtained less than (<) 5ft. or greater than (>) 5ft. to groundwater

NA - Sample Not Analyzed

ND - Not Detected

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

J - Indicates an estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B - (Organics) Indicates the analyte was found in the blank as well as the sample.

Bold face and shaded values indicates exccedance of TAGM value

Table 4
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
	< 5 ft.	> 5 ft.	SB-03 20-24 FT.	SB-04 12-16 FT.	SB-04 16-20 FT.	SB-04 20-24 FT.	SB-05 12-16 FT.	SB-05 16-20 FT.	SB-05 20-24 FT.	SB-06 12-16 FT.
Volatile Organic Compounds										
Trichloroethene	280	700	ND	ND	ND	ND	ND	ND	ND	2.6 J
Tetrachloroethene	560	1400	ND	ND	ND	ND	ND	ND	ND	5.80

Notes:

*TAGM Values are for soil samples obtained less than (<) 5ft. or greater than (>) 5ft. to groundwater

NA - Sample Not Analyzed

ND - Not Detected

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

J - Indicates an estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B - (Organics) Indicates the analyte was found in the blank as well as the sample.

Bold face and shaded values indicates exccedance of TAGM value

Table 4
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
	< 5 ft.	> 5 ft.	SB-06 16-20 FT.	SB-06 20-24 FT.	SB-07 12-16 FT.	SB-07 16-20 FT.	SB-07 20-24 FT.	SB-08 12-16 FT.	SB-08 16-20 FT.	SB-08 20-24 FT.
Volatile Organic Compounds										
Trichloroethene	280	700	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	560	1400	ND	ND	ND	1.90 J	ND	ND	ND	ND

Notes:

*TAGM Values are for soil samples obtained less than (<) 5ft. or greater than (>) 5ft. to groundwater

NA - Sample Not Analyzed

ND - Not Detected

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

J - Indicates an estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B - (Organics) Indicates the analyte was found in the blank as well as the sample.

Bold face and shaded values indicates exccedance of TAGM value

Table 4
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
	< 5 ft.	> 5 ft.	SB-09 12-16 FT.	SB-09 16-20 FT.	SB-09 20-24 FT.	SB-10 12-16 FT.	SB-10 16-20 FT.	SB-10 20-24 FT.	SB-11 0-4 FT.	SB-11 4-8 FT.
Volatile Organic Compounds										
Trichloroethene	280	700	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	560	1400	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

*TAGM Values are for soil samples obtained less than (<) 5ft. or greater than (>) 5ft. to groundwater

NA - Sample Not Analyzed

ND - Not Detected

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

J - Indicates an estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B - (Organics) Indicates the analyte was found in the blank as well as the sample.

Bold face and shaded values indicates exccedance of TAGM value

Table 4
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
	< 5 ft.	> 5 ft.	SB-11 12-16 FT.	SB-11 16-20 FT.	SB-11 20-24 FT.	SB-12 0-4 FT.	SB-12 12-16 FT.	SB-12 16-20 FT.	SB-12 20-24 FT.	SB-13 0-4 FT.
Volatile Organic Compounds										
Trichloroethene	280	700	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	560	1400	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

*TAGM Values are for soil samples obtained less than (<) 5ft. or greater than (>) 5ft. to groundwater

NA - Sample Not Analyzed

ND - Not Detected

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

J - Indicates an estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B - (Organics) Indicates the analyte was found in the blank as well as the sample.

Bold face and shaded values indicates exccedance of TAGM value

Table 4
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
	< 5 ft.	> 5 ft.	SB-13 4-8 FT.	SB-13 8-12 FT.	SB-13 12-16 FT.	SB-13 16-20 FT.	SB-13 20-24 FT.	SB-14 0-4 FT.	SB-14 4-8 FT.	SB-14 12-16 FT.
Volatile Organic Compounds										
Trichloroethene	280	700	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	560	1400	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
*TAGM Values are for soil samples obtained less than (<) 5ft. or greater than (>) 5ft. to groundwater

NA - Sample Not Analyzed

ND - Not Detected

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

J - Indicates an estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B - (Organics) Indicates the analyte was found in the blank as well as the sample.

Bold face and shaded values indicates exccedance of TAGM value

Table 4
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
	< 5 ft.	> 5 ft.	SB-14 16-20 FT.	SB-14 20-24 FT.	SB-15 0-4 FT.	SB-15 4-8 FT.	SB-15 12-16 FT.	SB-15 16-20 FT.	SB-15 20-24 FT.	SB-12 DUP 20-24 FT.
Volatile Organic Compounds										
Trichloroethene	280	700	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	560	1400	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
*TAGM Values are for soil samples obtained less than (<) 5ft. or greater than (>) 5ft. to groundwater

NA - Sample Not Analyzed

ND - Not Detected

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

J - Indicates an estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B - (Organics) Indicates the analyte was found in the blank as well as the sample.

Bold face and shaded values indicates exccedance of TAGM value

Table 4
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID		
	< 5 ft.	> 5 ft.	SB-14 DUP 20-24 FT.	SB-7 DUP 20-24 FT.	SB-2 DUP 16-20 FT.
Volatile Organic Compounds					
Trichloroethene	280	700	ND	ND	ND
Tetrachloroethene	560	1400	ND	ND	ND

Notes:

*TAGM Values are for soil samples obtained less than (<) 5ft. or greater than (>) 5ft. to groundwater

NA - Sample Not Analyzed

ND - Not Detected

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

J - Indicates an estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B - (Organics) Indicates the analyte was found in the blank as well as the sample.

Bold face and shaded values indicates exccedance of TAGM value

Table 5
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Semi Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
	<5 ft.	>5 ft.	SB-01 0-4 FT.	SB-01 4-8 FT.	SB-01 8-12 FT.	SB-01 12-16 FT.	SB-01 16-20 FT.	SB-01 20-24 FT.	SB-02 0-4 FT.	SB-02 4-8 FT.
Semi-Volatile Organic Compounds										
Acenaphthylene	41,000	41,000	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND	ND	ND	89 J	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND	ND	ND	43 J	ND
Diethylphthalate	7,100	7,100	ND	ND	ND	ND	ND	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	48,600	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	ND	ND	ND	62 J	ND
Phenanthrene	50,000	50,000	ND	ND	ND	ND	ND	ND	1100 D	ND
Anthracene	50,000	50,000	ND	ND	ND	ND	ND	ND	190 JD	ND
Carbazole	-	-	ND	ND	ND	ND	ND	ND	73 J	ND
Flouranthene	50,000	50,000	ND	ND	ND	ND	ND	ND	2700 D	71 J
Pyrene	50,000	50,000	ND	ND	ND	ND	ND	ND	2300 D	87 J
Benzo(a)anthracene	224	224	ND	ND	ND	ND	ND	ND	**1000 D**	49 J
Chrysene	160	400	ND	ND	ND	ND	ND	ND	**1200 D**	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	61	61	ND	ND	ND	ND	ND	ND	**1100 D**	45 J
Benzo(k)fluoranthene	440	610	ND	ND	ND	ND	ND	ND	**650 JD**	ND
Benzo(a)pyrene	61	61	ND	ND	ND	ND	ND	ND	**1000 D**	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	ND	ND	ND	520 JD	ND
2-Methylphenol	40	100	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	ND	ND	ND	ND	460 JD	ND

Notes:

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J - Indicates an estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

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Table 5
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Semi Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
	<5 ft.	>5 ft.	SB-02 12-16 FT.	SB-02 16-20 FT.	SB-02 20-24 FT.	SB-03 0-4 FT.	SB-03 4-8 FT.	SB-03 8-12 FT.	SB-03 12-16 FT.	SB-03 16-20 FT.
Semi-Volatile Organic Compounds										
Acenaphthylene	41,000	41,000	ND	ND	ND	59 J	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	470 JD	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	910 JD	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	390 JD	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	ND	ND	ND	ND	ND	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND	ND	ND	59 J	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	170 J	ND	ND	ND	ND
Butylbenzylphthalate	48,600	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	560 JD	ND	ND	ND	ND
Phenanthrene	50,000	50,000	ND	ND	ND	10000 D	ND	ND	ND	ND
Anthracene	50,000	50,000	ND	ND	ND	1400 JD	ND	ND	ND	ND
Carbazole	-	-	ND	ND	ND	390 JD	ND	ND	ND	ND
Flouranthene	50,000	50,000	ND	ND	ND	13000 D	ND	ND	ND	ND
Pyrene	50,000	50,000	ND	ND	ND	10000 D	ND	ND	ND	ND
Benzo(a)anthracene	224	224	ND	ND	ND	**3600 D**	ND	ND	ND	ND
Chrysene	160	400	ND	ND	ND	**3700 D**	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	61	61	ND	ND	ND	**3600 D**	ND	ND	ND	ND
Benzo(k)fluoranthene	440	610	ND	ND	ND	**1300 JD**	ND	ND	ND	ND
Benzo(a)pyrene	61	61	ND	ND	ND	**3300 D**	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	1700 JD	ND	ND	ND	ND
2-Methylphenol	40	100	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	**110 J**	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	ND	1800 JD	ND	ND	ND	ND

Notes:

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TCL Semi Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
			SB-03	SB-04	SB-04	SB-04	SB-05	SB-05	SB-05	SB-06
	<5 ft.	>5 ft.	20-24 FT.	12-16 FT.	16-20 FT.	20-24 FT.	12-16 FT.	16-20 FT.	20-24 FT.	12-16 FT.
Semi-Volatile Organic Compounds										
Acenaphthylene	41,000	41,000	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	ND	ND	ND	ND	39 J	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	48,600	50,000	ND	ND	ND	ND	130 J	90 J	86 J	ND
Flourene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	50,000	50,000	ND	ND	ND	ND	ND	ND	48 J	ND
Anthracene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Carbazole	-	-	ND	ND	ND	ND	ND	ND	ND	ND
Flouranthene	50,000	50,000	ND	ND	ND	ND	ND	ND	36 J	ND
Pyrene	50,000	50,000	ND	ND	ND	ND	ND	ND	36 J	ND
Benzo(a)anthracene	224	224	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	160	400	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	ND	68 J	83 J	350	210 J	820	500	44 J
Benzo(b)fluoranthene	61	61	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	440	610	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	61	61	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylphenol	40	100	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
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TCL Semi Volatile Organics
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Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
	<5 ft.	>5 ft.	SB-06 16-20 FT.	SB-06 20-24 FT.	SB-07 12-16 FT.	SB-07 16-20 FT.	SB-07 20-24 FT.	SB-08 12-16 FT.	SB-08 16-20 FT.	SB-08 20-24 FT.
Semi-Volatile Organic Compounds										
Acenaphthylene	41,000	41,000	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	ND	ND	ND	ND	ND	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	660	**26000 D**	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	48,600	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	50,000	50,000	ND	ND	ND	300 J	ND	ND	ND	ND
Anthracene	50,000	50,000	ND	ND	ND	77 J	ND	ND	ND	ND
Carbazole	-	-	ND	ND	ND	ND	ND	ND	ND	ND
Flouranthene	50,000	50,000	ND	ND	ND	280 J	ND	ND	ND	ND
Pyrene	50,000	50,000	ND	ND	ND	990 JD	ND	ND	ND	ND
Benzo(a)anthracene	224	224	ND	ND	ND	120 J	ND	ND	ND	ND
Chrysene	160	400	ND	ND	ND	110 J	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	49 J	ND	ND	990 JD	38 J	38 J	ND	ND
Benzo(b)fluoranthene	61	61	ND	ND	ND	**110 J**	ND	ND	ND	ND
Benzo(k)fluoranthene	440	610	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	61	61	ND	ND	ND	**87 J**	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylphenol	40	100	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
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TCL Semi Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
	<5 ft.	>5 ft.	SB-09 12-16 FT.	SB-09 16-20 FT.	SB-09 20-24 FT.	SB-10 12-16 FT.	SB-10 16-20 FT.	SB-10 20-24 FT.	SB-11 0-4 FT.	SB-11 4-8 FT.
Semi-Volatile Organic Compounds										
Acenaphthylene	41,000	41,000	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	ND	ND	ND	ND	ND	ND	ND	ND
di-n-butylphthalate	8,100	8,100	53 J	96 J	47 J	ND	ND	45 J	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	48,600	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Carbazole	-	-	ND	ND	ND	ND	ND	ND	ND	ND
Flouranthene	50,000	50,000	ND	ND	ND	ND	ND	ND	63 J	ND
Pyrene	50,000	50,000	ND	ND	ND	ND	ND	ND	71 J	ND
Benzo(a)anthracene	224	224	ND	ND	ND	ND	ND	ND	38 J	ND
Chrysene	160	400	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	1400	910	1800	2600	1300	980	ND	ND
Benzo(b)fluoranthene	61	61	ND	ND	ND	ND	ND	ND	48 J	ND
Benzo(k)fluoranthene	440	610	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	61	61	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylphenol	40	100	ND	52 J	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

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94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCL Semi Volatile Organics
January 2003 Investigation

Compound	TAGM 4046* Value (ug/kg)		Boring/Sample ID							
	<5 ft.	>5 ft.	SB-11 12-16 FT.	SB-11 16-20 FT.	SB-11 20-24 FT.	SB-12 0-4 FT.	SB-12 12-16 FT.	SB-12 16-20 FT.	SB-12 20-24 FT.	SB-13 8-12 FT.
Semi-Volatile Organic Compounds										
Acenaphthylene	41,000	41,000	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	ND	ND	ND	ND	ND	ND	ND	ND
di-n-butylphthalate	8,100	8,100	50 J	ND	52 J	ND	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	48,600	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Carbazole	-	-	ND	ND	ND	ND	ND	ND	ND	ND
Flouranthene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	224	224	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	160	400	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	65 J	120 J	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	61	61	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	440	610	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	61	61	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylphenol	40	100	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
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	<5 ft.	>5 ft.	SB-13 12-16 FT.	SB-13 16-20 FT.	SB-13 20-24 FT.	SB-14 12-16 FT.	SB-14 16-20 FT.	SB-14 20-24 FT.	SB-15 0-4 FT.	SB-15 4-8 FT.
Semi-Volatile Organic Compounds										
Acenaphthylene	41,000	41,000	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	ND	ND	ND	ND	ND	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	48,600	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	50,000	50,000	ND	ND	ND	ND	ND	ND	50 J	ND
Anthracene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Carbazole	-	-	ND	ND	ND	ND	ND	ND	ND	ND
Flouranthene	50,000	50,000	ND	ND	ND	ND	ND	ND	70 J	ND
Pyrene	50,000	50,000	ND	ND	ND	ND	ND	ND	94 J	ND
Benzo(a)anthracene	224	224	ND	ND	ND	ND	ND	ND	49 J	ND
Chrysene	160	400	ND	ND	ND	ND	ND	ND	59 J	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	44 J	ND	ND	70 J	41 J	39 J	ND	ND
Benzo(b)fluoranthene	61	61	ND	ND	ND	ND	ND	ND	49 J	ND
Benzo(k)fluoranthene	440	610	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	61	61	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylphenol	40	100	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND	ND

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TCL Semi Volatile Organics
January 2003 Investigation

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	<5 ft.	>5 ft.	SB-15 12-16 FT.	SB-15 16-20 FT.	SB-15 20-24 FT.	SB-12 DUP 20-24 FT.	SB-07 DUP 20-24 FT.	SB-14 DUP 20-24 FT.	SB-02 DUP 16-20 FT.
Semi-Volatile Organic Compounds									
Acenaphthylene	41,000	41,000	ND	ND	ND	ND	ND	ND	ND
Naphthalene	5,200	13,000	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	36,800	50,000	ND	ND	ND	ND	ND	ND	ND
Dibenzofuran	6,200	6,200	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	7,100	7,100	ND	ND	ND	ND	ND	ND	ND
di-n-butylphthalate	8,100	8,100	ND	ND	ND	ND	71 J	ND	ND
2-Methylnaphthalene	36,400	36,400	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	48,600	50,000	ND	ND	ND	ND	ND	ND	ND
Flourene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND
Anthracene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND
Carbazole	-	-	ND	ND	ND	ND	ND	ND	ND
Flouranthene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND
Pyrene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	224	224	ND	ND	ND	ND	ND	ND	ND
Chrysene	160	400	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	50,000	50,000	ND	ND	ND	85 J	130 J	110 J	ND
Benzo(b)fluoranthene	61	61	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	440	610	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	61	61	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	1,280	3,200	ND	ND	ND	ND	ND	ND	ND
2-Methylphenol	40	100	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	14.3	14.3	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	50,000	ND	ND	ND	ND	ND	ND	ND

Notes:

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NA - Sample Not Analyzed

ND - Not Detected

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

J - Indicates an estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B - (Organics) indicates the analyte was found in the blank as well as the sample.

Bold face and shaded values indicates exccedance of TAGM value

Table 6
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCLP Metals
January 2003 Investigation

Compound	TCLP Value * (ug/l)	Boring/Sample ID							
		SB-01 0-4 FT.	SB-01 4-8 FT.	SB-01 8-12 FT.	SB-01 12-16 FT.	SB-01 16-20 FT.	SB-01 20-24 FT.	SB-02 0-4 FT.	SB-02 4-8 FT.
Inorganics									
Arsenic	5,000	ND	ND	ND	ND	ND	ND	ND	ND
Barium	100,000	226.0 B	253.0 B	104.0 B	302.0 B	274.0 B	267.0 B	531.0 B	247.0 B
Cadmium	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	5,000	79.7 B	26.6 B	36.7 B	ND	ND	27.7 B	ND	ND
Lead	5,000	56.1	76.1	ND	70.2	41.2	43.5	471.0	56.4
Mercury	200	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	1,000	ND	ND	ND	ND	ND	ND	18.8	ND
Silver	5,000	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
* = Toxicity Characteristic Leaching Procedure
Bold face and shaded value indicates exccedance of NYSDEC GW Standard
ND - Not Detected
B = The reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

Table 6
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCLP Metals
January 2003 Investigation

Compound	TCLP Value * (ug/l)	Boring/Sample ID							
		SB-02 12-16 FT.	SB-02 16-20 FT.	SB-02 20-24 FT.	SB-03 0-4 FT.	SB-03 4-8 FT.	SB-03 8-12 FT.	SB-03 12-16 FT.	SB-03 16-20 FT.
Inorganics									
Arsenic	5,000	ND	ND	ND	ND	ND	ND	ND	ND
Barium	100,000	136.0 B	216.0 B	118.0 B	531.0 B	486.0 B	265.0 B	510.0 B	260.0 B
Cadmium	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	5,000	19.9 B	22.7 B	25.6 B	31.2 B	ND	23.7 B	ND	15.4 B
Lead	5,000	ND	ND	40.4	194.0	78.6	ND	63.0	40.7
Mercury	200	ND	ND	ND	ND	ND	ND	23.5 B	ND
Selenium	1,000	14.9	ND	ND	ND	ND	ND	ND	ND
Silver	5,000	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

* = Toxicity Characteristic Leaching Procedure

Bold face and shaded value indicates exccedance of NYSDEC GW Standard

ND - Not Detected

B = The reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

Table 6
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCLP Metals
January 2003 Investigation

Compound	TCLP Value * (ug/l)	Boring/Sample ID							
		SB-03 20-24 FT.	SB-04 12-16 FT.	SB-04 16-20 FT.	SB-04 20-24 FT.	SB-05 12-16 FT.	SB-05 16-20 FT.	SB-05 20-24 FT.	SB-06 12-16 FT.
Inorganics									
Arsenic	5,000	ND	ND	ND	ND	ND	ND	ND	ND
Barium	100,000	269.0 B	357.0 B	280.0 B	180.0 B	194.0 B	197.0 B	204.0 B	203.0 B
Cadmium	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	5,000	26.2 B	ND	ND	ND	15.2 B	ND	18.9 B	16.9 B
Lead	5,000	ND	ND	ND	ND	ND	ND	ND	ND
Mercury	200	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	1,000	ND	13.5 B	ND	ND	ND	ND	13.1 B	ND
Silver	5,000	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
* = Toxicity Characteristic Leaching Procedure
Bold face and shaded value indicates exccedance of NYSDEC GW Standard
ND - Not Detected
B = The reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

Table 6
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCLP Metals
January 2003 Investigation

Compound	TCLP Value * (ug/l)	Boring/Sample ID							
		SB-06 16-20 FT.	SB-06 20-24 FT.	SB-07 12-16 FT.	SB-07 16-20 FT.	SB-07 20-24 FT.	SB-08 12-16 FT.	SB-08 16-20 FT.	SB-08 20-24 FT.
Inorganics									
Arsenic	5,000	ND	ND	ND	ND	61.8 B	213.0	58.1 B	ND
Barium	100,000	131.0 B	262.0 B	ND	171.0 B	ND	ND	190.0 B	119.0 B
Cadmium	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	5,000	ND	18.2 B	ND	ND	ND	30.9 B	17.2 B	34.9 B
Lead	5,000	ND	37.4	35.9	179.0	ND	ND	ND	ND
Mercury	200	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Silver	5,000	ND	ND	ND	ND	ND	48.9 B	ND	53.9 B

Notes:
* = Toxicity Characteristic Leaching Procedure
Bold face and shaded value indicates exccedance of NYSDEC GW Standard
ND - Not Detected
B = The reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

Table 6
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCLP Metals
January 2003 Investigation

Compound	TCLP Value * (ug/l)	Boring/Sample ID							
		SB-09 12-16 FT.	SB-09 16-20 FT.	SB-09 20-24 FT.	SB-10 12-16 FT.	SB-10 16-20 FT.	SB-10 20-24 FT.	SB-11 0-4 FT.	SB-11 4-8 FT.
Inorganics									
Arsenic	5,000	ND	ND	ND	ND	ND	ND	65.7	ND
Barium	100,000	119.0 B	240.0 B	232.0 B	163.0 B	150.0 B	ND	249.0 B	ND
Cadmium	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	5,000	ND	30.4 B	ND	16.7 B	20.4 B	16.1 B	ND	ND
Lead	5,000	ND	ND	48.8 B	ND	ND	ND	74.1	ND
Mercury	200	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Silver	5,000	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
* = Toxicity Characteristic Leaching Procedure
Bold face and shaded value indicates exccedance of NYSDEC GW Standard
ND - Not Detected
B = The reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

Table 6
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCLP Metals
January 2003 Investigation

Compound	TCLP Value * (ug/l)	Boring/Sample ID							
		SB-11 12-16 FT.	SB-11 16-20 FT.	SB-11 20-24 FT.	SB-12 0-4 FT.	SB-12 12-16 FT.	SB-12 16-20 FT.	SB-12 20-24 FT.	SB-13 0-4 FT.
Inorganics									
Arsenic	5,000	ND	ND	ND	ND	ND	ND	ND	ND
Barium	100,000	259.0 B	342.0 B	219.0 B	289.0 B	144.0 B	136.0 B	314.0 B	451.0 B
Cadmium	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	5,000	35.7 B	ND	ND	29.2 B	ND	39.4 B	ND	18.9 B
Lead	5,000	ND	ND	ND	509.0	ND	34.1	134.0	134.0
Mercury	200	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Silver	5,000	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
* = Toxicity Characteristic Leaching Procedure
Bold face and shaded value indicates exccedance of NYSDEC GW Standard
ND - Not Detected
B = The reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

Table 6
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCLP Metals
January 2003 Investigation

Compound	TCLP Value * (ug/l)	Boring/Sample ID SB-13 4-8 FT.	SB-13 8-12 FT.	SB-13 12-16 FT.	SB-13 16-20 FT.	SB-13 20-24 FT.	SB-14 0-4 FT.	SB-14 4-8 FT.	SB-14 12-16 FT.
Inorganics									
Arsenic	5,000	ND	ND	75.5	ND	ND	ND	ND	86.4
Barium	100,000	154.0 B	248.0 B	367.0 B	181.0 B	176.0 B	462.0 B	257.0 B	ND
Cadmium	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	5,000	25.1 B	22.9 B	50.3 B	29.4 B	39.3 B	16.5 B	16.8 B	35.9 B
Lead	5,000	ND	ND	ND	ND	ND	73.9	ND	ND
Mercury	200	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Silver	5,000	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

* = Toxicity Characteristic Leaching Procedure

Bold face and shaded value indicates exccedance of NYSDEC GW Standard

ND - Not Detected

B = The reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

Table 6
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCLP Metals
January 2003 Investigation

Compound	TCLP Value * (ug/l)	Boring/Sample ID							
		SB-14 16-20 FT.	SB-14 20-24 FT.	SB-15 0-4 FT.	SB-15 4-8 FT.	SB-15 12-16 FT.	SB-15 16-20 FT.	SB-15 20-24 FT.	SB-12 DUP 20-24 FT.
Inorganics									
Arsenic	5,000	99.9 B	ND	ND	ND	ND	ND	ND	ND
Barium	100,000	157.0 B	264.0 B	522.0 B	ND	317.0 B	290.0 B	202.0 B	169.0 B
Cadmium	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	5,000	17.9 B	ND	ND	15.7 B	24.8 B	15.7 B	15.7 B	42.5 B
Lead	5,000	38.4	ND	62.8	ND	ND	ND	ND	ND
Mercury	200	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	1,000	ND	ND	ND	36.2 B	ND	ND	ND	ND
Silver	5,000	ND	ND	ND	ND	ND	ND	ND	48.9 B

Notes:

* = Toxicity Characteristic Leaching Procedure

Bold face and shaded value indicates exccedance of NYSDEC GW Standard

ND - Not Detected

B = The reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

Table 6
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil Analytical Data
TCLP Metals
January 2003 Investigation

Compound	TCLP Value * (ug/l)	Boring/Sample ID SB-07 DUP 20-24 FT.	SB-02 DUP 16-20 FT.	SB-14 DUP 20-24 FT.
Inorganics				
Arsenic	5,000	ND	ND	ND
Barium	100,000	ND	213.0 B	196.0 B
Cadmium	1,000	ND	ND	ND
Chromium	5,000	18.5 B	23.7 B	31.6 B
Lead	5,000	ND	ND	ND
Mercury	200	ND	ND	ND
Selenium	1,000	ND	ND	ND
Silver	5,000	ND	ND	ND

<u>Notes:</u>
* = Toxicity Characteristic Leaching Procedure
Bold face and shaded value indicates exccedance of NYSDEC GW Standard
ND - Not Detected
B = The reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection

Table 7
Summary of Groundwater Analytical Data
New York City School Construction Authority
Adams Brush Manufacturing
94-02 104th Street, Queens, New York
September 2002 Investigation

Compound	Part 703 Standard (ppb)	Sample ID				
		MW-1	MW-2	MW-3	MW-4	MW-5
Volatile Organic Compounds		(ppb)				
Acetone	5	ND	ND	ND	ND	ND
Methylene Chloride	5	ND	ND	ND	ND	ND
2-Butanone	-	ND	ND	ND	ND	ND
Trichloroethene	5	ND	ND	**16**	ND	ND
Toluene	5	ND	ND	ND	ND	ND
Tetrachloroethene	5	**14**	**22**	ND	ND	ND
Semi-Volatile Organic Compounds		(ppb)				
Total SVOCs	-	ND	ND	ND	ND	ND
Inorganics		(ppb)				
Barium	1,000	24.4 B	105 B	46.0 B	52.6 B	30.0 B
Chromium	50	4.1 B	2.1 B	3.9 B	3.6 B	1.7 B
Selenium	10	4.3 B	**15.5**	1.8 B	ND	3.7 B
Polychlorinated Biphenyls		(ppb)				
Total PCBs	0.1	ND	ND	ND	ND	ND

Notes:

NA - Sample Not Analyzed

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

J - Indicates and estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.

B - (Organics) Indicates the analyte was found in the blank as well as the sample.

B - (Inorganics) If the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).

ND - Not Detected

Bold face and shaded values indicates exceedance of standard

Table 7
Summary of Groundwater Analytical Data
New York City School Construction Authority
Adams Brush Manufacturing
94-02 104th Street, Queens, New York
September 2002 Investigation

Compound	Part 703 Standard (ppb)	Sample ID			
		MW-6	MW-7	Field Blank	Trip Blank
Volatile Organic Compounds		(ppb)			
Acetone	5	ND	ND	**40**	**25**
Methylene Chloride	5	ND	ND	3.7 J	2.3 J
2-Butanone	-	ND	ND	9.8	ND
Trichloroethene	5	ND	1.7 J	ND	ND
Toluene	5	ND	ND	1.5 J	1.0 J
Tetrachloroethene	5	ND	1.5 J	ND	ND
Semi-Volatile Organic Compounds		(ppb)			
Total SVOCs	-	ND	ND	ND	NA
Inorganics		(ppb)			
Barium	1,000	69.8 B	48.4 B	ND	NA
Chromium	50	1.5 B	2.2 B	ND	NA
Selenium	10	3.3 B	2.3 B	1.4 B	NA
Polychlorinated Biphenyls		(ppb)			
Total PCBs	0.1	ND	ND	ND	NA

Notes:
NA - Sample Not Analyzed
D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.
J - Indicates and estimated value. This flag is used when the mass spectral data indicated the identification; however, the result was less than the specified detection limit but greater than zero.
B - (Organics) Indicates the analyte was found in the blank as well as the sample.
B - (Inorganics) If the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).
ND - Not Detected
Bold face and shaded values indicates exceedance of standard

Table 7A

New York City School Construction Authority
Former Adams Brush Manufacturing Site
94-02 104th Street, Queens, New York
Historical PCE and TCE Detections

Monitoring Point	PCE				TCE			
	Mar-99	Jul-99	Nov-99	Jun-00	Mar-99	Jul-99	Nov-99	Jun-00
MW-1	10	11.5			ND	ND		
MW-2	16	12.4			ND	ND		
MW-3	ND	ND			510	502		
MW-4	ND	ND			8	2.2		
MW-5	ND	ND			11	6.1		
TW-01				ND				ND
TW-02				ND				17.5
TW-03				ND				ND
TW-04				ND				ND
SB-5				111				ND
SB-10				ND				ND
GP-1			55				ND	
GP-2 (adjacent to MW-2)			17				ND	
GP-3 (adjacent to MW-3)			ND				1300	

Notes:
November and March 1999 data from P.W. Grosser
July 1999 data from Anderson, Mulholland and Associates, Inc.
June 2000 data from Camp Dresser and McKee (CDM)
TW-01-TW-04 were temporary well points installed around the perimeter of the building by CDM as part of a Phase II ESA in June and September 2000
SB-5 and SB-10 were located adjacent to the 2000 gallon UST and 10,000 gallon UST, respectively, and were completed by CDM as part of a Phase II ESA in June and September 2000

Table 8
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil-Gas Analytical Data
Volatile Organics
January 2003 Investigation

Compound	Boring/Sample ID							
	SG-01 18-22 FT.	SG-02 26-30 FT.	SG-03 22-26 FT.	SG-04 18-22 FT.	SG-04 30-34 FT.	SG-05 22-26 FT.	SG-05 26-30FT.	SG-06 18-22FT.
Volatile Organic Compounds								
Methyl Tertiary Butyl Ether (MTBE)	39	13	39	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	20	29	26	32	53	33	44	21
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
m & p - Xylene	ND	ND	ND	ND	ND	ND	ND	ND
o - Xylene	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	20	ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene	21	ND	ND	ND	ND	ND	ND	ND
Naphthalene	11	ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	ND	ND	ND	ND	ND	ND	ND	14
Tetrachloroethene	13	ND	27	110	130	560	620	1,600
All analytical results expressed in micrograms per cubic meter								

Table 8

New York City School Construction Authority

94-02 104th Street, Queens, New York

Summary of Soil-Gas Analytical Data

Volatile Organics

January 2003 Investigation

	Boring/Sample ID							
Compound	**SG-06 22-26 FT.**	**SG-07 18-22 FT.**	**SG-07 26-30 FT.**	**SG-08 22-26 FT.**	**SG-09 18-22 FT.**	**SG-09 26-30 FT.**	**SG-10 22-26 FT.**	**SG-11 18-22 FT.**
Volatile Organic Compounds								
Methyl Tertiary Butyl Ether (MTBE)	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	19	23	22	36	38	15	78	51
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
m & p - Xylene	ND	ND	ND	ND	ND	ND	27	ND
o - Xylene	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	ND	11	ND	ND	4,100	230	5,300	1,600
Tetrachloroethene	530	13,000	63	82	76	ND	49	63
All analytical results expressed in micrograms per cubic meter								

Table 8
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil-Gas Analytical Data
Volatile Organics
January 2003 Investigation

Compound	Boring/Sample ID							
	SG-11 22-26 FT.	SG-11 26-30 FT.	SG-11 30-34 FT.	SG-12 18-22 FT.	SG-12 26-30 FT.	SG-13 18-22 FT.	SG-13 22-26 FT.	SG-13 26-30 FT.
Volatile Organic Compounds								
Methyl Tertiary Butyl Ether (MTBE)	ND	ND	ND	18	ND	ND	ND	ND
Benzene	ND	ND	11	ND	10	ND	ND	ND
Toluene	53	56	100	40	61	29	63	48
Ethylbenzene	ND	11	19	ND	ND	ND	ND	ND
m & p - Xylene	33	35	66	23	27	ND	ND	ND
o - Xylene	10	ND	19	ND	ND	ND	ND	ND
Total Xylenes	43	35	85	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	11	ND	ND	ND	14	ND	ND
Trichloroethylene	700	2,200	600	ND	ND	88	ND	ND
Tetrachloroethene	28	74	24	ND	ND	8,000	370	24
All analytical results expressed in micrograms per cubic meter								

Table 8
New York City School Construction Authority
94-02 104th Street, Queens, New York
Summary of Soil-Gas Analytical Data
Volatile Organics
January 2003 Investigation

Compound	Boring/Sample ID						
	SG-13 30-34 FT.	SG-14 18-22 FT.	SG-14 22-26 FT.	SG-14 26-30 FT.	SG-14 30-34 FT.	SG-15 18-22 FT.	SG-15 26-30 FT.
Volatile Organic Compounds							
Methyl Tertiary Butyl Ether (MTBE)	21	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND
Toluene	100	35	39	59	57	49	34
Ethylbenzene	24	ND	ND	ND	ND	ND	ND
m & p - Xylene	88	ND	ND	24	32	24	ND
o - Xylene	32	ND	ND	ND	11	ND	ND
Total Xylenes	120	ND	ND	ND	43	ND	ND
1,2,4-Trimethylbenzene	13	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	10	ND	ND	ND	ND	ND
Trichloroethylene	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	890	180	1,200	950	460	20	2,200

All analytical results expressed in micrograms per cubic meter

Table 9
Sampling Program Summary
Former Adams Brush Manufacturing Site
New York City School Construction Authority

Parameter	Matrix	Number of Samples	Number of Duplicates	Blanks	Method	Holding Times	Container	Preservative	Field Analysis
UST Excavation [1]									
VOCs	Soil	(1)	0	Trip: 1/ship	EPA 8021 (STARS list)	28 days	2 ounce	None	PID headspace
SVOCs	Soil	(1)	0	0	EPA 8270 (STARS list)	14 days	8 ounce	None	PID headspace
Excavation at 18 feet									
VOCs	Soil gas	12	0	0	EPA 8260	14 days	Charcoal/ Poropak N Sorbent tubes	None	NA
VOCs	Soil	12	1	Field: 1/day Trip: 1/ship.	EPA 8260	28 days	4 ounce	None	PID headspace
SVOCs	Soil	12	1	Field: 1/day	EPA 8270	10 days	8 ounce	None	N/A
Metals	Soil	12	1	Field: 1/day	EPA 6010 EPA 7471	6 weeks	8 ounce	None	NA
TCLP	Soil	12	0	0		2 weeks	16 ounce	None	NA

[1] Sampling to be performed by the selected contractor, pursuant to NYSDEC Spill Prevention Operations Technology Series (SPOTS) No. 14

APPENDIX A
STV PLANS AND SPECIFICATIONS

SECTION 02091
STORAGE, HANDLING, TRANSPORTATION AND DISPOSAL OF PETROLEUM-CONTAMINATED MATERIAL AND/OR HAZARDOUS WASTES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The areas of the required Work are shown on the Contract Drawings, are specified herein, and/or are described in the following Environmental Investigation Reports. All reports can be viewed at the School Construction Authority Office, 30-30 Thomson Avenue, Queens, New York.

1. Phase I and Phase II Environmental Site Assessments (Camp, Dresser and McKee, 2000).

2. Supplemental Phase II Environmental Site Investigation Report (Shaw Environmental and Infrastructure, September, 2002).

3. Pre-Construction Environmental Site Investigation Report (Shaw Environmental and Infrastructure, September, 2002).

4. Results of Supplemental Sampling and Analysis Plan (Memorandum to Lee Guterman from Shaw Environmental and Infrastructure, January, 2003).

B. Removal of three (3) 55-gallon drum volumes (165-gallons) of hazardous boiler room pit sediment. All hazardous wastes will be transported to a State Department-approved off-site RCRA facility, as specified in 40 CFR Part 265 and 6 NYCRR Part 373, that is acceptable to the Authority. All work is to be performed in conjunction with Sections 02100, 02200, and 02060, 02115, 13284, G01065, and S01010.

C. Contractor shall furnish all labor, materials, equipment and incidentals required to excavate, segregate, stockpile, test, load, transport, handle, and dispose all material deemed to be petroleum-contaminated material (soil and concrete) in accordance with all applicable city, state, and federal regulations. All petroleum-contaminated material will be transported to a State Department-approved off-site disposal facility/landfill. All work is to be performed in conjunction with Sections 02100, 02200, and 02060, 02115, 13284, G01065, and S01010.

Area / Quadrant	Approximate Excavation Depth as Required per Contract Documents and Drawings (ft-bg)	Approximate Quantity of Material to be Removed (tons)
1,800-gallon AST #1 / Quadrant F	2	10
2,000-gallon UST #2 / Quadrant F	15	450
10,000-gallon UST #3 / Quadrant I	20	750
Contents of UST #2 (Sand)	Not Applicable	25
Contents of UST #3 (Sand)	Not Applicable	135

D. Contractor shall provide sufficient containerized storage or secured stockpiles to allow for testing of the materials after removal, and before disposal, in accordance with the disposal facility's requirements. The Contractor shall have the appropriate permits for disposal facilities to accept the material. Applicable permits or certification by the disposal facility that they will accept the material throughout the contract time is required.

E. All material shall be transported under bills of lading or manifests approved by the Authority.

F. The work of this Section shall also include obtaining and paying for permits, not obtained by the Authority, and paying all fees required to perform the work. All work under this part will be performed under the supervision of an Authority employee or its representative.

G. The health and safety of the Contractor's employees shall be the sole responsibility of the Contractor during performance of the Work described in this specification. All work must be completed in accordance with applicable Federal, State, Local agency and the Authority's Health and Safety requirements and regulations. The Contractor shall also maintain a medical monitoring and respiratory protection program.

H. The Contractor shall prepare a Closure Report that is acceptable to the Authority and regulatory agencies.

I. If, at any time, the Authority's representative decides that Work Practices are violating pertinent regulations or, in its opinion, endangering workers or the public, he will immediately notify the Contractor (followed up in writing)that operations shall cease until corrective action is taken by the Contractor. The Contractor shall take such corrective action before proceeding with the Work. Loss or damage due to Stop Work Order(s) shall be the Contractor's responsibility.

1.02 RELATED SECTIONS AND WORK

A. Health and Safety Requirements, Section 01065 and S01010.

B. Site Preparation, Section 02100.

C. Earthwork, Section 02200.

D. Building Demolition, Section 02060.

E. Soil Erosion and Sedimentation Control, Section 02372.

F. Underground and Aboveground Storage Tank Removal, Section 02115.

G. Environmental Monitoring Well Abandonment Section 02526.

1.03 REFERENCES

A. New York State Department of Environmental Conservation NYSDEC):

1. Spill Technology and Remediation Series (STARS) Memo No. 1, Petroleum Contaminated Soil Guidance Policy, NYSDEC, Division of Construction Management, Bureau of Spill Prevention and Response, August 1992.

2. Technical Administrative Guidance Memorandum (TAGM)HWR-94-4046: Determination of Soil Cleanup Objectives and Cleanup Levels.

3. Consolidated Memorandum of STARS and TAGM dated December 12, 2000.

4. Division of Solid Waste Technical and Administrative Guidance Memorandum (TAGM; SW-89-2002); December 26, 1989.

5. Spill Prevention Operations Technology Series (SPOTS) Memo No. 14, Site Assessments at Bulk

Storage Facilities, NYSDEC, Division of Construction Management, Bureau of Spill Prevention and Response, May 1991.

B. New York Standards-New York Codes, Rules and Regulations (NYCRR):

1. 6 NYCRR Part 360, Solid Waste Management Facilities.

2. 6 NYCRR Part 371, Identification and Listing of Hazardous Wastes, July 14, 1985.

3. 6 NYCRR Part 372, Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities, July 1, 1986.

4. 6 NYCRR Part 373, Hazardous Waste Treatment, Storage and Disposal Facility Permitting Requirements

C. United States Department of Transportation (USDOT):

1. 49 CFR 172, Subpart C Shipping Papers

2. 49 CFR 172, Subpart D Marking

3. 49 CFR 172, Subpart F Placarding

4. 49 CFR 172, Subpart G Emergency Response Information

5. 49 CFR 173, General Requirements for Shipments and Packaging

6. 49 CFR 177, Carriage by Public Highway

D. United States Environmental Protection Agency (USEPA):

1. 40 CFR Part 261, Definition of RCRA Hazardous Wastes.

2. 40 CFR Part 262, Identification and Listing of Hazardous Waste.

3. 40 CFR Part 263, Standards Applicable, to Transporters of Hazardous Waste.

4. 40 CFR Part 265, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

E. U.S. Department of Labor (USDOL), Occupational Safety and Health Administration (OSHA), Title 29, Code of Federal Regulations (CFR):

1. 29 CFR 1910: Occupational Safety and Health Standards

F. All applicable Department of Transportation and Department of Sanitation Rules and Regulations

1.04 DEFINITIONS

A. Excavation

Excavation consists of removal of material encountered to contract level, stockpiling, loading, handling and subsequent legal disposal of such.

B. Petroleum-Contaminated Material

This material shall meet the NYSDEC STARS Memo #1 definition of petroleum-contaminated material. Specifically, petroleum-contaminated material shall be evidenced by odor, visual impacts (e.g., staining), proximity to existing or historic petroleum storage tanks and systems, known or suspected releases and exceed the guidance values provided in the NYSDEC Consolidated Memorandum of STARS and TAGM dated December 20, 2000.

C. Hazardous Waste

Material that meets the definition of a Resource Conservation and Recovery Act hazardous waste as defined in 40 CFR Part 261 or 6 NYCRR Part 371.

1.05 SUBMITTALS

The Contractor will provide the following:

A. A detailed Excavated Material Disposal Plan for the removal, testing, storage, handling, transportation, and disposal of petroleum-contaminated material and/or hazardous waste two weeks prior to the commencement of excavation. The Excavated Material Disposal Plan will be prepared in accordance with Article 3.04 of Section 02200 and will incorporate all excavated material covered under Section 02200. A Site-Specific Health and Safety Plan (HASP)for handling the excavated material must also be prepared in accordance with 29 CFR Part 1910.

B. List of tasks and statement of qualifications for Hazardous Waste Materials Management including names, addresses and telephone numbers of responsible individuals (all subject to review and written approval of the Engineer prior to initiation of work.

C. The Analytical laboratory shall provide certification under the New York State Department of Health Environmental Laboratory Accreditation Program (ELAP) for all chemical analyses required.

D. The Contractor shall provide a Sampling and Analysis Plan (SAP) in accordance with the requirements described in this Section.

E. The Contractor shall provide the Authority with analytical results from the collection and analyses of post-excavation soil samples as specified in SPOTS Memo #14 from areas where petroleum-contaminated material is present to verify that all petroleum-contaminated materials and/or hazardous wastes have been removed.

F. Results of all analytical sampling data and complete copies of all chain-of-custody forms shall be provided to the Authority at the completion of the work, unless specified otherwise.

G. Information on each State Department-approved off-site disposal facility that is proposed to receive petroleum-contaminated material and/or hazardous wastes. For each proposed facility, the following information will be submitted:

1. Name, address, and location of the facility, including the owner's name, address, telephone number, and fax number and the contact person at the facility.

2. The EPA Identification Number.

3. The amounts and types of petroleum-contaminated material and/or hazardous wastes that will be accepted at the facility on a daily basis.

4. Facility testing requirements and acceptance criteria.

5. The EPA region, State regulatory agency, and the local regulatory agency for which permits are required.

6. Copies of valid, existing, operating permits for the facility from the applicable regulatory agencies.

7. Copies of current valid permits from all applicable regulatory agencies indicating the types of excavated material that can be accepted at the facility.

H. Copies of all licenses and permits that apply to the transportation of petroleum-contaminated material and/or hazardous wastes including, but not limited to, New York State Department of Environmental Conservation (NYSDEC) Part 364 permits, hazardous waste transporter permits issued under 6 NYCRR Part 372.3, New York City Department of Consumer Affairs (NYCDCA) permits, and vehicle and hauling permits.

I. Copies of bills of lading/shipping documents for each shipment of petroleum-contaminated material and RCRA manifests for each shipment of hazardous wastes.

J. Names and addresses of each subcontractor performing work under this Section.

K. A dewatering plan in order to maintain the continuous dewatering of the open excavation, which shall be made available upon Authority's request.

L. A Community Air Monitoring Plan (CAMP). Air monitoring results will be documented and made available upon request.

M. Written Closure Report acceptable to regulatory agencies upon completion of the project. The documentation, provided by the Contractor, shall include, but is not limited to, a description of field activities, description of the excavated areas, analytical results, photographs, quantities removed, signed copies of bills of lading and RCRA manifests, certificates of final disposal (or destruction) for each manifest.

1.06 QUALITY ASSURANCE

A. Qualifications for Excavated Material Disposal Plan Design

1. Company specializing in performing the Work of this Section shall have a minimum of 3 years experience and shall have worked on 3 projects of similar size.

2. The Excavated Material Disposal Plan shall be prepared by a Certified Hazardous Materials Manager approved by the Institute of Certified Hazardous Management in Bethesda, Maryland, or Qualified Environmental Professional, approved by the Institute of Professional Environmental Practice, Pittsburgh, Pennsylvania, or similar board-certified professions, with professional experience in testing, handling and disposal of petroleum-contaminated material/hazardous wastes, and the preparation of excavated material disposal plans.

3. The work shall be performed by OSHA-certified workers, who are experienced in handling petroleum-contaminated material and hazardous wastes.

B. Regulatory Requirements

1. Work of this Section shall conform to all requirements of the NYC Building Code and all applicable regulations of governmental authorities having jurisdiction, including safety, health, and anti-pollution regulations. Where more severe requirements than those contained in the Building Code or other applicable regulations are given in this Section, the requirements of this Section shall govern.

2. Work outside the street line shall conform to the requirements of the governmental authorities or utilities having jurisdiction (i.e. DOT, DEP, etc.). Where more stringent requirements than those contained in the applicable governmental authority specifications are given in this Section, the requirements of this Section shall govern.

3. Conform to requirements of "Hazardous Waste Operations and Emergency Response" - OSHA.

4. All regulations and guidelines identified in Article 1.03 above.

PART 2 - PRODUCTS

A. 6-mil polyethylene sheeting shall be used as soil stockpile liners and covers.

B. A partial containment berm typically made up of haybales or 12" x 12" timbers shall be utilized around stockpiled soils to direct runoff and minimize erosion.

PART 3 - EXECUTION

3.01 PROTECTION

A. All Contractor personnel shall wear personal protective equipment and protective clothing consistent with the levels of protection required for this work as specified by OSHA and the site specific health and safety plan.

B. The Contractor shall be responsible for the safety of their operation, and for any damage that may result from the Contractor's work. Erect and properly maintain at all times, as required by the conditions and progress of the Work, proper safeguards for the protection of Workers and the public and post danger warnings as required by law or otherwise required by the Contract Documents against hazards created by the Contractor's operation. Furnish, install and remove after completion of the work, all signs, lights, barricades, fencing and other equipment as may be necessary for the safe execution of the Work.

C. Maintain safe sidewall slopes or provide adequate shoring. The excavation shoring shall meet all applicable New York City Department of Building Codes and OSHA requirements 29 CFR 1926. Refer to Section 02200.

D. The Contractor shall prepare and implement a Community Air Monitoring Plan (CAMP) and provide the Plan to the Authority before the start of excavation. Air Monitoring results will be documented and made available upon request. Ambient air monitoring shall be conducted periodically downwind of the excavation area at the property perimeter for fugitive dust emissions and organic vapors. If these readings are above established threshold levels, the Contractor shall institute measures to control dust and/or organic vapors at no additional cost to the Authority. The measures utilized are subject to the approval of the Authority.

E. Protect all monitoring wells from damage or displacement during excavation and handling activities.

3.02 PREPARATION

A. Transmit submittals required by this Section.

B. Furnish products as indicated.

C. Provide, pursuant to approval by the Project Engineer, separate locations where petroleum-contaminated material and/or hazardous wastes shall be stored for sampling and characterization prior to disposal.

3.03 WORK AREA CONDITIONS

A. Prior to bidding the Contract, the Contractor shall be aware of existing site constraints to properly stockpile and characterize the excavated material.

B. Representatives of NYSDEC may be at the area of Work. Cooperate with and give such assistance to such representatives as may be directed by the Engineer

C. A Safety Officer shall be present at the site at all times.

D. Display or have available at all times at the site a copy of the approved HASP.

E. Provide, pursuant to the approval by the Engineer, separate locations where petroleum contaminated material and/or hazardous materials shall be stored for sampling and characterization prior to disposal. All petroleum-contaminated material and/or hazardous materials shall be protected from precipitation, runoff and erosion. Storage location(s) shall be secured with access restricted to authorized personnel only.

3.04 DISPOSAL OF PETROLEUM-CONTAMINATED MATERIAL AND/OR HAZARDOUS WASTES

A. Description of Work

All petroleum-contaminated material shall be transported and disposed of to a State-approved off-site disposal facility permitted to receive petroleum-contaminated material. All hazardous wastes (as defined in 40 CFR Part 261 and 6 NYCRR Part 371) shall be transported and disposed of to an off-site disposal facility meeting the requirements of 40 CFR Part 265.

1. **Petroleum-Contaminated Material** - This material, as defined in Article 1.04B, shall meet the NYSDEC STARS Memo #1 definition of petroleum-contaminated soil. The Contractor shall provide the NYCSCA with a copy of the off-site disposal facility's permit to receive petroleum-contaminated material. The Contractor will stockpile or stage petroleum-contaminated material at the site pending off-site disposal. The stockpile will be placed on 6mil poly and will be covered and silt curbs will be installed around the stockpile. The Contractor will contract with an approved off-site disposal facility permitted to receive the petroleum-contaminated material. All petroleum-contaminated material will be handled in accordance with NYSDEC Spill Technology and Remediation Series (STARS) Memo #1 Petroleum-Contaminated Soil Guidance Policy. In addition the Contractor shall provide the Authority with original copies of all shipping papers, including manifests, weigh tickets, and original invoices. If there is no room on the site for stockpiling, staging soil in roll-offs or other containers that may be relocated from the work area to another on-site location will be considered based on approval from the Authority.

2. **Hazardous Wastes** - This material shall meet the definition provided in Article 1.04C. The Contractor shall provide the NYCSCA with a copy of the off-site disposal facility's permit to receive hazardous waste. The Contractor will stockpile or stage hazardous wastes at the site pending off-site disposal. The stockpile will be placed on 6mil poly and will be covered and silt curbs will be installed around the stockpile. The Contractor will contract with an approved off-site disposal facility meeting the requirements of 40 CFR 265 or 6 NYCRR Part 373. The Contractor shall provide the Authority with original copies of all manifests, weigh tickets, and original invoices.

3. The Contractor will provide all labor, equipment and material necessary to excavate, load, handle, and transport petroleum-contaminated material and/or hazardous wastes from the site to the designated facility(ies), as described herein, and is conditioned on the following:

   a. Comply with all applicable City, State, and Federal rules and regulations pertaining to the transport and disposal of petroleum-contaminated material and/or hazardous wastes.

b. Identify off-site disposal facilities that can properly manage petroleum-contaminated material and/or hazardous wastes.

c. Prior to commencing off-site disposal, furnish a list to be approved by the Authority that identifies the make, model, truck number and registration plate number of each of the trucks that will transport the material to the off-site facilities. Any change of trucks, or additional trucks, must have prior approval at least 24 hours in advance.

4. The Contractor shall prepare a dewatering plan in order to maintain the continuous dewatering of the open excavation. This pumping and removal applies to all water from any source whatsoever, and includes subsurface or ground water, seepage, leakage, drainage, trapped water, rain or snow, overflows, etc. The Contractor shall obtain all local, State and Federal permits required for dewatering. Refer to Section 02200.

B. Payment

The disposal of petroleum-contaminated material and hazardous material as defined in Article 1.04 of Section 02200 and as identified in Article 1.01B and C of this Section, and as specified herein, shall be included in the base bid. Reimbursement of petroleum-contaminated and/or hazardous wastes in excess of the amount specified in this Section, and approved by the Authority, shall be reimbursed at unit rates specified below following approval by the on-site Authority representative. Payment for the disposal of petroleum-contaminated material and/or hazardous wastes in excess of the quantities specified in this section will be contingent upon the Authority's receipt of manifests, if applicable, original shipping documents (e.g., manifests and bills of lading), weigh tickets, and original invoices. No additional payment will be made for excavating and loading and other requirements of this Section for any excess material. A credit will be issued by the Contractor to the Authority if the disposal quantity is less, at the unit rates specified below.

Unit Rate for transportation and disposal of PETROLEUM-CONTAMINATED MATERIAL is $53/ton.

Unit Rate for transportation and disposal of HAZARDOUS WASTE is $141/ton.

3.05 **TRANSPORTATION AND DISPOSAL**

A. All transportation vehicles shall be inspected, prior to leaving the site, by the Contractor to ensure that no material adheres to the wheels, undercarriage, tailgates, covers or other areas of transport vehicles. All vehicles shall be cleaned by washing tires, undercarriage, and any other contaminated parts prior to leaving the site.

B. When the Authority orders the Contractor to excavate during other than normal construction hours, the material shall be stockpiled on the site until the material can be delivered to the facility identified in the Excavated Material Disposal Plan. If there is no room on the site for stockpiling, staging soil in roll-offs or other containers that may be relocated from the work area to another on-site location will be considered based on approval from the Authority.

C. Transport and deliver the material only to disposal facilities approved by the Authority.

D. Provide for appropriate measurement of unit quantity of material removed from the site. Coordinate vehicle inspection and recording of quantities leaving the site with the Authority's on-site representative. These quantities shall be compared to recorded quantities received at the disposal facilities. Immediately resolve any discrepancies that occur and determine the probable cause for the discrepancy.

E. The Contractor shall be solely responsible for any and all actions necessary to remedy situations involving material spilled in transit.

F. Use only approved truck routes to transport material from the site to the expressways. En route, the Contractor shall use only Interstate or officially approved truck routes. All truck routes from the Interstate or officially approved truck routes to the disposal facility shall be subject to approval by the Authority. To the maximum extent possible, no vehicles shall travel on any local streets or through any residential areas. To the extent possible and in conformance with all applicable regulations, all vehicles shall be routed away from environmentally sensitive areas such as parks, schools, historic sites, wetlands, etc. For long distance hauling, all vehicles shall remain on primary highways.

G. Procure a sufficient number of containers and container handling equipment such that the material can be managed in accordance with the terms and conditions of this Section. The Contractor shall also have access to back-up vehicles and equipment to ensure that there is no downtime in connection with operations.

H. The disposal containers shall be ISO type, dump trailers, or approved equal, constructed of sufficient metal, have watertight bodies and sealed tailgates equipped with positive locking devices and provisions for controlled drainage of free liquids for dewatering. No liquid shall leak from any part of the loaded container or trailer. Furnish and install a metal or tarpaulin cover on each container immediately after the container is full. The cover shall be secured in an approved manner and shall remain in place until the container has reached the disposal facility.

I. All trucks and containers shall be washed clean before leaving the disposal facility and shall be maintained in clean, sanitary condition by the Contractor at all times. Furnish and utilize wash down equipment for the cleaning operations.

J. The Contractor is responsible for transportation safety. All vehicles shall be properly maintained, be driven properly, follow all rules and regulations, observe all speed limits, etc. All vehicles shall be inspected before every trip as part of the Contractor's preventive maintenance program. Inspect each vehicle to ensure that all doors, covers, etc. are secure and that no material can spill or otherwise be released or leak. Each vehicle shall bear, at a minimum, the name and phone number of the Contractor plainly visible on both cab doors. Each vehicle shall be uniquely numbered in lettering at least four inches high. Likewise, each trailer or container shall be so labeled on both sides and the tailgate if possible. The Authority can refuse any waste transport vehicle that does not satisfy the specifications. Costs associated with the refusal of a specific vehicle will be the Contractor's responsibility

K. Once the material has been stockpiled or loaded in the containers, the excavated material shall be immediately sampled and tested by the Contractor prior to transport to the disposal facility. The Contractor will be allowed to stage empty and loaded containers temporarily on the grounds at a location approved by the Authority's onsite representative. However, under no circumstances shall a loaded trailer be staged on site for a period greater than 24 hours after it has been tested

L. All transportation equipment shall be weighed before and after loading to ensure the highway weight restrictions are not exceeded. Weighing of transport vehicles leaving the site shall occur at a nearby truck scale certified by the State of New York. Weighing of transport vehicles outside the State of New York shall occur at the appropriate state or governing body certified scale

M. Provide and maintain a truck manifest and security system.

N. Submit the completed manifest for each container to document that the seals were not broken, completed manifest of each test sample, all scale tickets from the originating site(s), and all Disposal facility scale tickets. No payments shall be made until these documents have been furnished

1. Each manifest shall include the disposal facility following information:

a) Waste stream source and surface location description

b) Truck license plate number

c) Trailer license plate number

d) Container number

e) Contractor's name, address, contact person nd phone number

f) Transporter's name, address, contact person and phone number

g) Printed name and signature of the Contractor and date that the load was completed

h) Printed name and signature of the disposal facility representative and date that the load was received at the facility.

2. Each disposal facility scale ticket shall include the following information:

   a) Disposal facility name, address, and telephone number

   b) Material source and surface location description

   c) Scale ticket number

   d) Associated manifest number

   e) Truck license plate number

   f) Trailer license plate number

   g) Container number

   h) Transporter's name

   i) Gross, net and tare weight of the load

O. Ensure that the transport trucks are protected from contamination by properly covering and lining them with compatible materials or decontaminating them prior to any other use than hauling contaminated materials.

3.06 **SAMPLING**

A. Sampling for Disposal Facility Permits

1. The Contractor shall for the life of the contract sample and analyze material as necessary to maintain existing facility permits and/or obtain and maintain new facility permits. The Contractor must also ensure that disposal characterization sampling is in conformance with existing and/or new facility permit requirements throughout the life of the contract. The Authority must approve all sampling protocols. The Authority may randomly sample and analyze material.

2. Analysis shall be performed by an Environmental Laboratory Accreditation Program (ELAP) and NYSDEC certified laboratory.

B. Sampling For Closure of USTs

The Contractor shall collect sufficient material samples as specified in SPOTS #14 from the bottoms and sides of excavations where underground storage tanks (USTs) are removed to demonstrate that residual petroleum levels are below NYSDEC guidance values. The Contractor will analyze the samples for the constituents listed in Table 1 and Table 2 of STARS Memo #1.

3.07 EQUIPMENT DECONTAMINATION

A. All equipment shall be provided to the work site free of contamination. The Authority's on-site representative may prohibit from the site any equipment that in his opinion has not been thoroughly decontaminated prior to arrival. Any decontamination of the Contractor's equipment prior to arrival at the site shall be at the expense of the Contractor. The Contractor is prohibited from decontaminating equipment on the project site that is not thoroughly decontaminated prior to arrival.

B. The Contractor shall furnish labor, materials, tools and equipment for decontamination of all equipment and supplies that are used to handle petroleum-contaminated material and/or hazardous wastes. Decontamination shall be conducted at an area within the work site that shall be approved by the Authority's onsite representative. Frequency of decontamination shall be determined by the Authority's onsite representative, and may be required prior to equipment and supplies leaving the project site between stages of the work. All decontamination materials shall be collected, treated, tested and disposed in accordance with all applicable regulations with these documents.

C. Personnel contact with potentially contaminated materials will be kept to a minimum. Only gloves and Tyvek® suits will require disposal. Dusty clothing will be brushed off at the site and workers are instructed to wash hands and face immediately after leaving the work site.

LIST OF SUBMITTALS

SUBMITTAL	DATE SUBMITTED	DATE APPROVED
Excavated Material Disposal Plan	_______	_______
Community Air Monitoring Plan (if applicable)	_______	_______
Dewatering Plan (if applicable)	_______	_______

NYCDEP Discharge Permit (if applicable)	________	________
Health and Safety Plan	________	________
Name and Address of Subcontractors	________	________
List of Off-site Disposal Facilities	________	________
Disposal Facility Information & Permits::		
1. Petroleum-Contaminated Material	________	________
2. Hazardous Waste	________	________
List of Trucks for Off-Site Disposal	________	________
List of Water-Level Volume Of Trucks for Off-Site Disposal	________	________
Post-Excavation Soil Sample Results	________	________
Sample Results & Completed Chain of Custody	________	________
Copies of Completed Manifests	________	________
Scale Tickets from Point of Origin	________	________
Disposal Facility Scale Tickets	________	________
Original Invoices from Disposal Facility	________	________
Closure Report	________	________

END OF SECTION

SECTION 02115
UNDERGROUND AND ABOVEGROUND STORAGE TANK REMOVAL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements for excavation, removal, and off-site transportation and disposal of one abandoned 10,000-gallon underground storage tank (UST), one abandoned 2,000-gallon UST, and one existing 1,080-gallon aboveground storage tank (AST) as indicated on the Contract Drawings, as specified herein and as described in the following Environmental Investigation Reports. All reports can be viewed at the School Construction Authority Office, 30-30 Thomson Avenue, Queens, New York.

1. Phase I and Phase II Environmental Site Assessments (Camp, Dresser and McKee, 2000).

2. Supplemental Phase II Environmental Site Investigation Report (Shaw Environmental and Infrastructure, September, 2002).

3. Pre-Construction Environmental Site Investigation Report (Shaw Environmental and Infrastructure, September, 2002).

4. Results of Supplemental Sampling and Analysis Plan (Memorandum to Lee Guterman from Shaw Environmental and Infrastructure, January, 2003).

1.02 SCOPE OF WORK

A. The Contractor shall submit all plans outlined in this Section (i.e., Disposal Plan, Health and Safety Plan, Dewatering Plan, etc.). These plans shall be written to meet the requirements of all other applicable Sections of this Specification. These plans must be submitted to the Authority a minimum of two (2) weeks prior to initiation of work. The plans must be approved by the Authority prior to the start of excavation. No claims of delay will be permitted due to the Contractor's lack of approval of the plans by the Authority's Industrial and Environmental Hygiene Department.

B. The Contractor shall complete all necessary registration forms, provide proper notification to all City and State agencies (i.e. FDNY, NYSDEC) and utility companies, furnish all labor, materials, equipment and incidentals required for the proper decontamination and removal of the USTs and ASTs and associated electrical, structural, process piping and product equipment including, but not limited to, concrete, anchor straps, manways, pumps, remote fill lines, supply and return lines, vent lines, remote fill ports, etc. and steel cylinders to complete the Work as specified herein. The Contractor also shall be responsible for providing to the Authority a UST/AST closure report in accordance with existing NYSDEC guidance and regulatory policy. The location and configuration of the UST/AST is shown on the Contract Drawings.

C. The Work in this Section shall include locating, preparing, purging, testing of contents, in-place cleaning, removal and disposal of the USTs AND ASTs, contents, and associated components and the completion of all permits and closure reporting requirements.

D. Contractor shall be certified to perform UST/AST removal work by the New York City Fire Department (FDNY). Copies of FDNY certification shall be provided to the Authority and Authority's onsite representative prior to commencement of work.

E. Prior to cleaning the UST/AST, any products remaining in the tank shall be measured, reported to the Authority, and then transferred to temporary holding tanks to be provided by the Contractor. The Contractor shall characterize, remove and dispose of all residual material such as sand, product, water and sludge and properly decommission and remove the UST/AST.

F. The UST/AST and all associated supply piping, return piping, heating piping, remote fill piping, vent piping, vent riser and appurtenances shall be removed, thoroughly cleaned and properly disposed according to all applicable Federal, State and local requirements.

G. The Contractor shall be responsible for the excavation, segregation, stockpiling and disposal of overburden and any petroleum-contaminated soils, and concrete, as set forth in Section 02091.

H. The Contractor shall be responsible for the testing required for disposal classification of any contaminated debris, including, but not necessarily limited to, oil, sludge, water or water containing oil or separate phase product, and other ancillary tank system related materials such as piping, conduit, wiring, tank-fill facilities, and monitoring devices, to be removed from the site and shall include these costs in the base bid. The costs for items for disposal not specifically called out on the bid form shall be deemed included as part of the overall base bid submitted by the Contractor, and separate payment to the Contractor for those items shall not be made. The Contractor shall be responsible for post-excavation soil and water testing required by the NYSDEC for tank closure reporting. The Contractor shall collect and analyze any samples as directed by the Authority or the Authority's representative. These items shall be included in the base bid.

I. The Contractor shall obtain the required post-removal site assessment samples from the excavation bottom and sidewalls at the Authority's direction and as specified in SPOTS #14.

J. The Contractor shall prepare all necessary plans, closure reports, obtain all necessary permits, and provide all necessary submittals to New York City, State of New York and the Authority before, during and after performance of the removal work.

K. No work shall be performed under this Contract without the direct, on-site supervision of an Authority employee or its representative.

1.03 RELATED SECTIONS AND WORK

A. Health and Safety, Section 01065.

B. Storage, Handling, Transportation and Disposal of Petroleum-Contaminated Material and/or Hazardous Waste, Section 02091.

C. Site Preparation, Section 02100.

D. Earthwork, Section 02200.

E. Soil Erosion and Sedimentation Control, Section 02372.

F. Environmental Monitoring Well Abandonment, Section 02526.

1.04 QUALIFICATIONS

A. The underground and aboveground storage tanks shall be removed by a Contractor who is experienced in the closure and removal of tanks, operation of heavy equipment, has proper training and is certified by FDNY to perform UST/AST removals and closures. The Contractor shall provide a copy of current FDNY certification to the Authority.

B. All soil and water testing will be performed by a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory for the required analyses.

1.05 REFERENCE STANDARDS

A. The following are applicable references and regulations, incorporated herein by reference:

1. National Fire Protection Association (NFPA) Standard 327: Cleaning and Safeguarding Small Tanks and Containers.

2. American Petroleum Institute (API), Bulletin No. 1604, Recommended Practice for Abandonment and Removal of Used Underground Storage Tanks.

3. American Petroleum Institute (API), Bulletin No. 2015, Cleaning Petroleum Storage Tanks.

4. American Society of Testing Materials, ASTM D 5088 (1990), Decontamination of Field Equipment Used at Nonradioactive Waste Sites

5. Resource Conservation and Recovery Act, 40 CFR Parts 260-265, Safe Entry and Cleaning of Petroleum Storage Tanks.

6. 6 NYCRR Part 360, Solid Waste Management Facilities, July 14, 1985.

7. 6 NYCRR Part 364, Waste Transporter Permits, January 10, 1985.

8. 6 NYCRR Part 371, Identification and List of Hazardous Waste, July 14, 1985.

9. 6 NYCRR Part 372, Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities, July 1, 1986.

10. 6 NYCRR Parts 612-614, Petroleum Bulk Storage Regulations

11. The City of New York Building Code

12. US Department of Transportation (US DOT) 49 CFR Section 172.500 et seq.

13. New York State Department of Environmental Conservation, Spill Technology and Remediation Series (STARS) Memo#1 Petroleum-Contaminated Soil Guidance Policy

14. New York State Department of Environmental Conservation, Ambient Water Quality Standards and Guidance Values

15. United States Environmental Protection Agency,40 CFR 280,Underground Storage Tanks: Technical Requirements Final Rule

16. New York City Fire Department, FP Directive 3-73 Division of Fire Protection

17. New York City Fire Department, NYCAC Title 27, New York City Fire Prevention Code, Chapter 4 et seq.

18. New York City Fire Department, Rule 21-02 of the City of New York

19. New York City Department of Environmental Protection, 15 RCNY 19-01 et seq., Sewer Use Regulations and Sewer Use Permit

20. Permit for Work on Roadways, Curbs and Walkways (Form M-11) (Form R.F, 457)

21. U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Safety and Health Standards(29 CFR 1910, (General OSHA) and 29 CFR 1926 Construction Industry).

22. U.S. Department of Labor, OSHA 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response

23. U.S. Environmental Protection Agency (EPA), Office of Emergency and Remedial Response, Standard Operating Safety Guides, PB92-983414.

24. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities

25. U.S. Department of Labor, OSHA 29 CFR 1910.146, Permit-Required Confined Spaces.

26. New York State Department of Labor

27. U.S. Environmental Protection Agency (USEPA), Title 40, Code of Federal Regulations (CFR), 40 CFR Part 281: Approval of State Underground Storage Tank Programs.

28. National Fire Protection Association (NFPA) Standards, NFPA 30: Flammable and Combustible Liquids Code, 1996.

29. New York City Administrative Code, NYCAC Title 27 NYC Fire Prevention Code Chapter 4.

30. New York State Department of Environmental Conservation (NYSDEC), Spill Prevention Operations Technology Series (SPOTS) Memo No. 14, Site Assessments at Bulk Storage Facilities, NYSDEC, Division of Construction Management, Bureau of Spill Prevention and Response, May 1991.

31. New York State Department of Environmental Conservation (NYSDCE), Technical Administrative Guidance Memorandum (TAGM) HWR092-4046, Determination of Soil Cleanup Objectives and Cleanup Levels, January 24, 1994.

32. New York State Department of Environmental Conservation (NYSDCE), Soil Cleanup Consolidation Memorandum, NYSDEC, Division of Environmental Remediation, December 2000.

33. National Fire Protection (NFPA) Standards, NFPA 30: Flammable and Combustible Liquids Code, 1996.

34. New York City Administrative Code, NYCAC Title 27 NYC Fire Prevention Code Chapter 4.

1.06 SUBMITTALS

A. The Contractor shall submit to the Authority the following for review within two (2) weeks prior to initiating excavation. A checklist of the Submittals is provided in Article 3.09 of this Section.

1. A Disposal Plan which includes the requirements set forth in Section 02091, and the following information:

a. The name and address of the company(s) that will accept the remaining contents of the tank and all contaminated water collected during tank and pipe cleaning. (The Contractor is encouraged to recycle all other materials where feasible).

b. The name and address of the licensed tank disposal facility that will accept the tank and piping.

c. Written confirmation shall be submitted from each of the disposal or recycling facilities indicating that they will accept the tank and piping, any remaining product or sludge, and other Materials to be removed as part of this Work.

d. A copy of the certification that the Contractor removing the underground and aboveground storage tank is certified for the work by the FDNY, as outlined in Articles 1.02D of this Section.

B. Submit all pertinent information relating to the transport of materials specified herein. The information submitted shall include as a minimum:

1. Name and address of all transporters.

2. United States Environmental Protection Agency (EPA) Identification Number and expiration date.

3. Proof of permit, license or authorization to transport waste in all affected states.

C. Obtain and submit all local, State, and Federal permits required for the transport and disposal of all waste resulting from the performance of this Work.

D. Document that the disposal facility(s) proposed have all certifications and permits required by local, State, and Federal regulatory agencies to receive and dispose of the liquid and the solid wastes resulting from performance of the Work.

E. Obtain applicable permits or certification by the disposal facility(s) that they will accept the liquid and solid wastes throughout the contract time.

F. Submit a Health and Safety Plan and Procedures Including:

1. Name of Contractor's Health and Safety Officer.

2. Certification of Health and Safety Officer's authority.

3. Copies of all training certificates for the employees proposed for this project who have completed the training and medical requirements required for hazardous waste/confined space projects.

4. A Health and Safety Plan and Confined Space Entry Procedure, which addresses the required procedures for performance of the work in accordance with the reference standards.

5. Name and address of Contractor's consulting physician.

6. Name of Health and Safety Professional, employed by the Contractor, responsible for project safety management and the safety representative who will work under his/her direction.

7. Name of site health and safety coordinator.

8. Personal protection (including respiratory) programs, as applicable.

1.07 NOTIFICATION

A. The Contractor shall notify the Authority, the NYSDEC, and FDNY thirty (30) calendar days prior to commencement of any UST/AST removal work and shall obtain any necessary permits. The Contractor shall notify the aforementioned parties in writing.

B. The Contractor shall notify all utilities prior to the work, and arrange for mark-outs of underground utilities in accordance with all applicable local, State and Federal regulations.

1.08 EXISTING CONDITIONS

A. It is required that the Contractor visit the project site prior to bidding. The Contractor shall document all conditions that exist prior to commencement of the Work.

B. Existing conditions are reflected to the best of the Authority's knowledge. Should minor conditions be encountered which are not exactly as indicated, modifications to the Work shall be made as required at no additional expense to the Authority.

C. The Contractor is advised that existing subsurface conditions may not be clearly known and that he shall proceed with caution and extreme care in all phases of the Work.

1.09 CORRECTION OF DAMAGE TO PROPERTY

A. The Contractor is responsible for site security during the life of this Contract during both business and non-business hours. The Contractor shall consider any damage to the property not identified in the pre-job site visit as having resulted from execution of this Contract and the Contractor shall correct any such damage at no additional expense to the Authority.

B. If the Contractor damages a utility that has been properly marked by the local utility company and/or the Authority, the Contractor shall repair all damage at no expense to the Authority. All damages shall be immediately reported to the Authority.

1.10 UTILITIES

A. The Contractor is responsible to provide and generate all necessary utilities. If utilities are available from the Authority, the cost of the installation of any metering devices and the actual cost of the power and water consumed shall be paid to the Authority by the Contractor.

1.11 SIGN IN/OUT LOG

A. All contractor personnel, subcontractor personnel and Project Site visitors shall sign in and out on a daily basis for the duration of the project. The Contractor shall be responsible for establishing and maintaining the log.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall have available at all times on site a site-specific Health and Safety Plan (HASP), prepared in accordance with the referenced OSHA standards. A "Safety Officer" shall be identified in the HASP and shall be present at all times during the Work. The Safety Officer shall test excavations and underground/aboveground storage tanks for the presence of explosive, oxygen rich, oxygen deficient, and/or asphyxiating (i.e., confined space entry) conditions using portable combustible gas indicators (CGIs), photoionization detectors (PIDs) and percent oxygen indicators in accordance with the HASP. The Safety Officer shall continuously monitor the atmosphere of the work site for the presence of dust and organic vapors. The Contractor shall implement preventive measures, as necessary, if dust or organic vapors are produced during the performance of the Work.

B. The Contractor shall install visible barricades around the work area. Barricades shall be maintained throughout the entire contract duration. Refer to Section 02091 for requirements associated with these barricades.

C. The Contractor shall verify that all appropriate utilities are disconnected, locked out, and tagged prior to starting work on that utility.

D. The Contractor shall perform all necessary site preparation, restoration, security and control including but not limited to temporary fencing, backfilling with on-site soil and shoring as necessary to protect adjacent structures, workers and the public.

E. The Contractor shall provide a "Shoring and Sheeting Plan" (if required) signed and sealed by a Professional Engineer licensed in the State of New York as specified in Section entitled 02200 "Earthwork", where shown on the Contract Drawings, and where required to ensure that the movement, settling or damage to existing adjacent construction or structures does not occur. It shall be emphasized that the Contractor shall not compromise the Shoring and Sheeting Plan, and the structural integrity of the site takes precedence over the environmental work.

F. Contractor shall prepare a Dewatering Plan (see Section 02200) in order to maintain the continuous dewatering of the open excavation if continuous groundwater infiltration occurs and is required to be removed

G. The Contractor shall segregate clean and contaminated materials as set forth in Section 02091, as directed by the Authority's on-site representative. Materials which have no odor or visible evidence of petroleum contamination, and which do not show an indication above background levels when examined using a PID, shall be placed in the "clean" area. Materials which do show evidence of contamination when examined in this manner shall be placed in the contaminated area.

H. The Contractor shall provide a surface impoundment area for on-site storage of soil as described in Section 02091.

I. The Contractor shall collect and analyze post-excavation soil samples for laboratory analysis, as described in Article 3.04 of this Section.

J. The Contractor shall make provisions for leaving the excavation(s) open, as described in Article 3.04.

K. The Contractor shall obtain approval from the Authority to proceed at all stages of the project as identified on the contract drawings, including shoring stages and associated excavation of contaminated soils.

L. Protect all monitoring wells from damage or displacement during excavation and handling activities at the site.

3.02 PRE-REMOVAL

A. The Contractor shall remove drop tubes and check valves from the tank, if present. The Contractor shall drain and flush with water all piping back into the tank.

B. The Contractor shall remove any remaining product from the tank. Convey via a temporary closed system into USDOT approved drums or containers. After filling the drums or containers, seal the containers closed, identify contents and store the containers in the impoundment area.

1. Drums or containers shall be labeled as follows:

a. Specific work site (e.g. PS 163, UST #1)

b. Drum (container) number (in increasing sequence as filled)

c. Contents (e.g. rinse water from tank cleaning)

d. Date filled

2. Contractor shall maintain a written inventory of drums and containers.

C. Where indicated on the Contract Drawings, Contractor shall remove cover materials over tank and piping, and excavate additional soil as required to expose top of tank, fittings and product lines. Contractor shall disconnect and remove all piping, except vent line. Contaminated debris, such as fill devices, piping and fittings, conduit, and monitoring devices shall be placed within the prepared soil impoundment areas, described in Section 02091.

D. Cap or plug all tank openings, except vent line.

3.03 TANK CLEANING AND REMOVAL

A. The Contractor shall purge tank of vapors and oxygen by one of the following methods:

1. Displacement with bottled, inert gas (e.g. carbon dioxide)

2. Displacement with dry ice (minimum 15 lbs. per 1,000 gallon tank volume).

B. The Contractor shall gain access to tank interior (of non-enterable tanks) by careful use of a cold cut with a pneumatic rivet-buster, or equivalent. The cut shall be wetted with water to reduce the potential for sparks.

C. The Contractor shall clean the inside of the tank in accordance with API 2015 using high-pressure water rinse. Use as little water as possible for proper cleaning. Remove and containerize wash water and residual liquids and debris. After filling containers, seal the containers closed, mark and placard contents on the containers and place the containers in the impoundment area.

D. The Contractor shall remove the tank and all piping, including, but not limited to, supply piping, return piping, petrometer, heat piping, remote fill piping, vent piping and the vent riser, from the excavation. The Contractor shall use an approved biodegradable cleaning solution suitable for removal of fuel oil (Contractor to submit descriptive manufacturer's literature, and applicable MSDS sheets to the Authority and obtain approval for the cleaning solution in advance-note that solutions containing chlorinated solvents or volatile organic compounds are not acceptable) and clean the interior and exterior surfaces of the piping to remove all residual material and soil from the surfaces.

Cleaning shall be done in an area specifically set up by the Contractor for that purpose, curbed, and lined with an impermeable membrane, to contain the used cleaning solution, including any overspray, and any contaminated debris removed during the cleaning process. The Contractor shall submit a sketch of the proposed cleaning area showing sufficient detail to demonstrate to the Authority how the cleaning operation will be contained, and the materials used in its construction, and obtain the Authority's approval prior to implementing the cleaning process. Used cleaning solution and contaminated materials removed during the cleaning process shall be collected and containerized by the Contractor in drums that meet USDOT requirements for transportation of hazardous materials, and disposed by the Contractor at an approved TSD facility. Prior to transportation for disposal, these drums shall be labeled and stored as described above. All cleaning related materials and operations, and disposal of used cleaning solution and associated contaminated debris, shall be provided and performed at no additional cost to the Authority.

The tank and piping shall be inspected for signs of corrosion, cracks, structural damage, or leakage. Tank inspection shall be documented in writing and by photographs, with particular emphasis on any evidence of corrosion, cracks, structural damage, or leakage.

3.04 <u>SAMPLING</u>

A. The Contractor shall collect and analyze any required post-excavation samples. Post-excavation sampling will be required from the bottom and sidewalls of the excavation at several locations to be determined in the field by the Authority's representative. The Contractor shall make provisions for leaving the excavation open until the Authority and /or NYSDEC deems the work complete. No claims of delay will be permitted for assisting the Authority in the collection of soil samples or for keeping the excavation open until the Authority's and/or NYSDEC's requirements are met. Prior to backfilling the excavation with on-site soil, the Authority and the NYSDEC shall be notified and shall be given a minimum of two (2) working days' notice to inspect the excavation. The Contractor shall provide the Authority with a communication record that includes the name(s), phone number(s) and photocopies of any correspondence between the NYSDEC and the Contractor or any record of a NYSDEC official visiting the site.

B. Contractor is responsible for:

1. One composite sample shall be taken from each of the 4 sidewalls at a distance of approximately one-third from the bottom of the excavation. Sidewall samples shall be taken no less than 6-inches below the exposed surface being sampled.

2. Three samples shall be collected to form one composite sample from the bottom of each tank excavation. Bottom samples shall be obtained from a depth of 2 to 3 feet below the excavation.

3. One soil sample will be taken beneath the fill pipe or manway (1 sample per tank excavation).

4. A soil sample will be taken for every 20 linear feet of piping outside the tank excavation area. The samples associated with piping will be field analyzed, using a PID and sent for laboratory analysis only if elevated levels of volatile organic compounds are present.

5. If groundwater is within 5 feet of the bottom of the excavation, then a groundwater sample will also be taken. (1 sample per tank excavation).

3.05 DISPOSAL OF TANK AND CONTAMINATED MATERIALS

A. The Contractor shall permanently and legibly label both sides of the exterior shell of the tank with letters in orange spray paint not less than 2 inches high as follows:

TANK HAS CONTAINED (LIST TANK CONTENTS)
NOT VAPOR FREE, DO NOT ENTER
DATE OF REMOVAL (month, day, year)

B. The Contractor shall remove, transport and dispose all piping, the tank, ancillary equipment (tank hold down equipment, level monitoring and control equipment, transmitters, indicators, conduit, wiring, pumps) from the excavation. The Contractor shall ensure that the tank is unfit for further use by drilling or puncturing multiple holes in all surfaces. The Contractor shall provide the Authority's onsite representative with certification that the tanks and ancillary equipment were properly disposed at an approved and permitted disposal facility.

C. The fluid wastes generated and collected as a result of the tank emptying and the tank cleaning and the solid materials generated during tank excavation and as a result of dewatering shall be sampled and classified by the Contractor in accordance with the approved disposal facilities' requirements. Whenever possible, materials for disposal shall be characterized prior to loading so that staging loaded trucks and containers at the site is not required. Once classified and accepted by the approved facility in accordance with all Federal, State and local requirements, the Contractor shall provide the Authority's onsite representative with a photocopy of any required hazardous or non-hazardous waste manifests. The Contractor shall obtain all permits necessary to conform to these regulations. The Contractor shall identify, in writing, the facility at which this material will be disposed.

D. The Contractor shall remove, transport and dispose of all oil-impacted materials within the excavation. Removal of petroleum-impacted materials is addressed in Section entitled 02091 "Storage, Handling, Transportation and Disposal of Petroleum-Contaminated Material and/or Hazardous Wastes".

3.06 DECONTAMINATION OF EQUIPMENT AND MATERIALS

A. All decontamination procedures of equipment and materials shall conform to the requirements of applicable USEPA and NYSDEC regulations, as appropriate.

B. All recoverable equipment and materials which have been in contact with excavated soil shall be decontaminated prior to removal from the site. As used herein "recoverable" shall mean all items which are non-absorptive in nature and which can be successfully decontaminated. All items for which decontamination is difficult or uncertain shall be considered non-recoverable, as determined by the Authority.

C. Provide a non-porous barrier membrane of appropriate size and material under items being decontaminated to catch and hold rinse fluids and protect adjacent grade area (see description of decontamination area, above). This barrier membrane and the rinse fluids shall be considered non-recoverable.

D. Decontaminate recoverable Contractor-owned equipment and materials with pressurized steam. Do not utilize any detergent agents.

E. Deposit non-liquid non-recoverable materials into USDOT containers as directed by the Authority.

F. Mark and placard drummed decontamination materials and place in the impoundment area. The waste shall be sampled and classified by the Contractor in accordance with the approved disposal facilities' requirements. Once classified and accepted by the approved facility in accordance with all Federal, State, and local requirements, the Contractor shall provide the Authority's onsite representative with a photocopy of any required manifests.

3.07 CLOSE-OUT

A. The Contractor shall excavate, segregate, and dispose contaminated materials in accordance with Section 02091, "Storage, Handling, Transportation and Disposal of Petroleum-Contaminated Materials and/or Hazardous Wastes".

B. At the direction of the Authority, the Contractor shall backfill the UST/AST excavation with on-site soil.

C. Upon completion of the above tasks, and in concert with the requirements set forth in Section 02091 for the Tank Closure Report, the Contractor shall provide to the Authority a written Tank Closure Report acceptable to NYSDEC. The documentation in the closure report shall include, but is not limited to, copies of waste bills of lading or manifests, waste profiles, daily logs, description of tank contents, sample results, photographs, truck weighing tickets and disposal facility forms. This report shall be submitted to the Authority no later than three (3) weeks from completion of the fieldwork.

D. The Contractor shall acquire all permits and shall complete all manifests for the Authority's or the Authority's representative's signature. The Contractor shall return all completed manifests to the Authority

3.08 PAYMENT

All necessary labor, materials and equipment shall be furnished and installed by the Contractor, and all material shall be properly characterized and disposed of by the Contractor, for this Work under this Section and is included in the base bid for this Contract. No additional payment shall be made to the Contractor for the Work set forth in this Section.

3.09 LIST OF SUBMITTALS

The Contractor shall provide the required submittals as listed below and defined in Article 1.06 of this Section.

SUBMITTAL	DATE SUBMITTED	DATE APPROVED
Pre-Award		
1. Disposal Plan for Tank and Debris	__________	__________
2. Name and address of transporters with EPA numbers and expiration date	__________	__________
3. Proof of permit, license or authorization to transport the waste in all affected states	__________	__________
4. All required local, State and Federal Permits for the disposal of all liquid and solid wastes resulting from the performance of this work	__________	__________
5. Documentation that the proposed disposal facility(s) have all required local State and Federal permits to receive and dispose of the liquid and solid wastes resulting from performance of the work.	__________	__________
6. Applicable permits or certification by the disposal facility(s) that they will accept the liquid and solid wastes throughout the contract time	__________	__________

7. Insurance Certificates for Contractor and Subcontractor(s)	________	________
8. List of Subcontractors and qualifications	________	________
9. Documentation of required qualifications of Contractor's workers, including FDNY certifications.	________	________
10. A detailed project schedule	________	________

Post-Award

11. Copies of required NYC Department of Building permits for oil storage tank removal	________	________
12. Verification that the FDNY and NYSDEC have been notified of the removal commencement date.	________	________
13. Written dewatering plan and NYC Dept. of Environmental Protection discharge permit if obtained.	________	________
14. Worker training (i.e., hazmat, confined space, etc.) and medical monitoring certificates	________	________
15. Health and Safety Plan	________	________
16. Confirmation that utility lines within the proposed area of excavation have been identified, marked, locked/tagged out.	________	________
17. Sheeting/shoring calculations and drawings per Contract Drawings and Section 02200.	________	________
18. Tank Removal affidavit.	________	________
19. Proof of payment of prevailing wage rates.	________	________

20. Signed waste and tank

disposal manifests from disposal facility(ies) ____________ ____________

21. Closure Report

____________ ____________

END OF SECTION

APPENDIX B
RESUME OF QA/QC OFFICER

Brian J. Tucker

Current Corporate Title

Task Scientist

Functional Title

Task Scientist

Years Experience (as of June 2002)

At Stone & Webster: 11 With other Firms: 7

Division-Department/Location

Environmental/Infrastructure - Environmental Sciences & Engineering (042)/Boston

Current Status within Company

Full-Time Employee

Professional History

Stone & Webster Engineering Corporation, Boston, Massachusetts - 1990 - 1995; April, 1996 to Present
Metcalf & Eddy, Wakefield, Massachusetts - 1995 to 1996
W.R. Grace , Lexington, Massachusetts - 1987 to 1990
New Jersey Department of Health, Trenton, New Jersey - 1985 to 1987
Research Triangle Laboratories, Durham, North Carolina - 1984 to 1985

Areas of Expertise

Analytical Chemistry, Analytical Quality Assurance/Quality Control, Chemical Demilitarization, Waste Minimization, Nuclear Power Plant BOP Sampling Systems, Environmental and Radiological Testing, Data Validation, Laboratory Design, and Innovative Treatment Technologies

Languages

Some Spanish and German; not fluent in either one.

Security Clearances

DOE Level L

Awards

The Chromatography Forum of the Delaware Valley for Achievement in the Field of Separation Science at the Tenth Annual FACSS Meeting Student Award Symposium, September 7-15, 1983.

Computer Hardware/Software Capabilities

IBM PC, Microsoft Word, Word Perfect, Lotus 123, Microsoft Excel, Microsoft Access, Mathcad

Training

OSHA 40 Hour Training, First Aid, CPR, Hazardous Waste Site Manager or Supervisor Training, and Construction Quality Management for Contractors

Division/Department Assignments

Project Chemist for FUSRAP Remediation Projects; Air Monitoring, Sampling and Analysis of Process Fluids and Effluents, and Laboratory Design responsibility for the Army Chemical Agent Neutralization Plant Design Project; Sampling System Design for Nuclear Power Plants; Project Chemist and data validation responsibilities for several Air National Guard, Army Corps of Engineers, and Navy contracts, and Analytical QA/QC for the Army Corps of Engineers New England Division Remedial Action Contract, Navy BRAC and Massport Logan 2000 contract.

Experience Summary

Dr. Tucker has more than 17 years of progressively responsible professional experience in the fields of hazardous and radioactive materials analysis, management of sampling and analysis activities for RI/FS projects, chemical quality assurance/quality control, nuclear power plant sampling system design, pollution prevention/waste minimization, analytical equipment design and construction, laboratory evaluation and design, remedial planning, and air monitoring for hazardous organics. He has been a Project Manager for multi-million dollar engineering and remediation projects and is currently a Task Scientist for Stone & Webster's Environmental Technology & Services group, where he develops and ensures implementation of Quality Assurance Project Plans, prepares and reviews Project Sampling and Analysis Plans, assesses laboratory practices and performance, and validates project data.

He has dedicated much of his career to research and development in the fields of analytical chemistry and environmental restoration.

Education

- Drexel University - Ph.D., Analytical Chemistry, 1984
- Fordham University - Bachelor of Science, Chemistry 1977

Continuing Education: Massachusetts Contingency Plan, RCRA/CERCLA Compliance, Environmental Law, Industrial Waste Management, Air Resources Management, and Environmental Hydrogeochemistry

Publications

Steude, J. and B.J. Tucker, Selection of Innovative Technologies for the Remediation of Soils Contaminated with Radioactive and Mixed Wastes, Poster Session at Environmental Remediation '91, September 8-11, 1991 Pasco, WA.

Tucker, B.J., A.R. Bandy, and P.J. Maroulis, Measurements of Free Tropospheric CS_2 at the Low pptv (parts-per-trillion by volume) Level Over a 92 degree Latitude Range, Geophysical Research Letters, 12(1), 9-11, January 1985.

Bandy, A.R., B.J. Tucker, and P.J. Maroulis, Analytical Techniques for Measurement of Atmospheric Carbon Disulfide at the Low pptv (parts-per-trillion by volume) Level by GC/MS Using an Isotopic Dilution Method, Analytical Chemistry, 57, 1310-19 June 1985.

Carbon Disulfide Measurements in the Free Troposphere, Tenth Annual Federation of Analytical Chemistry and Spectroscopy Societies Meeting, September 25-28, 1983, Philadelphia, PA.

Experience History

STONE & WEBSTER ENGINEERING CORPORATION, BOSTON, MASSACHUSETTS - SEPTEMBER, 1990 TO MARCH , 1995 AND MAY, 1996 TO PRESENT

Dr. Tucker's most recent tasks have included:

- Client – United States Army Corps of Engineers (USACOE)
  Project Chemist for the $330 million Maywood, New Jersey Remediation Project under the FUSRAP Program. Developed the site Chemical Data Quality Management Work Plan (CDQMP), with a scope covering onsite and offsite chemical and radiological sampling and testing for various matrices, using pertinent QA/QC protocols and standard operating procedures (SOPs). The CDQMP is a critical document employed in all phases of work, including: a pre-design investigation, groundwater investigation, pilot study, environmental monitoring, and remedial design/remedial action of a large number of residential, commercial, and government properties contaminated with thorium, uranium, and radium.
- Client - United States Army Program Manager for Chemical Demilitarization (PMCD) Nonstockpile Program – review of chemical testing procedures and data for a number of proposed chemical agent neutralent and neutralent simulant destruction techniques.
- Client - United States Navy
  Lead Chemist for the Phase II Environmental Baseline Survey of the Base Realignment and Closure (BRAC) of South Weymouth Naval Air Station, handled laboratory and field sampling technical issues; managed the Data Validation effort for the analytical test data (CLP format, approximately 775 samples and 2000 test parameters).
- Client - United States Army Program Manager for Chemical Demilitarization (PMCD) Stockpile Program - Provided design and operations input for siting laboratory instrumentation during development of laboratory facility drawings for both mustard agent (HD) and VX nerve agents.
  Wrote the Mustard Agent (HD) Air Monitoring Basis of Design for the siting and operation of air monitors to detect mustard agent at the Aberdeen Proving Ground (HD). Managed the writing of and reviewed the Laboratory Quality Assurance Plan/Monitoring Concept Plan and VX Air Monitoring Basis of Design to detect VX at the Newport Chemical Depot for health and safety and process control purposes.
  Wrote the specification entitled Miniature Continuous Agent Monitoring System (MINICAMS®) for the Aberdeen and Newport plants.
  Wrote the calculations entitled Loading and Breakthrough Times of Ton Container Cleanout Carbon Filter Beds and Potential Flammability of HD and Hydrolysate Vapors in the Aberdeen Plant Process Vents for the mustard agent (HD) facility, Hazard Assessment and Personal Protective Equipment for VX Hydrolysate Handling for the VX facility, and reviewed the calculation entitled Carbon Filter Capacity for Vapors Generated by Hydrolysate Accident Spill into the Process Vent Cubicle, Hydrolysate Vent Cubicle, or SCWO Reactor Room

Provided technical oversight for several subcontracts with Southwest Research Institute in the areas of GC-PFPD and GC-PFPD/MS method development for measurement of trace levels of chemical agent, optimization of sorbent tube performance for collection and transport of chemical agent in air, and writing of program level monitoring documents.

Provided design input for siting of agent in air monitors, as well as VX hydrolysate sampling and testing recommendations for the CAMDS Hydrolysate Unit.

Reviewed the HD Air Permit Application and provided comments to the PMCD

Coordinated turnover of environmental and monitoring design information to the Aberdeen Systems Contractor and provide technical oversight for monitoring and permitting on the Systems Contract

- Client - Taiwan Power Company
  Designed non-radioactive sampling system for turbine, condensate polisher, and auxiliary boiler systems; prepared P&IDs, wrote system description, and provided data sheets and technical specifications for all equipment within these systems.
- Data validation for samples collected from numerous Air National Guard, Army Corps of Engineers, and Navy environmental restoration sites, and providing advice on QA/QC sampling and analysis issues.
- Writing and/or reviewing Sampling and Analysis Plans for ACOE Barnes and Fitzsimons Sites
- Chemical QA/QC Coordinator for the New England Division Army Corps of Engineers Remedial Action Contract; audited the laboratory subcontractor.
- Audits and evaluation of the field screening and testing subcontractor for the Airport Fueling Systems task of the Massport Logan 2000 contract.
- Lead Chemist for the Omaha TERC Twin Cities Army Ammunition Plant site
- Development and execution of a laboratory evaluation program for the purpose of establishing long term contracts with quality environmental sample testing laboratories

His past responsibilities included work on the Department of Energy' s Hanford and Savannah River high level waste tank and evaporator process programs , including:

- Deputy Startup Manager, developing and defending responses to review findings from various oversight groups and to 63 Environmental Protection Readiness Review affidavits in support of an evaporator mixed waste treatment facility startup.
- Conducting an Environmental Compliance Assessment of a life sciences laboratory facility.
- Conducting a Laboratory Audit to assess the adequacy of benzene testing at the Savannah River site.
- Reviewing the Operating General Contractor's evaluations and work plans of the Unreviewed Safety Questions (USQs) characterized by flammable gas accumulation in tank dome spaces and potential runaway reactions of ferrocyanide (FeCN) with tank waste oxidizers at elevated temperatures.
- Co-reviewing Safety, Environmental, and Hazard Assessments, Readiness Reviews, work packages and work plans prior to tank intrusive activities.

- Reviewing laboratory QA and QC program and project plans, analytical test procedures and data summaries.
- Recommending improvements in tank vapor sampling techniques and tank waste analysis procedures after visits to site laboratories.
- Development of hazardous and radioactive waste minimization alternatives which resulted in substantial waste handling and disposal savings to the DOE.
- Conducted air stack emissions studies in support of waste minimization efforts and to determine emissions levels.

As a Senior Environmental Scientist/Project Manager, Mr. Tucker developed mixed waste acceptance criteria with a focus on waste minimization for Lawrence Livermore National Laboratory to assist generators in the storage, packaging, handling and transport of mixed hazardous and radioactive waste. Reviewed and interpreted applicable Federal, State and local regulations.

He has also written Stone & Webster Standard Operating Procedures for various field sampling and testing activities, a corporate Drug Program for a gas pipeline proposal, and evaluated the integrity of a sampling system at the Salem nuclear power plant for collecting representative samples to be tested for trace iron levels.

Prior to joining Stone & Webster, Dr. Tucker was the Lead Chemist for the EPA Region I Alternative Remediation Contract Strategy. In this role, he scheduled, supervised, and managed the work performed by eight chemists, validated data and reviewed data validation reports, reviewed split sampling reports, wrote analytical specifications and a corrective action plan, and interacted with EPA and laboratories to resolve problems relating to collection and analysis of Superfund site samples. He also developed a National Laboratory Program, conducted laboratory audits, and evaluated and improved various wastewater treatment applications, including heavy metal and cyanide removal and odor control.

Dr. Tucker has also analyzed samples and prepared analytical reports for testing the inorganic and organic content and physical characteristics of many different matrices, including aqueous, synthetic lubricants, sealants, surfactant solutions, adsorbents and plastisols. He used a variety of analytical test methods, including AA, GC, HPLC, FT-IR, UV-VIS, PES and ILC. He has analyzed water and soil samples by EPA Method 625 under strict quality control guidelines using a GC/MS and autosampling equipment. Dr. Tucker has operated and maintained GC/MS/DS equipment to provide optimum performance, designed and constructed a sample concentrator for transfer of stack gas sampling (VOST) using a purge and trap technique, and planned and organized the construction of a laboratory for receipt, preparation and analysis of hazardous waste, wastewater and soil samples using GC/MS and GC/ECD.

He has operated and maintained a Finnigan 4000 GC/MS/DS under optimum performance conditions while developing analytical methods for measuring CS_2 at the low parts-per-trillion level; constructed a semi-automated desorption unit; participated on a NASA atmospheric research project, collecting ambient air samples over a 92 degree latitude range and analyzed them for CS_2 by GC/MS.

APPENDIX C
LABORATORY QUALITY ASSURANCE MANUALS

QUALITY ASSURANCE MANUAL

CHEMTECH

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Approved By:

Divya Mehta
Technical Director

Mildred Reyes
QA/QC Director

INTRODUCTION

The Chemtech Quality Program, outlined in this document, has been prepared to meet the requirements of ISO Guide 25 and National Environmental Laboratory Accreditation Program (NELAP). The program establishes all Quality Assurance (QA) policies and Quality Control (QC) procedures to follow in order to ensure and document the quality of the analytical data produced by the Laboratory. The Quality Program is reviewed periodically and revisions are implemented as required.

Chemtech Standard Operating Procedures (SOP's), provide explicit instructions on the implementation of each element of the plan and assure that compliance with the requirements of the plan are achieved. All employees are required to adhere to the requirements of the SOP's in performing their specific job functions. SOP's are reviewed periodically and revisions are implemented as required when change occurs.

The goal of the Quality Program is to consistently produce accurate, defensible analytical data through the implementation of sound and useful Quality Assurance/Quality Control management practices. The plan will ensure that Chemtech, its employees and client expectations are achieved.

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1 QUALITY POLICY

1.1 CHEMTECH MISSION

Chemtech will be recognized as a dynamic, professional organization which provides high quality analytical services to the environmental market.

It will consistently meet client expectations while providing a challenging work environment for its employees and acceptable profit margins for its shareholders.

1.2 POLICY STATEMENT

Chemtech is committed to the production of analytical data meeting specific defined quality standards and to continue improvements in all areas of our operation. As a result of having a focus on environmental analyses, an emphasis is placed on timelines of work, meeting data quality objectives, and the legal defensibility of the data. Each operation maintains a local perspective in its scope of services and client relations and maintains a national perspective in terms of quality. Under the guidance of this quality assurance manual, a level of quality, which is acceptable on a national and international scale, is upheld in all Chemtech laboratory operations.

Our corporate goal for all segments of Chemtech operations is to have uniform products and service quality standards, while encouraging local variation to meet state regulations and customer specifics needs. The process of achieving this goal entails continuous evaluation and action. Chemtech management requires documentation of existing practices and improvement action plans at every stage in the analytical measurement process. Documentation is fundamental to the demonstration and management of quality practices in environmental analytical laboratories.

A spirit of innovation is an essential element to the success of Chemtech in solving the complicated analytical problems encountered with environmental samples. This spirit, combined with the discipline and attention to detail required to provide the level of service expected by our customers, is what makes Chemtech stand out among others in this field. This same spirit is what drives continuous quality improvement and which is the keystone to the Chemtech quality program.

2. ORGANIZATION AND MANAGEMENT

2.1 ORGANIZATIONAL ENTITY

Chemtech, located in Mountainside, New Jersey, is a privately held independent analytical laboratory established in 1967. Chemtech is incorporated in the State of New York and registered to do business in the State of New Jersey. Our Directors, many of who are also major shareholders are acutely aware of the dynamics of our industry, the changing technology, and need for capital investment. Capital for investment in technology and expansion is mainly derived from operating profits and our shareholders. We have been successful in acquiring the necessary equipment, software and automation necessary to be a leader in the analytical community.

2.2 MANAGEMENT RESPONSIBILITIES

Objective: The laboratory has an established chain of command as detailed in the Organizational Chart. The responsibilities of the management staff are linked to the President of Chemtech who establishes the strategy and direction for all company activities.

President: Primarily responsible for all operations and business activities. Develops and implements strategies, initiatives and direction for the company. Delegates authority to Laboratory Directors, all Managers, and Quality Assurance/Quality Control Director to conduct day to day operations and execute quality assurance duties.

Chief Operating Officer/Technical Director: To facilitate uniformity and focus in all aspects of the company's technical affairs; including, Quality Assurance, Information Systems, and Organic and Inorganic technical direction. Strives to align the strategies, initiative and direction of technical affairs with the strategic direction of the company. Reports to the President.

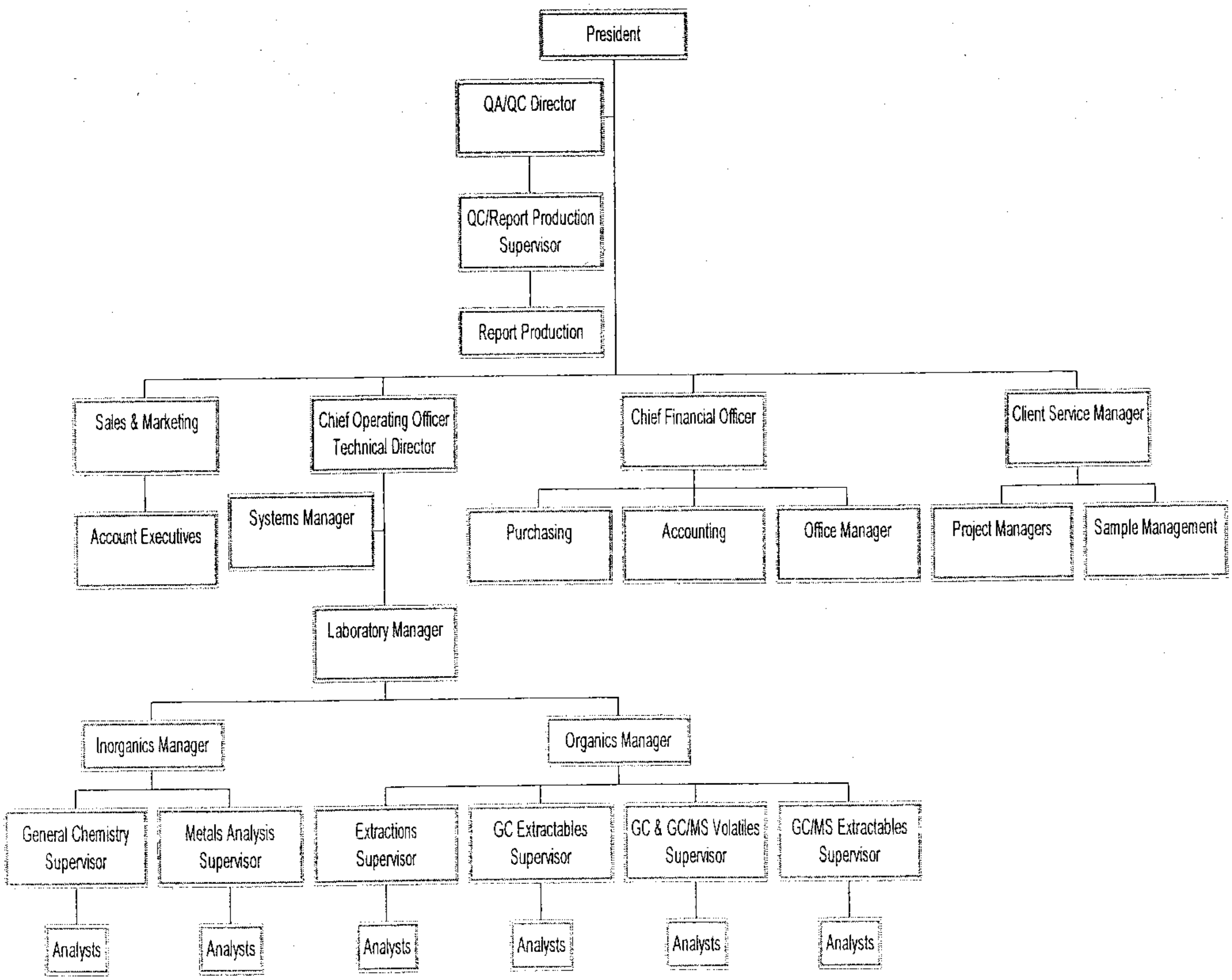
Quality Assurance/Quality Control (QA/QC) Director: To implement, supervise, and facilitate responsibility for all QA activities established by the Quality Program. Reports to the President.

Laboratory Manager: To plan, direct, and control the day to day company's operational performance expectations. Reports to the Chief Operating Officer/Technical Director.

Department Managers: To supervise, plan, direct, and control the day to day responsibility of a specific laboratory department. Report to Laboratory Manager.

Department Supervisors: To supervise day to day responsibility of a specific laboratory department. Report to Department Manager.

Chemtech
Organization Chart



3. RELATIONSHIP BETWEEN MANAGEMENT, TECHNICAL OPERATIONS, SUPPORT SERVICES, AND THE QUALITY SYSTEM

Objective: The members of the management team have defined responsibility for the Quality Program. The development and implementation of the Quality Program is the responsibility of Quality Assurance/Quality Control Director. The implementation and operation of the Program is the responsibility of the operations management.

President: Responsible for all quality activities including the overall responsibility of implementing the Program. Is the primary alternate in the absence of QA/QC Director. Authorizes the QA/QC Director to design, implement, and coordinate the Program.

Chief Operating Officer/Technical Director: Responsible for executing and coordinating the Program in all laboratory departments. Responsible to certify and document that personnel have the appropriate education and or technical background to perform the tests for which the laboratory is accredited to perform. Responsible for the development and implementation of corrective actions, including the authority to delegate Quality Program implementation responsibilities.

Quality Assurance/Quality Control Director: Responsible for the establishment, execution, support, training, and monitoring of the Quality Program. Identifies all product, process, or operational defects through statistical monitoring and audits including implementation of corrective action. Audits corrective actions for compliance with the Program.

Laboratory Manager: Responsible for coordinating and monitoring the requirements of the Quality Program in the laboratory. To assure that subordinates follow the requirements of the Quality Program. Implement corrective actions as necessary to address quality deficiencies. Is the primary alternate in the absence of Technical Director

Department Managers: Responsible for implementing the requirements of the Quality Program in their departments. To assure all subordinates and analysts follow the requirements of the Quality Program. Implement corrective actions as necessary to address quality deficiencies.

Department Supervisors: Responsible for implementing the requirements of the Quality Program within their department. To assure all analysts follow the requirements of Quality Program. Implement corrective actions as necessary to address quality deficiencies.

Department Supervisor: Provides supervision and directions for the group. Implements the daily analysis schedule. Ensures that the group and the analytical data are in compliance with the Quality Program. Reports to the Department Manager.

5. APPROVED SIGNATORIES

Objective: For traceability of data and related documents procedures are required which detail the authorization of signature approvals of data and information within Chemtech. A log of signatures and initials of all the analytical staff is maintained in the QA/QC office for cross-reference check.

5.1 SIGNATURE AUTHORITY

President: Authorizes contracts and binding agreements.

Chief Operating Officer/Technical Director: Approves the QA policy and SOP's and approves final reports in the absence of QC supervisor and QA/QC Director.

Quality Assurance/Quality Control Director: Approves SOP's, and the QA Plan. Approves final reports in the absence of QC supervisor.

5.2 SIGNATURE REQUIREMENT: All laboratory activities, commencing with sample receipt through the release of data, are approved by appropriate personnel by initialing or signing and dating the documents. A document is signed or initialed by an employee, is within their limits of authority. All raw data are initialed and dated by the analyst conducting the analysis. All signatures and initials can be cross-referenced to the signatures and initial log.

5.3 SIGNATURE AND INITIAL LOG: The QA/QC office keeps a logbook of all signatures and initials of all technical personnel. New technical employee's signatures and initials are added to the logbook on the first day of their employment. Ex-employee signatures are kept on file but annotated with the last day of employment.

8. FACILITIES AND RESOURCES FOR NEW ANALYTICAL PROJECTS AND IMPLEMENTING CLIENT REQUIREMENTS

Objective: To ensure that appropriate facilities and resources are available to meet the demand for new analytical projects and process to implement client requirements.

8.1 **REVIEW OF NEW ANALYTICAL PROJECTS:** A Project Chronicle (PC) is prepared by the Account Executive prior to a quotation preparation and or an award, and presented to the Technical Director and his staff for review and comments. The PC outlines all the client requirements and includes copies (if available) of the clients Quality Assurance Project Plan (QAPP), Statement of Work (SOW) and contractual provisions. The PC and associated information are scanned and stored on the network for future reference.

A "Kick Off Meeting" chaired by the Technical Director is scheduled to discuss the PC and its associated information. Project Management, the QA/QC Director, Laboratory Manager, including appropriate Department Managers/Supervisors, Sample Management and MIS staff are present to familiarize themselves with the requirements, and are asked to participate in the planning and implementation of the project.

8.2 **RESOURCE AVAILABILITY:** Chemtech maintains a 30,000 square foot laboratory designed for maximum efficiency and safety. There is a redundancy of equipment to ensure ample equipment resources. The laboratory is adequately staffed by a highly skilled group of chemists with diversified experience in environmental analysis; and managed by a knowledgeable team of professionals who are committed to quality and client satisfaction.

The laboratory management maintains a clearly defined model of laboratory capacity based upon historical data. This model is the basis for controlling resources, management of personnel and equipment, including the flow of work into and through the laboratory.

8.3 **NEW WORK COORDINATION:** Project Management coordinates the project logistics with the client and Sample Management in addition to overseeing the analytical progress through the laboratory. Sample Management initiates the Log-In process which includes requirements detailed in the PC and Quotation.

Prior to release of data to the client the Department Managers, Supervisors, and the QC/Report Production staff review the data for completeness, accuracy, and conformance with applicable regulatory and clients requirements.

9. CLIENT CONFIDENTIALITY

Objective: To design and implement policies and procedures to protect the confidentiality and proprietary rights of our clients.

9.1 CLIENT CONFIDENTIALITY

Information related to a Client and or a Project are entered and stored in Chemtech's LIMS SQL Server. The information is entered by employees with the appropriate level of authority. Security levels within Chemtech's system define an individuals access to information levels. Information on the Server is backed up at defined intervals, and the backup information is stored offsite.

Analytical data is prepared in a report format as required by the client. The report is copied and scanned electronically. A paginated copy of the report is distributed as directed by the client while the original copy and related information is kept on site in the Document Storage Area. The scanned copy is archived on our LIMS Server. Access to the Document Storage Area or the LIMS Server is limited by the employees security authorization levels. The files are archived for a period of five years.

Electronic data stored in Chemtech's database is protected by a variety of systems including, Virtual Private Networks (VPS), firewalls, log in user names and passwords. A Gateway system is also employed to restrict access to specific users based upon their authorization level.

Reports or client information requested by a third party must be accompanied by written authorization from our Client. Client information is released when directed by a subpoena from a court with valid jurisdiction. The Client is promptly notified of the subpoena requesting their information.

10. CLIENT COMPLAINTS RESOLUTIONS

Objective: To establish a system to address and resolve client complaints regarding any laboratory activity. The process for dealing with complaints must include a procedure, documentation, corrective action, and monitoring of the implemented corrective action.

10.1 PROCEDURE: When a client calls or e-mails an inquiry regarding a project or a report to the Project Manager (PM), the PM receiving the call (or e-mail) summarizes the client issue or requests the client to mail/fax any questions. Once a formal request is received, the PM prepares a Corrective Action (CA) report form, that includes the client name, laboratory project numbers(s), summary of issues, PM initials and date. The CA report form is a assigned a four digit tracking number, by the QC Supervisor. The CA report form is submitted to the Technical Director, who assigns the CA report form to the affected department supervisor to review, comment and correct the issue within 24 hours. All technical and data reporting inquiries are submitted to the QA/QC Director for review. Once the response comes back from the laboratory the QC Supervisor and QA/QC Director reviews it and if satisfactory the CA report form is filed in the QA/QC office. The client is sent the corrected information.

10.2 DOCUMENTATION: Client's complaints are documented using CA report form which originates from PM office. The original communication (phone log, e-mail, or fax) is kept in the PM office while closed CA report form is filed in the QC office. The CA report contains the date and name of the person receiving the complaint, a description of the complaint, source of the complaint, the resolution, and any written material accompanying the complaint. The CA database is updated by QA/QC office to which only QA/QC Director and QC officer has excess. A database is maintained where client inquiries are logged-in including date, client name, project number, department in question, and a summary of the inquiry and CA taken.

10.3 CORRECTIVE ACTION: The CA report is entered in a database to monitor systematic defects. The appropriate department supervisor must deal with the complaint by responding to the inquiry. The response must address the issue(s) and provide an explanation and resolution. The response may involve reprocessing of data and issuing a revised data report. The QA/QC Director reviews the CA for a persistent defect in case the respective SOP needs modifications.

10.4 QA/QC AUDITING: The CA is entered in a database to monitor systematic defects. The QA/QC Director investigates complaints and promptly audits all areas of activity to assure that the CA implemented has resolved the defect. If the defect persists, the QA/QC Director, and Department Manager and Supervisor develop and implement an effective process. When the defect is resolved, monitoring is incorporated as a part of the annual system audit. For a detailed information on client inquiries refer to the SOP for handling client inquiries.

11. SAMPLE MANAGEMENT PROCESS

Objective: To establish a system to process client requests for analytical services and samples upon arrival at the laboratory.

11.1 **ANALYTICAL REQUEST:** Project Managers prepare an Analytical Request (AR) Form from the information detailed on the Project Chronicle (PC) and provide a copy to Sample Management in order to initiate a sampling event.

11.2 **SAMPLE CONTAINER PREPARATION AND SHIPMENT:** All bottle orders prepared from the Analytical Requests are prepared with bottles that are certified pre-cleaned by the manufacturer according to US EPA specifications. Reagent grade preservatives are added to the bottles at the laboratory. All preservative solutions are checked to assure that they are free of contamination. Chemtech utilizes laboratory reagent water for trip and field blanks.

Bottle orders are prepared by one individual and checked by a second individual to ensure that the bottle order was properly prepared. The bottles are then relinquished from Sample Management to the appropriate courier. When the bottles arrive at the client destination, the courier will then relinquish custody of the bottles to the client or the client designee.

Samples arrive at the laboratory via Chemtech couriers, common carrier, or client delivery. All shipments and deliveries of samples are received through the shipping & receiving door located in the rear of the facility. All deliveries enter in the same location and go directly to the sample room. The SOP's for Chain of Custody (CoC) and Sample Acceptance and Receipt are followed.

Sample Management personnel will sign for all shipments received and notify the Sample Custodian immediately. The samples are then relinquished to the Sample Custodian.

A sample or sample container is considered to be in custody if: it is in the persons' actual possession; it is in the person's view after being in their physical possession; it was in their possession and then locked in a refrigerator or sealed in a cooler; it is in a designated secure area.

11.3 **SAMPLE ACCEPTANCE**
Upon receipt of sample coolers at the laboratory, coolers are examined for damaged or broken custody seals. Records of the condition of the custody seals and coolers are recorded on the Laboratory Chronicles. If seals and

coolers are intact, the sample acceptance procedure is continued. If they are not intact, the appropriate Laboratory Project Manager (PM) is notified. The PM will seek guidance from the client whether to proceed with the analysis of the samples or discard or send back the samples. The PM will communicate information given by the Client to Sample Management via a Record of Communication.

11.4 SAMPLE RECEIPT

Once the samples have been accepted, the sample receipt process begins. The Sample Custodian will line up the samples according to the CoC and begin comparing the information documented on the CoC to the samples received. Any deviation noted from the CoC or non-conformance is recorded on the Laboratory Chronicle and communicated to the appropriate Laboratory Project Manager.

11.5 SAMPLE CUSTODIAN RESPONSIBILITIES

The Sample Custodian must take a cooler temperature soon after sample receipt and record it on the Laboratory Chronicle and the Field CoC. This will verify that the samples were transported and received at the required temperature.

The Sample Custodian must ensure that samples are received in good condition and ensure that samples listed on the CoC are all present. The Sample Custodian must compare the sample identification on the CoC to the labels on the bottles, and make sure that the information on the CoC exactly matches the bottle labels. Verification that enough volume has been received for the sample tests requested and absence of headspace for volatile analysis must be noted.

The Sample Custodian must ensure that all samples are properly preserved. Appropriate preservation of samples is determined by checking the pH of the samples. Sample Management Staff are issued a reference table that lists the tests methods we utilize and their appropriate preservation techniques. The pH of the samples is recorded on the Laboratory Chronicle.

The Sample Custodian must sign the CoC and other documentation received with the samples. Documentation of custody is initiated when the field sampler is collecting the samples. Custody documentation includes all information that provides a clear record of the sample identification, time of collection, and collection chronology. This record is kept on the Chemtech or Client CoC Forms.

The Sample Custodian must place the samples in storage or relinquish to the appropriate laboratory analyst after labeling the samples with the unique laboratory number.

11.6 Sample Management Staff Responsibilities

Sample Management staff must review the Field CoC submitted by the Sample Custodian and procure the correct Analytical Request (AR) form from the file. They must compare the AR to the Field CoC and ensure that all information on the CoC follows the AR exactly. If not, contact the appropriate PM for further guidance. The PM should resolve all discrepancies between the AR and the CoC prior to sample login. Once the discrepancies are resolved the PM will issue a Record of Communication to document the client's instructions.

If an unapproved rush analysis is received, Sample Management staff must inform the PM, and contact the appropriate Department Supervisor via email. Proceed to login the samples. Create a folder with the original Field CoC, the sample and delivery tickets, any third party delivery documentation, and the login report.

11.7 Subcontracted Analysis

Projects sometimes contain analyses that Chemtech does not perform. In order to give a high level of service to our clients, Chemtech will subcontract these analyses to other laboratories. All subcontracted laboratories must meet vigorous standards set forth by QA/QC Department as well as standards established for the environmental laboratory industry. A documented procedure is followed to qualify laboratories for subcontracting and a list in maintained in our QA/QC Department. Procedures have also been established to assure that CoC is maintained and the subcontract laboratory achieves all client objectives.

A subcontracted laboratory must provide our QA/QC Department the following information in order to be used as a subcontractor: a valid state certification for the required tests, Quality Assurance Plan, PT Studies for the required tests, and copies of the SOP's for the required tests.

The subcontracting procedure is a documented procedure that is initiated by an Account Executive. The Account Executive is responsible for ensuring that the subcontracted laboratory meets all client specifications. When a client issues a Scope of Work, the Account Executive thoroughly reviews the document. If subcontracting is required, the Account Executive will consult the established subcontracting list that is issued by the QA/QC Department. If a particular analysis is not conducted by one of these approved laboratories, the Account Executive must then request that

QA/QC Director locates and approves a laboratory for the requested analysis.

Once a subcontract laboratory is found, the Account Executive must contact the laboratory to communicate the client's requirements and request a quotation from the laboratory. The Account Executive then creates a Project Chronicle that documents the client requirements, the subcontract laboratory to be used, and attaches a quote to this document. The Project Chronicle is an electronic document available to all appropriate personnel. This procedure is followed prior to the receipt of samples from the client.

When the client calls to order the bottles for the project, the PM initiates an Analytical Request Form (AR) from the information documented on the Project Chronicle. The AR includes the information for the subcontract laboratory as well as any special bottle instructions for the subcontracted tests, and is given to Sample Management. Sample Management then creates the bottle order and sends it to the client.

Upon receipt of the samples, the Sample Custodian will give a copy of the CoC to the Client Service Manager. The Client Service Manager will then create a subcontract chain of custody and procure a Purchase Order from Accounting. This documentation is given to Sample Management to send to the subcontract laboratory along with the samples. A copy of this documentation is retained and placed in the login folder and double-checked by the appropriate Project Manager.

All subcontracted samples are logged into the LIMS System to allow for sample tracking and data reporting. A PM will track the samples to ensure that client deadlines and specifications are met. Once the data packages arrive from the subcontract laboratory, the PM will check the report for completeness. If the data package is deficient, the PM will immediately notify the subcontract laboratory to remediate the deficiencies. The report is then passed to the QA/QC Department for further review. If any corrective action is required at this point, the QA/QC staff will call the subcontractor laboratory. All data that is subcontracted is clearly designated.

11.8 SAMPLE STORAGE

Chemtech maintains a 40-foot walk-in refrigerator that contains a multitude of shelves. All samples, with the exception of volatiles, are kept in this refrigerator. The refrigerator temperature is monitored constantly and recorded once a day. All shelves in the walk-in refrigerator are identified with a code. The Sample Custodian assigns samples to a refrigerator shelve and gives the shelve location to Sample Management to login with the sample information. This documented procedure allows the samples to be found very easily.

The volatile refrigerators are located in the Volatile Department and kept secure. All Volatile refrigerators are also monitored for temperature. The temperature is recorded every day in a logbook.

Back-up refrigerators are available should any mechanical problem present itself. All samples are securely moved to the backup refrigerators if necessary.

Only the Sample Custodians are permitted access to sample storage. Analysts create a sample request electronically and send the request to the Sample Custodians. Once received, the Sample Custodians fill out the appropriate paperwork and issue the samples to the Analysts.

Periodically throughout the day, the Sample Custodians will pick up samples from the laboratory and sign them back into storage. Analysts will send the Sample Custodian an email when they finished with the samples. All samples must be back in refrigeration at the end of a shift and the chain of custody is required to be kept at all times.

12. ANALYTICAL CAPABILITIES

Analytical Fraction	Soil/Solid Matrix Methods	Aqueous Matrix Methods
Volatile Organics by GC/MS	SW 5030B/8260B SW 5035/8260B SW 3585 OLM03.2 OLM04.2	SW 5030B/SW 8260B SW5035/SW 8260B OLM03.2 OLM04.2 OLC02.1 OLC03.1 EPA 524.2 EPA 624
Volatile Organics by GC	SW 8015B SW 5030B/SW 8021B SW 5035/8021B	SW 8015B SW 5030B/SW 8021B SW 5035/8021B EPA 601 EPA 602
Semivolatiles by GC/MS	SW 3510C/SW 8270C SW 3520C/SW 8270C SW 3540C/SW 8270C SW 3545/SW 8270C SW 3580A/SW 8270C OLM03.2 OLM04.2 SW 3550B	EPA 625 SW 3510C/SW 8270C SW 3520C/SW 8270C SW 3540C/SW 8270C SW 3545/SW 8270C SW 3580A/SW 8270C OLM03.2 OLM04.2 OLC02.1 OLC03.1
Semivolatiles by HPLC	SW 8310	SW 8310 SW 8330
Semivolatiles by GC	SW 8015B	SW 8015B
Pesticides &/ or PCBs	SW 3510C/SW 8081A&/or 8082 SW 3520C/SW 8081A&/or 8082 SW 3540C/SW 8081A&/or 8082 SW 3545/SW 8081A&/or 8082 SW 3580A/SW 8081A&/or 8082 OLM03.2 OLM04.2	SW 3510C/SW 8081A&/or 8082 SW 3520C/SW 8081A&/or 8082 SW 3540C/SW 8081A&/or 8082 SW 3545/SW 8081A&/or 8082 SW 3580A/SW 8081A&/or 8082 EPA 608 OLM03.2 OLM04.2
Chlorinated Herbicides	SW 8151A	SW 8151A
Volatile Organics by GC/MS	Air Matrix Method: TO-14	

Analytical Fraction	Soil/Solid Matrix Methods	Aqueous Matrix Methods
Metals	SW 6010B SW 7471A ILMO4.1 ILM05.0 SW 3050B	EPA 200.7 EPA 245.1 SW 6010B SW 7470A ILM04.1 ILM05.0 SW 3005A SW 3010A
Wet Chemistry		
Acidity	------	EPA 305.1 SM 18 2310B(4A)
Alkalinity	------	EPA 4100B SM18/19 2320 B
Alkalinity, Bicarbonate	------	SM18/19 2320 B
Ammonia	EPA 350.2	EPA 350.2 SM 18 4500-NH3 B/E
Anions: Bromate Bromide Chloride Fluoride Nitrate Nitrite Orthophosphate Sulfate	------	EPA 300.0
ASTM Leaching Procedure	ASTM 3987	------
Biochemical Oxygen Demand (BOD5)	------	EPA 405.1 SM 18 5210B
Bromide	SW 9211	EPA 320.1 EPA 300.0
Carbon Dioxide	------	EPA 310.1
Carbonaceous BOD (cBOD)	------	SM 18/19 ED 5210B
Cation-Exchange Capacity	SW 9080 SW 9081	------
Chemical Oxygen Demand (COD)	------	EPA 410.1 EPA 410.2 EPA 410.3 SM 18 5220C SM 18 5220D

Analytical Fraction	**Soil/Solid Matrix Methods**	**Aqueous Matrix Methods**
Chloride	SW 9212 SW 9056	EPA 325.3 EPA 300.0 SM 18 4500-Cl C
Chlorine Demand	------	SM 18/19 ED 2350B
Color	------	EPA 110.2 SM 18 2120B
Conductivity	SW 9050A	EPA 120.1 SM 18/19 ED 2510 B
Corrosivity	SW 9040B	SW 9040B
Corrosivity Toward Steel	SW 1110	SW 1110
Cyanide	SW 9010B	EPA 335.2 EPA 340.1 SM 18/19 4500-CN C&E
Cyanide-Amenable	SW 9010B SW 9213	EPA 335.1 SM 18 4500-CN G
Density	------	SM 18 2710F ASTM D1298 ASTM 5057
Dissolved Oxygen	-----	EPA 360.1 EPA 360.2 SM 4500-O C SM 4500-O G
Extractions	SW 3610 SW 3620 SW 3640 SW 3665 SW 8440	SW 3610 SW 3620 SW 3640 SW 3665 SW 8440
Ferrous Iron	------	SM 18 3500 B SM 19 3500FE-D
Flashpoint	SW 1010 SW 1030	SW 1010 SW 1030
Foaming Agents	-----	SM 18/19 ED 5540 C
Fluoride	SW 9214	EPA 340.2 SM 18 4500 F-B, C EPA 300.0
Hardness, Calcium	------	EPA 200.7
Hardness, Total	------	EPA 130.2 SM 18 2340 B OR C

Analytical Fraction	Soil/Solid Matrix Methods	Aqueous Matrix Methods
Hexavalent Chromium	SW 3060A/SW 7196A	SM 18/19 ED3500-Cr D
Ignitability	SW 1010 SW 1030	SW 1010 SW 1030
Methylene Blue Active Substances (MBAS) Surfactants	------	EPA 425.1 SM 18/19 ED 5540 C
Nitrate	SW 9210 SW 9056	EPA 353.2 SM 18 4500-NO3 F EPA 300.0
Nitrate/Nitrite	EPA 353.2	EPA 353.2 SM 18 4500-NO3 F EPA 300.0
Nitrite	EPA 353.2 SW 9056	EPA 354.1 SM 18 4500-NO2 B EPA 300.0
Odor	------	SM 18 2150 B
Oil & Grease	SW 9070	EPA 413.1 EPA 1664A
Organic Nitrogen	EPA 351.1, .2, .3 .4 EPA 350.1.2.3	EPA 351.1, .2, .3 .4 EPA 350.1.2.3 SM 18/19 4500-NH3 BCEFGH
Orthophosphate		EPA 365.2 SM 18/19 ED 4500-P,E
Paint Filter Test	------	SW 9095
Petroleum Hydrocarbons	EPA 418.1	EPA 418.1
pH	SW 9040B SW 9045C	EPA 150.1 SM 18 4500-H+-B SW 9041A
Phenolics	SW 9065 SW 9066 SW 9067	EPA 420.1
Phosphorus, Ortho	------	EPA 365.2 SM 18/19 4500 P-E
Phosphorus, Total	EPA 365.2	EPA 365.2 SM 18 4500-P B5+E
Reactive Cyanide	SW 7.3.3.2 Rev 3	SW 7.3.3.2 Rev 3
Reactive Sulfide	SW 7.3.4.2 Rev 3	SW 7.3.4.2 Rev 3
Redox Potential	SM 18 2580	SM 18 2580 ASTM D1498

Analytical Fraction	Soil/Solid Matrix Methods	Aqueous Matrix Methods
Residual Chlorine	-----	SM 18 4500-Cl G
Settleable Solids	------	EPA 160.5 SM 18/19 2540 F
Silica	SW 6010B	EPA 200.7
SPLP Extraction	SW 1312	SW 1312
Sulfate	SW 9035 SW 9036 SW9038	EPA 375.4 EPA 300.0 SM 18/19 4500SO4 F, C or D
Sulfide	SW 9215	EPA 376.1 SM 18/19 4500-S E SW 9215
Sulfide, Acid Soluble & Insoluble	SW 9030B	SW 9030B SW 9031
TCLP Leaching Procedure	SW 1311	SW 1311
Temperature	SW 2550B	EPA 170.1 SM 18/19 2550B
Total Dissolved Solids (TDS)	------	EPA 160.1 SM 18 2540 C
Total Kjeldahl Nitrogen (TKN)	EPA 351.3	EPA 351.3 SM 18/19 4500-N Org B or C
Total Organic Carbon (TOC)	SW 9060 Llyod Kahn	EPA 415.1 SM 18/19 5310 B, C or D
Total Organic Halides (TOX)	SW 9020B	SW 9020B EPA 450.1
Extractable Organic Halides (EOX)	SW 9023	SW 9023
Total Solids (TS)	EPA 160.3	EPA 160.3 SM 2540 B
Total Suspended Solids (TSS)	------	EPA 160.2 SM 2540 D
Total Volatile Solids (TVS)	------	EPA 160.4
Turbidity	------	EPA 180.1 SM 18/19 2130 B
Volatile Suspended Solids (VSS)	------	PA 160.4
Microbiology		
Total Coliform	SW 9131 SW 9132	SM 18/19 9221D SM 18/19 9222B
Fecal Coliform	------	SM 18/19 9222B or D

Analytical Fraction	Soil/Solid Matrix Methods	Aqueous Matrix Methods
Escherichia coli	------	SM 18/19 9222B SM 18/19 9221E
Heterotrophic bacteria (Standard Plate Count)	SM 18/19 9215D	SM 18/19 9215B

13. MAJOR EQUIPMENT

13.1 ORGANIC INSTRUMENTATION

Instrument	Manufacturer Description	Serial Number	Year Purchased
GC/MS	Hewlett Packard 5970 MSD/HP 7673 AS	2843A12446	1994
GC/MS	Hewlett Packard 5971A MSD/HP 7673 AS	2704A04914	1994
GC/MS	Hewlett Packard 5971A MSD/HP 7673 AS	3012A22005	2000
GC/MS	Hewlett Packard 5970 MSD/ Tekmar ALS 2016	2429A02327	1995
GC/MS	Hewlett Packard 5970 MSD/ Tekmar ALS 2016	2643A11383	2000
GC/MS	Hewlett Packard 5970 MSD/ Aero Trap	2429A02435	1995
GC/MS	Hewlett Packard 5970 MSD/ Archon	3033A31948	2000
GC/MS	Hewlett Packard 5970 MSD/ Archon	29723A1267	2000
GC/MS	Hewlett Packard 5971 MSD/ Tekmar ALS 2016	2623A07331	2000
GC/MS	Hewlett Packard 5971 MSD/ Archon	2749A00075	2000
GC/MS	Hewlett Packard 5970 MSD/ Tekmar ALS 2016	3449A20171	1996
GC	Perkin Elmer Auto System PID/Hall/ Tekmar LSC 2000	610N4101940	2000
GC	Hewlett Packard 5890 Series II PID/Hall/Tekmar LSC 2000	3235A46097	2000
GC	Trimetrics Dimensions PID/Hall/ Tekmar LSC 2000	921105	2000
GC	Hewlett Packard 5890 Dual ECD/HP 7673 AS	2323A08577	2000
GC	Hewlett Packard 5890 Dual ECD/HP 7673 AS	2413A03097	2000
GC	Hewlett Packard 5890 Dual ECD/HP 7673 AS	2618A07910	1996
GC	Hewlett Packard 5890 Series II Dual ECD/HP 7673 AS	3203A40376	1996
GC	Hewlett Packard 5890 Series II Dual ECD/HP 7673 AS	3115A34809	1996
GC	Hewlett Packard 5890 Series II Dual ECD/HP 7673 AS	3235A44756	1996
GC	Hewlett Packard 5890 FID/HP 7673 AS	2643A09798	2000
HPLC	Hewlett Packard Series II DAD/HP 91313A AS	JP73007001	2000
GPC	OI Analytical AP-500	9612AP/500	2000

13.2 METALS INSTRUMENTATION

Instrument	**Manufacture & Description**	**Serial Number**	**Year Purchased**
ICP	Thermo Jerrell Ash Trace 61E Simultaneous	364590	2000
ICP	Thermo Jerrell Ash Trace 61E Simultaneous	357490	2000
ICP/MS	Perkin Elmer Elan 6100	92700107	2001
Hg Analyzer	Leeman Labs DS200	61631	2000

13.3 WET CHEMISTRY INSTRUMENTATION

Instrument	**Manufacturer & Description**	**Serial Number**	**Year Purchased**
IR Spec.	Perkin Elmer 1310	1310/13503	1998
ASI	Dionics ASE 200	97060620	2000
TOX Analyzer	Mitsubishi TOX	75C01462	2000
TOC Analyzer	Dohrman DC-80	9311029	2000
Auto Analyzer	Lachet Quick Chem	125173	2000
DO Meter	YSI 5000	98C0951AB	2000
PH Meter	Beckman 040	0145738	2000
Flashpoint	Seta Flash	2805	2000
Cond. Meter	YSI 35	K8002530	2000
Turbidimeter	Mouitek TA1	T041367	2000
UVVIS Spec.	Hach DR/2010	97110006417	2000
Capillary Ion Analyzer	Waters CIA	251004	2000

14. DOCUMENT CONTROL

Objective: To establish a system in order to have all information related to the production of analytical data controlled, protected, and stored to ensure its integrity and traceability. The system must ensure that only most recent version of required documentation is used by the appropriate personnel in the laboratory. All internal regulatory documents including the QA manual, SOP's, software, and equipment user's manuals are subject to document control.

Quality Assurance Manual: The QA Manual outlines how Chemtech plans, implements, and assesses the effectiveness of QA/QC control actions in the functioning of its analytical services.

Standard Operating Procedures (SOP's): An SOP is a written document which details the method of an operating, analysis or action whose techniques and procedures are thoroughly prescribed and which is accepted as the method for performing certain routine or repetitive task. SOP's are an integral part of consistent quality laboratory work.

14.1 DOCUMENT OVERSIGHT: The QA/QC Director is responsible for the document control system and maintains a current list of controlled documents, their location, and revision number. The QA/QC Director and Technical Director approve all newly released operating procedures and any revision to controlled documents.

14.2 DISTRIBUTION OF CONTROLLED DOCUMENTS: Controlled documents are signed by QA/QC Director and Technical Director. Copies of documents not signed or assigned a control number are considered uncontrolled documents. All departments are assigned a unique number for the distribution and control of the QA Manual, SOP's, and any other related documents:

Department	Document Control ID
Extractions	#01
GC Extractables	#02
GC/MS Semivolatiles	#03
GC/MS VOA	#04
GC VOA	#05
Metals	#06
Wet Chemistry	#07
Sample Management	#08
Project Management	#09
Sales	#10

A copy of current applicable SOP (analytical, administrative, and or procedural) and QA Manual is kept in each department. One copy of each outdated SOP or QA manual is retained in the QA/QC office.

14.3 **DOCUMENTS REVISIONS:** All laboratory documents under document control are reviewed annually and revised as appropriate. A request to change a document is detailed on a "Document Change/Revision Form." For further details refer to the SOP for writing SOP's. The Technical Director and QA/QC Director review the requested change. The QA/QC Director is responsible for updating the appropriate document and Document Control List once a change has been approved.

14.4 **STANDARD OPERATING PROCEDURES (SOP's):** Three (3) types of SOP's are used at Chemtech.

14.4.1 **Analytical SOP**: Provides stepwise instructions to an analyst on how to perform a particular analysis.

14.4.2 **Administrative SOP**: Details the process of documentation of all administrative activities.

14.4.3 **Procedural SOP**: Provides instructions and information for support activities in the laboratory.

Each SOP developed is assigned a unique document control number. SOP's are reviewed annually and updated if necessary. SOP's can be edited more frequently if systematic errors dictate a need for process change or the originating regulatory agency promulgates a new revision of the method.

SOP's are maintained in electronic read only format on Chemtech LIMS network server. All original hard copies are kept in the QA/QC office in official SOP file.

14.5 **LOGBOOK CONTROL:** Laboratory logbooks maintained at Chemtech are preprinted, numbered and include a title which identifies the purpose of the logbook. Each logbook indicates the instrument name, manufacturer, model number and a Chemtech identification number. The logbooks also include calibration and maintenance schedules. Extraction department activities are recorded in preparation logbooks. All quality control activities are recorded in the logbooks.

Active logbooks are maintained in the laboratory and retired logbooks are maintained in the QA/QC office. Laboratory staff may keep two recent sequentially dated logbooks of the same type in order to simplify review of recently conducted analysis. For further details refer to the "Logbook Protocol" SOP.

14.6 **ANALYTICAL DOCUMENT MAINTENANCE AND STORAGE:** Analytical data logbooks and clients reports are retained for five years unless specified otherwise. After five years, the analytical data and reports are systematically destroyed.

Projects completed in the current year are maintained in the Report Production area. All other analytical data, reports, and logbooks are kept in the Document Storage Area. The electronically scanned data are archived on LIMS Server. Access to Document Storage Area and the LIMS Server is limited by levels of authorization.

In the event of an ownership change all appropriate regulatory agencies will be notified. As a condition of the ownership change the buyer will be requested to maintain all records and reports prior to the time of legal transfer.

In the event of a bankruptcy all appropriate regulatory agencies and clients will be notified. They will be given the opportunity to retrieve their records and reports within 30 days of notification. The records and reports will be destroyed after the 30 days notification period has expired.

14.7 **PERSONNEL RECORDS:** The QA/QC office maintains personnel folders for all analytical staff members. These folders document that analysts have received instructions for their job related activities including read receipts for SOP's and the QA Manual. Personnel records also include health and safety training received and a signed ethics agreement, in addition to technical training records, demonstration of capability, and precision and accuracy for the tests.

16. CALIBRATION AND VERIFICATION OF TEST PROCEDURES

Objective: To ensure that instrumentation is performing to predetermined operational standard prior to the analysis of any samples and that the data are of known quality and appropriate for a given regulatory agency requirements must be established by the laboratory.

16.1 ORGANIC TEST PROCEDURES

Tuning Criteria for GC/MS Instruments: Each GC/MS system must pass the performance criteria for 4-Bromofluorobenzene (BFB) or Decafluortriphenylphosphine (DFTPP) before any samples, standards or blanks can be analyzed. The tuning standard must meet the criteria specified in each analytical SOP. The chromatogram should not contain any baseline drift and the peaks should be symmetrical. Each GC/MS system must be tuned every 12 hours for SW846 methods, OLM04.2 and 24 hours for 600 series methods.

Initial Calibration: Second source standards are obtained from a different manufacturer than the original standards, unless one is not available and are used to verify the initial calibration. An initial calibration is run on all instruments. Initial calibration is rerun when continuing calibration criteria cannot be met. The criterion for an initial calibration curve consists of a minimum of five points for SW846 Methods and OLMO4.2 and a minimum of three points for 600 series methods. The lowest standard analyzed must be equal to or less than the reporting limit. The average response factor must be calculated for all compounds. The system performance check compounds (SPCC) are checked for a minimum average response factor. These compounds must meet the minimum response factors specified in each analytical SOP. If the minimum average response factor for any SPCC does not meet the criteria then corrective action is required and the GC/MS system recalibrated. The initial calibration verification must be successfully completed prior to running any samples.

Continuing Calibration Verification (CCV): The initial calibration curve for each compound of interest is checked and verified once every 12 hours for SW846 methods and OLMO4.2, and once every 24 hours for 600 series methods. This is accomplished by analyzing a midpoint calibration standard and verifying all continuing calibration criteria for a given method are met. Sample, blank, and QC standards cannot be analyzed unless a CCV meets method criteria. For further details refer to the individual SOP's.

16.2 INORGANIC TEST PROCEDURES

Balance Calibration: All balances are calibrated each day with with 3 class "S" weights covering the expected range of analysis and recorded in the balance calibration logbook. Each balance is certified for accuracy once a year by an outside contractor. A calibration sticker is placed on the balance and all associated information is maintained in the QA/QC department.

Titrant Standardization: All titrants used in the laboratory are standardized when opened to verify the titrant's normality in duplicate. These values are recorded in the appropriate analytical logbook. Each titrant must be within 90-110% of the known value. If not, the titrant is restandardized.

Instrument Calibration: An initial calibration is run on all instruments.

Mercury analyzer must be calibrated using a blank and 5 standards in graduated amounts that define the linear range of analysis. The correlation coefficient for the curve must be > 0.995.

Spectrophotometric analyses are calibrated by using a blank and a minimum 5 standards. The correlation coefficient must be > 0.995, or as defined in the analytical SOP

If any calibration curve has a correlation coefficient < 0.995, corrective action is taken and a new calibration curve is analyzed. Samples, blanks, and standards are not analyzed until the curve passes the criteria. For all calibrations the lowest standard analyzed must be equal to or less than the reporting limit.

Initial Calibration Verification (ICV): Second source standards are obtained from a different manufacturer than the original standards, unless one is not available and are used to verify the initial calibration. The ICV must be performed immediately after calibration of each metal and spectrophotometric analyses. This is accomplished by analyzing a midpoint calibration standard. The ICV must have a percent recovery between 90-110% from the initial calibration curve. If the criterion is not met, corrective action must be taken. If the source of the problem can be determined after corrective action has been taken, a new calibration MUST be generated. Samples, blank, and QC standards cannot be analyzed unless the ICV meets method criteria. The initial calibration shall be verified and documented for every analyte at each wavelength used for analysis.

Continuing Calibration Verification (CCV): CCV analysis is performed every 10 samples for all FLAA and spectrophotometric analyses. The CCV must be analyzed at the beginning of the run and after the last analytical sample. The CCV concentration is at or near the midpoint of the calibration curve and is analyzed at every wavelength used for the analysis of each analyte. The CCV results must fall within the control limits of 85-115% of the true value or the control limits specified in each analytical SOP.

Thermometer Calibration: Every thermometer used in the laboratory is certified annually against a NIST certified thermometer, which is traceable to the manufacturer. All data is recorded in a logbook.

pH meter Calibration: Each pH meter is calibrated daily at pH of 4 and 7 and then checked with a pH 10 buffer solution. The calibration is recorded in the pH logbook along with the date and time of calibration. The calibration is checked every 3 hours during use and any adjustments are made.

Spectrophotometer Wavelength Check: A wavelength check of each spectrophotometer is performed annually against Platinum/Cobalt standards and recorded in the maintenance logbook. If the wavelength does not meet the manufacturer's specified conditions, service is performed on the instruments.

Linear range Verification & Calibration for ICP - Metals: Linear range verification is performed for all ICP instruments. A series of calibration standards are analyzed over a broad range of concentration and data from these analyses are used to determine the valid analytical range for the instrument. ICP instrument calibration is routinely performed using a single standard at a concentration within the linear range and a blank.

17. CALIBRATION, VERIFICATION, AND MAINTENANCE OF EQUIPMENT

Objective: To establish a system to ensure accurate calibration and maintenance of all laboratory equipment. All instrument maintenance activities must be recorded in the instrument logbooks. Instrument should be labeled as a dedicated piece of equipment when an instrument is used for a unique activity.

17.1 **INSTRUMENT CALIBRATION:** Instruments are calibrated according to the requirements set forth in the by the manufacturer or as dictated by the respective SOP's for the test method for which the instruments are used. The frequency and type of maintenance and calibration activity performed must be documented in the instrument logbook. If an instrument is out of working order, out of calibration or in need of repair, a tag is affixed to the instrument directing the analysts to use another instrument.

Support instruments are calibrated and verified using NIST traceable reference standards over the range of use. Balances, ovens, incubators, water baths, freezers, and refrigerators are checked daily if in use and readings are recorded in their respective logbooks.

17.2 **INSTRUMENT MAINTENANCE:** Some instruments are purchased with a service contract. If a service contract is purchased, it is recorded in the logbook along with a contact phone number. Calibration is necessary after instrument repair and prior to using any new instrument. Instrument servicing includes routine cleaning and the repair and/or replacement of any faulty parts. For further information refer to the instrument manual or the SOP for the test method the equipment is used.

17.3 **CALIBRATION/MAINTENANCE LOG:** Each instrument has an associated maintenance and calibration logbook. The interval maintenance/calibrations are guided by the manufacturer's instructions or as often as needed based on individual instrument performance. It may be modified by user's experience and frequency of use. The instrument is identified on the first page of the logbook. The logbook must document the calibration and maintenance of the instrument.

18. VERIFICATION PRACTICES

Objective: To establish a process for the verification practices in effect to assure adherence to the Quality Assurance Plan. A system for proficiency testing, use of reference materials, and internal QC schemes must be in place in order to ensure compliance.

18.1 PROFICIENCY TESTING (PT) PROGRAMS:

External PT Samples: Chemtech participates in NYSDOH Potable, Non Potable and Solid/Hazardous Categories and USEPA CLP. The results are used to evaluate the ability of the laboratory to produce accurate data. PT reports and raw data are retained in the laboratory. The laboratory participates in the PT from other providers as well, e.g., client specific PT samples and Environmental Resources Association (ERA).

Internal PT Samples: The QA/QC Director is responsible for administering an in-house blind check sample program. Quality control samples are obtained from the EPA and from a private supplier. The known samples are blindly introduced into the system as a typical sample and analyzed as such. The results are reported to the QA/QC Director and evaluated.

This process allows for close monitoring of the accuracy of laboratory analyses on blind samples. If a problem is discovered, the QA/QC Director brings it to the attention of the Company President and Laboratory and Department Manager. With the assistance of the Technical Director, the cause of the problem is determined and appropriate corrective action is taken. Another blind sample is sent through the laboratory to confirm the problem has been resolved.

18.2 USE OF REFERENCE MATERIAL: The laboratory purchases external reference samples from known vendors. All reference samples are certified and the laboratory maintains the manufacturer's Certificate of Analysis on file.

18.3 INTERNAL QUALITY CONTROL PROCEDURES: The data acquired from QC procedures are used to judge the analytical quality of the data, to determine the need for a corrective action, and to interpret results after the implementation of corrective actions. Each test method SOP details the QC procedures to be followed.

Method Blank: A method blank is an aliquot of reagent water for aqueous samples and an aliquot of a solid matrix carried through the entire sample preparation and analytical procedure. A method blank must not contain any target analyte(s) at concentrations that exceed method requirements. If it does, the source of contamination must be removed or minimized before proceeding with sample analysis.

Laboratory Control Samples (LCS): A LCS is an aliquot of reagent water for aqueous samples and aliquot of a solid matrix spiked with the target analyte list analyzed with each batch of samples to demonstrate the method accuracy within acceptance QC limits. The results are used to determine batch acceptance. Each method SOP includes detailed QC procedures and QC limits.

Sample Duplicates: Sample duplicates are performed to measure analytical precision. One duplicate sample must be analyzed from each group of samples of similar matrix type for each batch of 20 samples. If a duplicate result falls outside QC limits the original sample and the duplicate sample data are regarded as unreliable and may necessitate corrective action.

Matrix Spikes: Matrix spikes are analyzed at a frequency of one per twenty samples to measure analytical precision and accuracy of the specified matrix. If precision and accuracy are out of QC limits, corrective action is required.

Surrogate Spikes: Surrogates are organic compounds that are similar in behavior to the target analytes but are not found in nature. They are added to all blanks, samples, and standards except the tuning standards at a concentration specified in relevant SOP's. All surrogates must meet the recovery limits specified in each SOP. If any surrogate does not meet the limits, the sample must be reanalyzed.

Internal Standard: An internal standard (IS) is a known amount of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical method. Retention time (RT) for an IS is also compared to reference standards to assure that target analytes can be located by their individual relative RT. If the criteria for IS response or RT criteria are not achieved corrective action is required, e.g., recalibration and reanalysis.

Sample Analysis: The analyst is responsible for performing all QC requirements before and after analyzing the sample to make sure that required QC criteria are met. If the sample QC criteria are not met, the analyst must take corrective action to rectify any problems. If the analyst is not able to remediate the issue, then must notify the supervisor who will take necessary corrective action.

Data Package Review: Data review is performed at four different levels to assure that all QC criteria are met. First data review is performed by the analyst conducting the analysis. A peer review is conducted by another analyst and then the data is submitted for supervisory review. The final review of the data is conducted in the QC department before the data are released to the client. A spot check review of the completed data packages is conducted by the QA/QC Director. For further details refer to "Procedures for Audits and Data Review" section of this QA Manual and "Data Review/Validation" SOP.

Monitoring Quality Control Limits: Quality Control data generated from duplicate analysis and matrix spikes/matrix spike duplicates are monitored and plotted on Quality Control Charts. Chemtech utilizes the Quality Control charts to identify data trends and assure that all tests are within control.

Chemtech records the theoretical or true value, then calculates and plots the mean value. In general, our warning limits are ±2 Standard Deviations from the true value. Corrective action is taken when ±3 Standard Deviations from the mean value are encountered. The Percent Recovery for all quality control samples must be within the limits stated in the method.

In addition to control chart limits, the laboratory uses limits of 75-125% and RPD limits of ±20% for inorganic analysis. For organic analysis %R limits and RPD limits as stated in applicable methods are used.

In control charts application, any points beyond the control limits indicate an out of control situation. When an out-of-control situation occurs, analyses must be stopped immediately until the problem has been identified and resolved. The control charts are also utilized to identify trends which can be checked and resolved before the system goes out-of-control.

Annual Quality Audits: An annual quality review of the system is important to ensure that laboratory management can continue to be confident that all measures are being taken to produce the highest quality of data and services. Annual audits, along with day-to-day data review, provide effective means for ensuring that QC activities are being implemented and that each analyst performs in a manner consistent with the quality system. The QA/QC Director conducts the audits which are scheduled and announced in advance. For further details refer to the "Data Review and Internal Quality Audits" section of this manual.

19. LABORATORY MANAGEMENT POLICY FOR PERMITTED DEPARTURES FROM DOCUMENTED POLICIES AND PROCEDURES

Objective: To establish a process for an event which requires departure from the documented policies and procedures.

19.1 PROCEDURE: The Technical Director, Laboratory Manager, and QA/QC Director have the responsibility for ensuring that the laboratory's policies are adhered to by all personnel. A departure from documented policies is allowed if fully documented and approved by the appropriate level of authority. Documentation of the departure includes the reason for the departure, the effected SOP(s), intended results of the departure and the actual results.

If the departure affects data, the client is notified before conducting the analysis for approval. This departure is also noted in the case narrative of the final report.
If the Client requests a method modification that represents a significant departure from a reference method, the client must acknowledge in writing the authorization of the modification. The acknowledgment can be in the form of a contract modification or signing the quotation acceptance page.

The quotation details the analytical requirements including the test methods for the project, the acceptance page to be signed by the client, states that "the quotation accurately describes the analytical requirements".

20. CORRECTIVE ACTIONS FOR TESTING DISCREPANCIES

Objective: To establish a system for actions taken in response to non-conformance reports issued during performance, data review, or a client complaint. The goal of the corrective action program is to correct and monitor out-of-control events which effect the integrity of analytical results. All conditions that adversely impact data quality must be identified and corrected.

20.1 OUT-OF-CONTROL EVENTS: Out-of-control situations are identified through analytical data validation procedures. An out-of-control event is a situation which results in the development of unacceptable results. Once a problem has been identified, the QC Officer must contact the department supervisor using the Corrective Action (CA) report form. The supervisor must initiate investigation into cause, and must ensure that corrective action is implemented and is effective. The CA must be documented on the (CA) report form and filed in QA/QC office. Refer to Corrective Action SOP for details of the corrective action report forms.

There are many situations that present an out-of-control situation. Contamination, percent recoveries and duplicate variations that are not within control limits, and failing calibrations are examples of situations considered out-of-control. Whenever a situation of this nature is encountered, Chemtech diligently develops the appropriate corrective action.

20.2 CORRECTIVE ACTION PROCESS: A corrective action is a response to an out-of-control event which brings back a system to produce acceptable results. Corrective actions taken to control an event can be: stop analytical work immediately; identify the symptom of the out-of-control event; identify the cause of the out-of-control event; implement a corrective action; confirm that a return to control has been achieved by analyzing reference samples; document entire process by completing a CA Report Form; complete and return the CA Report Form to the QA/QC office.

20.3 DEPARTURES FROM DOCUMENTED POLICIES AND PROCEDURES: Method SOP's provide QC acceptance criteria and specific protocols for corrective actions. When testing discrepancies are detected such as out-of-control QC, the analyst must follow the corrective action protocol as described in the applicable method SOP.

Any corrective action taken that is not mentioned in the SOP is first approved by Technical Director and QA/QC Director. This action is recorded in the CA Report Form and is documented in the electronic database of corrective actions. If necessary, the method SOP is than revised to incorporate the corrective action to make it a part of SOP for future use.

20.4 CORRECTIVE ACTION MONITORING: Laboratory Manager, Department Managers and QA/QC Director routinely monitor corrective actions implemented in the laboratory for effectiveness and to ensure that the deficiency has been completely removed from the system. If the deficiency still exists after a given period of time, the corrective action is reevaluated and modified.

21. REPORTING ANALYTICAL RESULTS

Objective: To ensure that the reported results are accurate, clear, objective, and unambiguous. The contents of the final report must include all necessary information and must be clear and understandable for the end-user.

21.1 REQUIRED DOCUMENTATION: All documentation used to approve and defend reported data must be collected and should be available and referenced so it can be found at any time it may be needed. Chemtech reports meet all applicable regulatory and client requirements. Electronic reports can be customized to meet the client specific requirements.

Documentation for Sample Identification: Includes at minimum sample identification, chain-of-custody, Field QC, if any and any other related documents.

Documentation of the Analytical Performance: Analytical method used and method detection limit (MDL, if required); Instrumentation (manufacturer, model, performance checks); Calibration data (initial and continuing); Detailed analytical work (raw data, runlogs, standard and reagent preparation, calculations)

QA/QC Documentation and Data: Analysis of blanks; Source of QC check standards; Preparation of spike stock solution.

Checks and Validation of Analytical Data: Peer review, Supervisory review, and QC review Checklists; Corrective actions (when applicable); Date and signature of approval of the reportable data of each parameter tested; Date and signature for approval of the final report.

21.2 SIGNIFICANT FIGURES IN ANALYTICAL REPORTS: Numerical data are often obtained with more digits than are justified by their accuracy and precision therefore must be reported by the accuracy of the analytical method.

The number of significant figures refers to the number of digits reported for the value of a measured or calculated quantity indicating the accuracy and precision of the value. Nonzero integers always count as significant figures. Leading zeros are zeros that precede all the zero digits and do not count as significant figures. The zeros simply indicate the position of the decimal point.

Captive zeros are zeros between nonzero digits, and always count as significant figures. Trailing zeros are zeros at the right end of the number and are significant only if the number contains a decimal point. At Chemtech the results are reported to two significant figures.

When rounding a number carry at least one digit beyond the last significant digit throughout all calculations. Round the final result by changing all digits beyond the last significant digit to zeros; drop these zeros if they are to the right of the decimal point.

21.3 UNITS USED TO EXPRESS ANALYTICAL RESULTS: Units used to express analytical results depend on the analytical method used, the concentration of the analytes, and the matrices of the sample analyzed.

The most common unit used to express results is milligrams per liter (mg/L), which is equal to parts per million (ppm) or milligrams per kilogram (mg/Kg). Other units used are microgram per liter (μg/L) which is equal to parts per billion (ppb) or micrograms per kilogram (μg/Kg).

21.4 REPORT CONTENTS: The final report includes the following information:

Client Information: name and address of the client

Project Information: Client project name and location (if specified by the client)

Chemtech Reference Information: Chemtech project number

Evidence Receipt: Description and identification of samples, chain-of-custody

Case narrative (if applicable): Description and/or identification of analysis performed with a description of deviations from the SOP if required

Summary and Results: Analytical results supported by raw data, chromatograms, initial calibration and continuous calibration, etc.

Report is sequentially numbered and all raw data and chromatogams are initialed and dated by the analyst. The final report is signed and dated by the QC supervisor.

22. DATA REVIEW AND INTERNAL QUALITY AUDITS

Objective: To design a process to assess compliance of laboratory activities with the operational requirements of the QA manual and to evaluate the performance of all analytical departments. The validation of data must be accomplished by a data review procedure.

22.1 DATA REVIEW: At Chemtech there are several stages for the data review/validation process. The first data review is conducted by the analyst performing the analysis. A secondary review is performed by a department peer. The supervisor reviews the data after the peer review. The QC/Report Production performs the final review.

Analyst Review: The analyst is responsible for ensuring that all work performed meets the specifications and criteria outlined in the Statement of Work. They are to double-check all aspects of their analyses, including instrumental conditions, QA/ QC limits, calculations, and compound identification. When manual integration's are performed, the raw data records shall include a complete audit trail for those manipulations. Raw data output showing the results of the manual integration's, a notation of the rationale for the manual integration, including the date and initials/signature of the person performing the manual operation must be included in the raw data file.

Peer Review: A qualified peer performs a technical data review, verifying the analysis logbook that the correct method was used, the accurate analytical sequence was employed, all QA/QC criteria were met, compounds were properly identified, and checked for standard, dilutions, and calculations. The supervisor signs the logbook following this review.

Supervisor Review: Supervisor performs a technical data review to ensure that proper analytical sequence was employed, all QA/QC criteria were met, compounds were properly identified and flagged if required, correct standard, dilutions, and calculations were made.

Quality Control/Report Production Review: The completed data is reviewed by the QC/Report Production. Sample information from the sample receiving documentation is compared to in-house laboratory information to ensure consistency. The data are checked for general completeness, compliance, and QA/QC requirements, and random calculations are performed. If a quality control measure is found to be out of control, and the result are to be report, all samples associated with the failed quality control measure will be reported with the appropriate data qualifier(s).

If a defect is identified in the data package, that can be corrected before the data are released to the client, the data package is returned to the laboratory for corrections along with a CA report form. Immediate action is taken by the affected department to rectify the problem and corrected data package is returned to QC/Report Production office for review and final release of the data.

Spot Check Review by QA/QC Director: The QA/QC Director performs spot-check reviews on data packages before they are released to the client. He/she focuses on all elements of data deliverables including sample identification, sample custody documentation, analytical quality control, and client specifications and requirements.

22.2 **INTERNAL QUALITY SYSTEM AUDITS:** Annual internal audits are conducted under the direction of the QA/QC Director. These audits are used to detect and correct any specific problems. The audit involves a thorough laboratory inspection to evaluate the following areas: adherence to all laboratory procedures as specified in applicable New Jersey, Pennsylvania, New York and other state regulations; verification of methodology; adherence to all method QC requirements; frequency of duplicates, spikes, blanks, and QC sample analyses; maintenance of documentation in adherence with good laboratory practices; and verification that laboratory equipment, supplies, and reagents are properly maintained. The internal audits also include the analyst qualifications and training documents.

A comprehensive audit checklist is used for the department to be audited based on the method SOP and includes the cycle of a sample analysis beginning from sample receiving till the disposal of the sample and the release of data to the client. Deficiencies are noted on the checklist and CA reports are issued to the area being audited.

Findings of the audit are documented and copies of the findings are given to the Company President, the Technical Director, the Laboratory Manager, and the Department Supervisor. A copy of the findings is also provided to the analyst. Any problems and their prospective resolutions are discussed among the QA/QC Director, Technical Director, and Department Supervisor. After an agreed upon time period, it is the responsibility of the QA/QC Director to ensure that the required corrective action has been implemented. All audit documents are kept on file by the QA/QC Director in the QA office.

23. Electronic Data

Objective: To establish a system to control, verify, validate and document computer software used by LIMS.

23.1 Software: To ensure that the software that is used to collect, analyze, process and or maintain LIMS Raw Data, SOP's are established, approved and managed for:

Testing and quality assurance methods to ensure that all LIMS software accurately performs its intended functions, including acceptance criteria, tests to be used, personnel responsible for conducting the tests, documentation of test results, and test review and approval.

Change control methods that include instructions for requesting, testing, approving, documenting and implementing changes. When indicated, change control methods shall also include reporting and evaluating problems, as well as implementing corrective actions.

23.2 Documentation: Documentation is established and maintained to demonstrate the validity of all software used in the LIMS and includes:

A description of the software and functional requirements; a listing of all algorithms and formulas; and as the occur, testing and quality assurance, installation and operation/enhancement, and retirement.

23.3 Security: SOP's are established to implement appropriate security procedures to assure the integrity of LIMS data are adequate.

24. References

1. ISO/IEC Guide 25: 1990. General requirements for the competence of calibration and testing laboratories.

2. NELAC, Program Policy and Structure, Revision 11, July 1, 1999.

3. NELAC, Quality Systems, Revision 14, June 29, 2000.

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

Antonia C. Novello, M.D., M.P.H., Dr.P.H.
Commissioner

Dennis P. Whalen
Executive Deputy Commissioner

JUL 05 2002

Dear Laboratory Director:

Enclosed are the ELAP and/or NELAP Certificate(s) of Approval for permit year 2002-2003, issued to your environmental laboratory. The Certificate(s) supersede any previously issued and are in effect through March 31, 2003. Please carefully examine the Certificate(s) to insure that the category(ies), subcategory(ies), analyte(s) and method(s) for which your laboratory is approved are listed correctly, as well as verifying your laboratory's name, address, director and identification number.

Please note that pursuant to Section 55-2.5(a) NYCRR, any misrepresentation of the analytes or subcategories for which your laboratory is approved may result in suspension, limitation or termination of said certification.

The National Environmental Laboratory Accreditation Conference (NELAC) further defines and limits the use of NELAP accreditation and the NELAP logo.

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
Encs.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Antonia C. Novello, M.D., M.P.H., Dr.P.H. *Commissioner*

Expires 12:01 AM April 01, 2003
Issued July 05, 2002

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. THOMAS J. MANCUSO
CHEMTECH CONSULTING GROUP
284 SHEFFIELD STREET
MOUNTAINSIDE NJ 07092 USA

NY Lab Id No: 11376
EPA Lab Code:

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 Metals I	
Arsenic, Total	EPA 200.7
Barium, Total	EPA 200.7
Cadmium, Total	EPA 200.7
Chromium, Total	EPA 200.7
Copper, Total	EPA 200.7
	EPA 200.9
Iron, Total	EPA 200.7
Lead, Total	EPA 200.9
Manganese, Total	EPA 200.7
Mercury, Total	EPA 245.1
Selenium, Total	EPA 200.9
Silver, Total	EPA 200.7
Sodium, Total	EPA 200.7
Zinc, Total	EPA 200.7
rinking Water Metals II	
Antimony, Total	EPA 200.9
Beryllium, Total	EPA 200.7
Nickel, Total	EPA 200.7
	EPA 200.9
Thallium, Total	EPA 200.9
'olatile Aromatics	
1,2,3-Trichlorobenzene	EPA 524.2
1,2,4-Trichlorobenzene	EPA 524.2

Volatile Aromatics	
1,2,4-Trimethylbenzene	EPA 524.2
1,2-Dichlorobenzene	EPA 524.2
1,3,5-Trimethylbenzene	EPA 524.2
1,3-Dichlorobenzene	EPA 524.2
1,4-Dichlorobenzene	EPA 524.2
2-Chlorotoluene	EPA 524.2
4-Chlorotoluene	EPA 524.2
Benzene	EPA 524.2
Bromobenzene	EPA 524.2
Chlorobenzene	EPA 524.2
Ethyl benzene	EPA 524.2
Hexachlorobutadiene	EPA 524.2
Isopropylbenzene	EPA 524.2
m-Xylene	EPA 524.2
n-Butylbenzene	EPA 524.2
n-Propylbenzene	EPA 524.2
o-Xylene	EPA 524.2
p-Isopropyltoluene (P-Cymene	EPA 524.2
p-Xylene	EPA 524.2
sec-Butylbenzene	EPA 524.2
Styrene	EPA 524.2
tert-Butylbenzene	EPA 524.2
Toluene	EPA 524.2

Serial No.: 16504

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lust be conspicuously posted. Valid certificates have a raised seal and may be
erified by calling (518) 485-5570.

DOH-3317 (3/97)

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ENVIRONMENTAL ANALYSES POTABLE WATER
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Volatile Halocarbons	
1,1,1,2-Tetrachloroethane	EPA 524.2
1,1,1-Trichloroethane	EPA 524.2
1,1,2,2-Tetrachloroethane	EPA 524.2
1,1,2-Trichloroethane	EPA 524.2
1,1-Dichloroethane	EPA 524.2
1,1-Dichloroethene	EPA 524.2
1,1-Dichloropropene	EPA 524.2
1,2-Dichloroethane	EPA 524.2
1,2-Dichloropropane	EPA 524.2
1,3-Dichloropropane	EPA 524.2
2,2-Dichloropropane	EPA 524.2
Bromochloromethane	EPA 524.2
Bromomethane	EPA 524.2
Carbon tetrachloride	EPA 524.2
Chloroethane	EPA 524.2
Chloromethane	EPA 524.2
cis-1,2-Dichloroethene	EPA 524.2
cis-1,3-Dichloropropene	EPA 524.2
Dibromomethane	EPA 524.2
Dichlorodifluoromethane	EPA 524.2
Methylene chloride	Method Not Specified
Tetrachloroethene	EPA 524.2
trans-1,2-Dichloroethene	EPA 524.2
trans-1,3-Dichloropropene	EPA 524.2

Volatile Halocarbons	
Trichloroethene	Method Not Specified
Trichlorofluoromethane	EPA 524.2
Vinyl chloride	EPA 524.2

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ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved subcategories and/or analytes are listed below:

Acrolein and Acrylonitrile

Acrolein	EPA 624
Acrylonitrile	EPA 624

Benzidines

3,3 -dichlorobenzidine	EPA 625
Benzidine	EPA 625

Chlorinated Hydrocarbon Pesticides

4,4 -DDE	EPA 608
4,4 -DDT	EPA 608
4,4-DDD	EPA 608
Aldrin	EPA 608
alpha-BHC	EPA 608
beta-BHC	EPA 608
Chlordane Total	EPA 608
delta-BHC	EPA 608
Dieldrin	EPA 608
Endosulfan I	EPA 608
Endosulfan II	EPA 608
Endosulfan sulfate	EPA 608
Endrin	EPA 608
Endrin aldehyde	EPA 608
Heptachlor	EPA 608
Heptachlor epoxide	EPA 608
Lindane	EPA 608

Chlorinated Hydrocarbon Pesticides

Methoxychlor	Method Not Specified
Toxaphene	EPA 608

Chlorinated Hydrocarbons

1,2,4-Trichlorobenzene	EPA 625
2-Chloronaphthalene	EPA 625
Hexachlorobenzene	EPA 625
Hexachlorobutadiene	EPA 625
Hexachlorocyclopentadiene	EPA 625
Hexachloroethane	EPA 625

Chlorophenoxy Acid Pesticides

2,4,5-T	Method Not Specified
2,4,5-TP (Silvex)	Method Not Specified
2,4-D	Method Not Specified
Dicamba	Method Not Specified

Demand

Biochemical Oxygen Demand	EPA 405.1
Chemical Oxygen Demand	EPA 410.1
	EPA 410.4
	SM18 5220D

Haloethers

4-Bromophenylphenyl ether	EPA 625
4-Chlorophenylphenyl ether	EPA 625

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Haloethers	
Bis (2-chloroisopropyl) ether	EPA 625
Bis(2-chloroethoxy)methane	EPA 625
Bis(2-chloroethyl)ether	EPA 625
Mineral	
Alkalinity	EPA 310.1
	SM18 2320-B
Chloride	EPA 300.0
	EPA 325.3
	SM18 4500-Cl C
Fluoride, Total	EPA 340.2
	SM18 4500-F-C
	SM18 4500-F-B
Hardness, Total	EPA 130.2
	EPA 200.7
	SM 18 2340 B
Sulfate (as SO4)	EPA 300.0
	EPA 375.4
Nitroaromatics and Isophorone	
2,4-Dinitrotoluene	EPA 625
2,6-Dinitrotoluene	EPA 625
Isophorone	EPA 625
Nitrobenzene	EPA 625

Nitrosoamines	
N-Nitrosodimethylamine	EPA 625
N-Nitrosodi-n-propylamine	EPA 625
N-Nitrosodiphenylamine	EPA 625
Nutrient	
Ammonia (as N)	EPA 350.1
	EPA 350.2
	EPA 350.3
	SM18 4500-NH3 E
	SM18 4500-NH3B
Kjeldahl Nitrogen, Total	EPA 351.1
	SM18 4500-NH3 E
	SM18 4500-NH3C
Nitrate (as N)	EPA 300.0
	EPA 353.2
	EPA 353.3
	SM18 4500-NO3 E
	SM18 4500-NO3 F
Nitrite (as N)	EPA 300.0
	SM18 4500-NO2B
Orthophosphate (as P)	EPA 365.3
	SM18 4500-P E
Phosphorus, Total	EPA 365.2
	SM18 4500-P E

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ENVIRONMENTAL ANALYSES NON POTABLE WATER
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Phthalate Esters

Benzyl butyl phthalate	EPA 625
Bis(2-ethylhexyl) phthalate	EPA 625
Diethyl phthalate	EPA 625
Dimethyl phthalate	EPA 625
Di-n-butyl phthalate	EPA 625
Di-n-octyl phthalate	EPA 625

Polychlorinated Biphenyls

PCB-1016	EPA 608
PCB-1221	EPA 608
PCB-1232	EPA 608
PCB-1242	EPA 608
PCB-1248	EPA 608
PCB-1254	EPA 608
PCB-1260	EPA 608

Polynuclear Aromatics

Acenaphthene	EPA 625
Acenaphthylene	EPA 625
Anthracene	EPA 625
Benzo(a)anthracene	EPA 625
Benzo(a)pyrene	Method Not Specified
Benzo(b)fluoranthene	EPA 625
Benzo(ghi)perylene	EPA 625
Benzo(k)fluoranthene	EPA 625

Polynuclear Aromatics

Chrysene	EPA 625
Dibenzo(a,h)anthracene	EPA 625
Fluoranthene	EPA 625
Fluorene	EPA 625
Indeno(1,2,3-cd)pyrene	EPA 625
Naphthalene	EPA 625
Phenanthrene	EPA 625
Pyrene	EPA 625

Priority Pollutant Phenols

2,4,5-Trichlorophenol	CLP 95-2
	SW-846 8270C
2,4,6-Trichlorophenol	EPA 625
2,4-Dichlorophenol	EPA 625
2,4-Dimethylphenol	EPA 625
2,4-Dinitrophenol	EPA 625
2-Chlorophenol	EPA 625
2-Methyl-4,6-dinitrophenol	EPA 625
2-Nitrophenol	EPA 625
4-Chloro-3-methylphenol	EPA 625
4-Nitrophenol	EPA 625
Pentachlorophenol	EPA 625
Phenol	EPA 625

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ENVIRONMENTAL ANALYSES NON POTABLE WATER
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Purgeable Aromatics	
1,2-Dichlorobenzene	EPA 601
	EPA 602
	EPA 624
	EPA 625
1,3-Dichlorobenzene	EPA 601
	EPA 602
	EPA 624
	EPA 625
1,4-Dichlorobenzene	EPA 601
	EPA 602
	EPA 624
	EPA 625
Benzene	EPA 602
	EPA 624
Chlorobenzene	EPA 601
	EPA 602
	EPA 624
Ethyl benzene	EPA 602
	EPA 624
Toluene	EPA 602
	EPA 624
Total Xylenes	EPA 602
	EPA 624

Purgeable Halocarbons	
1,1,1-Trichloroethane	EPA 601
	EPA 624
1,1,2,2-Tetrachloroethane	EPA 601
	EPA 624
1,1,2-Trichloroethane	EPA 601
	EPA 624
1,1-Dichloroethane	EPA 601
	EPA 624
1,1-Dichloroethene	EPA 601
	EPA 624
1,2-Dichloroethane	EPA 601
	EPA 624
1,2-Dichloroethene (total)	EPA 601
	EPA 624
1,2-Dichloropropane	EPA 601
	EPA 624
2-Chloroethylvinyl ether	EPA 601
	EPA 624
	SM18 6230B
Bromodichloromethane	EPA 601
	EPA 624
Bromoform	EPA 601
	EPA 624
Bromomethane	EPA 601

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ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved subcategories and/or analytes are listed below:

Purgeable Halocarbons

Carbon tetrachloride	EPA 601
	EPA 624
Chloroethane	EPA 601
	EPA 624
Chloroform	EPA 601
	EPA 624
Chloromethane	EPA 601
	EPA 624
cis-1,3-Dichloropropene	EPA 601
	EPA 624
Dibromochloromethane	EPA 601
	EPA 624
Dichlorodifluoromethane	EPA 601
	EPA 624
Methylene chloride	EPA 601
	EPA 624
Tetrachloroethene	EPA 601
	EPA 624
trans-1,3-Dichloropropene	EPA 601
	EPA 624
Trichloroethene	EPA 601
	EPA 624
Trichlorofluoromethane	EPA 601
	EPA 624

Purgeable Halocarbons

Vinyl chloride	EPA 601
	EPA 624

Residue

Solids, Total	EPA 160.3
	SM18 2540B
Solids, Total Dissolved	EPA 160.1
	SM18 2540C
Solids, Total Suspended	EPA 160.2
	SM18 2540D

TCLP Additional Compounds

Cresol	SW-846 8270C
Methylethyl ketone (2-butanon	SW-846 8015 B
	SW-846 8260B
Pyridine	SW-846 8270C

Wastewater Bacteriology

Coliform, Total	SM18 9221C MPN
	SM18, 9221B - MPN
	SM18, 9222B - MF
	SM18, 9222D - MF
Standard Plate Count	SM 18 9215B

Wastewater Metals I

Barium, Total	ASTM 4382-91

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Wastewater Metals I

Barium, Total	EPA 200.7
	EPA 200.8
	SM18 3111B
	SM18 3113B
	SM18 3120B
Cadmium, Total	EPA 200.7
	EPA 213.1
	EPA 213.2
	SM18 3111B
	SM18 3111C
	SM18 3113B
	SM18 3120B
Calcium, Total	EPA 200.7
Chromium, Total	EPA 200.7
	SM18 3111C
	SM18 3113B
	SM18 3120B
Copper, Total	ASTM D-1688-90B
	EPA 200.7
	EPA 200.9
	EPA 220.1
	EPA 220.2
	SM18 3111B
	SM18 3111C

Wastewater Metals I

Copper, Total	SM18 3113B
	SM18 3120B
Iron, Total	EPA 200.7
	EPA 236.1
	EPA 236.2
	SM18 3111B
	SM18 3111C
	SM18 3113B
	SM18 3120B
Lead, Total	EPA 200.7
	EPA 239.1
	EPA 239.2
	SM18 3111C
	SM18 3113B
	SM18 3120B
Magnesium, Total	EPA 200.7
	SM18 3111B
Manganese, Total	ASTM D-858-90C
	EPA 200.7
	EPA 243.1
	EPA 243.2
	SM18 3111B
	SM18 3113B
	SM18 3120B

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Wastewater Metals I

Nickel, Total	EPA 200.7
	EPA 249.1
	EPA 249.2
	SM18 3111B
	SM18 3111C
	SM18 3113B
	SM18 3120B
Silver, Total	EPA 200.7
	SM18 3111B
	SM18 3111C
	SM18 3113B
	SM18 3120B
Sodium, Total	EPA 200.7
	SM18 3111B
	SM18 3120B

Wastewater Metals II

Aluminum, Total	EPA 200.7
	EPA 202.1
	EPA 202.2
	SM18 3111B
	SM18 3120B
Antimony, Total	EPA 200.7
	EPA 204.1

Wastewater Metals II

Antimony, Total	EPA 204.2
	SM18 3111B
	SM18 3120B
Arsenic, Total	EPA 200.7
	EPA 206.2
	EPA 206.5
	SM18 3113B
	SM18 3120B
Beryllium, Total	EPA 200.7
	EPA 210.1
	EPA 210.2
	SM18 3111B
	SM18 3113B
	SM18 3120B
Chromium VI	SM18 3111C
Mercury, Total	EPA 245.1
	SM18 3112B
Selenium, Total	EPA 200.7
	EPA 270.2
	SM18 3113B
	SM18 3120B
Vanadium, Total	EPA 286.2
	SM18 3120B
Zinc, Total	EPA 200.7

Serial No.: 16505

DOH-3317 (3/97)

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Antonia C. Novello, M.D., M.P.H., Dr.P.H. *Commissioner*

Expires 12:01 AM April 01, 2003
Issued July 05, 2002

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. THOMAS J. MANCUSO
CHEMTECH CONSULTING GROUP
284 SHEFFIELD STREET
MOUNTAINSIDE NJ 07092 USA

NY Lab Id No: 11376
EPA Lab Code:

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved subcategories and/or analytes are listed below:.

Wastewater Metals II

Zinc, Total	EPA 289.1
	EPA 289.2
	SM18 3111B
	SM18 3111C
	SM18 3120B

Wastewater Metals III

Cobalt, Total	ASTM D-3558-90C
	EPA 200.7
	EPA 219.1
	EPA 219.2
	SM18 3111B
	SM18 3111C
	SM18 3113B
	SM18 3120B
Molybdenum, Total	EPA 200.7
	EPA 246.1
	EPA 246.2
	SM18 3111B
	SM18 3113B
	SM18 3120B
Thallium, Total	EPA 200.7
	EPA 279.2
	SM18 3120B

Wastewater Miscellaneous

Boron, Total	EPA 200.7
	SM18 3120B
Bromide	EPA 300.0
	EPA 320.1
Color	EPA 110.2
Cyanide, Total	EPA 335.2
	SM18 4500-CN-D
	SM18 4500-CN-E
	SM18,4500CN-C
Hydrogen Ion (pH)	EPA 150.1
	SM18 4500-H-B
Oil & Grease Total Recoverabl	EPA 413.1
Organic Carbon, Total	EPA 415.1
	SM 18 5310D
	SM18 5310B
	SM18 5310C
Phenols	EPA 420.1
Specific Conductance	EPA 120.1
	SM18 2510B
Sulfide (as S)	EPA 376.1
	SM18 4500S E
Surfactant (MBAS)	EPA 425.1
	SM18 5540C
Temperature	EPA 170.1

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Wastewater Miscellaneous

Temperature	SM18 2550B

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ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Acrolein and Acrylonitrile

Acrolein	SW-846 8260B
Acrylonitrile	SW-846 8260B

Characteristic Testing

Corrosivity	SW846 1110
E.P. Toxicity	SW846 1310
Ignitability	SW846 1010
	SW846 1020
Reactivity	SW846 Ch7, Sec. 7.3
TCLP	FED REG 1311

Chlorinated Hydrocarbon Pesticides

4,4 -DDE	SW-846 8081A
4,4 -DDT	SW-846 8081A
4,4-DDD	SW-846 8081A
Aldrin	SW-846 8081A
alpha-BHC	SW-846 8081A
beta-BHC	SW-846 8081A
Chlordane Total	SW-846 8081A
delta-BHC	SW-846 8081A
Dieldrin	SW-846 8081A
Endosulfan I	SW-846 8081A
Endosulfan II	SW-846 8081A
Endosulfan sulfate	SW-846 8081A
Endrin	SW-846 8081A

Chlorinated Hydrocarbon Pesticides

Endrin aldehyde	SW-846 8081A
Heptachlor	SW-846 8081A
Heptachlor epoxide	SW-846 8081A
Lindane	SW-846 8081A
Methoxychlor	SW-846 8081A
Toxaphene	SW-846 8081A

Chlorinated Hydrocarbons

1,2,4-Trichlorobenzene	SW-846 8270C
2-Chloronaphthalene	SW-846 8270C
Hexachlorobenzene	SW-846 8270C
Hexachlorobutadiene	SW-846 8270C
Hexachlorocyclopentadiene	SW-846 8270C
Hexachloroethane	SW-846 8270C

Chlorophenoxy Acid Pesticides

2,4,5-T	SW846 8151-A
2,4,5-TP (Silvex)	SW846 8151-A
2,4-D	SW846 8151-A
Dicamba	SW846 8151-A

Haloethers

Bis (2-chloroisopropyl) ether	SW-846 8270C
Bis(2-chloroethoxy)methane	SW-846 8270C

Serial No.: 16506

DOH-3317 (3/97)

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MOUNTAINSIDE NJ 07092 USA

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ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Metals I	
Barium, Total	SW-846 6010B
Cadmium, Total	SW-846 6010B
Chromium, Total	SW-846 6010B
Lead, Total	SW-846 6010B
Nickel, Total	SW-846 6010B
Silver, Total	SW-846 6010B
Metals II	
Antimony, Total	SW-846 6010B
Arsenic, Total	SW-846 6010B
Chromium VI	SW-846 7196A
Mercury, Total	SW846 7470A
	SW846 7471A
Selenium, Total	SW-846 6010B
Miscellaneous	
Cyanide, Total	SW-846 9012A
	SW-846 9010B
Hydrogen Ion (pH)	SW-846 9040B
	SW-846 9045C
Sulfide (as S)	SW-846 9030B
Nitroaromatics and Isophorone	
2,4-Dinitrotoluene	SW-846 8270C
2,6-Dinitrotoluene	SW-846 8270C
Isophorone	CLP 95-2
Nitroaromatics and Isophorone	
Isophorone	SW-846 8270C
Nitrobenzene	SW-846 8270C
Phthalate Esters	
Benzyl butyl phthalate	SW-846 8270C
Bis(2-ethylhexyl) phthalate	SW-846 8270C
Diethyl phthalate	SW-846 8270C
Dimethyl phthalate	SW-846 8270C
Di-n-butyl phthalate	SW-846 8270C
Di-n-octyl phthalate	SW-846 8270C
Polychlorinated Biphenyls	
PCB-1016	SW-846 8082
PCB-1221	SW-846 8082
PCB-1232	SW-846 8082
PCB-1242	SW-846 8082
PCB-1248	SW-846 8082
PCB-1254	SW-846 8082
PCB-1260	SW-846 8082
Polynuclear Aromatic Hydrocarbons	
Acenaphthene	SW-846 8270C
Acenaphthylene	SW-846 8270C
Anthracene	SW-846 8270C
Benzo(a)anthracene	SW-846 8270C
Benzo(a)pyrene	SW-846 8270C

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ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:-

Polynuclear Aromatic Hydrocarbons

Benzo(b)fluoranthene	SW-846 8270C
Benzo(ghi)perylene	SW-846 8270C
Chrysene	SW-846 8270C
Dibenzo(a,h)anthracene	SW-846 8270C
Fluoranthene	SW-846 8270C
Fluorene	SW-846 8270C
Indeno(1,2,3-cd)pyrene	SW-846 8270C
Naphthalene	SW-846 8270C
Phenanthrene	SW-846 8270C
Pyrene	SW-846 8270C

Priority Pollutant Phenols

2,4,6-Trichlorophenol	SW-846 8270C
2,4-Dichlorophenol	SW-846 8270C
2,4-Dimethylphenol	SW-846 8270C
2,4-Dinitrophenol	SW-846 8270C
2-Chlorophenol	SW-846 8270C
2-Methyl-4,6-dinitrophenol	SW-846 8270C
2-Nitrophenol	SW-846 8270C
4-Chloro-3-methylphenol	SW-846 8270C
4-Nitrophenol	SW-846 8270C
Pentachlorophenol	SW-846 8270C
Phenol	SW-846 8270C

Purgeable Aromatics

1,2-Dichlorobenzene	SW-846 8021B
	SW-846 8260B
1,3-Dichlorobenzene	SW-846 8021B
	SW-846 8260B
1,4-Dichlorobenzene	SW-846 8021B
	SW-846 8260B
Benzene	SW-846 8021B
	SW-846 8260B
Chlorobenzene	SW-846 8021B
	SW-846 8260B
Ethyl benzene	SW-846 8021B
	SW-846 8260B
Toluene	SW-846 8021B
	SW-846 8260B
Total Xylenes	SW-846 8021B
	SW-846 8260B

Purgeable Halocarbons

1,1,1-Trichloroethane	SW-846 8021B
	SW-846 8260B
1,1,2,2-Tetrachloroethane	SW-846 8021B
	SW-846 8260B
1,1,2-Trichloroethane	SW-846 8021B
	SW-846 8260B

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ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
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Purgeable Halocarbons

1,1-Dichloroethane	SW-846 8021B
	SW-846 8260B
1,1-Dichloroethene	SW-846 8021B
	SW-846 8260B
1,2-Dichloroethane	SW-846 8021B
	SW-846 8260B
1,2-Dichloropropane	SW-846 8021B
	SW-846 8260B
2-Chloroethylvinyl ether	SW-846 8021B
	SW-846 8260B
Bromodichloromethane	SW-846 8021B
	SW-846 8260B
Bromoform	SW-846 8021B
	SW-846 8260B
Bromomethane	SW-846 8021B
	SW-846 8260B
Carbon tetrachloride	SW-846 8021B
	SW-846 8260B
Chloroethane	SW-846 8021B
	SW-846 8260B
Chloroform	SW-846 8021B
	SW-846 8260B
Chloromethane	SW-846 8021B
	SW-846 8260B

Purgeable Halocarbons

cis-1,3-Dichloropropene	Method Not Specified
Dibromochloromethane	SW-846 8021B
	SW-846 8260B
Dichlorodifluoromethane	SW-846 8021B
	SW-846 8260B
Methylene chloride	SW-846 8021B
	SW-846 8260B
Tetrachloroethene	SW-846 8021B
	SW-846 8260B
trans-1,3-Dichloropropene	Method Not Specified
Trichloroethene	SW-846 8021B
	SW-846 8260B
Trichlorofluoromethane	SW-846 8021B
	SW-846 8260B
Vinyl chloride	SW-846 8021B
	SW-846 8260B

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284 SHEFFIELD STREET
MOUNTAINSIDE NJ 07092 USA

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved subcategories and/or analytes are listed below:

Purgeable Aromatics

1,2-Dichlorobenzene	Method Not Specified
1,4-Dichlorobenzene	Method Not Specified
Benzene	EPA TO-14
Chlorobenzene	Method Not Specified
Ethyl benzene	EPA TO-14
Toluene	EPA TO-14
Total Xylenes	EPA TO-14

Purgeable Halocarbons

1,1,2,2-Tetrachloroethane	Method Not Specified
1,1-Dichloroethane	Method Not Specified
1,1-Dichloroethene	Method Not Specified
1,2-Dichloroethane	Method Not Specified
1,2-Dichloropropane	Method Not Specified
Carbon tetrachloride	EPA TO-14
Chloroform	EPA TO-14
Methylene chloride	EPA TO-14
Tetrachloroethene	EPA TO-14
Vinyl chloride	Method Not Specified

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MOUNTAINSIDE NJ 07092 USA

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES ANALYTICAL SERVICES PROTOCOL
All approved subcategories and/or analytes are listed below:

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

Serial No.: 16508

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DOH-3317 (3/97)

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TESTING

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (631) 422-5777 • FAX (631) 422-5770

ELAP Laboratory ID# 10320

LABORATORY QUALITY MANUAL

TECHNICAL DIRECTOR: THOMAS R. TREUTLEIN
QA OFFICER: THOMAS U. POWELL

APPROVED: ______________________
TECHNICAL DIRECTOR

APPROVED: ______________________
QUALITY ASSURANCE OFFICER

NOTE: DISTRIBUTION LIST FOR THIS MANUAL IS ON FILE WITH QUALTIY ASSURANCE OFFICER.

REVISION RECORD

REV. NO.	DATE REVISED	RESPONS-IBLE PERSON	CHANGES		
			Reason	Sec	Description of Change
1	04/17/00	Tom Powell	Initial Release	All	Initial Release
2	0501/00	Tom Powell	Lab Inspec-tion	5	Record of initials of all staff
				10	Copy of Chain of Custody Form
				12	List of Equipment
				22	-Statement that Client will be advised of subcontracting of labwork in writing -Statement that reports will be numbered sequentially indicating on each page the total number of pages in report .
				23	-Description of LIMS -Description of electomic record archiving system. -Hardcopy data and record storage systems including lab analyst notebook storage.
3	09/06/00	Tom Powell	Rec'd ELAP Inspection Report	p.1	Distribution list moved to QA officer's file
				3	Organization Chart revised
				5 F.	Record of initials moved to QA officer's file
				11	Revised equipment list
				21	Expanded section on ethics training

TABLE OF CONTENTS

1. QUALITY POLICY

EcoTest Laboratories, Inc. is an independent, environmental testing laboratory which was founded in 1977. The company was founded by and is owned and co-directed by Thomas Powell and Thomas Treutlein.

Our main goal at EcoTest Laboratories is to produce the most accurate and precise analytical results possible, as quickly as possible. The data must be technically defensible for clients who must comply with Federal and state and local regulations such as SPDES, NPDES, RCRA, and SDWA.

Our efforts are concentrated on analytical chemistry and microbiology with a minimum of interpretive and consulting work. Because of the importance of our work to our clients in health, legal, economic, and other matters, we have instituted a comprehensive Quality Assurance/Quality Control (QA/QC) program. The Standard Operating Procedures described herein were designed by our staff to incorporate all those aspects needed for a good QA/QC program and in conformance with NELAC standards. These include the following:

- adequately staffed and equipped laboratory facility
- successful participation in the proficiency testing program operated by the New York State Environmental Laboratory Approval Program (NYSELAP)
- successful implementation of a NELAC compliant quality system
- annual internal audits with management review
- successful biennial assessments by NYSELAP
- laboratory test results that are supported by quality control data and documented laboratory testing procedures

The quality policy is communicated to employees during the training of new hires. It is understood, implemented, and maintained by employees at all levels. This is documented by management through the employee evaluation process, the training procedure, the internal audit process, and the document control process.

2. ACCREDITED TEST METHODS

PUBLIC DRINKING WATER

MICROBIOLOGY: TEST, METHOD DESCRIPTION	METHOD REFERENCE
Total Coliform, Presence-Absence (P-A) per 100 mL	SM 18, 9221D
E.coli, EC medium supplemented with MUG	40CFR, 141.21 (f) 6i
Total Coliform/E. coli (Present/Absent) Colilert	SM 18, 9223
Standard Plate Count, colonies /mL	SM 18, 9215B

PUBLIC DRINKING WATER

INORGANIC CHEMISTRY: TEST, METHOD DESCRIPTION	METHOD REFERENCE
Alkalinity, Titrimetric	SM 18, 2320B
Antimony, AA Furnace with Platform	EPA 200.9
Arsenic, ICP-AES AA Furnace with Platform	EPA 200.7 EPA 200.9
Barium, ICP-AES	EPA 200.7
Beryllium, ICP-AES	EPA 200.7
Chloride, Titrimetric (silver nitrate)	SM 17 4500 Cl-B
Cadmium, AA Furnace with Platform ICP-AES	EPA 200.9 EPA 200.7
Chromium-Total, AA Furnace with Platform ICP-AES	EPA 200.9 EPA 200.7
Color, Visual Comparison	SM 18 2120B
Conductivity, Wheatstone Bridge	SM 18 2510B
Copper, ICP-AES	EPA 200.7
Corrosivity, Langelier Index	SM 16 (203)
Cyanide, Semi-automated spectrophotometric	EPA 335.4
Fluoride, Potentiometric ion selective electrode	SM 18 4500F C
Hydrogen Ion (pH), Electrometric	EPA 150.1
Iron, ICP-AES Flame AA	EPA 200.7 SM 18 3111B
Lead, ICP-AES AA Furnace with Platform	EPA 200.7 EPA 200.9
Manganese, ICP-AES Flame AA	EPA 200.7 SM 18 3111B
Mercury, Automated cold vapor	EPA 245.1

Drinking Water Inorganic Chem (continued)	
Nickel, ICP-AES	EPA 200.7
Nitrate, Automated cadmium reduction	EPA 353.2
Nitrite, Manual Colorimetric	SM18 4500NO_2 B
Phosphorous, Total, Persulfate Digestion, Manual Ascorbic Acid	EPA 365.3
Selenium, AA Furnace with Platform	EPA 200.9
Silica, ICP-AES	EPA 200.7
Silver, ICP-AES AA Flame	EPA 200.7 SM 18 3111B
Sodium, AA Flame ICP-AES	SM 18 3111B EPA 200.7
Sulfate, Turbidimetric	EPA 375.4
Total Dissolved Solids,	SM 18 2540C
Thallium, AA Furnace with Platform	EPA 200.9
Zinc, AA Flame ICP-AES	SM 3111B EPA 200.7

PUBLIC DRINKING WATER

ORGANIC CHEMISTRY: TEST, METHOD DESCRIPTION	METHOD REFERENCE
Organohalide Pesticides, Liquid/Liquid Extraction, GC-ECD	EPA 508
Semi-Volatile Organic Compounds, Liquid-Solid Extraction, GC/MS	EPA 525.2
Glyphosate, HPLC with Post Column Derivitization	EPA 547
Trihalomethanes, GC, Purge and Trap GC/MS, Purge and Trap	EPA 502.2 EPA 524.2
Methylcarbamate Pesticides, HPLC with Post Column Derivitization	EPA 531.1
Chlorinated Phenoxy Acid Herbicides, Liquid/Liquid Extraction, GC-ECD	EPA 515.1
Volatile Halocarbons, GC, Purge and Trap GC/MS, Purge and Trap	EPA 502.2 EPA 524.2
Volatile Aromatics, GC, Purge and Trap GC/MS, Purge and Trap	EPA 502.2 EPA 524.2
Microextractables (EDB & DBCP), GC, Microextraction	EPA 504.1

PUBLIC DRINKING WATER, ORGANIC CHEMISTRY: TEST, METHOD DESCRIPTION (Continued)	METHOD REFERENCE
Nitrogen & Phosphorous-Containing Pesticides, Liquid/Liquid Extraction, GC/NPD	EPA 507

NONPOTABLE WATER

INORGANIC CHEMISTRY: TEST, METHOD DESCRIPTION	METHOD REFERENCE
Acidity, Electrometric or Titrimetric	EPA 305.1
Alkalinity, Electrometric or Titrimetric	SM 18, 2320B
Aluminum, ICP-AES	EPA 200.7
Ammonia, Specific Ion Electrode Distillation/Titration	EPA 350.3 EPA 350.2
Antimony, AA Furnace with Platform ICP-AES	EPA 200.9 EPA 200.7
Arsenic, ICP-AES AA Furnace with Platform	EPA 200.7 EPA 200.9
Barium, ICP-AES	EPA 200.7
Beryllium, ICP-AES	EPA 200.7
Biochemical Oxygen Demand, Electrode Method	EPA 405.1
Boron, ICP-AES	EPA 200.7
Cadmium, AA Furnace with Platform ICP-AES	EPA 200.9 EPA 200.7
Calcium, ICP-AES	EPA 200.7
Carbonaceous BOD, Electrode Method	SM 18, 5210B
Chemical Oxygen Demand, Spectrophotometric	EPA 410.4
Chloride, Titrimetric (silver nitrate)	SM 17 4500 Cl-B
Chromium-Total, AA Furnace with Platform ICP-AES AA Flame	EPA 200.9 EPA 200.7 EPA 218.1
Chromium VI, Colorimetric	SM 18 3111C
Cobalt, ICP-AES	EPA 200.7
Color, Visual Comparison	SM 18 2120B
Conductivity, Wheatstone Bridge	SM 18 2510B

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INORGANIC CHEMISTRY: TEST, METHOD DESCRIPTION (Continued)	METHOD REFERENCE
Copper, ICP-AES AA Flame	EPA 200.7 EPA 220.1
Cyanide, Automated spectrophotometric	EPA 335.3
Cyanide Amenable to Chlorination, Automated Spectrophotometric	EPA 335.3
Fluoride, Potentiometric ion selective electrode	SM 18 4500F C
Gold, AA Flame	EPA 231.1
Hardness, Total ICP-AES	EPA 200.7
Hydrogen Ion (pH), Electrometric	EPA 150.1
Iron, ICP-AES Flame AA	EPA 200.7 EPA 236.1
Lead. ICP-AES AA Furnace AA Flame	EPA 200.7 EPA 239.2 EPA 239.1
Magnesium, ICP-AES AA Flame	EPA 200.7 EPA 242.1
Manganese, ICP-AES Flame AA	EPA 200.7 SM 18 3111B
Mercury, Automated cold vapor	EPA 245.2
Molybdenum, ICP-AES	EPA 200.7
Nickel, ICP-AES AA Flame	EPA 200.7 EPA 249.1
Nitrate, Automated cadmium reduction	EPA 353.2
Nitrite, Spectrophotometric, manual	EPA 354.1
Nitrogen, Total Kjeldahl, Digestion/Titration	EPA 351.3
Nitrogen, Organic, TKN-Ammonia	See TKN & Ammonia
Oil & Grease, Freon Extraction/Gravimetry	EPA 413.1
Oxygen, Dissolved, Winkler (Azide Modification) Electrode	EPA 360.2 EPA 360.1
Palladium, AA Furnace	EPA 253.2
Phenols, Manual Colorimetric	EPA 420.1
Phosphate, Ortho, Manual Ascorbic Acid-Two Reagent	EPA 365.3
Phosphate, Total, Manual Ascorbic Acid-Two Reagent	EPA 365.3
Platinum, AA Furnace	EPA 255.2

NONPOTABLE WATER INORGANIC CHEMISTRY (CONTINUED)	METHOD REFERENCE
Potassium, AA Flame ICP-AES	EPA 258.1 EPA 200.7
Selenium, AA Furnace with Platform ICP-AES	EPA 270.2 E PA 200.7
Silica, ICP-AES	EPA 200.7
Silver, ICP-AES AA Flame	EPA 200.7 SM 18 3111B
Sodium, AA Flame ICP-AES	SM 18 3111B EPA 200.7
Sulfate, Turbidimetric	EPA 375.4
Sulfide, Colorimetric, Methylene Blue	EPA 376.2
Surfactants, Colorimetric (Methylene Blue)	EPA 425.1
Temperature, ° C, Thermometer	EPA 170.1
Total Dissolved Solids, Gravimetric, 180 ° C	EPA 160.1
Total Suspended Solids, Gravimetric, 103-105 °C	EPA 160.2
Total Solids, Gravimetric, 103-105 ° C	EPA 160.3
Thallium, AA Furnace with Platform ICP-AES	EPA 200.9 EPA 200.7
Tin. AA Furnace with Platform ICP-AES	EPA 200.9 EPA 200.7
Titanium, AA Furnace	EPA 200.7
Turbidity, NTU	EPA 180.1
Total Organic Carbon (TOC), Oxidation/IR	EPA 415.1
Vanadium, ICP-AES	EPA 200.7
Zinc, AA Flame ICP-AES	SM 3111B EPA 200.7

NONPOTABLE WATER

ORGANIC CHEMISTRY: TEST, METHOD DESCRIPTION	METHOD REFERENCE
Chlorinated Hydrocarbon Pesticides & PCBs, Liquid/Liquid Extraction, GC-ECD	EPA 608
Semi-Volatile Organic Compounds, Liquid/Liquid Extraction, GC/MS	EPA 625
Chlorinated Phenoxy Acid Herbicides, Liquid/Liquid Extraction, GC-ECD	SM 18 6640B
Purgeable Halocarbons, GC, Purge and Trap GC/MS, Purge and Trap	EPA 601 EPA 624
Purgeable Aromatics, GC, Purge and Trap GC/MS, Purge and Trap	EPA 602 EPA 624

NONPOTABLE WATER

MICROBIOLOGY: TEST, METHOD DESCRIPTION	METHOD REFERENCE
Total and Fecal Coliform, per 100 mL, Multiple Tube Fermentation, EC medium,	SM 18, 9221B, C, D, & E
Standard Plate Count, colonies /mL	SM 18, 9215B

SOLID AND HAZARDOUS WASTE

CHARACTERISTIC TESTING: TEST, METHOD DESCRIPTION	METHOD REFERENCE
Ignitability, Pesnky-Martens Closed Cup	EPA 1010
Reactivity Reactive Cyanide Reactive Sulfide	SW846 Ch7,S 7.3.3.2 SW846 Ch7,S7.3.4.2
Toxicity, Leaching Procedure (TCLP)	EPA 1311

SOLID AND HAZARDOUS WASTE

INORGANIC CHEMISTRY: TEST, METHOD DESCRIPTION	METHOD REFERENCE
Antimony, ICP-AES	EPA 6010B
Arsenic, ICP-AES	EPA 6010B
Barium, ICP-AES	EPA 6010B
Cadmium, ICP-AES	EPA 6010B
Chromium, Total, ICP-AES AA Flame	EPA 6010B EPA 7190
Chromium, Hexavalent, Alkaline Digestion Followed by Colorimetry (Diphenylcarbizide)	EPA 3660A EPA 7196A
Cyanide, Total, Automated Colorimetric with Offline Distillation	EPA 9012A
Hydrogen Ion (pH)	EPA 9040B EPA 9045C
Lead, ICP-AES AA Flame	EPA 6010B EPA 7420
Lead in Paint, ICP-AES AA Flame	EPA 6010B EPA 7420
Lead in Dust Wipes, ICP-AES AA Flame	EPA 6010B EPA 7420
Mercury, AA Cold Vapor	EPA7470A EPA7471A
Nickel, ICP-AES AA Flame	EPA 6010B EPA 7520
Selenium, ICP-AES AA Furnace	EPA 6010B EPA 7740
Silver, ICP-AES AA Flame	EPA 6010B EPA 7760A
Sulfide, Distillation	EPA 9030B

SOLID AND HAZARDOUS WASTE

ORGANIC CHEMISTRY, PESTICIDES TEST, METHOD DESCRIPTION	METHOD REFERENCE
Chlorinated Hydrocarbon Pesticides & PCBs, GC-ECD	EPA 8081A & EPA 8082
Chlorinated Phenoxy Acid Herbicides, GC-ECD	EPA 8151

SOLID AND HAZARDOUS WASTE

ORGANIC CHEMISTRY, NON-PESTICIDES TEST, METHOD DESCRIPTION	METHOD REFERENCE
Acrolein & Acrylonitrile, Purge & Trap GC/MS	EPA 8260B
Purgeable Aromatics & Halocarbons, Purge & Trap GC/MS Purge & Trap GC	EPA 8260B EPA 8021B
PCBs, GC/ECD	EPA 8082
Semivolatile Organics (Base/Neutral & Acid Extractables), GC/MS	EPA 8270C

AIR AND EMISSIONS

CHEMISTRY, INORGANIC TEST, METHOD DESCRIPTION	METHOD REFERENCE
Beryllium, AA Flame ICP-AES	EPA 210.1 EPA 200.7
Chromium, ICP-AES	EPA 200.7
Lead, Particulate, ICP-AES	EPA 200.7
Mercury, Automated Cold Vapor	EPA 245.2
Nitrates, In Suspended Particulates	EPA 353.2
Percent Solids in Ink, Gravimetric	ASTM 2697-86
Sulfates, in Suspended Particulates	EPA 375.4

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AIR AND EMISSIONS

ORGANIC CHEMISTRY, NON-PESTICIDES TEST, METHOD DESCRIPTION	METHOD REFERENCE
Benzene, Sorbent Tube Collection/GC or GCMS	NIOSH 2, VOL 1 (127) EPA 8021B EPA 8260B
Benzo (a) pyrene, Sorbent Tube Collection/GCMS	NIOSH 5515 EPA 8270C
Benzylchloride, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 2 (S115) EPA 8260B
Carbon tetrachloride, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 1 (127)
Chlorobenzene, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 1 (S133)
Chloroform, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 1 (127)
2-Chlorophenol, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 7 (337)
1,2-Dichlorobenzene, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 3 (S135)
1,4-Dichlorobenzene, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 3 (S281)
1,1-Dichloroethane, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 2 (S123)
1,2-Dichloroethane, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 2 (S123)
Ethyl benzene, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 2 (S29)
Formaldehyde, Impinger (NIOSH 3500)	NYSDEC 89-9
Hexachorobutadiene, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 5 (307)
Hexachoroethane, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 2(S101)
Methylene Chloride, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 1 (127)
Naphthalene, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 3 (S292)
Pentachlorophenol, Sorbent Tube Collection/GCMS	NIOSH 2, VOL4 (S297)
PCBs, Sorbent Tube Collection/GC-ECD	NYSDOH 311-1
Phenol, Sorbent Tube Collection/GCMS	NIOSH 3, VOL2 (3502)
1,1,2,2-Tetrachloroethane, Sorbent Tube Collection/GCMS	NIOSH 2,VOL 2 (S124)
Tetrachloroethene, Sorbent Tube Collection/GCMS	NIOSH 2, VOL 1 (127)
Toluene, Sorbent Tube Collection/GCMS	NIOSH 2, VOL1 (127)
1,2,4 Trichlorobenzene, Sorbent Tube Collection/GCMS	NIOSH 2, VOL (S133)
Vinyl Chloride, Sorbent Tube Collection/GCMS	40CFR,Part61,1984, App.B, Meth 106
Xylenes (m,o,&p), Sorbent Tube Collection/GCMS	NIOSH 2, VOL 1 (127)

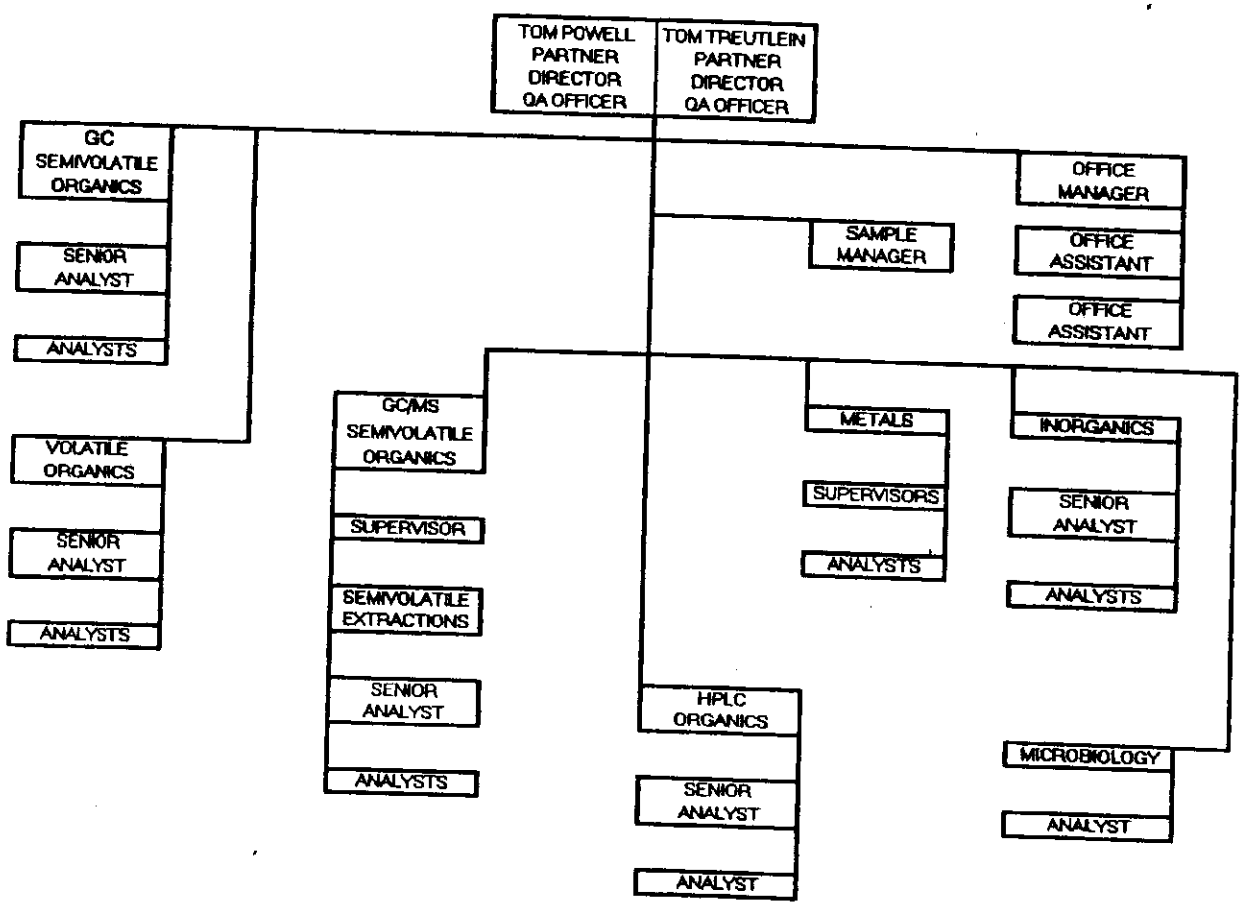
AIR AND EMISSIONS

CHEMISTRY, ORGANIC, PESTICIDES TEST, METHOD DESCRIPTION	METHOD REFERENCE
Aldrin	NIOSH 3, VOL 1 (5502)
Gamma BHC (Lindane)	NIOSH 3, VOL 1 (5502)
Chlordane	NIOSH 2,VOL 6 (S278)
2,4-D	NIOSH 2 VOL 1 (S279)
4,4-DDT	NIOSH 2, VOL3(S274)
Dieldrin	NIOSH 2, VOL3(S283)
Endrin	NIOSH 2, VOL6(S284)
Heptachlor	NIOSH 2, VOL5(S287)
2,4,5-T	NIOSH 2, VOL5(S303)
Toxaphene	NIOSH 2, VOL2(S67)

METHOD REFERENCES

- "Standard Methods for the Examination of Water and Wastewater", 14th - 18th editions, APHA.
- "Methods of Chemical Analysis of Water and Wastes", EPA 600/4-79-020, March 1979 and March 1983 rev.
- "Methods for Benzidine, Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater", EPA, Sept. 1978.
- "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", 3rd Edition, 1986, and Final Update III.
- "NIOSH Manual of Analytical Methods", U.S. National Institute for Occupational Safety and Health, 2nd, 3rd and 4th editions (1994).
- "Methods for the Determination of Organic Compounds in Drinking Water", EPA 600/4-88-039, 12/88 - rev. 7/91.
- "Methods for the Determination of Organic Compounds in Drinking Water - Supplement 1", EPA 600-4-90-020, 7/90.
- "Methods for the Determination of Organic Compounds in Drinking Water - Supplement 2", EPA 600-R-92-129, 8/92.
- "Analytical Handbook, Laboratory of Organic Analytical Chemistry", Wadsworth Center for Laboratories and Research, NYS Dept. of Health, Including frequent updates.
- "Methods for Determination of Toxic Organic Compounds in Air", William T. Winberry & Norma T. Murphy, EPA, 1990.
- "Analytical Services Protocol", 10/95 Edition, Lawrence Bailey ed., New York State Dept. of Environmental Conservation.

ORGANIZATIONAL CHART



4. RELATIONSHIP BETWEEN MANAGEMENT, TECHNICAL OPERATIONS, SUPPORT SERVICES, AND THE QUALITY SYSTEM

A. The lab director has overall responsibility for the technical operation of the lab. The lab director is also responsible for arranging and overseeing all support services including instrument service contracts, subcontracting sample analyses, and physical maintenance of the laboratory. The lab director also interacts with regulatory officials from outside the lab such as those performing audits and inspections of the lab.

B. When the director is not present in the lab, an operator who is familiar with the calibration and test procedures, the objective of the calibration or test, and the assessment of results, will be appointed by the director to supervise.

C. The lab director shall certify that personnel with appropriate educational and/or technical background perform all tests for which the lab is accredited.

D. The lab director shall ensure that the lab's policies and objectives for quality of testing services are documented in the Quality Manual. The director shall assure that the Quality Manual is communicated to, understood, and implemented by all personnel concerned. Documentation includes signed statements in each analyst's training file.

E. There are two quality assurance officers at EcoTest who have responsibility for the quality system and its implementation. The QA officers are the partners/owners of the lab. One of the QA officers is also the lab director. Each QA officer oversees the activities of different departments of the lab. When the QA officers are not present, a deputy shall be appointed.

5. JOB DESCRIPTIONS OF STAFF

A. Laboratory Director - SEE ITEM 4 A. (ABOVE)

B. Quality Assurance Officer -

- Serve as the focal point for QA/QC and be responsible for the oversight and/or review of quality control data.
- Have functions independent from laboratory operations for which they have quality assurance oversight.
- Be able to evaluate objectively and perform assessments without outside influence.
- Have documented training and/or experience in QA/QC procedures and knowledgeable in the quality system as defined under NELAC.
- Have a general knowledge of the analytical test methods for which data review is performed.
- Arrange for or conduct internal audits of the technical operations for designated departments annually.
- Discuss deficiencies in the quality system with other QA officer and department supervisor(s) and monitor corrective action.

C. Department Supervisors-

There are laboratory supervisors assigned to different areas of the lab: metals analysis, organic analysis and wet chemistry/microbiology. The duties of lab supervisor include:

- Training of technicians in general laboratory procedures, analytical methods and quality control procedures.
- Communicating with director, QA officers and analysts to insure that analysis is carried out property.
- Resolving any problems involving analytical procedures that may arise. Problems that cannot be resolved at this level are brought to the attention of the lab director or QA officer for further attempts at resolution.

D. Sample Manager- Duties include:

- Receipt of samples and Chain of Custody forms and any other documentation such as shipping records.
- Recording type and condition of sample containers, preservatives

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used, condition of custody seal if used.

- Checking of sample tags and/or labels against Chain of Custody forms for agreement and recording of discrepancies.
- Logging-in of samples consisting of recording pertinent information in log book and filing of associated documentation such as Chain of Custody forms.
- Distribution of sample bottles to appropriate storage shelves or refrigerators.
- Removal of completed samples to special storage room where inactive samples are held pending disposal. At appropriate time, sample manager oversees disposal of samples.

E. Laboratory Technician - Duties Include:

- Perform analysis and report results of samples.
- Be responsible for complying with all QA/QC requirements that pertain to the analysis performed.
- Assist supervisors, QA officers, and director in the training of other technicians.

F. Record of Initials of All Staff

THIS DOCUMENT IS ON FILE WITH QUALITY CONTROL OFFICER AND WILL BE DISTRIBUTED TO EACH DEPARTMENT SEPARATELY FROM LABORATORY QUALITY DOCUMENT.

6. DOCUMENT CONTROL

All operating procedures, manuals including this quality manual, and documents, are subject to document control. Distribution of controlled documents is limited to those indicated on the document distribution list. Controlled documents are indicated by the blue EcoTest logo at the top of each page. Uncontrolled copies are indicated by black logo. The Quality Assurance Officer controls the paper used to produce controlled copies.

The purpose of the document control system is to ensure that only the most recent revisions are available to the appropriate personnel, revisions are timely, and receive the required approvals. All internal regulatory documentation, standard operating procedures, work instructions, service manuals, and product instructions are under document control. The Quality Assurance Officer is responsible for the document control system and keeps a master list of the location of all documents and their current revision. The Laboratory Director and the Quality Assurance Officer approve all newly released documents and revised documents. Any employee can request a change to a document. Where necessary, obsolete documents may be retained for legal reasons or for knowledge preservation. The Quality Assurance Officer stores retained obsolete documents. Each page of documents produced by the laboratory will contain the effective date, revision number, Document number, and Document title. Controlled documents will have an approval signature page, a revision (change record) history page, and a distribution list.

7. TRACEABILITY OF MEASUREMENTS

Verification and/or validation of equipment, such as, balances, thermometers, and spectrophotometers, shall be performed with National Institute of Standards and Technology (NIST) traceable standards. Calibration certificates must indicate NIST Traceability along with measurement results and the associated uncertainty and/or a statement of compliance with an identified metrological specification, such as tolerance. Reference standards, such as Class S weights and NIST traceable thermometers, are used for calibration only and shall be calibrated by an organization that can provide traceability to NIST. Traceability to national standards of measurement is not applicable to the BOD, pH, and Fecal Coliform tests, therefore, the EcoTest Lab's participation in the NIST accredited New York State ELAP proficiency testing program provides satisfactory evidence of correlation of results.

8. REVIEW OF ALL NEW WORK

All new work is initiated by the Laboratory Director who delegates responsibilities for the new work according to available resources. Staff meet prior to initiation of new work in order to determine if appropriate facilities and resources are available. The plan for any new testing shall be reviewed and approved by the Laboratory Director before commencing such work. After agreement is reached, facilities and resources are organized to efficiently perform the work. For any new testing requirements, the designated employee shall write a standard operating procedure and demonstrate capability to perform those tests prior to reporting results. The SOP(s) shall be under document control and a Demonstration of Capability Statement(s) must be on file.

9. CALIBRATION/VERIFICATION OF TEST PROCEDURES.

A. Calibration and/or verification procedures are designed to ensure that the data will be of known quality and be appropriate for a given regulation or decision. Details of instrument calibration and/or test verification procedures including calibration range, standardizations, calculations and acceptance criteria are included or referenced in each test method SOP.

B. Sufficient raw data are retained to reconstruct the calibration used to calculate the sample result.

C. All calibrations are verified with a second source standard which is traceable to a national standard, when available.

D. Calibration standards include a concentration at or below the regulatory/decision level but above the laboratory's detection limit.

E. Results of samples must be within the calibration range (bracketed by standards) or the results must be flagged as having less certainty.

F. No data associated with a calibration that is out-of-control will be reported.

G. Method Detection Limits (MDL): The MDL has been determined by the laboratory and documented for each analyte where spiking solutions are available. MDL can be determined by the procedure presented in 40 CFR Part 136, Appendix B. All sample processing steps of the analytical method are included in the determination of MDL. The standard deviation of the analysis of seven portions of a spiked reagent water is calculated. The spiked reagent water is at an estimated concentration between the actual MDL and 5 times the actual MDL. The MDL is the product of 3.14 times the calculated standard deviation. The MDL should be about one fifth of the practical and routinely achievable detection level that can be reported with relatively good certainty that any reported value is reliable. Detection limits for BOD and TSS are defined by the method. MDLs are included in the Methods Manual for each method.

10. SAMPLE HANDLING

A. <u>Sample Acceptance Policy</u> - When EcoTest is required to collect samples, designated employees, trained as sample collectors are utilized. Collection is performed using approved plastic or glass containers of sufficient volume containing the necessary preservatives and chlorine neutralizing agents. Microbiological samples are collected in sterile containers. Samples that have not been properly stored during transport to the laboratory shall not be accepted or data must be flagged and client's permssion must be obtained. Containers that are found at receipt to be compromised, either cracked or leaking, will not be accepted. Each sample container will be uniquely identified using a durable (water resistant) label. The source (job name or location), site ID, along with the collection date, and time will be used to mark the samples submitted. Samples that require holding at 4 °C and which are hand delivered to the laboratory immediately after collection must be transported on ice in order to demonstrate that the chilling process has begun. The sample acceptance policy is available to the sample collectors. If any samples do not meet any requirements of the acceptance policy, the samples are not accepted for testing and resampling is requested unless client agrees to exception and data is flagged.

Obtaining sample aliquots from a submitted sample as part of the test method is carried out using procedures as written in each method SOP. Appropriate techniques to obtain representative subsamples are employed and documented in the method SOP.

The samples must be submitted to the laboratory with records of field ID, location, date and time of collection, collector's name, preservation, sample type, and remarks. Complete preservation and handling instructions are furnished to the sample collectors.

Summary of Sampling and Handling Requirements: copies of tables from New York State ELAP Manual are included as APPENDIX A.

B. Sample Receipt Protocol - Upon receipt, the condition of the samples, including all items specified in the sample acceptance policy, are checked and recorded. Samples with a temperature of just above freezing to 6°C are acceptable if 4°C is specified. Samples that have not had time to cool are acceptable if they arrive on ice and cooling has begun. Dechlorinated samples are acceptable if the chemical test yields no free chlorine detected. Acid-preserved samples are acceptable if test with pH paper or pH meter yields a result of <2. All exceptions to the sample receipt protocol are fully documented. Sample records are linked to the sample ID and include all required information specified by the sample acceptance policy.

C. Procedures for handling submitted samples. Samples are stored according to conditions specified in each test SOP. The laboratory has documented procedures and appropriate facilities to avoid deterioration, contamination, or damage to samples during storage, handling, preparation, and testing. Storage conditions are maintained, monitored, and recorded.

Additional procedures for handling submitted samples:
I). Obtaining sample aliquots from a submitted sample as part of the test method is carried out using procedures as written in each method SOP. Appropriate techniques to obtain representative subsamples are employed.
2). Each sample container will be uniquely identified using a durable label. For this laboratory, the field code or site ID along with the collection date will be used to mark the samples submitted.
3). The sample acceptance policy is documented and available to the sample collectors. If any samples do not meet any requirements of the acceptance policy, the data is flagged in an unambiguous manner clearly defining the nature and substance of the variation.
4). The sample receipt protocol is documented. The condition of the sample, including any abnormalities or departures from standard-condition as prescribed in the relevant test method, is recorded. Chain-of-Custody forms are employed whenever practicable.
5). Receipt of all samples is recorded in a permanent chronological record, or log book. The log book contains project name, date and time of laboratory receipt, laboratory ID, initials of recorder.
6). Sample records which are also available and linked to the sample ID include all required information specified by the sample acceptance policy.
7). Samples are stored according to conditions specified in each test SOP. The laboratory has documented procedures and appropriate facilities to avoid deterioration, contamination, or damage to samples during storage, handling, preparation, and testing. Storage conditions are maintained, monitored, and recorded where necessary.

D. Copy of Chain of Custody Form:

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CHAIN OF CUSTODY RECORD

Client:
Address:

Phone: FAX:
Person receiving report:
Sampled by:
Source:
Job No.:

MATRIX SOIL Water, etc.	COLLECTED DATE	COLLECTED TIME	SAMPLE IDENTIFICATION	TYPE & NUMBER OF CONTAINERS	[illegible]

Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:	Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:
Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:	Relinquished by: (Signature) Representing:	DATE/TIME	SEAL INTACT? YES NO NA	Received by: (Signature) Representing:

11. LABORATORY ENVIRONMENT

A. Calibration and testing occur only within the laboratory, designed, built and maintained as laboratory space. The laboratory space is maintained and monitored by the staff to the specifications required for laboratory space. The specification for temperature is (70'F +/- 3'F); for humidity (45% RH +/- 5%); and for voltage (120V +/- 2%). Electronic balances are located away from drafts and doorways and mounted on stone top counters in areas where their use could be effected by vibrations. . Neighboring test areas of incompatible activities are effectively separated. Specific work areas are defined and access is controlled. (Only authorized laboratory personnel and escorted signed-in visitors may enter the work area.) Good housekeeping measures are employed to avoid the possibility of contamination. (Smoking is prohibited in the laboratory.)

B. All equipment and reference materials required for the accredited tests are available in the laboratory. Records are maintained for all equipment, reference measurement materials, and services used by the laboratory.

C. Reference materials traceable to national standards of measurement or to national standard reference materials are stored away from heavy use areas or major equipment that may effect the proper operation of the materials. Certificates of Traceability are available for the reference thermometer and the Class S weights. The reference materials are used only for calibration to maintain the validity of performance.

12. PROCEDURES FOR CALIBRATION, VERIFICATION, AND MAINTENANCE OF EQUIPMENT

A. Equipment is maintained, inspected, and cleaned according to the written Equipment Maintenance Procedures. Any defective item of equipment is clearly marked and taken out of service until it has been shown to perform satisfactorily,

B. Each item of equipment or reference material is labeled to show its calibration status.

C. Equipment and reference material records include:

1) name of item of equipment or reference material
2) manufacturer, identification, serial number
3) date received and placed in service
4) current location
5) condition when received
6) copy of manufacturer's instructions or manuals
7) dates and results of calibrations/verifications and date of next calibration/verification
8) details of maintenance carried out to date and planned for the future
9) history of any damage, malfunction, modification, or repair

D. Service of equipment is performed by qualified service organizations. All records and certificates from service calls are retained.

E. Support equipment are calibrated/verified annually using NIST traceable references over the range of use. Balances, ovens, refrigerators, freezers, incubators, and water baths are checked with NIST traceable references (where possible) daily and recorded. Additional monitoring as prescribed by the test method SOP is recorded. Mechanical volumetric dispensing devices are checked for accuracy quarterly and recorded. Autoclave cycles of chemical tests (digestions) are recorded by use of chemical indicators or temperature recorder and pressure gauge. The sterilization temperature, cycle time, and pressure of each autoclave run for biological tests are recorded by use of appropriate chemical or biological sterilization indicators. Since this laboratory does not have a continuous temperature recorder, ftequent use of spore strips demonstrate sterilization. Autoclave tape is only used to indicate that each batch has been exposed to the sterilization process.

F. List of Equipment:

1). Metals Analysis:

- Perkin Elmer Model 2100, AA (Graphite Furnace with D2 Background Correction)
- Perkin Elmer Model 3100, AA (Flame)
- Perkin Elmer Model 3110, AA (Flame)
- Perkin Elmer Model 5100PC, AA (Graphite Furnace with Zeeman Background Correction)
- Perkin Elmer Model 3300 Optima, Simultaneous ICP
- Two Each: Perkin Elmer EDL Power Supplies for Atomic Absorption (for Electrodeless Discharge Lamps)
- Perkin Elmer FIMS Cold Vapor Mercury Analyzer
- Varian Model 20ABQ AA with VGA-7 Automatic Vapor Generation for Cold Vapor Mercury Analysis
- Hot Block non-metallic Digestion Blocks for metals digestions

2). Organics Analysis:

Extraction Equipment:

- Zymark Automatic Solvent Extract Evaporators, Turbo-Vap II
- Dionex ASE (Accelerated Solvent Extraction) Apparatus forextraction of soils and sludges for Semivolatile Organics, Pesticides, PCBs, TPH
- Ultrasonic Disrupters, Tekmar

Gas Chromatographs:

- Hewlett Packard Model 5890 with dual ECD
- Hewlett Packard Model 5890E with FID/NPD
- Hewlett Packard Model 5890 with dual Hall/PID and dual 16-Stage Purge & Trap Modules.
- Tracor Model 540 with ECD
- Tracor Model 540 with Hall/PID and 16-Stage Purge & Trap Module

- Tracor Model 540 with Hall/PID and 16-Stage Purge & Trap Module
- Varian Model 3400 with Hall/PID and 50-Vial Purge & Trap Module

GC/MS
- Hewlett Packard Model 5970 with Precept II 48 Sample Purge & Trap Module
- 2 Each: Hewlett Packard Model 5990 with Precept II 48 Sample Purge & Trap Module
- Hewlett Packard Model 5971 with 16-Stage Purge & Trap Module
- Hewlett Packard Model 5970 with autoinjection for Semivolatiles analysis
- Hewlett Packard Model 5971 with autoinjection for Semivolatiles analysis
- Hewlett Packard Model 5971 with autoinjection for Semivolatiles analysis

HPLC
- Hewlett Packard Model 1050 with Pickering Post Column Reaction Module, UV and Fluorescence Detectors

3). Other Equipment:
- TOC Analyzer, Dohrmann Model 85 with Solid & Water modules
- TOX Analyzer, Rosemont-Dohrmann Model DX2000
- Infrared Spectrophotometer-Fixed Wavelength, Buck Model 404
- Infrared Spectrophotometer-Scanning, Perkin Elmer 727B
- Auto Analyzer, Technicon Model AAII, Nitrate Module
- Auto Analyzer, Technicon Model AAII, Cyanide Module
- Top Loading Balances
- Analytical Balances
- UV/VIS Spectrophotometers
- Glass Distillation Units for Cyanide
- Glass Distillation Units for Phenols
- Automated Distillation Units for Nitrogen
- Muffle Furnace
- Refrigeration units for sample storage
- Chlorine Titrator, Fischer Porter
- Membrane Filtration Units (suction & pressure)
- Conductivity Meters

- Turbidimeters
- pH/Specific Ion Meters & Electrodes
- Dissolved Oxygen Meters & Probes
- Incubators for BOD and Microbiology
- Drying Ovens
- Autoclaves
- Flash Point Testers, Pensky-Martens
- Rotary Extractors for TCLP
- Zero Headspace Extraction Vessels
- Zymark Automatic Solvent Extract Evaporators, Turbo-Vap II
- Dionex ASE (Accelerated Solvent Extraction) Apparatus forextraction of soils and sludges for Semivolatile Organics, Pesticides, PCBs, TPH
- Environmental Express Hot Blocks, metals digesters (non-metallic construction)

13. PROFICIENCY TESTING PARTICIPATION, INTERLABORATORY COMPARISONS, USE OF REFERENCE MATERIALS

A. The laboratory participates in the semi-annual New York State ELAP proficiency testing program. The results are used to evaluate the ability of the laboratory to produce accurate data. Proficiency test reports along with all raw data necessary to reconstruct the analyses are retained at the laboratory.

B. The laboratory purchases external reference samples. All reference samples are certified. The laboratory retains the manufacturer's Certificate of Analysis.

14. INTERNAL QUALITY CONTROL PROCEDURES

The data acquired from quality control (QC) procedures are used to estimate the quality

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of analytical data, to determine the need for corrective action, and to interpret results after corrective actions are implemented. Each method standard operating procedure (SOP) includes detailed QC procedures and QC limits. QC limits are generated where no method limits exist. QC limits for laboratory control samples (LCS) and matrix spikes (MS) are based on the historical mean recovery plus or minus three standard deviations units. Duplicate limits for precision range from zero to 3.27 times the mean of the historical differences or relative percent differences.

(In cases where historical data is not available, interim QC limits will be used until 20 data points are available to calculate QC limits. Interim QC limits for LCS and MS will be 80% - 120% recovery. Interim QC limits for duplicates will be 20% relative percent difference.)

All quality control measures are assessed and evaluated on an on-going basis. EcoTest chooses to present results of LCS and Matrix Spikes on control charts for on-going and trend evaluation. Results of Laboratory Duplicate analyses are also presented control charts for on-going evaluation. Analytical data generated with QC samples that fall within prescribed acceptance limits indicate the test method was in control. Data generated with QC samples that fall outside QC limits indicate the test method was out of control . These data are considered suspect and the corresponding samples are reanalyzed or reported with qualifiers if reanalysis is not possible.

Method Blanks are performed at a frequency of one per batch of twenty or fewer samples for all analytes with the exception of analytes such as pH where blanks are not applicable. The results are used to determine batch acceptance. When blanks exceed the method SOP limits, the source of the contamination is investigated and measures are taken to correct, minimize and eliminate the problem.

Laboratory Control Samples (LCS), also referred to as Reference Samples, are performed at a frequency of one per batch of twenty or fewer samples for all analytes. The results are used to determine batch acceptance.

Matrix spikes are performed at a frequency of one per twenty samples for all analytes with the exception of analytes such as pH and Total Suspended Solids where matrix spikes are not applicable. The results are used to determine the existence of matrix effects in the spike sample. A matrix effect is indicated if the LCS data are within QC limits but the matrix spike data exceed QC limits.

Laboratory duplicates are performed at a frequency of one per twenty samples for all analytes. Duplicates are a measure of precision. If a duplicate result falls outside QC limits the original sample and the duplicate sample data is regarded as unreliable:

15. TESTING DISCREPANCIES

Specific Corrective action protocols for handling out-of-control QC are in each method SOP of the Methods Manual. In addition, general procedures are followed to determine when departures from quality control have occurred. Provision is made for such deviations and documentation is determined by the Corrective Action Procedure. Because of the sampling schedule and the time frame of the analysis it is not always possible to repeat the analysis if all quality control measures are not found acceptable. Therefore, if a quality control measure is found to be out-of-control, and the data is to be reported, all samples associated with the failed quality control measure are reported with the appropriate data qualifier.

16. CORRECTIVE ACTION PROCEDURE

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable departures from policies and procedures or out of control QC performance which can affect data quality.

Method SOPs provide QC acceptance criteria and specific protocols for corrective actions. Any QC measure result that falls outside of acceptance limits requires corrective action. When testing discrepancies are detected such as out-of-control QC, the analyst will follow the specific protocol for corrective action as stated in the method

SOP located in the Methods Manual. In addition, any discrepancies are documented in the Corrective Action Log maintained in the laboratory . The discrepancy will be identified, and the sample data associated with the discrepancy will be flagged. The QA officer will recommend corrective actions to be initiated by the analyst and ensure implementation and documentation of the corrective action. Each corrective action log entry is reviewed, signed, and dated by the QA Officer and the Laboratory Director. Corrective actions are performed prior to the reporting of the effected data.

17. EXCEPTIONALLY PERMITTED DEPARTURES FROM DOCUMENTED POLICIES AND PROCEDURES OR FROM STANDARD SPECIFICATIONS.

The lab director has responsibility for ensuring the lab's policies and procedures are adhered to. Arrangements for known and controlled departures from documented policies and procedures are allowed. Planned departures do not require audits, however, the departure will be fully documented and included the reason for the departure, the effected SOP(s), the intended results of the departure and the actual results. If the data reported to the client is effected adversely, it will be notified in writing. The QA officer or lab director must approve the departures. The procedures used to document any specific departure is the same as the corrective action procedure.

18. COMPLAINTS

All complaints about the laboratory's activities received from clients or other parties will be documented in a complaint file maintained in the laboratory. The file will contain the date and name of the person receiving the complaint, a description of the complaint, source of the complaint, the resolution, and any written material accompanying the complaint.

The QA officer investigates complaints and promptly audits all areas of activity and responsibility involved. The written results of the investigation including actions taken by the laboratory are reviewed by the Laboratory Director. The results of the investigation are signed and dated by the Laboratory Director and the QA Officer.

19 INTERNAL AUDIT AND DATA REVIEW

A. Data Review - All data, including original observations, calculations and derived data, calibration records, QC records, and a copy of the test report, resulting from the analyses of samples are recorded and kept for five years (ten years for public water supplies) to allow historical reconstruction of the final result. All results are reviewed and evaluated by a second analyst or the QC Officer before it is reported. Errors detected in the review process are referred to the analyst for corrective action. The QC Officer assures that all errors found in the review process are documented along with the corrective action.

B. Internal Quality System Audits - The QA Officer will arrange for an internal quality system review annually. The audit will be carried out by trained personnel who are independent (if possible) of the activity being audited. The QA Officer will review the requirements of the ELAP manual against laboratory operations, and laboratory operations against the laboratory Quality Manual and SOPS. The results of the audits will be documented in writing. Where audit findings cast doubt on the validity or correctness of the data, the lab will take immediate corrective action. Any corrective actions will be documented. The Laboratory Director will ensure that the corrective - actions are discharged within the agreed-upon time frame. Any client whose work was possibly adversely affected shall be notified in writing.

C. Managerial Review - The Laboratory Director shall review the laboratory quality system and its testing and calibration activities annually to introduce any necessary changes or improvements. The review will be take into account the outcome of recent internal audits, assessments by external bodies (NYSDOH, -NYS DEC, USEPA), the results of interlaboratory comparisons, the results of ELAP proficiency tests, any changes in the volume and type of work undertaken, feedback from clients or regulatory agencies and corrective actions. The findings and any corrective actions from this review will be documented.

20. TRAINING AND REVIEW OF PERSONNEL QUALIFICATIONS

Laboratory management reviews an applicant's level of qualification, experience, and skills against the laboratory's job description requirements before assigning an employee to the laboratory. Each analyst has adequate experience and education to demonstrate specific knowledge of their function and a general knowledge of laboratory operations, test methods, QC procedures, and records management..

New hires will be required to have earned a minimum of an associates degree in a scientific field. In order to perform a test that is new to the employee there must be a training period in which the trainee works with an experienced technician or supervisor until the trainer is satisfied that the trainee is able to perform the test with limited supervision. The trainee is required to take notes while being trained and to carefully read the SOP for the method. The training period will vary depending on the complexity of the test and it is the responsibility of the trainer to continue to assist the trainee and decide when he/she can perform the test independently.

The Laboratory Director will keep the following personnel records:

A. The laboratory will maintain a training, file which contains:

1. A statement from each employee that they have read, understood, and are using the latest version of the laboratory Quality Manual and SOPS. The statement will be signed and dated.

2. A statement from each employee that they have read, acknowledged and understood their personal ethical and legal responsibilities including the potential punishments and penalties for improper, unethical or illegal actions. The statement will be signed and dated.

3. A Demonstration of Capability (DOC) for each employee for each accredited method.

4. Documentation of any training courses, seminars, and/or workshops

5. Documentation of each employee's continued proficiency to perform each test method by one of the following annually:

i. acceptable performance of a blind sample (single blind to the analyst) for each accredited method;

ii. another Demonstration of Capability;

iii at least four consecutive Laboratory Control Samples with acceptable levels of precision and accuracy;

iv. if i - iv cannot be performed, analysis of authentic samples that have been analyzed by another trained analyst with statistically indistinguishable results.

B. <u>Demonstration of Capability (DOC)</u> - A DOC must be performed prior to using any test method, and any time there is a change in instrument type, personnel, or method. The procedure will follow ELAP Certification Manual Item 233, and the DOC Certificate included therein is completed for each analyst for each accredited method. EcoTest

Labs, through QC charting, has historical data adequately demonstrating analysts' capability to meet the laboratory-generated acceptance criteria. Where the analyst has demonstrated capability through analysis and QC charting, of Laboratory Control Samples with acceptable results, the procedure for demonstrating continued proficiency to perform the test method (above) will be used for the DOC Certification Statement.

21. EDUCATION AND TRAINING IN ETHICAL AND LEGAL RESPONSIBILITIES INCLUDING THE POTENTIAL PUNISHMENT AND PENALTIES FOR IMPROPER, UNETHICAL OR ILLEGAL ACTIONS

- Knowingly creating a safety hazard in violation of lab safety policies may also be considered grounds for dismissal.
- Results are considered confidential and the property of our client. Therefore, no employee will release results or information concerning the analysis performed by EcoTest unless instructed to do so by management.
- Results of proficiency samples will not be discussed with other laboratories prior to final submission of results to ELAP.
- Sexual harassment will not be permitted. Incidents should be reported to supvervisors or partners.
- Derogatory remarks or mistreatment of individuals based on ethnicity, religion or nationality will not be tolerated. Incidents should be reported to supvervisors or partners.

- Knowingly reporting falsified data or QC results will be considered a serious breach of ethics and may be considered grounds for dismissal. (SEE TABLE OF TYPICAL LABORATORY PROBLEMS BELOW)

PROBLEM	UNACCEPTABLE SOLUTION	ACCEPTABLE SOLUTION
Lack of time or resources to perform testing	Making up data (dry-labbing).	All analytical results are based on actual analyses. Documented data match actual data
Holding time near or past	Improper clock setting (time traveling) or improper date/time recording.	Reported dates and times match the actual dates and times.
Gas chromotography-mass spectrometry (GC/MS) tuning criteria not met	Improper manipulation of instrument or data.	GC/MS tuning data are based on proper data handling procedures.
Calibration or quality control (QC) acceptance criteria not met	Improper peak integration (peak shaving or enhancing).	Instrument peaks are integrated and reported consistently according to proper techniques.
	Comparing calibration or QC data to incorrect (inappropriate) values.	Calibration and QC data are compared to correct values.
	Discarding points in the initial calibration.	Calibration points can be rejected for inclusion in the calibration curve only if a known error was made or if a statistical evaluation indicates that a point can be discarded. Points may be discarded in the upper end of the curve if the linear range of the detector has been exceeded. Points may be discarded in the lower end of the curve if the detector is not producing an adequate response.

	Discarding points from a method detection limit (MDL) study.	Data points can be rejected for inclusion in the MDL calculation only if a known error was made or if a statistical evaluation indicates that points can be discarded.
	File substitution.	All data are generated and reported for actual analyses performed.
	Unwarranted manipulation of computer software.	Computer manipulation only is allowed for warranted reasons and any manipulation should be minimal and traceable.
QC samples or spikes not within control limits	Misrepresentation of QC samples and spikes.	QC samples and spikes are prepared, analyzed, and reported according to appropriate standards.
Analytical conditions for calibration standard does not work for sample	Improper alteration of analytical conditions for sample.	All samples are analyzed under the same condi- tions as those used for calibration standards.
Sample not analyzed at appropriate dilution or detection limit	Overdilution of samples or misrepresentation of detection limits.	Dilutions are made for legitimate reasons. Sample detection or reporting limits reflect sample preparation and any dilution factors.
Out-of-control data	Intentional deletion of out-of-control data to conceal the fact that analyses were noncompliant.	All data associated with sample analyses include any out-of-control events.
Undesirable situation with analysis or sample	Concealment of a known analytical or sample problem f rom client or management	Any knowledge of analytical or sample problems is communicated to laboratory management who in tern report to the client.

Knowledge of unethical conduct	Concealment of unethical conduct from management.	Any knowledge of unethical behavior or actions is communicated fully to laboratory management.

22. REPORTING ANALYTICAL RESULTS

The results of each test carried out by the laboratory are reported accurately, clearly, unambiguously, and objectively.
Final reports to clients will have each page numbered sequentially indicating total number of pages in report on each page.
Client will always be notified in writing, in advance of any lab work subcontracted. Subcontractors will be NY State ELAP approved if analytes are subject to approval. As a minimum, the NYS ELAP ID number of the subcontractor will be listed on the report.

23. LABORATORY DATA SYSTEMS AND STORAGE & RETRIEVAL OF DATA AND RECORDS

A. Laboratory Information Management System (LIMS) constsists of a Unix based multiuser system utilizing Filepro data base software. The system was designed by our staff to fulfill our particular needs. This system handles sample log-in and gneration of final reports. Analysts enter final results for all testing into this system. The system tracks samples and worksheets are generated daily to inform analysts of all uncompleted analysis. This network is not linked to any other computer system in the lab and is therefore isolated from outside viruses or other corruption. Analysts must have password to log onto system. Access by analysts is limited to current and previous year. Results are currently available on the system back to and including 1986 to selected personel. Backups of different levels are made daily, weekly and monthly. Copies of complete backups are stored in the lab office and offsite by selected personel.

A second network of computers links all GC/MS instruments and certain GCs.

This system is used to transfer data for reporting, archiving, and QC reporting. Only analysts using the instruments have passwords for system

B. Electronic record archiving system for lab reports consists of storage of complete backup tapes both in office and offsite. System currently contains all reports from inception of system in 1986 to present. Electronic data from instruments such as GC/MS and GC is copied to CD ROM disks and archived in lab. ICP raw data from all runs is stored on the instument's hard drive and on a second hard drive in another computer.

C. Hardcopy data and record storage systems are maintained for all paper records going back at least five years for all records except public drinking water which must be kept for at least ten years. These records are stored in designated storage areas in marked boxes in the lab and in a 40 foot storage container between buildings one and two in a fenced area. A detailed description for location of records is kept in office by QC manager.

D. Lab analysyt notebook storage system consists of a filing system of individual analysts' notebooks filed by analysts name and chronologically. These are stored in the lab. Analysts are instructed not to remove their analytical notebooks from the lab at any time. QC officer has list of individuals who perform tests historically.

24. REFERENCES

1. Standard Methods for the Examination of Water and Wastewater, l8th ed. 1992, APHA.

2. National Environmental Laboratory Accreditation Conference, Constitution Bylaws, and Standards, Approved July 1999, Chapter 5, Quality Systems.

3. New York State Environmental Laboratory Approval Program, Certification Manual, October 15, 1999.

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APPENDIX A

SAMPLE HOLDING TIMES, CONTAINERS, AND PRESERVATIVES

ENVIRONMENTAL LABORATORY APPROVAL PROGRAM
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SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements for Public Drinking Water	6/1/95	1 of 9	241

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Bacteriological Tests:			
Coliform (Total)	P,G	0.008% $Na_2S_2O_3$	30 hours
Standard Plate Count	P,G	0.008% $Na_2S_2O_3$	30 hours
Inorganic Tests:			
Alkalinity	P,G	Separate bottle completely filled to the exclusion of air, cool, 4°C	14 days
Antimony	P,G	HNO_3 to pH<2	6 months
Arsenic	P,G	HNO_3 to pH<2	6 months
Barium	P,G	HNO_3 to pH<2	6 months
Beryllium	P,G	HNO_3 to pH<2	6 months
Cadmium	P,G	HNO_3 to pH<2	6 months
Calcium	P,G	HNO_3 to pH<2	6 months
Chloride	P,G	None	28 days
Chromium	P,G	HNO_3 to pH<2	6 months
Color,	P,G	Cool, 4°C	48 hours
Conductivity	P,G	Cool, 4°C	28 days
Copper	P,G	HNO_3 to pH<2*	6 months
Cyanide	P,G	Cool, 4°C NaOH to pH >12 1.2 g/L ascorbic acid	14 days
Fluoride	P,G	None	28 days
Lead	P,G	HNO_3 to pH<2*	6 months

*Consumer collected samples may be left unrpeserved for up to 14 days.

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ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Mercury	G P	HNO_3 to pH<2 HNO_3 to pH<2	26 days 14 days
Nickel	P,G	HNO_3 to pH<2	6 months
Nitrate			
By Ion Chromatography	P,G	Cool, 4°C	48 hours
Chlorinated Supplies	P,G	Cool, 4°C	28 days
Non-chlorinated Supplies	P,G	H_2SO_4 to pH<2	14 days
Nitrite	P,G	Cool, 4°C	48 hours
pH	P,G	None	1 hour
Phosphorus (as Orthophosphate)	P,G	Cool, 4°C	48 hours
Selenium	P,G	HNO_3 to pH<2	6 months
Silica	P	Cool, 4°C	28 days
Silver	P,G	HNO_3 to pH<2	6 months
Sodium	P,G	HNO_3 to pH<2	6 months
Sulfate	P,G	Cool, 4°C	28 days
Thallium	P,G	HNO_3 to pH<2	6 months
Total Filterable Residue	P,G	Cool, 4°C	7 days
Organic Tests:			
Trihalomethanes: Bromodichloromethane Bromoform Chlorodibromomethane Chloroform	Glass with Teflon-lined Septum	0.008% $Na_2S_2O_3$	14 days

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ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Mercury	G	HNO_3 to pH<2	26 days
	P	HNO_3 to pH<2	14 days
Nickel	P,G	HNO_3 to pH<2	6 months
Nitrate			
By Ion Chromatography	P,G	Cool, 4°C	48 hours
Chlorinated Supplies	P,G	Cool, 4°C	28 days
Non-chlorinated Supplies	P,G	H_2SO_4 to pH<2	14 days
Nitrite	P,G	Cool, 4°C	48 hours
pH	P,G	None	1 hour
Phosphorus (as Orthophosphate)	P,G	Cool, 4°C	48 hours
Selenium	P,G	HNO_3 to pH<2	6 months
Silica	P	Cool, 4°C	28 days
Silver	P,G	HNO_3 to pH<2	6 months
Sodium	P,G	HNO_3 to pH<2	6 months
Sulfate	P,G	Cool, 4°C	28 days
Thallium	P,G	HNO_3 to pH<2	6 months
Total Filterable Residue	P,G	Cool, 4°C	7 days
Organic Tests:			
Trihalomethanes: Bromodichloromethane Bromoform Chlorodibromomethane Chloroform	Glass with Teflon-lined Septum	0.008%$Na_2S_2O_3$	14 days

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ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Volatile Halocarbon and Volatile Aromatics:	Glass with Teflon-lined Septum	Ascorbic Acid (25 mg/40 ml) added to empty sample bottle then add 1:1 HCl to pH<2. Cool 4°C	14 days
Microextractables: Method 504.1	Glass with Teflon-lined Septum	Cool, 4°C 3 mg $Na_2S_2O_3$ per 40 ml vial	28 days
Method 505 analytes: Alachlor, Aldrin, Atrazine, Chlordane, Dieldrin, Heptachlor, Heptachlor epoxide, Hexachlorobenzene, Hexachlorocyclopentadiene, Lindane, Methoxychlor, Metolachlor, Metribuzin, PCB's, Simazine, Toxaphene	40-ml glass vial with cap liner	3 mg $Na_2S_2O_3$ Cool, 4°C	7 days

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ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Method 506 analytes: Di-(2-ethylhexyl)adipate Di-(2-ethylhexyl) phthalate	1-L (or qt.) amber glass with TFE lined cap	60 mg $Na_2S_2O_3$ Cool, 4°C	14 days until extraction, then 14 days after extraction
Method 507 analytes: Alachlor Atrazine Butachlor Chlordane Metolachlor Metribuzine Propachlor Simazine	1-L Borosilicate glass, graduated, with TFE lined cap	80 mg $Na_2S_2O_3$ Cool, 4°C Protect from light	14 days until extraction, then 14 days after extraction
Method 508 analytes: Aldrin Chlordane Dieldrin Endrin Heptachlor Heptachlor epoxide Hexachlorobenzene Hexachlorocyclopen-tadiene Lindane Methoxychlor Metribuzin PCB's Toxaphene	1-L Borosilicate glass, graduated, with TFE lined cap	80 mg $Na_2S_2O_3$ Cool, 4°C Protect from light	14 days until extraction, then 14 days after extraction

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ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Method 508A: PCB's, Total as decachlorobiphenyl	1-L glass, with TFE lined cap	Cool, 4°C	14 days until extraction, then 30 days after extraction
Method 508.1 All	1L glass with TFE lined cap	50 mg Na_2SO_3 then 1:1 HCl to pH<2 Cool, 4°C	14 days until extraction then 30 days after extration
Method 1613: 2,3,7,8-TCDD	1-L glass, with TFE lined cap	Protect from light and temperature extremes	7 days until extraction, then 40 days after extraction
Method 515.1: 515.2 Chlorinated Acids	1-L Borosilicate glass, graduated, with TFE lined cap	80 mg $Na_2S_2O_3$ Cool, 4°C Protect from light	14 days until extraction, then 14 days after extraction

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ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Method 525.2: Alachlor Aldrin Atrazine Benzo(a)pyrene Butachlor Chlordane (Technical) Dieldrin Di(2-ethylhexyl)adipate Di(2-ethylhexyl) phthalate Endrin Heptachlor Heptachlor Epoxide Hexachlorobenzene Hexachlorocyclopenta-diene Lindane Methoxychlor Metolachlor Metribuzin Pentachlorophenol Propachlor Simazine Toxaphene	Refrigerated glass sample containers, sampling equipment must be free of plastic tubing, gaskets, etc. that may leach analytes into water	Cool, 4°C; Remove Cl residual; adjust pH<2 with 6 N HCl	Extract within 7 days. Analyze within 30 days of sample collection
Method 531.1: Methylcarbamate pesticides	60-ml vial with PTFE faced silicone septa	1.8 ml acetic acid buffer, 4.8 mg $Na_2S_2O_3$ Ship at 4°C Store at -10°C	28 days

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ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Glyphosate	60-ml vial PTFE faced silicone septa	6 mg $Na_2S_2O_3$ Cool 4°C; Protect from light	14 days
Endothall	40-ml amber glass vial with TFE lined cap	Cool 4°C; Protect from light	7 days
Diquat	1-L amber plastic or silanized glass with screw cap	100 mg $Na_2S_2O_3$; H_2SO_4 to pH=2; Cool to 4°C; Protect from light	7 days until extraction, then 21 days after extraction
Benzo(a)pyrene	1-L (or qt.) amber glass with TFE lined cap	100 mg $Na_2S_2O_3$ 1:1 HCl to pH<2; Cool 4°C; Protect from light	7 days until extraction, then 30 (40 for Method 550.1) days after extraction
Method 551 Bromodichloromethane Bromoform Carbon Tetrachloride Chloroform Dibromochloromethane 1,2-Dibromo-3-chloropropane [DBCP] 1,2 Dibromoethane [EDB] Tetrachloroethylene 1,1,1-Trichloroethane Trichloroethylene	40 mL glass vials Teflon lined Septum	4 mg $Na_2S_2O_3$/40 mL or 25 mg Ascorbic acid/40 mL Cool 4°C	Analyze within 14 days of collection

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ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Method 552.1 Dalapon	Amber glass with TFE liner	Add NH_4Cl to a concentration of 100 mg/L in sample; Cool 4°C	Analyze within 14 days of collection
Method 555 2,4-D Dicamba Pichloram 2,4,5-TP	glass TFE lined	Acidify to pH2 with 1:1 Hcl; Dechlorinate with 5mg$NaSO_3$ per 100mL sample; Cool 4°C; Protect from light	Analyze after extraction, within 14 days of collection
Microscopical Tests: Asbestos	P,G	Cool, 4°C	48 hours
		Preserved in 20 ppm Hg as $HgCl_2$	6 months
Radiological Tests: Gross Alpha	P,G	HCL or HNO_3 to pH<2	6 months
Gross Beta	P,G	HCL or HNO_3 to pH<2	6 months
Strontium-89	P,G	HCL or HNO_3 to pH<2	6 months
Strontium-90	P,G	HCL to HNO_3 to pH<2	6 months
Radium-226	P,G	HCL or HNO_3 to pH<2	6 months
Radium-228	P,G	HCL or HNO_3 to pH<2	6 months

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ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Radon-222	Glass with teflon-lined septum	Cool, 4°C	4 days
Radioactive Cesium	P,G	HCL to pH<2	6 months
Iodine-131	P,G	None	7 days
Tritium	G	None	6 months
Uranium	P,G	HCL or HNO_3 to pH<2	6 months
Photon Emitters	P,G	HCL or HNO_3 to pH<2	6 months

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ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Bacteriological Tests:			
Coliform, Total and Fecal	P,G	Cool, 4°C	6 hours
Coliform, Total and Fecal in chlorinated samples	P,G	Cool 4°C, 0.008% $Na_2S_2O_3$	6 hours
Standard Plate Counts	P,G	Cool 4°C, 0.008% $Na_2S_2O_3$	6 hours
Inorganic Tests:			
Acidity	P,G	Separate bottle completely filled to the exclusion of air, Cool, 4°C	14 days
Alkalinity	P,G	Separate bottle completely filled to the exclusion of air, Cool, 4°C	14 days
Ammonia	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Biochemical oxygen demand	P,G	Cool, 4°C	48 hours
Bromide	P,G	None	28 days
Biochemical oxygen demand, carbonaceous	P,G	Cool, 4°C	48 hours
Chemical oxygen demand	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Chloride	P,G	None	28 days
Color	P,G	Cool, 4°C	48 hours

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Sample Collection: Requirements for Environmental Analyses/Water	11/1/95	2 of 7	242

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Cyanide, total and amenable to chlorination	P,G	Cool, 4°C, NaOH to pH>12, 0.6g ascorbic acid	14 days
Fluoride	P	None	28 days
Hardness	P,G	HNO_3 to pH<2 H_2SO_4 to pH<2	6 months
Hydrogen ion (pH)	P,G	None	Analyze immediately
Kjeldahl and organic nitrogen	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Metals, except boron, chromium VI and mercury	P,G	HNO_3 to pH<2	6 months
Boron	P, Quartz	HNO_3 to pH<2	6 months
Chromium VI	P,G	Cool, 4°C	24 hours
Mercury	P,G	HNO_3 to pH<2	28 days
Nitrate	P,G	Cool, 4°C	48 hours
Nitrate-nitrite	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Nitrite	P,G	Cool, 4°C	48 hours
Oil and Grease	G	Cool, 4°C, Hcl or H_2SO_4 to pH<2	28 days
Organic carbon	P,G	Cool, 4°C, Hcl or H_3PO_4, or H_2SO_4 to pH<2	28 days
Orthophosphate	P,G	Filter immediately, Cool, 4°C	48 hours

ENVIRONMENTAL LABORATORY APPROVAL PROGRAM
CERTIFICATION MANUAL

SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements for Environmental Analyses/Water	11/1/95	3 of 7	242

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Phenols	G	Cool, 4°C H_2SO_4 to pH<2	28 days
Phosphorus (elemental)	G	Cool, 4°C	48 hours
Phosphorus, total	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Residue, Total	P,G	Cool, 4°C	7 days
Residue, Filterable	P,G	Cool, 4°C	7 days
Residue, Nonfilterable	P,G	Cool, 4°C	7 days
Residue, Volatile	P,G	Cool, 4°C	7 days
Silica	P, Quartz	Cool, 4°C	28 days
Specific Conductance	P,G	Cool, 4°C	28 days
Sulfate	P,G	Cool, 4°C	28 days
Sulfide	P,G	Cool, 4°C, add zinc acetate plus sodium hydroxide to pH>9	7 days
Surfactants	P,G	Cool, 4°C	48 hours
Temperature	P,G	None	Analyze Immediately
Organic Tests:			
Purgeable Halocarbons plus Benzyl Chloride and Epichlorohydrin	G, Teflon-lined septum	Cool, 4°C, Ascorbic Acid (25 mg/40 ml) for residual chlorine	14 days

**ENVIRONMENTAL LABORATORY APPROVAL PROGRAM
CERTIFICATION MANUAL**

SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements for Environmental Analyses/Water	6/1/95	4 of 7	242

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Purgeable Aromatics	G, Teflon-lined septum	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine	14 days
		Preserve as above and HCl to pH<2	14 days
Acrolein and Acrylonitrile	G, Teflon-lined septum	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine	14 days for acrylonitrile, 3 days for acrolein
		Preserve as above and pH to 4-5	14 days
Phenols	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine	7 days until extraction 40 days after extraction
Benzidines	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine	7 days until extraction 7 days after extraction if stored under inert gas
Phthalate Esters	G, Teflon-lined cap	Cool, 4°C	7 days until extraction 40 days after extraction

ENVIRONMENTAL LABORATORY APPROVAL PROGRAM
CERTIFICATION MANUAL

SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements for Environmental Analyses/Water	6/1/95	5 of 7	242

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Nitrosamines	G, Teflon-lined cap	Cool, 4°C, store in dark, 0.008% $Na_2S_2O_3$ for residual chlorine. For diphenylnitrosamine add 0.008% $Na_2S_2O_3$ and adjust pH 7-10 with NaOH within 24 hours of sampling	7 days until extraction 40 days after extraction
Nitroaromatics and Isophorone	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine, store in dark	7 days until extraction 40 days after extraction
PCBs	G, Teflon-lined cap	Cool, 4°C	7 days until extraction 40 days after extraction
Pesticides	G, Teflon-lined cap	Cool, 4°C	72 hours
		Cool, 4°C, pH 5-9, 0.008% $Na_2S_2O_3$ for residual chlorine if aldrin is to be determined	7 days until extraction 40 days after extraction
Polynuclear Aromatic Hydrocarbons	G, Teflon-lined cap	Cool, 4°C, 0.08% $Na_2S_2O_3$ for residual chlorine only, store in dark	7 days until extraction 40 days after extraction

ENVIRONMENTAL LABORATORY APPROVAL PROGRAM
CERTIFICATION MANUAL

SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements for Environmental Analyses/Water	6/1/95	6 of 7	242

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Haloethers	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine only	7 days until extraction 40 days after extraction
Chlorinated Hydrocarbons	G, Teflon-lined cap	Cool, 4°C	7 days until extraction 40 days after extraction
2,3,7,8-Tetrachlorodi-benzo-p-Dioxin	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine only	7 days until extraction 40 days after extraction
Radiological Tests:			
Gross Alpha	P,G	HCL or HNO_3 to pH<2	6 months
Gross Beta	P,G	HCL or HNO_3 to pH<2	6 months
Strontium-89	P,G	HCL or HNO_3 to pH<2	6 months
Strontium-90	P,G	HCL or HNO_3 to pH<2	6 months
Radium-226	P,G	HCL or HNO_3 to pH<2	6 months
Radium-228	P,G	HCL or HNO_3 to pH<2	6 months
Radon-222	glass with teflon-lined septum	Cool, 4°C	4 days

ENVIRONMENTAL LABORATORY APPROVAL PROGRAM
CERTIFICATION MANUAL

SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements for Environmental Analyses/Water	6/1/95	7 of 7	242

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Radioactive Cesium	P,G	HCL to pH<2	6 months
Iodine-131	P,G	None	7 days
Tritium	G	None	6 months
Uranium	P,G	HCL or HNO_3 to pH<2	6 months
Photon Emitters	P,G	HCL or HNO_3 to pH<2	6 months
Microscopical Tests:			
Asbestos	P	Cool to 4°C	48 hours
		20 mg/l Hg as $HgCl_2$	6 months

ENVIRONMENTAL LABORATORY APPROVAL PROGRAM
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SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements For Environmental Analyses/Solid & Hazardous Waste	6/1/95	1 of 1	243

SAMPLE PRESERVATION

Due to the variety of possible sample types, only generalizations can be made. Most solid samples are best preserved by refrigeration to 4°C. Analysis should begin as soon as possible. If SW846 does not list a holding time, then the holding time must not exceed the holding time listed for water samples. A complete record should be maintained on each sample to provide a history of sample handling from collection to analysis.

Sample containers may be either plastic or glass with a Teflon lined screw cap. Volatile Organics may be collected in standard VOA bottles filled to the septum.

APPENDIX B

CERTIFICATES OF APPROVAL

NEW YORK STATE DEPT. OF HEALTH, ENVIRONMENTAL LABORATORY APPROVAL PROGRAM (ELAP)

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER
Antonia C. Novello, M.D., M.P.H., Dr.P.H.   Commissioner

Expires 12:01 AM April 01, 2003
Issued July 01, 2002

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. THOMAS TREUTLEIN
ECOTEST LABORATORIES INC
377 SHEFFIELD AVENUE
NORTH BABYLON NY 11703 USA

NY Lab Id No: 10320
EPA Lab Code: NY00038

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Drinking Water Bacteriology

Coliform, Total	SM18 9221 D
	SM18 9223
	SM18, 9221B - MPN
Standard Plate Count	SM 18 9215B

Drinking Water Chlorinated Acids

2,4,5-TP (Silvex)	EPA 515.1
2,4-D	EPA 515.1
Dalapon	EPA 515.1
Dicamba	EPA 515.1
Dinoseb	EPA 515.1
Pentachlorophenol	EPA 515.1
Pichloram	EPA 515.1

Drinking Water Metals I

Arsenic, Total	EPA 200.7
	EPA 200.9
Barium, Total	EPA 200.7
Cadmium, Total	EPA 200.7
	EPA 200.9
Chromium, Total	EPA 200.7
	SM18 3113B
Copper, Total	EPA 200.7
Iron, Total	EPA 200.7
Lead, Total	EPA 200.9

Drinking Water Metals I

Manganese, Total	EPA 200.7
	SM18 3113B
Mercury, Total	EPA 245.1
Selenium, Total	EPA 200.9
Silver, Total	EPA 200.7
	SM18 3113B
Sodium, Total	SM18 3111B
Zinc, Total	EPA 200.7
	SM18 3113B

Drinking Water Metals II

Antimony, Total	EPA 200.9
Beryllium, Total	EPA 200.7
Nickel, Total	EPA 200.7
Thallium, Total	EPA 200.9

Drinking Water Methylcarbamate Pesticides

3-Hydroxy Carbofuran	EPA 531.1
Aldicarb	EPA 531.1
Aldicarb Sulfone	EPA 531.1
Aldicarb Sulfoxide	EPA 531.1
Carbaryl	EPA 531.1
Carbofuran	EPA 531.1
Methomyl	EPA 531.1
Oxamyl	EPA 531.1

Serial No.: 16124

DOH-3317 (3/97)

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Drinking Water Miscellaneous

Benzo(a)pyrene	EPA 525.2
Bis(2-ethylhexyl) phthalate	EPA 525.2
Butachlor	EPA 507
Di (2-ethylhexyl) adipate	EPA 525.2
Glyphosate	EPA 547
Hexachlorobenzene	EPA 508
Hexachlorocyclopentadiene	EPA 525.2
Propachlor	EPA 508

Drinking Water Non-Metals

Alkalinity	SM18 2320-B
Calcium Hardness	EPA 200.7
Chloride	SM18, 4500 Cl-B
Color	SM 18/19 2120B
Corrosivity	SM 18/19 2330
Cyanide	EPA 335.4
Fluoride, Total	SM18 4500-F-C
Hydrogen Ion (pH)	EPA 150.1
Nitrate (as N)	EPA 353.2
Silica, Dissolved	EPA 200.7
Solids, Total Dissolved	SM18 2540C
Sulfate (as SO4)	EPA 375.4

Drinking Water Organohalide Pesticides

Alachlor	EPA 507

Drinking Water Organohalide Pesticides

Aldrin	EPA 508
Atrazine	EPA 507
Chlordane Total	EPA 508
Dieldrin	EPA 508
Endrin	EPA 508
Heptachlor	EPA 508
Heptachlor epoxide	EPA 508
Lindane	EPA 508
Methoxychlor	EPA 508
Metolachlor	EPA 507
Metribuzin	EPA 507
Simazine	EPA 507
Toxaphene	EPA 508

Drinking Water Trihalomethanes

Bromodichloromethane	EPA 524.2
Bromoform	EPA 524.2
Chloroform	EPA 524.2
Dibromochloromethane	EPA 524.2

Microextractibles

1,2-Dibromo-3-chloropropane	EPA 504.1
1,2-Dibromoethane	EPA 504.1

Polychlorinated Biphenyls

PCB-1016	EPA 508

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Polychlorinated Biphenyls

PCB-1221	EPA 508
PCB-1232	EPA 508
PCB-1242	EPA 508
PCB-1248	EPA 508
PCB-1254	EPA 508
PCB-1260	EPA 508

Volatile Aromatics

1,2,3-Trichlorobenzene	EPA 524.2
1,2,4-Trichlorobenzene	EPA 524.2
1,2,4-Trimethylbenzene	EPA 524.2
1,2-Dichlorobenzene	EPA 524.2
1,3,5-Trimethylbenzene	EPA 524.2
1,3-Dichlorobenzene	EPA 524.2
1,4-Dichlorobenzene	EPA 524.2
2-Chlorotoluene	EPA 524.2
4-Chlorotoluene	EPA 524.2
Benzene	EPA 524.2
Bromobenzene	EPA 524.2
Chlorobenzene	EPA 524.2
Ethyl benzene	EPA 524.2
Hexachlorobutadiene	EPA 524.2
Isopropylbenzene	EPA 524.2
m-Xylene	EPA 524.2

Volatile Aromatics

n-Butylbenzene	EPA 524.2
n-Propylbenzene	EPA 524.2
o-Xylene	EPA 524.2
p-Isopropyltoluene (P-Cymene	EPA 524.2
p-Xylene	EPA 524.2
sec-Butylbenzene	EPA 524.2
Styrene	EPA 524.2
tert-Butylbenzene	EPA 524.2
Toluene	EPA 524.2

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 524.2
1,1,1-Trichloroethane	EPA 524.2
1,1,2,2-Tetrachloroethane	EPA 524.2
1,1,2-Trichloroethane	EPA 524.2
1,1-Dichloroethane	EPA 524.2
1,1-Dichloroethene	EPA 524.2
1,1-Dichloropropene	EPA 524.2
1,2,3-Trichloropropane	EPA 524.2
1,2-Dichloroethane	EPA 524.2
1,2-Dichloropropane	EPA 524.2
1,3-Dichloropropane	EPA 524.2
2,2-Dichloropropane	EPA 524.2
Bromochloromethane	EPA 524.2

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ENVIRONMENTAL ANALYSES POTABLE WATER
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'olatile Halocarbons

Bromomethane	EPA 524.2
Carbon tetrachloride	EPA 524.2
Chloroethane	EPA 524.2
Chloromethane	EPA 524.2
cis-1,2-Dichloroethene	EPA 524.2
cis-1,3-Dichloropropene	EPA 524.2
Dibromomethane	EPA 524.2
Dichlorodifluoromethane	EPA 524.2
Methylene chloride	EPA 524.2
Tetrachloroethene	EPA 524.2
trans-1,2-Dichloroethene	EPA 524.2
trans-1,3-Dichloropropene	EPA 524.2
Trichloroethene	EPA 502.2
Trichlorofluoromethane	EPA 524.2
Vinyl chloride	EPA 524.2

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DOH-3317 (3/97)

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ENVIRONMENTAL ANALYSES POTABLE WATER
All approved subcategories and/or analytes are listed below:

Drinking Water Non-Metals

Nitrite (as N)	SM 18 4500 NO2 B
Orthophosphate (as P)	SM18 4500-P E
Specific Conductance	SM18 2510B

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DOH-3317 (3/97)

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ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Acrolein and Acrylonitrile

Acrolein	EPA 624
Acrylonitrile	EPA 624

Benzidines

3,3 -dichlorobenzidine	EPA 625
Benzidine	EPA 625

Chlorinated Hydrocarbon Pesticides

4,4 -DDE	EPA 608
4,4 -DDT	EPA 608
Aldrin	EPA 608
beta-BHC	EPA 608
Chlordane Total	EPA 608
delta-BHC	EPA 608
Endosulfan II	EPA 608
Endrin	EPA 608
Heptachlor	EPA 608
Methoxychlor	SM18 6630B
Mirex	SM18 6630B

Chlorinated Hydrocarbons

1,2,4-Trichlorobenzene	EPA 625
2-Chloronaphthalene	EPA 625
Hexachlorobenzene	EPA 625
Hexachlorobutadiene	EPA 625
Hexachlorocyclopentadiene	EPA 625

Chlorinated Hydrocarbons

Hexachloroethane	EPA 625

Chlorophenoxy Acid Pesticides

2,4,5-T	EPA 1978, p.115
2,4,5-TP (Silvex)	EPA 1978, p.115
	SM18 6640B
2,4-D	EPA 1978, p.115
	SM18 6640B
Dicamba	EPA 1978, p.115

Demand

Biochemical Oxygen Demand	EPA 405.1
Chemical Oxygen Demand	EPA 410.4

Haloethers

4-Bromophenylphenyl ether	EPA 625
4-Chlorophenylphenyl ether	EPA 625
Bis (2-chloroisopropyl) ether	EPA 625
Bis(2-chloroethoxy)methane	EPA 625
Bis(2-chloroethyl)ether	EPA 625

Mineral

Acidity	EPA 305.1
Alkalinity	SM18 2320-B
Calcium Hardness	EPA 200.7
Chloride	SM18 4500Cl-B

Serial No.: 16126

DOH-3317 (3/97)

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ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Mineral	
Fluoride, Total	SM18 4500-F-C
Hardness, Total	EPA 200.7
Sulfate (as SO4)	EPA 375.4
Nitroaromatics and Isophorone	
2,4-Dinitrotoluene	EPA 625
2,6-Dinitrotoluene	EPA 625
Isophorone	EPA 625
Nitrobenzene	EPA 625
Nitrosoamines	
N-Nitrosodimethylamine	EPA 625
N-Nitrosodi-n-propylamine	EPA 625
N-Nitrosodiphenylamine	EPA 625
Nutrient	
Ammonia (as N)	EPA 350.2
	EPA 350.3
Kjeldahl Nitrogen, Total	EPA 351.1
Nitrate (as N)	EPA 353.2
Orthophosphate (as P)	EPA 365.3
Phosphorus, Total	EPA 365.2
Phthalate Esters	
Benzyl butyl phthalate	EPA 625
Bis(2-ethylhexyl) phthalate	EPA 625

Phthalate Esters	
Diethyl phthalate	EPA 625
Dimethyl phthalate	EPA 625
Di-n-butyl phthalate	EPA 625
Di-n-octyl phthalate	EPA 625
Polychlorinated Biphenyls	
PCB-1232	EPA 608
PCB-1260	EPA 608
Polynuclear Aromatics	
Acenaphthene	EPA 625
Anthracene	EPA 625
Benzo(a)anthracene	EPA 625
Benzo(a)pyrene	EPA 625
Benzo(b)fluoranthene	EPA 625
Fluoranthene	EPA 625
Indeno(1,2,3-cd)pyrene	EPA 625
Pyrene	EPA 625
Priority Pollutant Phenols	
2,4,5-Trichlorophenol	SW-846 8270C
2,4,6-Trichlorophenol	EPA 625
2,4-Dichlorophenol	EPA 625
2,4-Dimethylphenol	EPA 625
2,4-Dinitrophenol	EPA 625
2-Chlorophenol	EPA 625

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All approved analytes are listed below:

Priority Pollutant Phenols

2-Methyl-4,6-dinitrophenol	EPA 625
2-Nitrophenol	EPA 625
4-Chloro-3-methylphenol	EPA 625
4-Nitrophenol	EPA 625
Pentachlorophenol	EPA 625
Phenol	EPA 625

Purgeable Aromatics

1,3-Dichlorobenzene	EPA 601
	EPA 602
	EPA 624
	EPA 625
Benzene	EPA 624
Chlorobenzene	EPA 624
Ethyl benzene	EPA 602
	EPA 624
Toluene	EPA 602
	EPA 624
Total Xylenes	EPA 602
	EPA 624

Purgeable Halocarbons

1,1,1-Trichloroethane	EPA 601
	EPA 624
1,1,2,2-Tetrachloroethane	EPA 601

Purgeable Halocarbons

1,1,2,2-Tetrachloroethane	EPA 624
1,1-Dichloroethene	EPA 601
	EPA 624
1,2-Dichloroethane	EPA 601
	EPA 624
2-Chloroethylvinyl ether	SM18 6230B
Bromomethane	EPA 601
	EPA 624
Carbon tetrachloride	EPA 601
	EPA 624
Chloroethane	EPA 601
	EPA 624
Chloroform	EPA 601
	EPA 624
Dibromochloromethane	EPA 601
	EPA 624
Dichlorodifluoromethane	EPA 601
Methylene chloride	EPA 601
	EPA 624
Trichloroethene	EPA 601
	EPA 624
Trichlorofluoromethane	EPA 601
Vinyl chloride	EPA 601
	EPA 624

Serial No.: 16126

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DOH-3317 (3/97)

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER
Antonia C. Novello, M.D., M.P.H., Dr.P.H. Commissioner

Expires 12:01 AM April 01, 2003
Issued July 01, 2002

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. THOMAS TREUTLEIN
ECOTEST LABORATORIES INC
377 SHEFFIELD AVENUE
NORTH BABYLON NY 11703 USA

NY Lab Id No: 10320
EPA Lab Code: NY00038

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Residue

Solids, Total	EPA 160.1
	EPA 160.3
Solids, Total Dissolved	EPA 160.1
Solids, Total Suspended	EPA 160.2

Wastewater Bacteriology

Coliform, fecal	SM18, 9221 E - MPN
	SM18, 9221B - MPN
Coliform, Total	SM18, 9221B - MPN
Standard Plate Count	SM 18 9215B

Wastewater Metals I

Barium, Total	EPA 200.7
Cadmium, Total	EPA 200.7
	EPA 200.9
Calcium, Total	EPA 200.7
Chromium, Total	EPA 200.7
	EPA 200.9
	EPA 218.1
Copper, Total	EPA 200.7
	EPA 220.1
Iron, Total	EPA 236.1
Lead, Total	EPA 200.7
	EPA 239.1
	EPA 239.2

Wastewater Metals I

Magnesium, Total	EPA 200.7
	EPA 242.1
Manganese, Total	EPA 200.7
	SM18 3111B
Nickel, Total	EPA 200.7
	EPA 249.1
Potassium, Total	EPA 200.7
	EPA 258.1
Silver, Total	EPA 200.7
	SM18 3113B
Sodium, Total	EPA 200.7
	SM18 3111B

Wastewater Metals II

Aluminum, Total	EPA 200.7
Antimony, Total	EPA 200.7
	EPA 200.9
Arsenic, Total	EPA 200.7
	EPA 200.9
Beryllium, Total	EPA 200.7
	EPA 200.9
Mercury, Total	EPA 245.2
Selenium, Total	EPA 200.7
	EPA 270.2

Serial No.: 16126

DOH-3317 (3/97)

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ENVIRONMENTAL ANALYSES NON POTABLE WATER
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Wastewater Metals II

Vanadium, Total	EPA 200.7
Zinc, Total	EPA 200.7
	SM18 3111B

Wastewater Metals III

Cobalt, Total	EPA 200.7
Gold, Total	EPA 231.1
Molybdenum, Total	EPA 200.7
Palladium, Total	EPA 253.2
	EPA 255.2
Thallium, Total	EPA 200.7
	EPA 200.9
Tin, Total	EPA 200.9
Titanium, Total	EPA 200.7

Wastewater Miscellaneous

Boron, Total	EPA 200.7
Bromide	EPA 320.1
Color	SM 18/19 2120B
Cyanide, Total	EPA 335.3
Hydrogen Ion (pH)	EPA 150.1
Oil & Grease Total Recoverabl	EPA 413.1
Organic Carbon, Total	EPA 415.1
Phenols	EPA 420.1
Silica, Dissolved	EPA 200.7

Wastewater Miscellaneous

Specific Conductance	EPA 120.1
	SM18 2510B
Sulfide (as S)	EPA 376.2
Surfactant (MBAS)	EPA 425.1
Temperature	EPA 170.1

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ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved subcategories and/or analytes are listed below:

Chlorinated Hydrocarbon Pesticides

4,4-DDD	EPA 608
alpha-BHC	EPA 608
Dieldrin	EPA 608
Endosulfan I	EPA 608
Endosulfan sulfate	EPA 608
Endrin aldehyde	EPA 608
Heptachlor epoxide	EPA 608
Lindane	EPA 608
Toxaphene	EPA 608

Nutrient

Nitrite (as N)	EPA 354.1

Polychlorinated Biphenyls

PCB-1016	EPA 608
PCB-1221	EPA 608
PCB-1242	EPA 608
PCB-1248	EPA 608
PCB-1254	EPA 608

Polynuclear Aromatics

Acenaphthylene	EPA 625
Benzo(ghi)perylene	EPA 625
Benzo(k)fluoranthene	EPA 625
Chrysene	EPA 625
Dibenzo(a,h)anthracene	EPA 625

Polynuclear Aromatics

Fluorene	EPA 625
Naphthalene	EPA 625
Phenanthrene	EPA 625

Purgeable Aromatics

1,2-Dichlorobenzene	EPA 624
	EPA 625
1,4-Dichlorobenzene	EPA 601
	EPA 602
	EPA 624
	EPA 625

Purgeable Halocarbons

1,1,2-Trichloroethane	EPA 601
	EPA 624
1,1-Dichloroethane	EPA 601
	EPA 624
1,2-Dichloroethene (total)	EPA 601
	EPA 624
1,2-Dichloropropane	EPA 601
	EPA 624
Bromodichloromethane	EPA 601
	EPA 624
Bromoform	EPA 601
	EPA 624

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ENVIRONMENTAL ANALYSES NON POTABLE WATER
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'urgeable Halocarbons

Chloromethane	EPA 601
	EPA 624
cis-1,3-Dichloropropene	EPA 601
	EPA 624
Tetrachloroethene	EPA 601
	EPA 624
trans-1,3-Dichloropropene	EPA 601
	EPA 624

CLP Additional Compounds

Cresol	SW-846 8270C
Methylethyl ketone (2-butanon(	SW-846 8260B
Pyridine	SW-846 8260B

Wastewater Metals II

Chromium VI	SM18 3111C

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ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:

Chlorinated Hydrocarbon Pesticides	
4,4 -DDT	NIOSH 2, VOL. 3 S274
Aldrin	NIOSH 4, VOL. 1 5502
Chlordane Total	NYS DOH APC-34
Dieldrin	NIOSH 2, VOL. 3 S283
	NYS DOH APC-34
Endrin	NIOSH 2, VOL. 6 S284
Heptachlor	NIOSH 2, VOL. 5 S287
Lindane	NIOSH 4, VOL. 1 5502
Toxaphene	NIOSH 2, VOL. 2 S67
Chlorinated Hydrocarbons	
1,2,4-Trichlorobenzene	NIOSH 2, VOL. 2 S133
Hexachlorobutadiene	NIOSH 2, VOL. 5 307
Hexachloroethane	NIOSH 2, VOL. 2 S101
Metals I	
Lead, Total	EPA 239.1
Metals II	
Beryllium, Total	40 CFR PART61 1984 APP.B METH 10
Mercury, Total	EPA 245.2
Mineral	
Fluoride, Total	EPA 340.2
Nitrate (as N)	40 CFR PART 50 1984 APP B
	EPA 353.2
Mineral	
Sulfate (as SO4)	EPA 375.4
Miscellaneous Air	
Formaldehyde	MASA 2 116
Polychlorinated Biphenyls	
PCB-1016	EPA, 1980
	NYS DOH 311-1
PCB-1221	EPA, 1980
	NYS DOH 311-1
PCB-1232	EPA, 1980
	NYS DOH 311-1
PCB-1242	EPA, 1980
	NYS DOH 311-1
PCB-1248	EPA, 1980
	NYS DOH 311-1
PCB-1254	EPA, 1980
	NYS DOH 311-1
PCB-1260	EPA, 1980
	NYS DOH 311-1
Purgeable Aromatics	
1,2-Dichlorobenzene	NIOSH 2, VOL.3 S135
1,4-Dichlorobenzene	NIOSH 2, VOL. 3 S281
Benzene	NIOSH 2, VOL. 1 127
Chlorobenzene	NIOSH 2, VOL. 2 S133

Serial No.: 16130

DOH-3317 (3/97)

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ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:

'urgeable Aromatics

Ethyl benzene	NIOSH 2, VOL 2 S29
Toluene	NIOSH 2, VOL. 1 127
Total Xylenes	NIOSH 2, VOL. 1 127

Purgeable Halocarbons

1,1,2,2-Tetrachloroethane	NIOSH 2, VOL. 2 S124
1,1-Dichloroethane	NIOSH 2, VOL. 2 S123
1,1-Dichloroethene	NIOSH 2, VOL. 2 S110
1,2-Dichloroethane	NIOSH 2, VOL. 2 S123
1,2-Dichloropropane	NIOSH 2, VOL. 6 321
Carbon tetrachloride	NIOSH 2, VOL. 1 127
Chloroform	NIOSH 2, VOL. 1 127
Methylene chloride	NIOSH 2, VOL. 1 127
Tetrachloroethene	NIOSH 2, VOL. 1 127
Vinyl chloride	40 CFR, PART 61 1984 APP. B METH 1

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All approved analytes are listed below:

Acrolein and Acrylonitrile

Acrolein	SW-846 8260B
Acrylonitrile	SW-846 8260B

Characteristic Testing

Corrosivity	SW-846 1110
E.P. Toxicity	SW-846 1310
Ignitability	SW-846 1010
Reactivity	SW846 Ch7, Sec. 7.3
TCLP	FED REG 1311

Chlorinated Hydrocarbon Pesticides

4,4-DDD	SW-846 8081A
alpha-BHC	SW-846 8081A
Chlordane Total	SW-846 8081A
Dieldrin	SW-846 8081A
Endosulfan I	SW-846 8081A
Endosulfan sulfate	SW-846 8081A
Endrin aldehyde	SW-846 8081A
Heptachlor epoxide	SW-846 8081A
Lindane	SW-846 8081A

Chlorinated Hydrocarbons

1,2,4-Trichlorobenzene	SW-846 8270C
2-Chloronaphthalene	SW-846 8270C

Chlorinated Hydrocarbons

Hexachlorobenzene	SW-846 8270C
Hexachlorobutadiene	SW-846 8270C
Hexachlorocyclopentadiene	SW-846 8270C
Hexachloroethane	SW-846 8270C

Chlorophenoxy Acid Pesticides

2,4,5-T	SW-846 8151A
2,4,5-TP (Silvex)	SW-846 8151A
2,4-D	SW-846 8151A
Dicamba	SW-846 8151A

Haloethers

Bis (2-chloroisopropyl) ether	SW-846 8270C
Bis(2-chloroethoxy)methane	SW-846 8270C

Metals I

Barium, Total	SW-846 6010B
Cadmium, Total	SW-846 6010B
Chromium, Total	SW-846 6010B
Lead, Total	SW-846 6010B
Nickel, Total	SW-846 6010B
Silver, Total	SW-846 6010B
	SW-846 7760A

Serial No.: 18142

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All approved analytes are listed below:

letals II

Antimony, Total	SW-846 6010B
Arsenic, Total	SW-846 6010B
Selenium, Total	SW-846 6010B
	SW-846 7740

liscellaneous

Hydrogen Ion (pH)	SW-846 9040B
	SW-846 9045C
Lead in Dust Wipes	SW-846 6010B
Lead in Paint	SM 18-19 3111B
	SM 18-20 3120B
Sulfide (as S)	SW-846 9030B

Nitroaromatics and Isophorone

2,4-Dinitrotoluene	SW-846 8270C
2,6-Dinitrotoluene	SW-846 8270C
Isophorone	CLP 95-2
Nitrobenzene	SW-846 8270C

Organophosphate Pesticides

Azinphos methyl	SW-846 8270C
Demeton-O	SW-846 8270C
Demeton-S	SW-846 8270C
Diazinon	SW-846 8270C

Organophosphate Pesticides

Disulfoton	SW-846 8270C
Malathion	SW-846 8270C
Parathion ethyl	SW-846 8270C
Parathion methyl	SW-846 8270C

Phthalate Esters

Benzyl butyl phthalate	SW-846 8270C
Bis(2-ethylhexyl) phthalate	SW-846 8270C
Diethyl phthalate	SW-846 8270C
Dimethyl phthalate	SW-846 8270C
Di-n-butyl phthalate	SW-846 8270C
Di-n-octyl phthalate	SW-846 8270C

Polychlorinated Biphenyls

PCB-1016	SW-846 8082
PCB-1221	SW-846 8082
PCB-1232	SW-846 8082
PCB-1242	SW-846 8082
PCB-1248	SW-846 8082
PCB-1254	SW-846 8082
PCB-1260	SW-846 8082

Polynuclear Aromatic Hydrocarbons

Acenaphthylene	SW-846 8270C

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ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
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Polynuclear Aromatic Hydrocarbons

Benzo(b)fluoranthene	SW-846 8270C
Benzo(ghi)perylene	SW-846 8270C
Chrysene	SW-846 8270C
Dibenzo(a,h)anthracene	SW-846 8270C
Fluorene	SW-846 8270C
Naphthalene	SW-846 8270C
Phenanthrene	SW-846 8270C

Priority Pollutant Phenols

2,4,6-Trichlorophenol	SW-846 8270C
2,4-Dichlorophenol	SW-846 8270C
2,4-Dimethylphenol	SW-846 8270C
2,4-Dinitrophenol	SW-846 8270C
2-Chlorophenol	SW-846 8270C
2-Methyl-4,6-dinitrophenol	SW-846 8270C
2-Nitrophenol	SW-846 8270C
4-Chloro-3-methylphenol	SW-846 8270C
4-Nitrophenol	SW-846 8270C
Pentachlorophenol	SW-846 8270C
Phenol	SW-846 8270C

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Chlorinated Hydrocarbon Pesticides	
4,4 -DDE	SW-846 8081A
4,4 -DDT	SW-846 8081A
Aldrin	SW-846 8081A
beta-BHC	SW-846 8081A
delta-BHC	SW-846 8081A
Endosulfan II	SW-846 8081A
Endrin	SW-846 8081A
Heptachlor	SW-846 8081A
Methoxychlor	SW-846 8081A
Toxaphene	SW-846 8081A

Metals II	
Chromium VI	SW-846 7196A
Mercury, Total	SW-846 7470A
	SW-846 7471A

Miscellaneous	
Cyanide, Total	SW-846 9012A

Polynuclear Aromatic Hydrocarbons	
Acenaphthene	SW-846 8270C
Anthracene	SW-846 8270C
Benzo(a)anthracene	SW-846 8270C
Benzo(a)pyrene	SW-846 8270C

Polynuclear Aromatic Hydrocarbons	
Fluoranthene	SW-846 8270C
Indeno(1,2,3-cd)pyrene	SW-846 8270C
Pyrene	SW-846 8270C

Purgeable Aromatics	
1,2-Dichlorobenzene	SW-846 8021B
	SW-846 8260B
1,3-Dichlorobenzene	SW-846 8021B
	SW-846 8260B
1,4-Dichlorobenzene	SW-846 8021B
	SW-846 8260B
Benzene	SW-846 8021B
	SW-846 8260B
Chlorobenzene	SW-846 8021B
	SW-846 8260B
Ethyl benzene	SW-846 8021B
	SW-846 8260B
Toluene	SW-846 8021B
	SW-846 8260B
Total Xylenes	SW-846 8021B
	SW-846 8260B

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Purgeable Halocarbons

1,1,1-Trichloroethane	SW-846 8021B
	SW-846 8260B
1,1,2,2-Tetrachloroethane	SW-846 8021B
	SW-846 8260B
1,1,2-Trichloroethane	SW-846 8021B
	SW-846 8260B
1,1-Dichloroethane	SW-846 8021B
	SW-846 8260B
1,1-Dichloroethene	SW-846 8021B
	SW-846 8260B
1,2-Dichloroethane	SW-846 8021B
	SW-846 8260B
1,2-Dichloropropane	SW-846 8021B
	SW-846 8260B
2-Chloroethylvinyl ether	SW-846 8021B
	SW-846 8260B
Bromodichloromethane	SW-846 8021B
	SW-846 8260B
Bromoform	SW-846 8021B
	SW-846 8260B
Bromomethane	SW-846 8021B

Purgeable Halocarbons

Bromomethane	SW-846 8260B
Carbon tetrachloride	SW-846 8021B
	SW-846 8260B
Chloroethane	SW-846 8021B
	SW-846 8260B
Chloroform	SW-846 8021B
	SW-846 8260B
Chloromethane	SW-846 8021B
	SW-846 8260B
cis-1,3-Dichloropropene	Method Not Specified
Dibromochloromethane	SW-846 8021B
	SW-846 8260B
Dichlorodifluoromethane	SW-846 8021B
	SW-846 8260B
Methylene chloride	SW-846 8021B
	SW-846 8260B
Tetrachloroethene	SW-846 8021B
	SW-846 8260B
trans-1,3-Dichloropropene	Method Not Specified
Trichloroethene	SW-846 8021B
	SW-846 8260B

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Purgeable Halocarbons

Trichlorofluoromethane	SW-846 8021B
	SW-846 8260B
Vinyl chloride	SW-846 8021B
	SW-846 8260B

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DOH-3317 (3/97)

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

Antonia C. Novello, M.D., M.P.H., Dr.P.H.
Commissioner

Dennis P. Whalen
Executive Deputy Commissioner

February 18, 2003

Dear Lead Technical Director:

Please note that although your ELAP Certificate(s) of Approval is/are scheduled to expire at 12:01 AM April 1, 2003, it/they will remain valid until June 16, 2003. This extension is being granted in advance due to the possibility that the New York State budget may not be approved by April 1, 2003. The only exceptions to this extension are laboratories who are notified in writing that their certification has been revoked for just cause.

If there are any questions, please feel free to contact me at 518-485-5570 or by email to jej02@health.state.ny.us.

Verification of your laboratory's approved ELAP status is available to you or your clients by calling the Program Office at (518) 485-5570 between 8:30 a.m. and 4:45 p.m. Monday through Friday.

Sincerely,

Joyce Reilly
Administrative Assistant
Environmental Laboratory Approval Program

NYSDOH - WADSWORTH CENTER - ELAP - PO BOX 509 - ALBANY NY 12201-0509
Phone: 518-485-5570 www.wadsworth.org/labcert Fax: 518-485-5568