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ELMIRA CITY SCHOOL DISTRICT
SOUTHSIDE HIGH SCHOOL
ELMIRA, NEW YORK

ENVIRONMENTAL MANAGEMENT PLAN

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Elmira City School District
Southside High School
Elmira, New York

Environmental Management Plan (EMP)

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1.0 INTRODUCTION

1.1 SOUTHSIDE HIGH SCHOOL PROPERTY BACKGROUND

1.1.1 Location and Description

The Environmental Management Plan (EMP) is for the Southside High School property located at 777 South Main Street, Elmira, Chemung County, New York (SHS property), which is owned by the Elmira City School District (School District). The SHS property is approximately 34 acres in area and is bounded by South Main Street to the east, Figgie Properties Inc. property to the south, and the Consolidated Rail Corp. property to the west and vacant land to the north. Miller Pond is located approximately 1,000 feet east of the SHS property. A Property Location Map is provided as Figure 1-1. The SHS property features and property boundaries are presented on Figure 1-2.

1.1.2 History

According to background information reported in the September 2003 New York State Department of Health (NYSDOH) Health Consultation Report the SHS property was occupied by various industrial facilities:

- From 1887 to 1909, B.W. Payne & Sons produced high speed steam engines.
- From 1909 to 1935, Morrow Manufacturing manufactured drill chucks, machine parts and tools.
- From 1936 until 1972, Remington Rand manufactured typewriter parts.
- From 1974 to 1977, Westinghouse utilized the northern portion of the SHS property mainly for warehousing.
- In 1977, Remington Rand deeded the SHS property to the Southern Tier Economic Growth Agency.
- In 1979, Southside High School was built on the northern portion of the original 83-acre parcel of property.

In 1995, fuel oil contamination was discovered on Miller Pond east of the SHS property. Subsequent investigations by the New York State Department of Environmental Conservation (NYSDEC) revealed a petroleum contaminated plume approximately fifteen (15) feet below grade, extending from underneath the SHS property toward Miller Pond. On April 8, 2000, the Elmira City School Board received a letter from parents in the community regarding a perceived unusual number of occurrences of cancer in current and former students of the Southside High School. The School Board subsequently requested that the NYSDEC and NYSDOH attend a public meeting on May 2, 2000. During the public meeting historical environmental conditions in the area and proposed actions for investigation of the environment and perceived trends in cancer occurrences were presented by the NYSDEC and NYSDOH. As a result of the expressed public concern, the NYSDEC collected soil samples from the SHS property and the NYSDOH initiated a cancer study, collected indoor air samples from inside the high school, and assisted the NYSDEC in collecting soil samples. The data results and conclusions of these investigations are discussed in the September 2003 NYSDOH Health Consultation Report.

1.1.3 Geologic Conditions

Observations made during previous investigations of the soil conditions for the SHS property indicate the following overburden units are present.

A stratigraphic layer comprised of reworked native soils and fill material is located on the SHS property at a depth of approximately zero (0) to six (6) feet below ground surface (bgs) (thickness varies). The fill unit is composed primarily of medium to fine sand with silt and medium to fine gravel and includes some red brick, concrete fragments, and wood debris.

Two (2) naturally occurring continuous stratigraphic units underlie the fill unit. The upper unit is post-glacial outwash. This unit consists of gray-brown fine sand and subrounded to rounded coarse to fine gravel. The post-glacial outwash unit extends from approximately six (6) feet below grade to approximately thirty-eight (38) feet below grade.

The second unit is a glacio-lacustrine silt and clay. This unit is relatively impermeable and consists of soft, gray-brown silt and clay, and extends from approximately thirty-eight (38) feet to approximately seventy-eight (78) feet below grade in undisturbed areas. The top of weathered bedrock underlies the lacustrine unit and overlays competent shale which dips slightly to the north.

Previous investigations conducted for the SHS property indicate that general groundwater flow direction in the local area is to the east in the overburden water bearing zone.

1.2 PURPOSE OF EMP

1.2.1 Management of Environmental Issues at Southside High School

The SHS property was used by various industries since the late 1800s to the 1970s and contamination from industrial operations has impacted the soil, groundwater and sub-surface soil vapor for some areas of the SHS property. In addition, the source of a fuel oil spill reported in 1995 to the east of the SHS property at Miller Pond was identified as petroleum contamination that extends from under the High School building. The purpose of the EMP is to prevent construction personnel and the general community from exposure to impacted soil, groundwater and soil vapor.

This EMP provides specific procedures and safety precautions to guide the School District Health and Safety Office (SDHSO) and the designated Project Manager through various activities that may occur at the SHS property.

The EMP is comprised of several plans described in Section 1.3. For each proposed construction activity or for the operation, maintenance and monitoring of a particular system, the SDHSO will determine which portions of the EMP are applicable for each project.

1.2.2 2003 NYSDOH Health Consultation Report Conclusions & Recommendations

As a result of concerns submitted to the Elmira City School Board in April 2000, with regards to a perceived unusual number of cancer cases reported for current and former students of SHS, an environmental investigation was conducted by the NYSDEC in 2000 and a cancer survey was conducted in 2002 by the NYSDOH. A public health assessment that summarized environmental data, evaluated public health implications and provided recommendations for specific health related actions pertaining to the SHS property was completed by the NYSDOH, in conjunction with U.S. Agency for Toxic Substances and Disease Registry (ATSDR), and results were published in the NYSDOH Health Consultation Report (September 30, 2003). A copy of the 2003 NYSDOH Report is provided in Appendix 2A.

Conclusions from the NYSDOH Health Consultation Report found that environmental conditions, including indoor air quality and surface soils, pose no apparent public health hazard. Analytical data collected for shallow and deeper sub-surface soil samples report some parameters that exceed the public health comparison values, however the general community is not exposed to the impacted sub-surface soils. The potential for exposure to impacted sub-surface soils exists if ground-intrusive activities occur at the SHS property. Municipal water that meets all State and Federal drinking water standards is provided to the High School, and therefore direct contact by the general public with the contaminated groundwater is not expected.

Recommendations provided by the NYSDOH Health Consultation Report include developing and implementing a Soils Management Plan (SMP) to provide measures to minimize the potential for human exposure to subsurface soils and an indoor air quality action plan (IAQAP) to address the potential of impacted soil vapor migrating into the High School building.

1.2.3 Remedial Actions

In 1995, fuel oil contamination was discovered on Miller Pond, approximately 1,000 feet east of the SHS property (NYSDEC Spill #94-16668). Subsequent investigations of the soil and groundwater media in the surrounding area between 1995 through 1998 indicated that the most likely source of the fuel oil contamination was the former oil storage tanks located in the current location of the SHS gymnasium. Additional investigations of the SHS property conducted after 1998 support this location as the likely source of fuel oil contamination. The following remedial actions were performed to address the fuel oil contamination plume:

Between July 2000 and November 2001, an Oxygen-Injection System (OIS) operated on the SHS property. The OIS was installed by Marcor Remediation, Inc. (Marcor) in response to the reported concentrations of petroleum contaminants during previous investigations of the overburden groundwater aquifer and soil conditions in the area on and around the SHS property. The purpose of the OIS was to facilitate the growth of a contaminant degrading microbes within the subgrade soil and groundwater media. The system was comprised of a grid of forty-three (43) injection point immediately east of the SHS gymnasium. Marcor performed operation and maintenance (O&M) on the OIS during the period of operation. During the period in which the OIS was in place, Marcor extracted a total of 200 gallons of petroleum contaminated water and petroleum product from groundwater monitoring wells MW-10 and MW-32. In November 2001, the system was shutdown and removed from the SHS property at the request of the NYSDEC.

In September 2003, the NYSDEC began operating a twenty-four (24) point OIS in the southern portion of the football field on the SHS property. The system was comprised of four (4) horizontal runs, each containing six (6) injection zones spaced approximately forty-five (45) feet apart. The OIS was operated until August 2006.

In August 2006, Empire Geo Services, Inc. (Empire) began operating a seventeen (17) point OIS to remediate the area around monitoring wells MW-10, MW-32, and MW-33, northeast of the SHS building. The system is ongoing and no termination date has been established. Analytical data of groundwater samples collected in 2007 suggest that Diesel Range Organic (DRO) and Gasoline Range Organic (GRO) concentrations have stabilized and degradation of contaminant compounds has occurred.

1.3 COMPONENTS OF EMP

1.3.1 Soils Management Plan (SMP)

The Soils Management Plan (SMP) (see Section 2.0) addresses issues relating to the management of soil during future development or construction on the property. It provides a chronology and overview of soil investigations performed on and near the SHS property. The SMP also summarizes soil conditions on the SHS property, including the nature and extent of soil contamination, and identifies Contaminants of

Concern (COCs) based on analytical results from 2000 to 2007. Proposed and existing cover systems used to prevent human contact with residually contaminated soil and to reduce the potential for contaminated surface water runoff from the SHS property are described. The SMP establishes guidelines and procedures for management of soil/fill and cover systems, including site preparation, excavations, underground storage tank (UST)/buried drum handling, soil characterization procedures, and composite soils sampling. The requirements for the use of off-property fill soils and re-use of excavated soils on the SHS property are also described. Specifications for soil cover systems including soil, asphalt, and concrete are established. The SMP indentifies temporary and permanent erosion controls and dust control practices to be followed during development activities on the SHS property.

1.3.2 Groundwater Management Plan (GMP)

The Groundwater Management Plan (GMP) (see Section 3.0) provides a general overview of the groundwater conditions on and near the SHS property, including depth to groundwater, flow direction, surface water conditions, and COCs in the overburden aquifer. The GMP summarizes the groundwater investigations performed between 1997 and 2007, including details of monitoring well construction, analytical results of historical groundwater samples, and the nature and extent of groundwater contamination. Historic and current remedial activities are described. Protocols for groundwater monitoring well sampling, repair, replacement, and decommissioning are established. The GMP also provides guidelines for managing and handling groundwater encountered during excavations on the SHS property.

1.3.3 Indoor Air Quality Action Plan (IAQAP)

The Indoor Air Quality Action Plan (IAQAP) provides an overview of previous investigations and actions to address the potential for exposures related to soil vapor intrusion in existing and future buildings at the property. The IAQAP (see Section 4.0) also addresses issues and conditions contributing to indoor air quality inside the Main Building. A summary of chemicals that contain volatile organic compounds (VOCs) at various locations within the building, are described. The IAQAP assesses the potential of soil and groundwater as sources of VOCs in the sub-slab soil vapor below the Main Building and ranks soil, groundwater, and soil vapor in terms of the potential for exposure. The IAQAP describes potential preferential pathways of VOC migration through the soil and inside the building, and the procedures to monitor differential pressures between the indoor air and sub-slab vapor in the Main Building. The IAQAP establishes a program for sampling and evaluating indoor air and sub-slab vapor in the Main Building. Past, present, and future steps for the protection of indoor air quality are discussed including:

- Heating Ventilation/Air Conditioning (HVAC) System (Positive Pressure System) – *Present and Future*
- Sub-Slab Depressurization System – *Future*
- Vapor Barriers – *Present and Future*
- Air and Vapor Monitoring – *Past and Future*
- Chemical Storage – *Past, Present, and Future*

1.3.4 Operations, Monitoring and Maintenance (OM&M) Plan (Engineering Controls)

In response to low levels of contamination from industrial activities on the SHS property, certain engineering controls have been implemented including a soil cover system, a vapor barrier system, and sub-slab depressurization. These engineering controls are briefly described in the Operation, Monitoring, and Maintenance (OM&M) Plan (see Section 5.0) and procedures for inspecting, evaluating, and maintaining the systems are presented. Guidance is provided on the information that will be presented in annual soil cover system reports. The OM&M Plan describes sampling requirements and procedures for both short-term (up to 48 hours) and long-term (more than 48 hours) shutdowns of the sub-slab depressurization system. A summary of procedures for inspecting, evaluating, and maintaining the groundwater remediation system on the SHS property is also included in the OM&M Plan.

1.3.5 Documentation and Reporting Requirements (Institutional Controls)

System inspections are required to ensure mitigation of previous contamination. The Documentation and Reporting Plan (see Section 6.0) establishes notification requirements and inspection report deadlines for all inspections of the engineering control systems. It explains the function of annual certification process of engineering controls. The Documentation and Reporting Plan provides details on the date by which an annual report will be submitted to the Elmira City School District Board of Education and the contents of the annual report.

1.3.6 Health and Safety Plan (HASP)

The Health and Safety Plan (HASP) (see Section 7.0) identifies known and suspected hazardous conditions and substances on the SHS property. The HASP describes measures to be taken to ensure that the work conditions do not pose potential risks to the health and safety of construction workers conducting field activities and the general community. It designates responsibility among the individuals responsible for implementing the requirements and procedures set forth in the plan. Health and safety concerns and hazards are addressed with respect to potential exposure to COCs, noise hazards, slip, trip and fall hazards, equipment hazards, and natural and weather related hazards. The HASP addresses other health and safety concerns including public access to the work zone, air monitoring methods, and recommended and required uses of Personal Protective Equipment (PPE). Table 7-2 summarizes airborne exposure limits and odor thresholds for COCs at the SHS property. The HASP designates excavation and sampling work zones and provides guidance on observing symptoms and treating exposures to natural hazards such as heat/cold stress and insect/plant reactions. An Emergency Action Plan is included, as well as decontamination and disposal procedures in cases of contact with hazardous substances.

1.3.7 Community Air Monitoring Plan (CAMP)

The Community Air Monitoring Plan (CAMP) (see Section 8.0) describes conditions, locations, and activities on the SHS property for which periodic or continuous air monitoring of VOCs and particulates is required. The CAMP is intended to provide a measure of protection for the downwind community (i.e., building occupants and the general public) from potential airborne contaminant releases as a direct result of ground-intrusive work activities. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Response levels and actions are described for specified concentrations of VOCs and particulates detected in the ambient air of the downwind perimeter of the Exclusion Zone (as defined in Section 7.3.10). Requirements and recommendations are established for indoor work, including air monitoring for VOCs and particulates around a room perimeter and for adjacent rooms, engineering controls, and activity planning and timing. The CAMP provides specific guidance for air monitoring requirements in work areas within twenty (20) feet of potentially exposed populations or occupied structures.

2.0 SOILS MANAGEMENT PLAN (SMP)

2.1 INTRODUCTION AND PURPOSE

2.1.1 Overview and Objectives

The SMP is for the SHS property located at 777 South Main Street, Elmira, Chemung County, New York, which is owned by the School District. The SHS property is approximately 34 acres in area. Surface and subsurface soils were characterized during an extensive environmental investigation performed in 2000 by the NYSDEC. The environmental investigation was conducted in conjunction with the NYSDOH Health Consultation that evaluated exposure to contaminants at the SHS property. The Health Consultation Report prepared by the NYSDOH (dated September 30, 2003) provides a summary of the 2000 NYSDEC environmental investigation and the NYSDOH 2002 exposure evaluation. A copy of the Health Consultation Report is included on a compact disc (CD) in Appendix 2A.

The objective of the existing SMP is to provide guidelines to the School District for management of soils during future activities that will breach existing cover systems and for new cover systems that may be installed at the SHS property. The School District is responsible for implementing and certifying that the SMP has been followed for ground intrusive activities.

The SMP follows New York State environmental policy guidelines and the NYSDEC and NYSDOH are available to provide technical assistance to the NYSED. The School District will contact the NYSED for technical assistance with regards to the SMP when necessary, however the State agencies do not have direct regulatory authority over the School District.

The SMP is not intended to serve as a design document for construction activities related to redevelopment activities. It is the School District's responsibility to obtain design documents incorporating the requirements for cover and soil management as set forth in this SMP.

Previous environmental investigation reports are summarized in this SMP and the following reports are provided on a CD in Appendix 2A:

- Subsurface Environmental Assessment Report, 777 South Main Street to Parkside Drive, prepared by Matrix Environmental Technologies, November 9, 1998 for Spill 94-16668.
- Soil Sample Results for Southside High School and Adjacent Properties (November 13, 2000) (marked DRAFT).
- Site Remedial Data, August-October 18, 2001 (Letter Report) to NYSDEC Region 8 from Marcor Remediation, Inc.
- Site Remedial Data, November 16, 2001-June 2002 (Letter Report) to NYSDEC Region 8 from Marcor Remediation, Inc.
- Health Consultation Report/Southside High School prepared by NYSDOH (dated September 30, 2003).
- IIWA Report on Groundwater Chlorinated Solvent Investigation, Southside High School and Adjacent Properties, prepared by the NYSDEC Region 8 for the NYSDEC Central Office (March 2004).

- Soil Sample Results/Test Boring Logs for Proposed Addition Area (Letter Report) to Elmira City School District c/o Keystone Associates from CME Associates, Inc., August 28, 2007.

- Groundwater Sampling and Remediation System Performance Summary through March 2007 (Letter Report) to the NYSDEC Region 8 from Empire Geo Services, Inc., February 18, 2008.

- Soil Characterization Report by Sterling Environmental Engineering, P.C., July 14, 2008.

2.1.2 Site History

According to background information reported in the NYSDOH Health Consultation Report, dated September 2003, the SHS property was occupied by various industrial facilities:

- From 1887 to 1909, B.W. Payne & Sons produced high speed steam engines.

- From 1909 to 1935, Morrow Manufacturing manufactured drill chucks, machine parts and tools.

- From 1936 until 1972, Remington Rand manufactured typewriter parts.

- From 1974 to 1977, Westinghouse utilized the northern portion of the SHS property mainly for warehousing.

- In 1977, Remington Rand deeded the Site to the Southern Tier Economic Growth Agency.

- In 1979, the Southside High School was built on the northern portion of the property.

2.2 PREVIOUS INVESTIGATIONS

2.2.1 Chronology

The following is a chronological summary of the significant investigations performed at the Site.

- October 1996-July 1998: A Subsurface Environmental Assessment was prepared for NYSDEC Spill #94-16668 for the area from South Main Street to Parkside Drive. The assessment included test pits, soil borings and monitoring well installation and soil and groundwater sampling. The source of the petroleum spill plume was tentatively identified as seven (7) underground storage tanks (USTs) and an oil pump house formerly located at the present location of the Southside High School (High School) building. The plume boundaries were identified from the assessment and a separate phase petroleum layer and dissolved phase petroleum plume were also identified. Groundwater flow in the overburden aquifer was reported to be to the east from the SHS property towards Miller Pond with a gradient of 0.4%.

- May-October 2000: The NYSDEC conducted an investigation in conjunction with the NYSDOH Health Exposure Evaluation. Results are discussed in Section 2.2.2.

- August 2001-June 2002: Ongoing sampling of monitoring wells and maintenance of the Oxygen Injection System (OIS) with regards to Spill #94-16668 by Marcor Remediation, Inc.

- April-May 2003: A Groundwater Chlorinated Solvent Investigation was conducted to determine the source of chlorinated solvents detected in April 2002 in two (2) shallow monitoring wells located east of the High School building. The Investigation Report (dated March 2004) concluded no on-site chlorinated solvent source was identified on the Southside High School property and there was no significant threat to public health or the environment.

- July 2007: Three (3) soil borings and one (1) test pit were installed in the area of the proposed addition to the High School. Analytical results for soil samples are discussed in Section 2.2.2.

- August 2005-2007: Ongoing monitoring and remedial assessment for Spill #94-16668. Network of Injection wells installed in areas of MW-10, MW-32 and MW-33 (the system was fully operational since August 2006). On-going remedial actions are discussed in Section 2.2.2.1.

- June 2008: A Soil Characterization Investigation for the area of the proposed addition for the High School was conducted in June 2008 at a depth of 0-3 feet. Results indicate Polychlorinated Biphenyls (PCBs) levels for four (4) composite soil samples exceed the Soil Management Objectives (SMOs) (see Table 2-1), however are at levels that are classified non-hazardous for disposal at a permitted facility.

2.2.2 Nature and Extent of Contamination

2.2.2.1 Soils

The Health Consultation Report dated September 2003 for the Southside High School was developed by the NYSDOH in cooperation with the U.S. Agency for Toxic Substances and Disease Registry (ATSDR).

The Health Consultation Report indicates the NYSDEC collected a total of 156 soil samples from the SHS property from May to October 2000. In addition, three (3) soil borings were installed in July 2007 at the boundaries of the proposed addition for the High School and soil samples were collected from the borings designated Bl and B3. Analytical results for soil samples from B1 and B3 report PCBs at 4.5 parts per million (ppm) for B1 and 32 ppm for B3 at a depth of 0-6 feet below ground surface (bgs). At a depth of 6-12 feet bgs, PCBs are reported at "non-detect" (<0.2 mg/kg) for Bl and at 87 ppm for B3 (No soil samples were analyzed from B2).

Based on analytical results from the 2000 and 2007 sampling events, the following potential Contaminants of Concern (COCs) are identified for surface, shallow subsurface and deeper subsurface soils located on the SHS property:

Surface Soils (0 to 3 inches bgs)

- Copper, Chromium, Nickel and Selenium
- PCB Aroclor 1248
- PCB Aroclor 1260
- Polycyclic Aromatic Hydrocarbons (PAHs)

According to the Health Consultation Report, the average concentration of PCBs in surface soils at the SHS property is higher than the range of average concentrations for Total PCBs reported for a National soil monitoring program. Exposure to these soils could result in a somewhat higher level of exposure to PCBs relative to that expected from typical soils. The average concentrations of PCBs in the SHS surface soils are less than the public health assessment comparison values.

According to the Health Consultation Report, the average concentration of PAHs in SHS property surface soils are below the higher range of background concentrations for urban soils. Exposure to these soils could result in a level of exposure to PAHs that approach the upper limit of the range of urban soils.

Shallow Subsurface Soils (6 inches to 4 feet bgs)

- Antimony, Arsenic, Barium, Chromium, Cobalt, Copper, Lead, Mercury, Nickel, Selenium, Zinc
- PAHs
- PCB Aroclor 1248

Deep Subsurface Soils (> 4 feet bgs)

- Barium, Cobalt, Copper, Nickel, Selenium, Zinc
- PCBs Aroclor 1248 and 1260
- Benzo(a)pyrene

The existing SHS cover systems include vegetated soil, concrete, and asphalt. The potential for exposure to SHS property surface soils, subsurface soils and soil vapor may occur at times when an existing cover system is removed for construction purposes.

Potential migration routes for contaminants that may be present in groundwater and soil vapor in unconsolidated material overlying bedrock, include materials that have higher permeability values and connected pore spaces. These materials include utility bedding material such as gravel or stone that may be present around subsurface utility pipes.

Potential exposure pathways during ground-intrusive work include inhalation of airborne soil particles and soil vapor and ingestion of soil particles. Preventative measures to reduce the potential for exposure to workers and the SHS community are provided in the Health and Safety Plan (HASP) (see Section 7.0) and the Community Air Monitoring Plan (CAMP) (see Section 8.0) when major ground-intrusive activities occur on the SHS property. Major ground intrusive activities are defined as excavations that are greater than 20 cubic yards (cy) of soil. For minor/routine ground intrusive activities (< 20 cy), the CAMP and portions of the HASP will be implemented as determined by the School District Health and Safety Officer (SDHSO).

The COCs for soil consist primarily of metals, PAHs, PCBs Aroclor 1248 and PCB Aroclor 1260. Results of groundwater sampling indicate constituents in the soil/fill material have not significantly impacted groundwater quality; however this does imply the existing groundwater contamination is not insignificant.

Reported levels of contaminants in groundwater collected from 1997 to 2007 from monitoring wells located on the SHS property and adjacent properties indicate the COCs for groundwater are chlorinated organic compounds. Detected compounds include tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-Dichloroethene, vinyl chloride, 1,1,1 Trichloroethane, Acetone, Methylene Chloride, Freon 113 and Freon 123A. The State continues to monitor groundwater for chlorinated Volatile Organic Compounds (VOCs). The Health Consultation Report provided in Appendix 2A indicates extensive sampling has been completed to evaluate potential contaminant exposures and to investigate preferential pathways for exposure. Additional soil sampling may be required for SHS property areas that lack sufficient analytical soil data if ground intrusive activities are proposed in "data gap" areas.

In 1995, fuel oil contamination was reported on the surface of Miller Pond, which is approximately 915 feet east of the SHS property. The reported Spill #94-16668 is registered on the NYSDEC Spills Database as "not-closed" status. Results from the investigation coordinated by the NYSDEC in 1998 reported the petroleum plume extends from under the SHS building towards Miller Pond. COCs include Diesel Range Organics (DRO) characteristic of fuel oil contamination. An OIS was installed east of the High School gymnasium in 2000 to reduce the petroleum contamination plume. The OIS was subsequently moved to the football field and is currently located near the northeast corner of the High School gymnasium. The OIS will continue to operate until DRO concentrations are reduced to acceptable levels.

2.3 CONTEMPLATED USE

The SHS property is comprised of a public education building with associated recreational fields and parking areas. Use includes typical activities associated with a secondary school, such as sporting events involving the congregation of students and the general public.

2.4 SUMMARY OF ENVIRONMENTAL MANAGEMENT STRATEGIES

The environmental management strategies presented in Section 2.5 for SHS property soils with residual contamination follow the 6 NYCRR Part 375 Environmental Remedial Program regulations (Part 375) only as a basis for design. The environmental management strategies are consistent with Part 375, provided that the following conditions apply:

- Residual levels of contamination do not represent source areas of contamination.
- Cover systems are maintained to prevent exposures.

The SMOs for the SHS property are based, for design purposes only, on the Part 375-6.4 Restricted Residential Use Soil Cleanup Objectives (SCOs) for the protection of public health.

The human health and environmental risks are identified in the Health Consultation Report (see Appendix 2A) and are discussed in Section 2.2.2.1. Based on the contemplated public use, the purpose of the existing and proposed cover systems is to minimize potential exposure to SHS property surface soils, subsurface soils, and groundwater.

Soil excavated for previous SHS construction activities was disposed as non-hazardous soil to a permitted facility. This included the construction of the new food storage unit, the new freezer at the loading dock and the new fence installed between the track and the baseball field.

In addition, an OIS is part of the ongoing remediation action for the petroleum plume contamination discussed in Section 2.2.2.1.

2.4.1 Cover Systems

The purpose of the existing and proposed cover systems is to eliminate the potential for human contact with residually contaminated soil and to eliminate the potential for contaminated surface water runoff from the SHS property. When new cover systems are installed for future construction activities at SHS the following criteria should apply:

- Soil:
  Twenty-four (24) inches of vegetated soil cover underlain by a demarcation layer.

- Asphalt:
  A minimum of six (6) inches of material (asphalt and subbase material) in areas that will become roads, sidewalks, and parking lots. Actual cross-section thickness will be determined based on the intended use of the area.

- Concrete:
  A minimum of six (6) inches of material (concrete and subbase material) in areas that will become slab-on-grade structures or for roads, sidewalks, and parking lots in lieu of asphalt. Actual cross-section thickness will be determined based on the intended use of the area.

2.5 MANAGEMENT OF SOIL/FILL AND LONG TERM MAINTENANCE OF COVER SYSTEMS

Guidelines for management of subsurface soil/fill and the repair/replacement of the cover systems during future intrusive work breaching the cover systems are summarized as follows. Whenever possible, major ground intrusive activities at the Site should be conducted when the High School is not in session.

2.5.1 Site Preparation

Prior to any excavation, DigSafely.New York (1-800-962-7962) must be contacted for a utility location request for the proposed excavation area.

As part of redevelopment or future intrusive activities, the SHS property may require grading prior to cover system replacement. Trees, shrubs, roots, brush, masonry, rubbish, scrap, debris, pavement, curbs, fences, etc. will be removed and properly disposed to permitted facilities whenever contaminated soil can adhere to the material. Prior to cover system replacement, protruding material will be removed from the ground surface. Burning will not be allowed on the SHS property.

2.5.2 Excavation Below the Cover Systems

During SHS construction or maintenance activities, the excavation of soil/fill material may be necessary for the construction of footings, foundation structures, utility corridors and/or other activities. For excavation work below the cover system, a Professional Engineer or representative with construction/remediation experience, representing the SHS property owner or developer, will monitor soil/fill excavations or disturbances. The Professional Engineer must also provide a stamped/signed certification that excavation work below the cover system and subsequent repair/replacement of the cover system was conducted in a manner consistent with this SMP. The Professional Engineer certification must be included in the Annual Certification Report discussed in Section 2.8.

2.5.2.1 Buried Drums or Underground Storage Tanks

If buried drums or USTs or grossly contaminated media are encountered during soil excavation activities, the excavation activity at that location will cease and the NYSDEC Spills Emergency Response Program (NYS Spills Hotline (800) 457-7362) will be immediately notified. All drums and/or USTs encountered will be evaluated and a removal plan will be prepared for NYSDEC approval. Appropriately trained personnel will excavate all of the drums and/or USTs while following all applicable Federal, State, and local regulations. Removed drums and USTs will be properly characterized and disposed to a permitted facility. The soil/fill surrounding the buried drums or USTs will be considered potentially contaminated and will be stockpiled and characterized.

2.5.3 Characterization Procedures for Excavated Soil

Procedures for characterizing excavated soils from the SHS property are summarized on Figure 2-1 "Characterization Flowchart for Excavated Soils" and are discussed in Sections 2.5.3.1 through 2.5.3.4.

Historic contaminant levels for SHS property soils are summarized in Figures 2-2 through 2-4 and Plates 2A through 2C. Figures 2-2 through 2-4 are provided as reference maps to quickly determine if an area on the SHS property is a potential management area with regards to contamination or if data gaps exist for the area. Plates 2A through 2C, which are enlarged copies of Figures 2-2 through 2-4, are provided to review contaminant types and concentration levels. Contamination levels for VOCs, Semi-Volatile Organic Compounds (SVOCs), PCBs and Metals are provided for soils at varying depths. Historical environmental data provided in reports from previous investigations (see Appendix 2A) can also be reviewed to assist in the appropriate utilization and characterization of excavated soils. These reports, summary figures and plates for soil are intended to provide information that will assist to protect against both short and long term exposures during ground-intrusive activities.

Soil excavated from the SHS property must be characterized to determine whether it can be reused as a soil cover system (zero (0) to two (2) feet bgs), as fill material below a cover system, or disposed to a permitted facility. Excavated soil may be reused as a soil cover system, or as backfill in landscaping berms, provided that soil concentrations do not exceed the SMOs, as provided in Table 2-1.

All excavated soil, regardless of condition, must be placed on polyethylene sheeting (sheeting) and covered with sheeting to reduce precipitation infiltration and dust migration.

All soil samples that require analysis will be submitted to a NYSDOH Environmental Laboratory Approval Program (ELAP) certified laboratory and analytical results will be data validated by an independent third party to insure accuracy of sampling, testing and data reporting procedures.

2.5.3.1 Characterization of Excavated Soil Disposed at a Permitted Facility

Excavated soils that are not being considered for reuse on the SHS property will be stockpiled as described in Section 2.5.3 and composite soil sample(s) will be collected as described in Section 2.5.3.5. The composite sample(s) will be analyzed for the parameters specified in Table 2-2 "Permitted Disposal Facilities-Soil Sampling Requirements Summary", and any additional parameters required by the permitted transporter. The number of composite samples collected will depend on the volume of soil excavated and the permitted disposal facility requirements. NO SSHS SOILS (regardless of analytical data) WILL BE DISPOSED OF AT LOCATIONS OTHER THAN PERMITTED DISPOSAL FACILITIES.

2.5.3.2 Characteristics of Potentially Contaminated Soil

Soil observed to be stained, discolored, tinted, dyed, unnaturally mottled, or has a sheen or produces elevated photoionization detector (PID) readings (i.e., sustained 10 ppm or greater) will be considered potentially contaminated and stockpiled for further assessment.

Potentially contaminated soil defined as a source level of contamination includes soil that contains contaminant concentrations sufficient to be a potential exposure to public health or the environment, or can release contaminants to another environmental medium. Analytical methods to determine if contaminant levels are source levels include testing impacted soil for ignitability, corrosivity, reactivity and toxicity. Toxicity can be measured by conducting the Toxicity Characteristics Leaching Procedure (TCLP) for soil as outlined in 6 NYCRR 371.3(e).

2.5.3.3 Reuse of Excavated Soil Not Considered Potentially Contaminated

If excavated soil does not have characteristics of potentially contaminated soil, as described in Section 2.5.3.2, it may be reused on the SHS property as fill beneath an approved cover system and no analytical characterization is required.

If excavated soil does not have characteristics of potentially contaminated soil and is planned for reuse as an approved soil cover system, a composite soil sample must be collected for every 500 cy of excavated soil, following procedures in Section 2.5.3.5. The composite soil sample(s) will be analyzed for parameters provided in Table 2-1; however analysis for VOCs is not required, as a basis for achieving the SMOs. If analytical results indicate that the SMOs are not exceeded, the soil may be used as a soil cover system (0-2 feet thick) or as fill material beneath an approved cover system. If SMOs are exceeded and reported concentrations are not considered source levels of contamination, the soil may be reused as backfill beneath an approved cover system or for disposal at a permitted facility (see Section 2.5.3.1).

2.5.3.4 Reuse of Excavated Soil Considered Potentially Contaminated

If excavated soil has characteristics of potentially contaminated soil, as described in Section 2.5.3.2, and is being considered for reuse as a soil cover system or as fill beneath an approved cover system, a composite soil sample must be collected for every 100 cy of excavated soil following procedures in Section 2.5.3.5. For stockpiles considered potentially contaminated with VOCs as described above or referenced in Plate 2A and Figure 2-2 for Potential VOCs management areas, one (1) grab sample will also be collected from the stockpile sample location with the highest PID measurement and will be analyzed only for VOCs, as listed in Table 2-1. Composite soil sample(s) will be analyzed for parameters (excluding VOCs) provided in Table 2-1 as a basis for achieving the Site SMOs.

If analytical results indicate any of the SMOs are exceeded, the excavated soil may not be reused as a soil cover system. However, the soil may be considered for use as fill beneath an approved cover system if reported concentrations are not considered source levels of contamination, as defined in Section 2.5.3.2, or for disposal to a permitted facility.

2.5.3.5 Procedures for Collecting Soil Samples

Soil sampling procedures are provided in Appendix 2B.

A composite soil sample will be collected from each stockpile (either 100 or 500 cy stockpiles) from five (5) locations within each stockpile. A duplicate sample will also be collected for every twenty (20) composite soils collected. PID measurements will be recorded for each of the five (5) individual locations. For stockpiles considered potentially contaminated with VOCs, one (1) grab sample will also be collected from the stockpile sample location with the highest PID measurement. If none of the five (5) individual sample locations exhibit PID readings, one (1) location will be selected at random. Grab soil sample(s) will be analyzed only for the VOCs listed in Table 2-1 and composite soil samples will be analyzed for all parameters listed in Table 2-1, except for VOCs.

Soil samples will be composited by placing equal portions of fill/soil from each of the five (5) composite sample locations from one (1) soil stockpile (either 100 or 500 cy) into a clean, stainless steel or Pyrex glass mixing bowl. The soil/fill will be thoroughly homogenized using a stainless steel scoop or trowel and transferred to jars provided by the laboratory. Sample jars will then be labeled and a Chain-of-Custody form will be prepared.

2.5.4 Requirements for Use of Off-Property Soils as Grading or Fill Material on SHS Property

Subgrade material from off property locations used to backfill excavations to increase SHS property grades or to increase elevation shall meet the following criteria:

- Off-property borrow soils will be documented as having originated from locations having no evidence of disposal or release of hazardous, toxic or radioactive substances, wastes or petroleum products.

- Off-property soils intended for use as SHS property backfill cannot be defined as a solid waste in accordance with 6 NYCRR Part 360-1.2(a).

- If an off-property soil source is designated as "virgin" soil, it shall be further documented in writing to be native soil material from areas not having supported any known prior industrial or commercial development or agricultural use.

- Virgin soils should be subject to collection of one (1) representative composite sample and one (1) grab sample per source.

- Non-virgin soils will be tested by collecting one (1) composite sample and one (1) grab sample per 500 cy of material from each source area. If more than 1,000 cy of soil are borrowed from a given off-Property non-virgin soil source area, and both samples of the first 1,000 cy meet the SMOs, the sample collection frequency will be reduced to one (1) composite sample and one (1) grab sample for every 2,500 cy of additional soils from the same source, up to 5,000 cy. For borrow sources greater than 5,000 cubic yards, sampling frequency may be reduced to one (1) composite sample and one (1) grab sample per 5,000 cy, provided all earlier samples meet the SMOs.

- Composite soil samples should be analyzed for parameters listed in Table 2-1, except for VOCs, and grab soil samples should be analyzed only for the VOCs listed in Table 2-1. Soil will be acceptable for use as backfill provided that all parameters meet the SMOs provided in Table 2-1.

2.5.5 Cover System Specifications

Approved cover systems for the SHS property include a vegetated soil layer, asphalt and concrete. The cover systems are intended to provide protection from exposure of potentially impacted soil/fill materials. Each of the approved cover systems must meet the criteria specified below.

2.5.5.1 Soil

Cover system soil must meet the specifications outlined in Sections 2.5.3.3, 2.5.3.4 and 2.5.4. In addition, the following criteria must also be followed

- The soil cover system must be two (2) feet thick and vegetated.
- The topsoil used for the final cover shall conform to the specification of 713-01 of the New York State Department of Transportation's (NYSDOT's) most recent version of the standard specifications. The topsoil will be fertile, friable, natural loam surface soil, capable of sustaining plant growth, and free of clods or hard earth, plants or roots, sticks or other extraneous material harmful to plant growth.
- Grassed areas will be seeded with a sustainable perennial mixture with appropriate erosion control measures taken until the perennial grasses are established.
- To reduce the disturbance of the surface cover material, berms will be constructed with soil that meets the SMOs in areas where shallow-rooted trees and shrubs will be planted. The berms will be of sufficient thickness to allow the excavation to be deep enough to plant the tree or shrub root ball. The berm material will contain sufficient organic material to allow tree and/or shrub growth, and will be of sufficient strength to support trees and/or shrubs at their maximum height.

2.5.5.2 Asphalt

Where asphalt pavement is proposed for roads, sidewalks, and parking lots, the asphalt pavement will represent an approved cover system that will have a minimum cross-sectional thickness of six (6) inches of material (asphalt and clean subbase material). The actual cross-section of the asphalt cover (i.e., thickness of the asphalt and subbase material) will be determined based on the intended use in each paved area.

2.5.5.3 Concrete

Where concrete pavement is proposed for slab-on-grade structures, utilities, footings, foundations, or signs, or if concrete is used instead of asphalt for roads, sidewalks, and parking lots, it will represent an approved cover system that will have a minimum cross-sectional thickness of six (6) inches of material (concrete and clean subbase material). A vapor barrier consisting of polyethylene sheeting with a minimum thickness of eight (8)-mils and an active sub-slab depressurization system will be installed under all newly constructed structures.

2.5.6 Requirements for Minor Routine or Emergency Soil Excavation Projects

Minor routine excavation projects are defined as projects that will generate less than 20 cy of excavated soil. Emergency soil excavation projects are defined as projects that must occur immediately to address subsurface maintenance emergency (e.g. damaged utility pipes).

Contaminants reported for soils are summarized in Figures 2-2 through 2-4 and Plates 2A through 2C. The figures and plates should be reviewed to determine if the area to be excavated is located in a potentially contaminated area and to identify the potential type, concentration, and depth of contaminant.

DigSafely.New York (1-800-962-7962) must be contacted prior to ground intrusive activities if the project will potentially affect underground utility lines.

Excavated soil must be stockpiled on polyethylene sheeting. Soil must also be covered if it remains on the ground for more than one (1) workday.

Soil that does not appear contaminated may be returned to the excavation following project completion. The disturbed cover system must be replaced and restored to its original condition following procedures outlined in Section 2.5.7.2.

If odors, stained soils, liquid product or groundwater are encountered in an excavation, the activity should be stopped immediately and the School District should contact a certified environmental professional and follow soil characterization procedures for potentially contaminated soils as outlined in Section 2.5.3.2.

Minor routine and emergency excavation projects must be recorded and submitted as part of the Annual Certification Report and include the information outlined in Section 2.8.

2.5.7 Erosion Control and Permitting

When development at the SHS property requires disturbing more than one (1) acre of land, Federal and State laws require that the project obtain coverage under the NYSDEC State Pollutant Discharge Elimination System (SPDES) General Permit for Storm Water Discharges from Construction Activities, Permit #GP-0-08-001 (Construction Storm Water General Permit) effective December 9, 2002. Requirements for coverage under the Construction Storm Water General Permit include the submittal of a Notice of Intent (NOI) form and the development of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must fulfill all permit requirements and will provide the following information:

- Background discussion of the scope of the construction project.
- Statement of the storm water management objectives.
- Evaluation of post-construction runoff conditions.
- Description of proposed storm water control measures.
- Description of the type and frequency of maintenance activities required to support the control measure.

The SWPPP must address issues such as erosion prevention, sedimentation control, hydraulic loading, pollutant loading, ecological protection, SHS property characteristics that impact design, and SHS property management planning. All descriptions of proposed features and structures will include a description of structure placement, supporting engineering data and calculations, construction scheduling, and references to established detailed design criteria. The SWPPP will conform to all requirements as established by applicable regulatory agencies.

Proven soil conservation practices will be incorporated in the construction and development plans to mitigate soil erosion, off-Property sediment migration, and water pollution from erosion. The use of appropriate temporary erosion control measures such as silt fencing and/or hay bales will be required around all soil/fill stockpiles and unvegetated soil surfaces during construction activities. These methods are described in Section 2.5.7.1. Stockpiles shall be graded and compacted as necessary for positive surface water runoff and dust control. Stockpiles of soil/fill will be placed a minimum of 50 feet from the SHS property boundary.

2.5.7.1 Temporary Erosion Control Measures

Temporary erosion and sedimentation control measures and Best Management Practices (BMPs) will be employed during active construction stages. Prior to any construction activity, temporary erosion and sediment control measures shall be installed and maintained until such time that installed permanent erosion control measures are effective. Silt fencing and filter fabric inlet protection will be incorporated into construction activities.

As sediment collects along the silt fences, the silt fences will be cleaned to maintain the desired performance and to prevent structural failure of the fence. Accumulated sediment will be removed when bulges develop in the silt fence. Removed sediment will be stockpiled and characterized in accordance with Section 2.5.3. The perimeter silt fences will remain in place until construction activities in the area are completed and vegetative cover or other erosion control measures are adequately established. Silt fences will be provided and installed in accordance with the New York Guidelines for Urban Erosion and Sediment Control.

2.5.7.2 Permanent Erosion Control Measures

Permanent erosion control measures and BMPs will be incorporated during cover system construction and during construction for long-term erosion protection. Permanent measures, as discussed below, will be installed as early as possible during construction phases. Parking and building systems associated with redevelopment shall not include dry wells or other subsurface injections/disposal piping unless they are located in areas where a subsurface investigation has reported contamination levels do not exceed groundwater standards.

Soils management practices involve the installation of an approved cover system including asphalt, concrete, or vegetated soil over all or portions of the SHS property that are under construction. Permanent erosion control measures incorporate a combination of design features to limit overall erosion and sediment problems to practical design limits, and the placement of permanent facilities during restoration for long term erosion protection.

Design features incorporated into the construction plans to control erosion will include limiting steep slopes, routing runoff to surface water collection channels, limiting flow velocities in the collection channels to the extent practical, and lining collection channels, where appropriate. In areas where flow will be concentrated (i.e.; collection channels) the channel slopes and configuration will be designed to maintain channel stability.

Any final slopes greater than 33% will be reinforced, and will have a demarcation layer under the clean cover to indicate if erosion has extended to the subgrade. Following the placement of final cover soils over regraded areas, a revegetation program will be implemented to establish permanent vegetation. Vegetation serves to reduce erosion, enhance evapotranspiration, and improve runoff water quality. Areas with slopes greater than 33% will be seeded in stages as construction is completed with 100 lbs./acre of seed of a sustainable perennial mixture.

In addition to the above seed mixture, mulch, mulch blankets, or synthetic fabric will be placed to prevent erosion during turf establishment.

Mulch will be placed on all slopes less than 15% and a mulch blanket on all slopes greater than 15%. Synthetic erosion control fabric will be placed in drainage ditches and swales.

2.5.8 Dust Control

Particulate monitoring will be performed in accordance with the CAMP (see Section 8.0) when ground-intrusive activities are conducted, including excavation, grading, and soil handling activities.

Dust suppression techniques that may be used at the SHS property include applying water on roadways, wetting equipment and excavation faces, spraying water on buckets during excavating and dumping, hauling materials in properly covered or watertight containers, restricting vehicle speed to ten (10) miles per hour (mph), covering excavated areas and material after excavating activities cease, establishing vegetative cover immediately after placement of cover soil, and reducing the excavation size and/or number of excavations. The use of atomizing sprays is recommended so that excessively wet areas will not be created, however fugitive dust will be suppressed.

2.5.9 Construction Water Management

Air monitoring for VOCs will be conducted during pumping of groundwater from an excavation and will follow procedures outlines in Section 8.1. If pumping of water from an excavation is necessary (i.e., groundwater and/or storm water that has accumulated in an excavation), this will be performed in such a manner as to prevent the migration of particulates, soil/fill, or unsolidified concrete materials, and to prevent damage to the existing subgrade. Water pumped from excavations will be managed properly in accordance with all applicable regulations so as to prevent endangerment of public health, property, or any portion of the construction area (see Section 3.5).

Existing data for parameters reported at concentrations that exceed the applicable water quality standards and areas of potential groundwater management areas are summarized on Figures 3-1 through 3-3 and Plates 3A through 3C in the Groundwater Management Plan (see Section 3.0).

In areas where groundwater may be contaminated, the groundwater in excavations will be field screened for VOCs and observed for any visible sheens. Water in the excavations will not be discharged to the ground surface if staining or PID measurements above background are observed in the excavation, or a sheen is present on the water surface.

If any of these conditions exist, the water pumped from the excavations will be containerized in drums, totes or Frac tanks and will be analyzed in accordance with the Surface Water and Ground Water Quality Standards set forth in 6 NYCRR Part 703.5 and the local sewer authority discharge permit. If the water meets the surface water and groundwater quality standards, it may be discharged to the ground surface. If the water does not meet the surface water and groundwater quality standards, it may be discharged to the local sewer authority under a discharge permit. If the water quality is such that the local sewer authority discharge permit requirements will be exceeded, or the local sewer authority will not approve the discharge to a sewer, it will be transported to a permitted facility or treated on the SHS property via a treatment system that has been approved by the NYSDEC.

Runoff from surface discharges shall be controlled. No discharges shall enter a surface water body without proper permits.

2.5.10 Access Controls

Access to soil/fill on the property must be controlled until final cover is placed to prevent direct contact with subgrade materials. Stockpiled soil/fill must be covered to limit access to that material and the construction area must be restricted with temporary fencing posted with "no trespassing" signs.

2.6 HEALTH AND SAFETY

Invasive work performed at the SHS property will be performed in accordance with all applicable local, State, and Federal regulations to protect the health and safety of construction personnel and the general community.

Any workers (including School District staff and construction personnel) whom may be exposed to contaminated media (soil, groundwater or vapor) will be informed by the School District or the District's consultant of the nature or type of contaminants that may be encountered. Workers responsible for the handling of contaminated media will be directed by the District or the District's consultant, regarding the established safe handling practices and the appropriate personal protective equipment that may be required for an activity, as well as appropriate decontamination procedures.

If intrusive work is expected to breach the cover systems at the SHS property, all contractors hired by the School District performing redevelopment or major maintenance activities will be required to review the HASP provided in Section 7.0 and to prepare a project specific HASP. The project specific HASP must also include provisions for protection of the community, as described in Section 2.6.2.

2.6.1 Construction Personnel Protection

Construction personnel (contractor) engaged in subsurface construction or maintenance activities (e.g., foundation and utility workers) will be required to implement appropriate health and safety procedures. These procedures will involve, at a minimum, wearing adequate personal protective equipment, performing appropriate air monitoring, and implementing other engineering controls as necessary to mitigate potential ingestion, inhalation and contact with residual constituents in the soils. Recommended health and safety procedures include, however may not be limited to, the following:

1. While conducting invasive work at the SHS property, the contractor shall provide safe and healthful working conditions. The contractor shall comply with all New York State Department of Labor (NYSDOL) regulations and published recommendations and regulations promulgated under the Federal Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, as amended, and with laws, rules, and regulations of other authorities having jurisdiction. Compliance with governmental requirements is mandated by law and considered only a minimum level of safety performance. The contractor shall ensure that all work is performed in accordance with recognized safe work practices.

2. The contractor shall be responsible for the safety of the contractor's employees and the public. The contractor shall be solely responsible for the adequacy and safety of all construction methods, materials and equipment.

3. The contractor is responsible to ensure that all project personnel have been trained in accordance with 29 CFR 1910.120.

4. The contractor shall provide a project-specific HASP, written in accordance with 29 CFR 1910.120 and 1926.65, prepared, signed and sealed by a safety professional. A safety

professional and/or a trained safety representative(s) shall be present whenever work is in progress. An effective and documented safety training program shall be provided to all personnel working on the SHS property and a safety work method checklist system shall be implemented.

5. Recognition as a safety professional shall be based on a minimum certification by the Board of Certified Safety Professionals as a Certified Safety Professional or Certified Industrial Hygienist (CIH) with similar credentials and five (5) years of professional safety management experience in similar types of construction and conditions expected to be encountered on the SHS property.

6. All personnel employed by the contractor or subcontractors, or any visitors entering the project area, shall be required to wear appropriate personal protection equipment.

2.6.2 Community Air Monitoring Program (CAMP)

Air monitoring will be performed during all ground-intrusive work in accordance with the CAMP prepared for the SHS property, which is included in Section 8.0. All air monitoring readings will be recorded and will be available for review, if requested, by the NYSDEC, NYSDOH and the Chemung County Health Department.

2.7 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

2.7.1 Analytical Data

All characterization samples collected for the SHS property redevelopment activities will be analyzed using the most recent NYSDEC Analytical Services Protocol (ASP), consistent with Section 2.0 of DER-10, the NYSDEC's Technical Guidance Document for Site Investigation and Remediation.

The laboratory proposed to perform analyses for samples will be certified through the NYSDOH ELAP to perform Contract Laboratory Program (CLP) analysis and Solid Waste and Hazardous Waste Analytical testing for all media to be sampled during this investigation. The laboratory will maintain this certification for the duration of the project.

The laboratory detection limit for compounds listed in Table 2-1 shall be equal to or less than the noted action level.

Sampling and decontamination procedures are presented in Appendix 2B and in Section 7.6. Procedures for Chain-of-Custody, laboratory instrumentation calibration, laboratory analyses, reporting of data, internal quality control, and corrective actions shall follow the NYSDEC ASP and the laboratory's Quality Assurance Plan. Where appropriate, trip blanks, field blanks, field duplicates, matrix spike, and matrix spike duplicate shall be performed at a rate of 5% (1 per 20 samples) and will be used to assess the quality of the data. The laboratory's in-house QA/QC limits will be utilized whenever they are more stringent than those suggested by the USEPA analytical methods.

2.8 NOTIFICATION AND REPORTING

All construction that results in the disturbance or excavation of the SHS property, which compromises the integrity of the cover system or that could result in human exposure to contaminated soils, must implement the SMP and it is the School District's responsibility to ensure all construction work is in compliance with the SMP.

The following minimum notification and reporting requirements shall be followed by the School District prior to and following Site development, as appropriate:

- If buried drums or USTs are encountered during soil excavation activities, excavation at that location will cease and the NYSDEC Spills Emergency Response Program will be immediately notified (1-800-457-7362).

- The SHS SDHSO shall complete and submit a copy of the Annual Certification Report by January 15th of each year to the School District Board of Education and a courtesy copy to the NYSED, NYSDEC and NYSDOH. The Annual Certification Report shall certify that the School District implemented the SMP and that it is effective; that protective covers have been maintained; and conditions at the SHS property are fully protective of public health and the environment.

  A copy of the Annual Certification Report will be available for downloading from the School District's website for public review and notification will be placed in the High School newsletter.

- If the cover systems have been breached, the School District shall include the following in the Annual Certification Report:

  - Certification that all work was performed in conformance with the SMP.

  - Plans showing areas and depths of fill removal.

  - Copies of daily inspection reports for soil-related issues.

  - Description of erosion control measures.

  - A narrative describing the excavation activities performed, health and safety monitoring performed (includes community air monitoring), quantities and locations of soil/fill excavated, disposal locations for the soil/fill, soil sampling locations and results, a description of any issues encountered, location and acceptability of test results for backfill sources, and other pertinent information necessary to document that the activities were carried out properly.

- If the disturbed area exceeds one (1) acre, the following must also be included in the Annual Certification Report:

  - SPDES Permit and Storm Water Pollution Prevention Plan (SWPPP) (see Section 2.5.7).
  - Plans showing before and after survey elevations on a 100-foot grid system to document the thickness of the clean soil cover system.

Advisory Contacts:

State Education Department
89 Washington Avenue
Room 1060 EBA
Albany, New York 12234
(518) 474-3906
Attention: Mr. Carl Thurnau

NYSDEC Region 8
Hazardous Waste Remedial Program
6274 E. Avon-Lima Road
Avon, New York 14414-9519
(585) 226-5353
Attention: Hazardous Waste Remediation Engineer (Mr. Bart Putzig)

NYSDOH
Bureau of Environmental Exposure Investigation
547 River Street
Troy, New York 12180
(800) 458-1158 ext. 27860
Attention: Ms. Krista Anders

3.0 GROUNDWATER MANAGEMENT PLAN (GMP)

3.1 GENERAL DESCRIPTION OF GROUNDWATER CHARACTERISTICS

Groundwater elevations in the overburden aquifer range from approximately three (3) to fifteen (15) feet. Groundwater in the overburden aquifer flows to the east at an approximate gradient of 0.4% and discharges into Miller Pond, located approximately 1,000 feet east of the SHS property. During investigations of the shallow overburden aquifer in the area around and upgradient of Miller Pond in 1995, the NYSDEC identified a petroleum plume that originated from the SHS property. Subsequent investigations of the shallow overburden aquifer identified Gasoline Range Organics (GROs), Diesel Range Organics (DROs), and chlorinated solvents reported at concentrations above applicable standards, or guidance values. Chlorinated solvents have also been detected in samples collected from the deep overburden aquifer, reported at concentrations above applicable groundwater standards or guidance values.

3.2 SUMMARY OF GROUNDWATER INVESTIGATIONS AND REMEDIAL ACTIONS

Groundwater management areas based on analytical results for groundwater samples collected from monitoring wells located on the SHS property are summarized in Figures 3-1 through 3-3. Larger versions of these figures are provided as Plates 3A through 3C, which list the individual parameters and reported concentrations that exceed the applicable groundwater standard for each monitoring well location.

Groundwater investigations began in September 1997, in response to the discovery of fuel oil contamination on Miller Pond in 1995. During the initial groundwater investigation, Matrix Environmental Technologies (Matrix) collected samples from five (5) groundwater monitoring wells (MW-1 through MW-5) west of Miller Pond and downgradient of the SHS property. Concentrations above applicable standards, criteria, or guidance values for Total Petroleum Hydrocarbons (TPHs) were detected in samples collected from all five (5) locations. Concentrations above the groundwater standards for vinyl chloride and cis-1,2-Dichloroethene (cis-1,2-DCE) were reported for the MW-5 sample, which was the closest sampling location to the SHS building for this sampling event. Polychlorinated Biphenyls (PCBs) were not detected in any of the samples, suggesting that they are not a component of the existing petroleum plume.

Matrix collected twenty (20) additional groundwater samples from new and existing monitoring wells in December 1997. During this round of sampling, petroleum product was observed in fifteen (15) of the wells sampled. Diesel Range Organics (DROs) were detected in sixteen (16) of the samples collected. Five (5) wells were sampled for VOCs during this sampling event including MW-5, where VOCs were detected during the September 1997 sampling event, and four (4) other locations closest to the school building. Trichloroethene (TCE) was detected in the sample collected from MW-5 at a concentration above applicable groundwater standard. Trace concentrations of TCE and 1,1,2-Trichloroethane (1,1,2-TCA) were detected in samples collected from monitoring well locations closest to the SHS property. Free petroleum product was observed in MW-8. The petroleum product in MW-8 was identified as fuel oil and motor oil was also detected.

In 2000, two (2) groundwater samples on the SHS property and five (5) downgradient groundwater samples located off the SHS property were sampled and analyzed. Concentrations above the applicable groundwater standards for Chromium and Lead were detected in samples collected from the SHS property. Analysis of samples collected from downgradient locations identified high concentrations of TCE and vinyl chloride. Cis-1,2-DCE and Lead were also detected in samples collected from downgradient locations during this round of sampling.

Between July 2000 and November 2001, an OIS was operated on the SHS property, east of the gymnasium. The OIS was comprised of a forty-three (43) injection point grid immediately east of the gymnasium. The purpose of the OIS was to facilitate the growth of a contaminant degrading microbes in the subsurface soils and shallow overburden aquifer. During the period in which the OIS was in place, Marcor performed O&M inspections every two (2) weeks, including monitoring of dissolved oxygen (DO) in all injection points, and monitoring DO, free petroleum product thickness, and groundwater elevation in groundwater monitoring wells within and immediately surrounding the remediation area (MW-8 through MW-10, MW-12, and MW-30 through MW-34). Samples from these monitoring wells were analyzed for DROs on a monthly basis during the period in which the OIS was in place. One (1) preliminary round of samples was analyzed from these monitoring wells in March 2000. Post-remediation groundwater samples were collected and analyzed for DROs in January, April, and June 2002. On October 11, 2001, Marcor extracted 200 gallons of contaminated water and petroleum product from groundwater monitoring wells MW-10 and MW-32.

In April 2002, groundwater samples were collected by the NYSDEC from monitoring wells MW-1 through MW-3, MW-5, MW-8 through MW-10, MW-12, MW-13 and MW-30 through MW-34, to assess the ongoing remediation of the petroleum source area. Chlorinated solvents were detected in samples collected from shallow on-site monitoring wells MW-8 and MW-30, and shallow off-site monitoring well MW-5. The NYSDEC collected additional groundwater samples in June and July 2002. Analysis of these samples confirmed the presence of chlorinated solvents on the SHS property, including Tetrachloroethene (PCE), TCE, cis-1,2-DCE, and Freon 113. Chlorinated solvents, vinyl chloride and cis-1,2-DCE were detected in a sample collected from off-site monitoring well MW-5 during this round of sampling.

In May and September 2003, the NYSDEC collected additional groundwater samples from monitoring wells. Twelve (12) existing shallow overburden groundwater monitoring wells (MW-4 through MW-5, MW-7 through MW-9, MW-11, MW-12, MW-15, MW-17, MW-22, MW-30 and MW-31) and three (3) deep overburden groundwater monitoring wells (MW-11D, MW-15D, and MW-D) were sampled. Several chlorinated solvents were detected in samples collected from the shallow wells during this round of sampling. Freon 113 and cis-1,2-DCE were detected in samples collected from one (1) deep well (MW-D).

In September 2003, the NYSDEC collected samples from five (5) shallow overburden groundwater monitoring wells (MW-5, MW-8, MW-12, MW-30 and MW-31) and all three (3) deep groundwater monitoring wells. The shallow wells were selected based on the presence of detectable concentrations of chlorinated solvents during the previous round of sampling. Freon 113 was detected in samples collected from MW-5, MW-8, MW-12, MW-30, and MW-D. Cis-1,2-DCE was detected in samples collected from MW-8 and MW-30.

The NYSDEC began operating a twenty-four (24) point OIS in the southern portion of the football field in September 2003. The system was comprised of four (4) horizontal runs, each containing six (6) injection zones spaced approximately forty-five (45) feet apart. The OIS was operated until August 2006.

In August 2005, Empire Geo Services, Inc. (Empire) performed periodic monitoring of groundwater in preparation for the OIS operation on the SHS property. GROs, DROs, and petroleum related VOCs were analyzed in samples collected quarterly from the SHS property and downgradient monitoring wells. The OIS is comprised of seventeen (17) injection points in the area around MW-10, MW-32, and MW-33, near the northeast corner of the high school building. The system supplies oxygen (O_2) to the soil and groundwater media in order to facilitate the growth of a contaminant degrading microbes. Dissolved oxygen (DO) and temperature are measured and recorded periodically during the remediation system operations. The system is fully operational, starting in August 2006. Analytical data of samples collected in 2007 suggest that DRO and GRO concentrations have stabilized in the groundwater and degradation of contaminant compounds has occurred. Analysis of quarterly samples for GROs and VOCs was terminated in 2007 as directed by the NYSDEC. Quarterly sampling of groundwater for DROs is ongoing. Operation of the OIS remains ongoing and no date of termination for the system has been established by the NYSDEC.

3.3 SUMMARY OF POTENTIAL EXPOSURE ROUTES TO GROUNDWATER CONTAMINANTS

Exposure to contaminated groundwater can occur through sampling of monitoring wells or encountering groundwater in excavations. In order to reduce exposure to contaminated groundwater, workers who are responsible for sampling monitoring wells should wear appropriate protective gear including a disposable outer garment, protective gloves and eye safety glasses. Procedures for managing groundwater encountered in excavations are provided in Section 3.5.

3.4 GROUNDWATER MONITORING WELLS

All sampling, repair, replacement and decommissioning of existing monitoring wells located on the SHS Property are managed by the NYSDEC Region 8 Division of Environmental Remediation, Bureau of Spill Prevention & Response. Implementation of these procedures is not the responsibility of the School District, and Sections 3.4.2 and 3.4.3 are provided for informational purposes only.

3.4.1 Locations and Descriptions

Groundwater monitoring well locations for all wells located on the SHS property are presented in Figure 3-4. Between December 1996 and July 1998, Matrix Environmental Technologies (Matrix) observed the installation of twenty-nine (29) monitoring well locations in the shallow overburden aquifer. Two (2) monitoring wells (MW-15 and MW-16) are located northwest of the SHS building, upgradient from the source of the petroleum plume. Twenty-seven (27) monitoring wells were installed in the area around the school and downgradient, in order to determine the approximate horizontal boundaries of the existing petroleum plume. All of the monitoring wells were installed in the shallow overburden aquifer, and their total depths ranged from twelve (12) to twenty-six (26) feet below grade. The well construction details of each of these monitoring wells are presented as an appendix from Matrix's November 9, 1998 Subsurface Environmental Assessment Report (see Appendix 2A).

In addition, three (3) existing monitoring wells (EMW1-3) were previously installed by the City of Elmira north-northeast of the SHS property for an unrelated project. Well construction details are not available for these monitoring wells.

In April/May 2003, the NYSDEC and Earth Tech Environmental and Infrastructure, Inc. (Earth Tech) observed the installation of three (3) additional groundwater monitoring wells at depths of 44.0 feet (MWD), 76.5 feet (MW-15D), and 78.5 feet (MW-11D) below grade. In order to determine the vertical extent of the existing petroleum plume and assess the groundwater quality of the deep overburden aquifer.

3.4.2 Monitoring Well Sampling Protocol

According to the NYSDEC, groundwater samples collected on the SHS property should comply with the procedures and protocols outlined in Section 6.4 and Appendix N of the NYSDEC Spill Guidance Manual (SGM) that is provided on the NYSDEC website. According to the SGM, newly installed wells must be developed prior to sample collection. Water level and product level should be measured to the nearest hundredth of a foot prior to sampling. The SGM states that three (3) to five (5) full volumes of standing well water should be purged, or ten (10) percent or less variability in three (3) consecutive measurements of pH, temperature, and specific conductance should be achieved, prior to sampling. If a well is incapable of producing a sustained yield and does not yield sufficiently during purging, it should be allowed to recover sixty (60) to eighty (80) percent of the original volume prior to sample collection. According to the SGM, sampling devices should be constructed of stainless steel, non-flexible PVC, Teflon, or another inert material. Sampling equipment should not come into contact with soil or drilling fluids and the sampling technique implemented should suite the contaminants of interest.

3.4.3 Monitoring Well Repair, Replacement and Decommissioning

Guidance for decommissioning of monitoring wells is provided in the NYSDEC Division of Environmental Remediation, June 2008 Groundwater Monitoring Well Decommissioning Procedures Manual. According to the manual, in general, if a riser for an overburden groundwater monitoring well can be pulled out while grouting, that is the preferred method for well decommissioning and abandonment. In cases where the riser cannot be pulled, it is recommended that the riser be grouted in place. When a monitoring well is grouted in place, any above-grade appurtenances should be removed. The filter pack around the riser should be excavated so that native soil is exposed on all sides. The riser should be cut down to allow for a minimum one (1) foot deep grout or cement seal and the well should be filled with grout/cement mix. A procedure selection flow diagram for decommissioning groundwater monitoring wells is provided in Figure 3-5.

3.5 MANAGEMENT PROCEDURES FOR GROUNDWATER ENCOUNTERED IN EXCAVATIONS

If an excavation intersects the groundwater table, and ponded groundwater on the excavation floor interferes with further excavation, the following procedures must be implemented:

- Create a temporary sump in the lowest section of the excavation by removing additional material in this area where groundwater can collect.

- If the temporary sump cannot contain the collected groundwater volume during excavating, groundwater must be pumped and containerized in 55-gallon drums. Drums must be dated, labeled and stored in a secure area.

- A composite sample must be collected from all drums and analyzed for parameters specified by a permitted facility that accepts impacted groundwater. Arrangements must be made with the disposal facility for transport and disposal following receipt of the analytical results for the composite sample.

- All workers involved with managing groundwater in excavations and sampling containerized water must wear disposable outer garments, protective gloves and eyewear.

4.0 INDOOR AIR QUALITY ACTION PLAN (IAQAP)

4.1 SUMMARY OF PREVIOUS INVESTIGATION RESULTS

4.1.1 Soil Investigations

The soil investigations are summarized in the Soil Management Plan, Section 2.0.

4.1.2 Groundwater Investigations

The groundwater investigations are summarized in the Groundwater Management Plan, Section 3.0.

4.1.3 Indoor Air and Soil Vapor Investigations

Indoor air has been sampled on multiple occasions from 1997 to 2000.

Indoor air samples were obtained by SHS personnel on November 4, 1997 at various locations throughout the Main Building (see Appendix 4A and Tables 4-5 through Table 4-13). The VOCs tested include:

- 1,1,1-Trichloroethane (TCA)
- 1,1-Dichloroethene (1,1-DCE)
- cis-1,2-Dichloroethene (cis-1,2-DCE)
- m&p-Xylene
- o-Xylene
- Tetrachloroethene (PCE); and
- Trichloroethene (TCE)

Four (4) indoor air samples were obtained (see Appendix 4A). All four (4) indoor air samples contained detectable concentrations of m&p-Xylene. The detected concentrations of m&p-Xylene ranged from 1.22 to 21.78 ug/m^3. All of the samples contained detectable concentrations of o-Xylene and the concentrations ranged from 0.45 to 7.51 ug/m^3. Three (3) indoor air samples contained detectable concentrations of PCE and the concentrations ranged from 0.11 to 3.57 ug/m^3. Two (2) samples contained detectable concentrations of TCA ranging from 0.01 to 0.04 ug/m^3. Three (3) samples contained detectable concentrations of TCE ranging from 0.05 to 0.15 ug/m^3. None of the samples collected contained detectable concentrations of 1,1-DCE or cis-1,2-DCE.

The NYSDOH obtained indoor air and sub-slab vapor samples on May 23, 2000 (see Appendix 4B, and Tables 4-5 through Table 4-13). The VOCs tested include:

- 1,1,2-Trichlorotrifluoroethane (Freon 113)
- 1,1-DCE
- Acetone
- cis-1,2-DCE
- m&p-Xylene
- o-Xylene
- PCE
- TCA; and
- TCE

All three (3) sub-slab vapor samples contained detectable concentrations of Freon 113, Acetone, m&p-Xylene, o-Xylene, PCE, TCA, and TCE. The detected concentrations of these parameters ranged from 16 to >1,000 ug/m^3 for Freon 113, 3.8 to 16 ug/m^3 for Acetone, <1 to 1.1 ug/m^3 for m&p-Xylene, 3.2 to 70 ug/m^3 for PCE, 2.7 to 55 ug/m^3 for TCA, and 14 to 325 ug/m^3 for TCE. The detected concentrations of o-Xylene were <1 ug/m^3 for all three (3) sub-slab vapor samples. One (1) sub-slab vapor sample contained a detectable concentration of 1,1-DCE and one (1) sample contained a detectable concentration of cis-1,2-DCE, 1,1-DCE was detected at a concentration of 2.6 ug/m^3 and cis-1,2-DCE was detected at a concentration of 1.1 ug/m^3.

Seven (7) indoor air samples were collected in May 2000 by the NYSDOH. All seven (7) indoor air samples contained detectable concentrations of Acetone, m&p-Xylene, and o-Xylene. The detected concentrations of these parameters ranged from <1 to 16 ug/m^3 for Acetone, <1 to 1.0 ug/m^3 for m&p-Xylene, and <1 to 1.1 ug/m^3 for o-Xylene. Six (6) of the indoor air samples contained detectable concentrations of TCA and the concentrations ranged from <1 to 2.1 ug/m^3. Five (5) of the samples contained detectable concentrations of PCE and Freon 113. PCE was detected at concentrations of <1.5 ug/m^3. The range of detected concentrations of Freon 113 was <1 to 1.1 ug/m^3. One (1) sample contained detectable concentrations of 1,1-DCE, cis-1,2-DCE, and TCE at <1 ug/m^3 for all three parameters.

Two (2) additional indoor air samples and one (1) additional sub-slab gas sample were obtained by the NYSDOH on August 31, 2000 (see Appendix 4B and Tables 4-5 through Table 4-13). The sub-slab sample contained the following concentrations: 65 ug/m^3 for Freon 113, 3.7 ug/m^3 for Acetone, <1 ug/m^3 for m&p-Xylene, <1 ug/m^3 for o-Xylene, 25 ug/m^3 for PCE, 14 ug/m^3 for TCA, and 170 ug/m^3 for TCE.

The two (2) indoor air samples contained the following concentrations: 1.4 and 1.6 ug/m^3 for Freon 113, 32 and 46 ug/m^3 for Acetone, 1.5 and 1.8 ug/m^3 for m&p-Xylene, 1.2 and 2.2 ug/m^3 for o-Xylene, <1.5 ug/m^3 for PCE, and <1.0 and 1.8 ug/m^3 for TCA. Neither of the indoor air samples contained detectable concentrations of TCE.

After consideration of these results in the Health Consultation Report dated September 30, 2003, the NYSDOH recommended that the Elmira City School District consider instituting an IAQAP consistent with the most recent USEPA guidance.

Based on a review of the air results, as well as the soil and groundwater data at the property, the NYSDEC and NYSDOH have recommended that additional air samples be collected from within and beneath the Main Building (with emphasis placed on areas where preferential pathways may exist) and that the heating, ventilation/air conditioning (HVAC) system in the Main Building continues to operate in a positive-pressure mode.

4.2 SUMMARY OF RESPONSE ACTIONS

As a result of the contamination found in the sub-slab gas and indoor air samples, as well as the contamination found in soil and groundwater, the Elmira CSD has taken and will take several actions including:

1. Preparation of this Indoor Air Quality Action Plan (IAQAP).

2. An inventory and use evaluation has been performed of products used within the school that may contain VOCs.

3. The sources and pathways of VOCs with the potential to enter the entire high school building were reviewed and assessed.

4. Inventory, monitoring and mitigation programs were established to assess and ensure a reduced exposure of the occupants for the entire high school building to VOCs. One of the main methods for mitigating the sub-slab gas exposure pathway in the Main Building is the application of positive air pressure in the building, created by the HVAC system during the period of each day that the Main Building is occupied. The other method for mitigating the exposure pathway in the Main Building is monitoring and maintenance of the concrete floor slab to ensure no new cracks, crevices or penetrations are allowed.

5. For any new construction, including the planned construction of the Science Addition, several means of mitigating potential VOC infiltration will be instituted including:

    - A vapor barrier.
    - A sub-slab depressurization system.
    - During operating hours, a pressurized HVAC system.

The features of these actions are addressed in the following sections.

4.3 SUMMARY OF POTENTIAL SOURCES AND FACTORS THAT MAY IMPACT INDOOR AIR QUALITY

The two (2) primary potential sources impacting indoor air quality are:

a. chemicals or products containing VOCs that are used inside the building, and
b. contaminated sub-slab vapors.

A principal secondary source of VOCs is construction or exterior activities that can alter the two (2) primary sources or create new exposures to contamination.

4.3.1 Building Chemicals- Inventory and Use Evaluation

The School District Health and Safety Hygienist maintains an on-going inventory of all products containing chemicals and a library of Material Safety Data Sheets (MSDSs) for these chemicals. The Health and Safety Hygienist and Sterling Environmental Engineering, P.C. (STERLING) reviewed the products that could potentially be sources of VOCs and assembled an inventory of these chemicals that contain VOCs.

On January 21, 2009, STERLING staff and the Health and Safety Hygienist completed the inventory by assessing storage conditions, container integrity and condition, and by testing the air adjacent to the lids and covers of the containers for VOCs with a PID. One (1) box of twelve (12) eight (8) oz. containers of Ross rubber cement in the Art Room had a measurable PID reading of 8.5 ppm. One (1) box of six (6) eleven (11) oz. containers of Krylon UV-resistant acrylic coating in the Art Room had a measureable PID reading of 25.1 ppm. These containers appeared to have small residuals on the threads even though each container was tightly closed. Given the adhesive quality of the contents, having the user wipe the threads with a towel will result in approximately the same volatilization of the material into the indoor air. The materials do not appear to have a substitute with acceptable performance characteristics. Therefore, no changes are recommended to the use of these minor number of containers.

The chemicals are used in the following locations within the Main Building:

a. Art room
b. Chemistry Classroom 230
c. Storeroom 229
d. Custodial Storeroom M-10
e. Wood Shop Finish Room
f. Boiler Room (M-13)
g. Custodial Cleaning Chemicals

A copy of the complete inventory is provided in Table 4-1.

4.3.2 Contaminated Sub-Slab Vapor

Contaminated soil vapor can reach the building sub-slab directly from soil and groundwater contaminant sources, abandoned or existing underground storage tanks (USTs) or utility structures, as well as indirectly through preferential migration pathways such as underground utility conduits and bedding.

4.3.2.1 Contaminated Soil Source

The previous soil and related groundwater investigations that have produced data on soil contamination are summarized in Section 2.2.

As noted in Section 2.2, certain metals, PCB arochlors, Polycyclic Aromatic Hydrocarbons (PAHs) and Benzo(a)pyrene have been found in the soil. VOCs were not detected above the detection limits. Therefore sampling has not determined soil to be a significant source of soil vapor containing VOCs.

4.3.2.2 Groundwater Investigations

Groundwater adjacent to the SHS property contains VOCs. Specifically TCE, TCA, Vinyl Chloride and cis-1,2-Dichloroethene (cis-1,2-DCE) have been detected at a number of wells. In biologically active soils, PCE is reductively dechlorinated to TCE, then to Dichloroethene and finally to Vinyl Chloride ("Remediation Engineering of Contaminated Soils" by Donald Lee Wise. 2000. CRC Press). Given that the same chlorinated compounds and their daughter products are found in both groundwater and in soil gas, apparently the chlorinated VOCs are volatilizing from the groundwater into the soil gas.

4.3.2.3 Potential Preferential Pathways of Contaminant Migration

A preferential pathway of soil vapor contaminant migration is a natural or artificial route through which vapors can migrate more easily than through surrounding materials. Naturally existing routes include fractured rock or soil. Artificial routes include open slab penetrations, open slab cracks, former tank locations, buried utilities and crushed stone beneath footers, slabs or other concrete structures.

At the SHS property, a six (6) inch diameter water line passes beneath the Science Addition in an alignment approximately forty-six (46) feet from and parallel with the adjacent wall of the Main Building. A thirty-six (36) inch diameter reinforced concrete sewer pipe line passes beneath the Science Addition approximately thirty-two (32) feet east from the six (6) inch diameter waterline. Water, gas, electric and other sanitary sewage utility pipelines that pass into the Main Building and stormwater pipelines that approach the Main Building as shown on Plate 4A.

All these utility pipelines are suspected to be bedded in gravel. Gravel bedding could conduct contaminated soil vapor or groundwater providing pathways that could promote the migration of contaminants below the floor slabs of the Main Building or the Science Addition.

In addition to these utility pipelines that are presently in use, the SHS property has former utility pipeline trenches from its former use as an industrial site. When the High School was constructed, these pipelines were required to be removed, however the gravel trench bedding could still remain. The major legacy utility trench appears to be the former steam lines. One (1) of these appears to be located between the cafeteria area and the area of classrooms to the south of the library. Furthermore, the former industrial use of the property involved similar utility pipelines and potential sources of contamination such as tanks or wastewater treatment facilities. The potential sources and preferential pathways located using the Sanborn Fire Insurance Maps (see Appendix 4E) are presented on Plate 4A.

4.3.3 Construction or Exterior Activities

Construction or exterior activities have the potential to cause vapor migration or to affect the migration of VOC contamination beneath the floor slabs, or have the potential to create holes, cracks or gaps in the floor slabs and/or vapor barrier that raise the risk of migration of sub-slab VOC contamination into the interior occupied space.

The construction of a new pipeline with associated bedding material could allow contaminated groundwater or vapors to migrate at a much faster rate than would otherwise occur in the soil before the pipe bedding material is placed.

Similarly, drilling or creating a new hole through a slab and, if present, the vapor barrier, could greatly increase the ability of sub-slab vapors to enter a building, especially if the hole is large and left uncovered (i.e., a sump pit without a sump cover or an unprotected floor drain). Proper precautions while drilling new holes, such as prompt sealing of sub-slab vapor sample collection ports, minimize the likelihood for soil vapor migration. Installing drangers (a ball valve on the lower tip of a "J' shaped drain tube) are recommended for floor drains to prevent vapors from entering through drainage pipes.

The School District will carefully consider all construction projects and will conduct regular monitoring to ensure construction or exterior activities have not increased the likelihood of exposure to the building occupants.

4.3.4 Heating, Ventilation and Air Conditioning (HVAC) Zones

The Main Building has fifteen (15) HVAC zones presently. This system will be reconstructed and will divide the Main Building into seven (7) HVAC zones on the ground floor by mid-2010. The present HVAC zones are as follows:

1. Locker Rooms and the North End
2. Ancillary Gym
3. Gym
4. Pool
5. Nurses Suite
6. Fitness Room and Shop
7. Cafeteria
8. Kitchen
9. Music Suite
10. Auditorium and Front Lobby
11. Portion A of Classrooms in Southwest Wing
12. Portion B of Classrooms in Southwest Wing
13. Portion C of Classrooms in Southwest Wing
14. Library
15. Main Office

Ducts from these zones heat adjacent hallways. The hallways are distributed throughout the entire Main Building and permit air movement among adjacent HVAC zones.

4.4 INVENTORY, MONITORING AND MITIGATION PROGRAMS

Staff at the SHS property will continue to inventory products containing VOCs in use at the School and will also ensure products with no or low VOCs are purchased, stored and used at the property in the future.

Outdoor air, indoor air and sub-slab samples will be obtained at the Main Building to assess the VOC concentrations at these locations, and to determine the proper response to any VOC concentrations. Similarly, the difference between indoor air pressures and pressures outdoors and below the slabs will be measured in both the Main Building and the Science Addition.

Mitigation at the Science Addition consists of the following:

- a vapor barrier
- a sub-slab depressurization system
- building pressurization by the HVAC system during the daily hours that the building is occupied.

The details of the monitoring and mitigation programs at the SHS property are presented in the subsequent sections.

4.4.1 Indoor Air and Sub-Slab Chemical Monitoring Programs

In this program indoor air or sub-slab vapor, is drawn into a Summa canister. The sample canisters are submitted to a laboratory where the collected gas is analyzed for VOCs.

The details of the monitoring program through this means follow in the succeeding sections.

4.4.1.1 Historical and Preplanned Chemical Monitoring Locations

Within the Main Building, sample ports were placed in the concrete floor slab to facilitate the obtaining of sub-slab vapor samples. The locations (see Figure 4-1B, which also shows the results by VOC compound and sample dates) are as follows:

- Room 151A;
- Pool Filter Room;
- Boiler Room (M-13); and
- Gym Storage.

In the 1997 sampling event and the three (3) events in 2000, certain rooms were selected in the Main Building for indoor air sampling. These rooms (see Figure 4-1A, which also shows the results by VOC compound and sample dates) are:

- Room 127;
- Room 148;
- Library;
- Cafeteria;
- Room 151A;
- Room 138;
- Gym Storage; and
- Gym.

In Figure 4-1C, the sampling results for all these locations are shown together with the color coding illustrating whether the sample was sub-slab vapor or indoor air.

4.4.1.2 Slab Penetrations Survey Methods

A pre-sampling inspection will be performed prior to each sampling event to identify and minimize conditions that may interfere with the proposed testing. The inspection will take into account the type of structure, floor layout, air flows and physical conditions of the area of the building(s) being studied. This information, along with information on the sources of potential exposures to indoor air, will be identified on a Building Inventory Form.

The Building Inventory Form is located in Appendix B of the "NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York" dated October 2006.

Items to be included in the building inventory include the following:

- construction characteristics, including foundation joints, cracks and utility penetrations or other openings that may serve as preferential pathways for vapor intrusion;
- presence of an attached garage;
- recent renovations or maintenance to the building (e.g., fresh paint, new carpet or furniture);
- mechanical equipment that can affect pressure gradients (e.g., heating systems, clothes dryers or exhaust fans);
- use or storage of petroleum products (e.g., fuel containers); and
- recent use of petroleum-based finishes or products containing volatile chemicals.

Each room on the floor being tested and on lower floors, if possible, will be inspected. This is important because even products stored in another area of a building can affect the air of the room being tested.

The presence and description of odors (e.g., solvent, moldy) and portable vapor monitoring equipment readings (e.g., PID) will be noted and used to aid in evaluating potential sources. This includes obtaining readings near products stored or used in the building. Where applicable, readings will be provided in units that denote the calibration gas as well as the reading (e.g., Isobutylene-equivalent ppm, Benzene-equivalent ppm, etc.).

Potential interference from products or activities releasing volatile chemicals will be controlled to the extent practicable. Removing the source from the indoor environment prior to testing is the most effective means of reducing interference. Ensuring that containers are tightly sealed may be sufficient. When testing for VOCs, containers will be tested with portable vapor monitoring equipment to determine whether compounds are leaking. The inability to eliminate potential interference may be justification for not testing, especially when testing for compounds at low levels that are similar in the sub-slab environment and the potential interfering source. The possibility that chemicals may adsorb onto porous materials and may take time to dissipate will be considered when sources are removed prior to testing.

In some cases, the goal of the testing is to evaluate the impact from products used or stored in the building (e.g., pesticide applications in contravention of the pesticide label, school renovation projects). If the goal of the testing is to determine whether products are an indoor volatile chemical contaminant source, removing these sources will not apply.

Once interfering conditions are corrected (if applicable), ventilation may be appropriate prior to sampling to minimize residual contamination in the indoor air. If ventilation is appropriate after indoor source removal, it will be completed twenty-four (24) hours or more prior to the scheduled sampling time. Where applicable, ventilation can be accomplished by operating the building's HVAC system to maximize outside air intake. Opening windows and doors, and operating exhaust fans may also help.

If air samples are designed to represent typical exposure in a mechanically ventilated building, the operation of HVAC systems during sampling will be noted on the building inventory form. When samples are collected, the building's HVAC system will be operating in a manner consistent with normal operating conditions when the building is occupied (e.g., schools, businesses, etc.). Unnecessary building ventilation will be avoided within twenty-four (24) hours prior to and during sampling. Heating systems will be operating to maintain normal indoor air temperatures (i.e., 65 – 75 °F) for at least twenty-four (24) hours prior to and during the scheduled sampling time.

Depending upon the goal of the indoor air sampling, some situations may warrant deviation from the above protocol regarding building ventilation. In such cases, building conditions and sampling efforts will be understood and noted within the framework and scope of the investigation.

To avoid potential interferences and dilution effects, occupants will be instructed to make a reasonable effort to avoid the following for twenty-four (24) hours prior to sampling:

- opening any windows, openings or vents;
- operating ventilation fans unless special arrangements are made;
- smoking in the building (which is banned at all times);
- painting;
- using any auxiliary heating equipment (e.g., kerosene heater);
- operating or storing any automobile in the building;

- allowing containers of gasoline or oil to remain within the building, except for any existing fuel oil tanks;
- cleaning, waxing or polishing furniture, floors or other woodwork with petroleum- or oil-based products;
- using air fresheners, scented candles or odor eliminators;
- engaging in any hobbies that use materials containing volatile chemicals;
- using cosmetics including hairspray, nail polish, nail polish removers, perfume/cologne, etc.;
- lawn mowing, paving with asphalt, or snow blowing;
- applying pesticides;
- using building repair or maintenance products, such as caulk or roofing tar; and
- bringing freshly dry-cleaned clothing or furnishings into the building.

4.4.1.3 Methods for Selecting Additional Chemical Sampling Locations

The following conditions and considerations were used to select the sampling locations for sub-slab vapor and indoor air samples in the Main Building to characterize the contamination:

Sub-Slab Vapor Chemical Sample Locations:

- Since the sub-slab vapor and groundwater data does not provide complete evidence of an intact plume for solvents, locations were selected over zones of preferential pathways to and beneath the Main Building, as these preferential pathways could allow contaminated soil vapor to spread from the potentially dispersed sources of these contaminants (see Plate 4A).

- To address the petroleum spill that is being remediated, locations were selected nearest to, and along preferential pathways from the petroleum spill.

- The highest TCE sub-slab vapor concentration discovered to date is at the Pool Filter Room, located with the range, produces the recommendation to mitigate in the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006, no matter the indoor air concentration. Therefore, one (1) sub-slab sample location has been placed at Room 154C.

- Nearly nine (9) years have elapsed since the last sampling effort, therefore sub-slab vapor locations were selected to ensure the plume of TCE soil vapor and other detected VOCs are tracked.

Indoor Air Chemical Sample Locations:

- Certain locations were selected on the west side of the Main Building to determine the extent of TCE soil vapor contamination, as the study performed in 2000 did not cover this area.

- One (1) indoor air sampling location was selected at the lowest elevation floor area that is a lowest occupied space (Room 151A). Another was placed at the Pool Filter Room as it is a local low elevation area that is lower than the surrounding rooms however not the lowest room in the entire building.

- The most recent indoor air concentrations were measured in 2000, therefore the remaining locations were selected to evaluate indoor air concentration trends.

The selected indoor air sample locations were reviewed and found acceptable given the following:

- the hallways provide significant opportunities for air movement between zones;
- the most critical zones, such as at low points in the floor or in contact with preferential pathways, are already selected for sampling; and
- the indoor air sample locations distribution is widely dispersed among the HVAC zones.

Sub-slab vapor sample locations are provided in Table 4-2 and include the reasons for each location selection.

The indoor air sample locations are provided in Table 4-3.

The sub-slab vapor and indoor air sample locations are depicted on Plate 4A.

Also, seven (7) sample ports will be installed in the Science Addition and will be located in:

- Room K04, K07, K08, K10, K15 and K18; and
- Hallway Adjacent to K02.

The locations of these chemical sampling points are shown on the revised Sheet EM000 and are revised from the locations shown on Sheet EM000 in the Soil Vapor Mitigation Design Plan (see Appendix 4C). The sub-slab vapor sampling ports will be installed in conformance with Detail 1 "Sample Collection Port" on Sheet EM002 of the Soil Vapor Mitigation Design Plan. Sheets EM001 and EM002 provide the details of these sampling points and other details related to Sheet EM000.

4.4.1.4 Analytical Parameter List

All of the sub-slab, indoor, and outdoor chemical samples will be analyzed at a NYSDOH ELAP certified laboratory for a range of VOCs listed in Table 4-4 because an industrial facility was located on the property and the exact solvents and chemicals used are unknown. Table 4-4 provides the minimum reporting limit for each VOC. The Matrix 1 VOCs are provided with the lower reporting limit as required in the "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York" dated October 2006, prepared by the NYSDOH.

4.4.1.5 Chemical Sampling Schedule, Sampling Protocol and Analytical Methods

The chemical sampling schedule for the Main Building will consist of an initial chemical sampling investigation for sub-slab vapor, indoor air, and outdoor air, and differential pressure. The initial sampling investigation may require additional rounds of sampling depending on analytical results. The initial sampling investigation will be followed by a long-term chemical monitoring program of the same types of media. The long-term chemical monitoring program may require fewer sampling locations once the distribution and behavior of contaminated soil gas is understood. Similarly, the schedule of chemical sampling in the long term chemical monitoring program will be will be based upon the results of the initial soil vapor intrusion investigation.

The initial chemical sampling will be scheduled for the Main Building in the first 45 days of the heating season. Sampling protocol for indoor air, outdoor air, and sub-slab vapor samples for the Main Building will adhere to the "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York," October 2006, prepared by the NYSDOH. Summa canisters will be attached to permanent sampling ports or will collect indoor air or outdoor air samples and indoor air samples will be collected at the same time the sub-slab samples are obtained.

An outdoor ambient air sample will be obtained approximately ten (10) feet upwind of one of the air intakes or the Main Building or the Science Addition, selected at random on the date of sampling. (The wind direction will be noted on the sample date).

The chemical sampling period, at a minimum, will span the entire period of occupancy of the building in one day (approximately 17 hours). All chemical sampling will be completed in the heating season.

At each indoor sample location, an indoor air sample will be obtained. Sample preparation, collection and handling methodology will be the same as described for the sub-slab locations with the exception of installing and connecting to a sampling port.

Chemical sampling procedures and protocols are presented in Appendix 4D.

The VOC analytical parameters determined for each chemical sample are listed in Table 4-4 and will be analyzed by Method TO-15. Table 4-4 consists of all the VOCs included in the NYSDEC Final DER TO-15VI General Soil Vapor Parameter List plus Acetone. The compound Acetone was added because the parameter exceeded Standards, Criteria, and Guidance Levels in soil and/or groundwater at the Southside High School property.

4.4.1.6 QA/QC Requirements

Appropriate QA/QC procedures will be followed during all aspects of sample collection and analysis to ensure that sampling error is minimized and high quality data are obtained. Sampling personnel will avoid actions (e.g., fueling vehicles, using permanent marking pens, wearing freshly dry-cleaned clothing or personal fragrances, etc.) that can cause sample interference in the field. Field instruments will be properly maintained, calibrated and tested to ensure validity of measurements. Air sampling equipment will be stored and transported in a manner consistent with the best environmental consulting practices to minimize field contamination and cross-contamination. Disposable sampling tubing will be discarded after a single use. Summa canisters and regulators will be pre-cleaned or decontaminated respectively by an ELAP approved laboratory prior to use. The end of the tubing connected to the purge pump will be clipped with a clean tubing shear prior to being connected to the Summa canister.

As stated earlier, samples will be collected using certified clean sample devices. Tracer gas (Helium) screening will be performed in the field prior to and immediately following collecting sub-slab vapor samples and will not be analyzed in the laboratory on the samples from Summa canisters. Samples will meet sample holding times and temperatures, and will be delivered to the analytical laboratory as soon as possible after collection. In addition, laboratory accession procedures will be followed, including field documentation (sample collection information and locations), chain of custody, field blanks, field sample duplicates and laboratory duplicates, as appropriate.

Duplicate samples will be collected in accordance with the requirements of the sampling and analytical methods being implemented. A minimum of ten (10) percent duplicate samples will be obtained to assess errors. Calibration samples will be analyzed as appropriate for the analytical method and as per ELAP requirements. The selected laboratory will provide written and electronic results and QA/QC data for review.

4.4.1.7 Notification/Contact List

The notification of sampling results will be provided by the Elmira CSD staff to the Elmira City School District Board of Education. Both the District staff and the Board of Education will coordinate to create a contact list.

The contact list will contains names, addresses and telephone numbers of individuals and organizations with interest or involvement in the property. The individuals and organizations on the contact list may be affected by or interested in the property, or have information that staff needs to make effective remedial or mitigative decisions.

The contact list will include residents near the property, elected officials, appropriate Federal, State, and local government contacts, local media, and organized environmental groups, as well as local businesses, civic and recreational groups, religious facilities, School District officials, and all staff (NYSED, NYSDEC, NYSDOH, County Health Department, USEPA, etc.) involved at the property. The checklist provided in the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006 (see Appendix G.1), will be used to identify who will be included in the property's contact list.

With respect to soil vapor intrusion, the property contact list will be used to:

- send a fact sheet announcing any proposed investigation in the area, a major project decision or proposal, the project's status or progress, a public meeting or availability session, or the availability of documents in the identified repositories;
- inform building occupants of sampling dates and times and to transmit sampling results (in written form and/or verbally); and
- provide community members with verbal updates on the project's status or progress.

Development and revision of the contact list will be ongoing on an annual basis.

4.4.1.8 Exposure Assessment and Action Determination

The School District will evaluate air data in consultation with New York State's *"Final Guidance for Evaluating Soil Vapor Intrusion"* (NYSDOH 2006) and the NYSED, NYSDEC and NYSDOH. Based on that evaluation, appropriate actions to address exposures related to soil vapor intrusion will be identified and implemented as necessary.

4.4.1.9 Mitigation Methods and Post-Mitigation and Pre-Termination Sampling Procedures

Two (2) types of mitigation are, have been or will be implemented for the SHS building:

- A vapor mitigation system consisting of a vapor barrier and a sub-slab depressurization system will be installed in the Science Addition, with intermittent mitigation provided by the HVAC system pressurization.
- A vapor mitigation system consisting of a vapor barrier provided by the sealed concrete slab and intermittent mitigation provided by the HVAC system pressurization in the Main Building.

Some natural attenuation may be occurring. In addition to highly chlorinated compounds being present, such as PCE and TCE, the less chlorinated daughter compounds are present at lower concentrations.

Other mitigation methods may be adopted depending on the results of the scheduled indoor air and sub-slab vapor chemical sampling events.

The chemical sampling and differential pressure procedures specified in Sections 4.4.1.5 and 4.4.2 for the Main Building will also be the Post-Mitigation Sampling Procedures because maintenance of the concrete floor slab and part-time pressurization of the building interior by the HVAC system constitute mitigation. Similarly, for the Science Addition, the procedures specified in the Soil Vapor Intrusion Mitigation Design Plan in Appendix 4C and in the Operations, Maintenance, and Monitoring Plan in Section 5.0 will also be the Post-Mitigation Sampling Procedures because the sub-slab depressurization system and the pressurization of the building interior by the HVAC system constitute mitigation.

If any new mitigation is initiated, a differential pressure and chemical sampling program will also be initiated. The goal will be to verify the continued effectiveness of the mitigation measures, however the program may better characterize the potential sources of contamination and evaluate the nature and extent of subsurface environmental contamination.

If any form of mitigation over time is suspected to have resulted in the sub-slab vapors meeting levels at which mitigation is no longer required to protect the building occupants, then:

- Initial pre-termination sampling will be conducted after all active sub-slab depressurization systems have been turned off for a week to ensure that the subsurface soil vapors have reached a state of natural equilibrium before chemical sampling.

- Additional pre-termination sampling may be required to ensure that a rebound in soil vapor contamination has not occurred. Sufficient chemical sampling will be completed to evaluate the potential for rebounding effects associated with the termination of the system.

4.4.2 Differential Pressure Monitoring Program

The SHS property will use a differential pressure monitoring system to monitor the operation of the HVAC system. In the Main Building, positive air pressure provided by the existing HVAC system appears to provide adequate vapor mitigation. In the Science Addition, the sub-slab depressurization system will provide adequate vapor mitigation without the influence of the HVAC system. In both cases, the differential air pressure between the structure interior and the sub-slab prevents the soil vapor from entering the interior air space. Details of the monitoring programs are outlined in the following sections.

4.4.2.1 Present and Planned Pressure Monitoring Locations

The sub-slab pressure monitoring points utilized in the past in the Main Building consist of the same sampling points that the samples were obtained. These sampling points have been filled with caulk. The permanent pressure monitoring points in the Main Building will be installed near however not through the locations of former sub-slab pressure monitoring points and will be monitored on a weekly basis. Permanent pressure monitoring points in the Science Addition will be installed and pressure data will be recorded weekly. The points will be installed in conformance with Detail 1 "Sample Collection Port" on Sheet EM002 of the Soil Vapor Mitigation Design Plan (see Appendix 4C).

The indoor air pressure within the Main Building was compared to the pressure beneath the slab and outside the building in 2000. Whenever the HVAC was operating the pressure within the building was adequate to mitigate sub-slab vapor from entering the building through small holes, cracks and gaps within the floor slab..

There are five (5) sub-slab differential monitoring points in the Science Addition, these locations are discussed in the Soil Vapor Mitigation Plan (see Appendix 4C). The five (5) differential pressure monitoring points will be monitored once at the completion of construction, and subsequently, the two (2) points with permanent monitors will be monitored, assuming the two (2) points are representative of the differential pressure of all five (5) points.

4.4.2.2 Differential Pressure Monitoring Schedule

The differential pressure will be monitored quarterly in the Main Building.

The Science Addition is monitored continuously at two (2) points by the electronic pressure monitors. The pressure value will be read once per week and will be recorded.

4.5 MITIGATION OF POTENTIAL INDOOR AIR QUALITY IMPACTS

The School District will make all reasonable efforts to mitigate potential impacts to indoor air quality. This will be accomplished through the use of the HVAC system, the sub-slab depressurization system, vapor barriers, air and vapor chemical monitoring and inventory of chemical storage. Details of these systems are outlined in the following sections. Details on the operation of the HVAC System, the Sub-Slab Depressurization System, and the Vapor Barrier are provided in the OM&M Manual in Section 5.0.

4.5.1 Heating Ventilation/Air Conditioning (HVAC) System (Positive Pressure System)

During its operation, the HVAC system pressurizes the interior space of the Main Building and the Science Addition relative to the sub-slab and outdoor pressure and creates a pressure gradient that tends to force interior air through any gaps in the floor slab.

Because the HVAC system does not operate throughout the night, this is only a supplemental mitigation measure that augments the vapor barrier and the sub-slab depressurization systems. The HVAC system will operate in the same manner and schedule as it is presently at least until some form of mitigation has reduced the sub-slab concentrations sufficiently that mitigation is no longer required.

4.5.2 Sub-Slab Depressurization System

The sub-slab depressurization system will operate to create a pressure that is higher in the interior space and lower in the sub-slab creating a gradient inducing flow toward the sub-slab thereby preventing sub-slab vapors from entering the Science Addition (see the Soil Vapor Mitigation Design in Appendix 4C).

4.5.3 Vapor Barriers

The Science Addition will have an engineered vapor barrier designed to block the movement of sub-slab vapors into the interior space. This consists of polyethylene sheets overlain by a concrete slab with joint sealers (see the Soil Vapor Mitigation Design in Appendix 4C).

4.5.4 Air and Vapor Monitoring

The chemical monitoring of indoor air and sub-slab, vapor (in locations without active sub-slab depressurizations), provides data to the School District to monitor the functioning of the physical mitigation systems and make adjustments as required.

4.5.5 Chemical Use and Storage

Control of chemicals coming into the SHS building, and proper storage, handling and inventory of the chemicals that are kept in the building, prevents building occupants from being unnecessarily exposed to VOCs. A chemical inventory will be conducted annually and will include PID monitoring to verify individual container closure and condition.

5.0 OPERATIONS, MONITORING AND MAINTENANCE (OM& M) PLAN (ENGINEERING CONTROLS)

5.1 INTRODUCTION AND PURPOSE OF ENGINEERING CONTROLS

The SHS property has low levels of contamination in soil, groundwater and soil vapor from industrial activities that are reported in Sections 1.0 through 3.0. In response to this contamination, certain engineering controls have been implemented and these controls include cover systems (soil, asphalt and concrete), a vapor barrier system and a sub-slab depressurization system.

The cover systems assist in preventing casual physical contact with contaminated soil and thereby reduce the potential for exposure by dermal, inhalation and ingestion routes.

The SHS property cover systems include building slabs, concrete, asphalt and vegetated soil. The potential for exposure to contaminated surface soils and subsurface soils may occur during the period when the cover systems are removed for construction purposes. Potential exposure pathways include inhalation of airborne soil particles and ingestion of soil particles. The potential for exposure to contaminated soil exists if the precautionary steps identified in the EMP are not taken.

The Science Addition vapor barrier system and sub-slab depressurization system will minimize the intrusion of contaminated soil vapor into the building, thereby blocking the inhalation exposure route.

The OM&M Plan serves as an effective guide for the operation, maintenance and monitoring of the SHS property cover systems.

5.2 EXISTING ENGINEERING CONTROLS

In the following sections, the plans for operating, monitoring and maintaining each of the engineering controls is described.

5.2.1 OM&M for Cover Systems

This section includes inspection procedures, evaluation of existing and final cover systems, repair of any deficiencies, inspection reporting and maintenance procedures.

5.2.1.1 Introduction and Purpose

The cover systems at the SHS property, including building slabs, concrete, asphalt and vegetated soil prevent casual contact with ingestion of and inhalation of the COCs.

5.2.1.2 Contaminants of Concern (COCs)

The known COCs for soil are metals, Polycyclic Aromatic Hydrocarbons (PAHs), PCBs Aroclor 1248 and Aroclor 1260. Results of groundwater sampling indicate the constituents that remain in the soil/fill material have not significantly impacted groundwater quality.

Reported levels of contaminants in groundwater collected from 1997 to 2007 from monitoring wells located on the SHS property and adjacent properties indicate the COCs for groundwater are chlorinated organic compounds and the constituents of fuel oil. Detected compounds include PCE, TCE, cis 1-2 Dichloroethene, Vinyl Chloride, 1,1,1 Trichloroethane, Acetone, Methylene Chloride, Freon 113, Freon 123A, and TPH (Total Petroleum Hydrocarbon) compounds.

5.2.1.3 Inspection and Maintenance Procedures for Cover Systems

The following procedures are necessary to maintain the function of the existing and final cover systems to repair of any deficiencies to maintain inspection reporting and to ensure maintenance procedures are implemented.

During ground intrusive work on the SHS property, existing cover systems should be inspected to determine if the specifications for approved cover systems, provided in Section 2.4.1, are satisfied. If existing cover systems do not meet the specifications, the appropriate actions must be taken following completion of the ground intrusive activity to meet the specifications for approved cover systems.

An Inspection Form for the SHS property cover systems will be completed by School District personnel or a designated consultant on a semi-annual basis. The Inspection Form is provided in Appendix 6A. Inspection of outdoor cover systems should be conducted when snow/ice are absent. Cover systems to be inspected include asphalt, concrete, gravel areas, mulched planting areas, vegetated areas and building slab foundations. Specific items to be examined for each cover system are noted on the Inspection Form. The Inspection Form will also be utilized to record deficiencies and proposed corrective actions.

In the event that vegetative, concrete, asphalt or slab floor covers are damaged, the School District will arrange for prompt and appropriate repairs. If footpaths on the SHS property are bare soil and appear to be eroding, these areas should be paved. In the event that the vegetation cover is observed to be inadequate, reseeding and mulching will be performed. Routine mowing by School District personnel is required to maintain the integrity of the short rooted vegetative cover.

5.2.2 Vapor Barrier System

This section includes inspection procedures, evaluation of the vapor barrier system, inspection, reporting and maintenance procedures. The vapor barrier system includes polyethylene sheets, beneath the concrete floor slab in the Science Addition, the mastic used to seal the sheets to the concrete slab in the Science Addition and joint sealers applied to joints and cracks at both the Science Addition and the Main Building.

During work that may penetrate the vapor barrier system, actions should be taken to ensure the integrity of the vapor barrier is returned to its original condition. Repairs may include the use of polyethylene sheet patches with sealant between the patch and the intact vapor barrier sheet. Joint sealer may be applied at new joints, cracks or penetrations. Other methods may be utilized provided such do not impede the function of the vapor barrier system or the sub-slab depressurization system. All repair methods to the vapor barrier will require the prior approval of the School District, with assistance from a Professional Engineer.

5.2.2.1 Inspection Procedures for Vapor Barrier System

The floor of the Science Addition will be inspected annually for openings, cracks, penetrations or breaches that might impact the performance of the vapor barrier system. The slab will be inspected for cracks, holes or objects penetrating the surface that were not intentionally installed during the construction of the addition or during an approved remodeling effort. All visible joints, cracks and penetrations will be inspected to determine if there are gaps between the joint sealer and the slab or penetrating component, such as a pipe or conduit.

5.2.2.2 Maintenance Procedures for Vapor Barrier System

If a breach of the vapor barrier is observed, repair of the components will be undertaken as long as there is an available repair method that will not impede the function of the vapor barrier or the sub-slab depressurization system. If the plastic sheeting is penetrated or damaged such that a seal is not maintained, holes will be drilled at close spacing to allow pressure grouting or sealing with a material that will come into intimate contact with the sheeting. If a patch of sheeting is used against the original polyethylene sheeting, the patch will be sealed to a boot that will be placed on any pipe, conduit or other component intersecting the polyethylene sheeting. Similarly, pressure grouting may need to seal to another component, or may be brought into intimate contact with the pipe, conduit or other component intersecting the polyethylene sheeting. In most cases the concrete slab will be repaired with replacement concrete or concrete patch materials. In these cases, the visible joints at the top of the concrete must be sealed with elastomeric joint sealer or its equivalent.

5.2.3 Sub-Slab Depressurization System

Most sub-slab depressurization systems, including the one in the Science Addition, depend on the functioning of the static components, such as solid and perforated pipes, and on mechanical components, such as the fan. Each must be monitored and maintained in order to ensure the sub-slab depressurization system performs effectively. The following maintenance procedures apply to any such sub-slab depressurization system. If a dissimilar design is installed for a sub-slab depressurization system on the property, then these procedures may have to be modified or supplemented.

5.2.3.1 Fan Operation

This electrical/mechanical unit must be maintained in correct operation to ensure sub-slab depressurization.

5.2.3.1.1 Inspection Procedures for Fan and Exhaust

Within the first 45 days of heating season (November 1st) and within the first 45 days of the cooling season every year, the inspector (a qualified HVAC technician) must obtain access to the roof to approach the fan unit. The operation of the fan should be verified by listening for the sound or feeling the vibration of the unit on the outer housing. The exhaust opening should be examined to ensure that air is coming out and that nothing is obstructing the exhaust (such as bird nests). The area surrounding the exhaust should be examined to ensure that no air intakes are within ten (10) feet of the exhaust point.

5.2.3.1.2 Maintenance Procedures for Fan and Exhaust Line

If the fan is not operating, the circuit breaker will be checked to determine if the breaker has tripped and created a lack of power to the fan. If the breaker has tripped, the electrical circuit should be investigated by a qualified electrician to determine is repairs are necessary. Blockages in the exhaust will be removed immediately.

5.2.3.2 Gas Permeable Layer

The gas permeable layer and the negative pressure piping are critical components in the sub-slab depressurization system.

5.2.3.2.1 Inspection Gas Permeable Layer and Negative Pressure Piping

The negative pressure solid pipe that emerges from the slab, travels upward through the interior of the building, penetrates the roof and is connected to the base of the fan should be inspected within the building and above the roof to ensure no holes, cracks or penetrations have occurred that could allow building air or outside air to infiltrate the system, thereby reducing the negative pressure gradient withdrawing air from the sub-slab gas permeable layer.

The remaining components of the negative pressure system will be inspected to ensure that a negative pressure is maintained at the sub-slab monitoring locations by monitoring the permanently installed manometer, the duct and the sub-slab differential pressure gauges. The differential pressure must be a maintained negative pressure of at least 0.020 inch water column (wc) or five (5) Pascals (Pa) at both pressure monitoring points.

The manometer that monitors the fiberglass duct connecting the plenum to the exhaust fan must be inspected within the first 45 days of the heating season and within the first 45 days of the cooling season.

5.2.3.2.2 Maintenance Procedures for the Gas Permeable Layer and Negative Pressure System

If a hole, crack or penetration occurs in the negative pressure portion of the solid pipe, it will be repaired. Any penetrating item will be removed. The damaged portion of pipe will be removed and a new pipe portion will be installed with slip collars glued in place at the new joints. If the damaged pipe area is relatively small, caulk or a plug may be inserted into the gap as long as care is taken not to create a significant obstruction in the pipe that could hinder air flow. After repairs, the system will be restarted. Nontoxic smoke will be generated near the repair, with a small, handheld smoke tube, to visually confirm that the smoke is entering the pipe and the former gap is completely sealed.

Whenever negative pressure in the system is not achieved, the first focus will be on the fan. However, if the fan is working properly, attention will be turned to the negative pressure portion of the solid pipes. If the solid portion of the pipe is fully intact and the fan is operating properly, then a hole, crack or gap in the vapor barrier system is most likely preventing air pressure from reaching the monitoring points, or the pressure gauges at the sub-slab monitoring points have failed. Since a simultaneous failure of both gauges is unlikely, the inspection of the vapor barrier should be conducted first. If the vapor barrier appears intact, then the pressure gauges should be removed and inspected.

5.2.3.3 System Shutdown

To perform maintenance on the sub-slab depressurization system, it may need to be shutdown for a short term. Also, at some point in the future, contaminated soil vapors may be sufficiently mitigated so that the system can be shutdown long-term and potentially terminated, after careful monitoring has demonstrated it is no longer needed. The need for air sampling after shutdown or after system restart will be determined based on the period of time the system was offline, the reason for temporary shutdown, the continued operation of supplemental mitigation measures and other factors, and any air sampling will be completed in a manner consistent with Section 4.4.1.

5.2.4 HVAC Positive Pressure System

Both the Main Building and the Science Addition each have an HVAC system that provides positive pressure relative to the building exterior and sub-slab when it is operating. The HVAC systems do not operate at night in the summer to save energy. However, they do operate whenever the buildings are occupied and during that time they provide pressure differential that acts to prevent soil vapor from entering the building through cracks, holes and gaps in the slab.

5.2.4.1 HVAC System Monitoring and Inspection

The School District will record when the HVAC systems are turned on and off either in a log or with an automatic recording system. The School District will also measure the differential pressure between the indoor air in the Main Building and the outdoor air regularly at locations to be determined after the initial chemical sampling and the initial differential pressure monitoring has been completed and interpreted.

The following components of the HVAC systems will be inspected as per the manufacturers' specifications for function and condition, based on the manufacturers recommended frequency:

- Fan Blades
- Fan Motors
- Belts (if any)
- Filters
- Intake Openings
- Exhaust Openings
- Dampers

- Thermostats
- Cycle Controls and Timers

One advantage of HVAC systems is that malfunctions beyond a certain degree become noticeable to the building occupants and complaints will be directed to the maintenance supervisor.

5.2.5 Groundwater Remediation System

The past and current OIS employed on the SHS property for groundwater remediation purposes are described in Section 3.0 of this report. Further inquiries regarding these systems should be directed to:

Mr. Chad Kehoe
Environmental Engineer II
Spill Response
NYSDEC, Region 8 Sub-Office
276 Sing Sing Road, Suite 1
Horseheads, New York 14845

6.0 DOCUMENTATION AND REPORTING PLAN (INSTITUTIONAL CONTROLS)

6.1 INTRODUCTION AND PURPOSE OF INSTITUTIONAL CONTROLS

The institutional controls for the SHS property address the health and safety of the occupants. Institutional Control means any non-physical means of enforcing a restriction on the use of real property that limits human and environmental exposure, restricts the use of groundwater, provides notice to potential owners, operators, or members of the public, or prevents actions that would interfere with the effectiveness of a remedial program or with the effectiveness and/or integrity of OM&M activities at or pertaining to a remedial site. As described in more detail below, there are a number of critical system inspections that must occur throughout the year to minimize the potential exposures related to soil vapor intrusion. In order to demonstrate that the inspection process and results are fully transparent, an Annual Report, also discussed below, will be submitted by the School District staff to the School Board of Education.

6.2 INSPECTIONS AND NOTIFICATIONS

Inspections of the SHS engineering controls and notification to the School Board are instrumental to ensure engineering controls are functioning. Details of inspection and notification procedures follow.

6.2.1 Inspection Schedules and Forms for SHS Property Systems

The inspection schedule for the SHS engineering controls is specified in the OM&M Plan (see Section 5.0). This plan includes schedules for inspection of the cover systems (soil, asphalt, concrete), building slabs, vapor barrier, sub-slab depressurization and the HVAC system. Inspection forms for the SHS property systems are provided in Appendix 6A.

6.2.2 Notification Requirements

All inspection forms will be submitted by the School District to the School Board of Education on an annual basis. If during an inspection a potential exposure related to soil vapor intrusion is discovered, the

School District will take action to address the health and safety of the building's occupants and notify the School Board of the potential exposure and the corrective action to be completed in a timely manner.

6.3 REPORTING PLAN

A reporting plan has been developed for the SHS property to ensure that inspection results are easily available for proper review. Details of the reporting plan follow.

6.3.1 Certification of Engineering Controls

A Professional Engineer will annually inspect all cover systems, vapor barriers and the sub-slab depressurization system and will prepare a Certified Annual Inspection Report for the School District. The Annual Report will also include notification of any changes, modifications or terminations of any engineering controls maintained by the State. A certified heating ventilation or air conditioning technician will prepare an annual certification of the HVAC system. These certifications will assure the School District that the engineering controls are functioning as designed and continue to mitigate exposures to contamination at the property. The NYSDEC supervises the operation of the groundwater remediation systems.

6.3.2 Annual Report

An Annual Report will be submitted by the School District to the Elmira City School District Board of Education by January 22nd. The Annual Report will include copies of the inspection forms provided in Appendix 6A and a narrative description of maintenance and repair work performed on the SHS property cover systems, vapor barrier system, sub-slab depressurization system and HVAC system. For any repair work completed on the systems, "before," "during," and "after" photographs will be included. The Annual Report will also contain copies of the required Professional Engineer and HVAC certifications.

7.0 HEALTH AND SAFETY PLAN (HASP)

7.1 GENERAL INFORMATION

The HASP identifies hazardous substances and conditions known or suspected to be present on the SHS property and specific measures to be taken to ensure hazardous substances or conditions do not adversely impact the health and safety of construction personnel and the general community (public). The HASP is intended to identify potential hazards and appropriate precautions as defined by OSHA 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response).

All construction personnel working on this project must read this HASP, acknowledge understanding of this plan, and abide by its requirements.

In general, construction personnel are responsible for complying with all regulations and policies applicable to the work they are performing. The SDHSO for the Elmira CSD or the Project Manager are authorized to stop work if any construction personnel/subcontractor fails to adhere to the required health and safety procedures. The HASP Certification Form is provided as Appendix 7A.

In addition to this HASP, each contractor must provide a HASP that addresses minimum training requirements for activities specific to the project and identifies potential hazards specific to the project that are not discussed herein.

Additionally, the project specific HASP provided by the contractor must outline minimum training requirements for workers, supervisors and trainers as specified in 29 CFR 1910.120(e)(3-9), which include:

Initial Training

1. General workers (such as equipment operators, general laborers and supervisory personnel) engaged in hazardous substance removal or other activities that expose or potentially expose workers to hazardous substances and health hazards shall receive a minimum of 40 hours of instruction, and a minimum of three (3) days of actual field experience under the direct supervision of a trained experienced supervisor.

2. Workers who are on the SHS property only occasionally for a specific limited task (such as, however not limited to, groundwater monitoring, land surveying, or geophysical surveying) and who are unlikely to be exposed over permissible exposure limits and published exposure limits, shall receive a minimum of 24 hours of instruction, and a minimum of one (1) day actual field experience under the direct supervision of a trained, experienced supervisor.

3. Workers regularly working in areas that have been monitored and fully characterized indicating that exposures are under permissible and published exposure limits, and where respirators are not necessary, and the characterization indicates that there are no health hazards or no possibility of an emergency developing, shall receive a minimum of 24 hours of instruction, and a minimum of one (1) day actual field experience under the direct supervision of a trained, experienced supervisor.

4. Workers with 24 hours of training who are originally covered under Items 2 or 3 and who become general workers as defined in Item 1, or who are required to wear respirators, shall have the additional 16 hours and two (2) days of training necessary to total the training specified in Item 1.

Management and Supervisor Training

5. Managers and supervisors directly responsible for, or who supervise workers engaged in hazardous waste operations, shall receive 40 hours initial training, and three (3) days of supervised field experience (the training may be reduced to 24 hours and one (1) day if the only area of their responsibility is supervising workers covered by Items 2 and 3 and have had at least eight (8) additional hours of specialized training at the time of job assignment on such topics as, however not limited to, the contractor's HASP (inclusive of employees training program), personal protective equipment program, spill containment program, and health hazard monitoring procedures and techniques.

Qualifications for Trainers

6. Trainers shall be qualified to instruct workers regarding the subject matter presented in training. Such trainers shall have satisfactorily completed a training program for teaching the subjects they are expected to teach, or they shall have the academic credentials and instructional experience necessary for teaching the subjects. Instructors shall demonstrate competent instructional skills and knowledge of the applicable subject matter.

Training Certification

7. Workers and supervisors who have received and successfully completed the training and field experience shall be certified by their instructor or the head instructor and trained supervisor as having completed the necessary training. A written certificate shall be provided to each certified person. Any person who has not been certified or who does not meet the requirements of Item 10 shall be prohibited from engaging in hazardous waste operations.

Emergency Response

8. Workers who are engaged in responding to hazardous emergency situations that may expose them to hazardous substances shall be trained in how to respond to such expected emergencies.

Refresher Training

9. Workers, managers and supervisors shall receive eight (8) hours of refresher training annually on the items specified in 29 CFR 1910.120(e)(2) and/or (e)(4) and shall review incidents that occurred in the past year that can serve as training examples of related work, and other relevant topics.

Equivalent Training

10. Workers who can show by documentation or certification that their experience and/or training has resulted in training equivalent to that training required in 29 CFR 1910.120(e)(1-4) shall provide a copy of the certification or documentation upon request. However, certified workers with equivalent training upon initial assignment to the SHS property shall receive appropriate, specific training before entering restricted areas and shall have the appropriate number of supervised field days. Equivalent training includes any academic training or training that existing workers might have already received from actual hazardous waste site experience.

Project specific logs of assigned SHS workers and their associated training/refresher certifications will be kept for each activity where potential exposures to contaminants exist.

7.2 DESIGNATION OF RESPONSIBILITIES

The responsibility for implementing this HASP is shared by the Project Manager and SDHSO. The individuals serving in these roles are provided below. The Project Manager will be designated by the SDHSO and can be the contractor hired for a particular project or an independent consultant hired by the School District.

The SDHSO will recommend policy on all matters to the Project Manager and will provide the necessary resources to conduct the project safely.

The SDHSO is responsible for developing safety procedures and training programs, and is the final decision point for determination of health and safety policies and protocols for all projects. The SDHSO is responsible for establishing operating standards and coordinating all safety and technical activities.

KEY PERSONNEL		
Title of Officer	**Name**	**Telephone #**
SDHSO	Dominic Insogna	O: 607-735-3992 C: 607-483-1133
Project Manager	Jason Plumley	607-327-0310

The SDHSO has the authority to:

- Suspend field activities or otherwise limit exposures if the health or safety of any person appears to be endangered. This authority includes suspension of work due to adverse weather conditions, fire or other emergency.
- Direct the Project Manager or contractor personnel to alter work practices that are deemed not properly protective of human health or the environment.
- Suspend an individual from field activities for infraction of the requirements in this HASP.

The Project Manager is responsible for:

- Ensuring the availability, use, and proper maintenance of specified personal protective equipment, decontamination, and other health or safety equipment.
- Maintaining a high level of safety awareness among construction personnel/subcontractors and communicating pertinent matters promptly.
- Ensuring all field activities are performed in a manner consistent with this HASP.
- Monitoring for dangerous conditions during field activities.
- Ensuring proper decontamination of personnel and equipment.
- Coordinating with emergency response personnel and medical support facilities.
- Initiating immediate corrective actions in the event of an emergency or unsafe condition.
- Notifying the SDHSO of any emergency, unsafe condition, problem encountered, or exception to the requirements of this HASP.
- Recommending improved health and safety measures to the SDHSO.

The SDHSO or Project Manager must be present for all intrusive investigative activities on the SHS property. However, the presence of the SDHSO or Project Manager shall in no way relieve any person or company of its obligations to comply with the requirements of the HASP and all applicable Federal, State and local laws and regulations.

All personnel involved in the project must be familiar with and conform to the safety protocols prescribed in this HASP, and communicate any relevant experience or observations to the SDHSO or the Project Manager to ensure that these valuable inputs improve overall safety. Individual project members are the key elements in ensuring health and safety compliance. Every project member is considered responsible for implementing and following this HASP.

7.3 SHS PROPERTY SPECIFIC HEALTH AND SAFETY CONCERNS

7.3.1 Airborne Exposure Limits

Table 7-1 lists the published airborne exposure limits for those substances that are known or suspected to be present at the SHS property.

Unknown or unexpected materials of a hazardous nature may be encountered during ground intrusive activities. No work will be conducted if field measurements or observations indicate there is potential uncontrolled exposure to undefined hazards, or that exposures may exceed protection afforded by the requirements in this HASP.

7.3.2 Explosive Gas

Explosive gas, including hydrogen sulfide (H_2S), may be present in the subsurface pore spaces and therefore any major ground intrusive activity must be monitored with a gas unit that measures the Lower Explosive Limit (LEL) in percent and H_2S in parts per million (ppm). Action levels for explosive gas and H_2S are provided in Table 7-2. If the measured LEL and H_2S levels are between 10-20% and 5-10 ppm, respectively, and the SHS building is occupied, work will halt and the area will be allowed to ventilate until levels are less than 10% LEL and 5 ppm H_2S. If LEL and H_2S levels are between 10-20% and 5-10 ppm, respectively, and the SHS building is unoccupied, a warning will be issued and work will continue with continuous monitoring.

7.3.3 Personal Protective Equipment (PPE)

Table 7-2 provides a summary of potential airborne hazards that may be encountered by workers during ground intrusive and construction activities, action levels and corresponding required actions and the PPE level required for workers. Specific types of PPE for levels C and D are also listed on Table 7-2.

No work is anticipated requiring Level B or A PPE and very limited work in Level C. If air monitoring results require PPE upgrades from Level D, then only medically qualified, trained personnel experienced in the use and limitations of air purifying or supplied air respirators will be used. Air purifying respirators with High-Efficiency Particulate Air (HEPA) filters, capable of removing particles of 0.3 micron or larger from air at 99.97% or greater efficiency, should be used when exposure to dust is a potential risk.

Unless the SDHSO directs otherwise, respirators used for organic vapors or particulates should have cartridges changed after eight (8) hours of use, or at the end of each shift, or when any indication of breakthrough or excessive resistance to breathing is detected. OSHA regulations require a Respiratory Protection Program for companies that require employees to enter areas where respirators are required and such Respiratory Protection Programs must address the requirements for replacement of cartridges.

7.3.4 Suspected Safety Hazards

Suspected safety hazards include those inherent with the operation of heavy equipment such as drill rigs or excavators, and proximity to excavations. Inspections to ensure appropriate safety measures are in place and the use of lockout and tagout procedures during maintenance of this equipment will control these inherent hazards. Personal protective equipment (PPE) including hard hats, safety shoes and eye protection will be worn to augment other safety precautions.

Drill rigs and excavators must not operate closer than thirty (30) feet to any overhead lines, measured directly between any part of the equipment and the lines themselves except where electrical distribution and transmission lines have been de-energized and visibly grounded at the point of work, or where insulating barriers have been erected to prevent physical contact with the lines. If drilling or excavating is required within thirty (30) feet of any overhead lines, a written work plan must be provided by the contractor or other equipment operator that includes special measures designed to mitigate the risks and is in accordance with 29 CFR 1926.550(a)(15). The work plan must be reviewed and approved by written signature by the SDHSO.

Care must be taken to ensure loose clothing does not get tangled in any moving equipment associated with drill rigs or excavators.

There may be slip or trip hazards associated with rough, slippery or elevated work surfaces.

There is also the possibility of organic vapors being encountered during ground intrusive activities due to the presence of petroleum compound soils and groundwater. The Project Manager or SDHSO will use continuous monitoring instruments that measure total VOCs while each task is being conducted to determine ambient levels of contaminants. Procedures for monitoring VOCs and airborne particulates are provided in Section 8.0.

All excavations will be maintained to prevent access by unauthorized persons and will be filled or fenced off by the end of the workday. Absolutely no one will be permitted in the excavations, except the operator of equipment where the operator is always located above ground level. If equipment breaks down within the excavation, the equipment will have to be towed out of the excavation for repair. All subsurface samples will be obtained by operation of the excavating equipment and will be collected from the excavator bucket.

7.3.5 Excavator and Drill Rig Operations

Excavations will be performed with a track-mounted excavator or backhoe. To conduct soil borings, a hollow-stem auger or direct push drill rig will be used. Working with or near this equipment poses potential hazards, including being struck by or pinched/caught by equipment, potentially resulting in serious physical bodily harm.

In particular, the following precautions will be used to reduce the potential for injuries and accidents:

- The inspection of excavator and drill rig brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices will be conducted prior to the initial mobilization and checked routinely throughout the project.

- Excavator and drill rig cabs will be kept free of all nonessential items and all loose items will be secured.

- Excavators and drill rigs will be provided with necessary safety equipment, including seat belts.

- Drill rig cables and auger flight connections will be inspected for evidence of wear. Frayed or broken cables or defective connections will be replaced immediately.

- Parking brakes will be set before shutting off any heavy equipment or vehicle.

All employees will be briefed on the potential hazards prior to the start of each excavation or drilling project.

7.3.6 Adverse Weather

Drilling or excavating is dangerous during electrical storms. All field activity must terminate during thunderstorms. Extreme heat and cold, ice and heavy rain can produce unsafe conditions for drilling work. Such conditions, when present, will be evaluated on a case-by-case basis to determine if work shall terminate.

7.3.7 Fire and Explosion

Use of gasoline or diesel powered equipment increases the risk of fire and explosion hazards. Contractors will be required to store diesel fuel and gasoline in metal cans with self-closing lids and flash arrestors.

7.3.8 Requirement to Conduct Utility Mark Out

Prior to the start of any subsurface work, underground utilities and piping that may pose a potential hazard will be identified and located. DigSafely.NewYork or equivalent service will be contacted and underground utilities will be located and marked. Also, the location of privately owned utility lines will be determined.

In the event a pipe or line is struck, work will stop and the Emergency Action Plan (see Section 7.5) will be implemented.

7.3.9 Confined Space Entry

Confined space entry is not anticipated for excavating and sampling activities. If a project requires confined space entry, a specific HASP will be implemented.

"Confined Space" is defined as a space that:

1) is large enough and so configured that an employee can bodily enter and perform assigned work;
2) has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and
3) is not designed for continuous employee occupancy.

7.3.10 Excavation and Sampling Work Zones

One of the basic elements of an effective HASP is the delineation of work zones for each ground intrusive location. The purpose of establishing work zones is to:

- Reduce the accidental spread of hazardous substances by workers or equipment from the contaminated areas to the clean areas;
- Confine work activities to the appropriate areas, thereby minimizing the likelihood of accidental exposures;
- Facilitate the location and evacuation of personnel in case of an emergency; and
- Prevent unauthorized personnel from entering controlled areas.

Although a work site may be divided into as many zones as necessary to ensure minimal employee exposure to hazardous substances, this HASP uses the three (3) most frequently identified zones: the Exclusion Zone, Decontamination Zone, and Support Zone. Movement of personnel and equipment between these zones should be minimized and restricted to specific access control points to minimize the spreading of contamination.

- **<u>Exclusion Zone</u>**

  During investigative work, the Exclusion Zone is the immediate excavation, test pit, borehole, or other area where contamination is either known or expected to occur and where the greatest potential for exposure exists. The following protective measures will be taken in the Exclusion Zone.

  Unprotected onlookers will be restricted from the excavation location so that they are at least twenty-five (25) feet upwind or fifty (50) feet downwind of excavation or drilling activities.

  Workers conducting activities and sampling in the Exclusion Zone will wear the applicable PPE. The actions to be taken and PPE to be worn in the Exclusion Zone if VOCs are above background levels are described in Table 7-2.

- **<u>Decontamination Zone</u>**

  During investigative work, a Decontamination Zone will be established at the perimeter of the Exclusion Zone, and will include the personnel, equipment and supplies that are needed to decontaminate equipment. The size will be selected by the SDHSO or Project Manager to conduct the necessary decontamination activities. Personnel and equipment in the Exclusion Zone must pass through this zone before leaving or entering the Support Zone. The necessary decontamination must be completed in this zone and the requirements are described in Section 7.6.1 and Appendix 7B. This zone should always be established and maintained upwind of the Exclusion Zone.

- **<u>Support Zone</u>**

  During investigative work, the areas located beyond the Decontamination Zone will be considered the Support Zone. Break areas, operational direction and support facilities will be located in this area. Eating and drinking will be allowed only in the Support Zone.

7.3.11 Natural Hazards

Work that takes place in the natural environment may be affected by plants and animals known to be hazardous to humans. Spiders, bees, wasps, hornets, ticks, poison oak and poison ivy are only some of the hazards that may be encountered. Individuals who may potentially be exposed to these hazards should be made aware of their existence and instructed in their identification. Emergencies resulting from contact with a natural hazard should be handled through the normal medical emergency channels. Individuals who are sensitive or allergic to these types of natural hazards should indicate their susceptibility to the SDHSO.

7.3.12 Heat and Cold Stress Hazards

If work is to be conducted during the winter, cold stress is a concern to the health and safety of personnel. Because disposal clothing such as Tyvek does not "breathe", perspiration does not evaporate and the suits can become wet. Wet clothes combined with cold temperatures can lead to hypothermia. If the air temperature is less than 40 degrees Fahrenheit (°F) and a worker's clothes become wet due to perspiration, the worker must change to dry clothes.

Signs and Symptoms of Cold Stress

- **Incipient frostbite:** is a mild form of cold stress characterized by sudden blanching or whitening of the skin.
- **Chilblain:** is an inflammation of the hands and feet caused by exposure to cold moisture. It is characterized by a reoccurring localized itching, swelling, and painful inflammation of the fingers, toes, or ears. Such a sequence produces severe spasms, accompanied by pain.
- **Second-degree frostbite** is manifested by skin which has a white, waxy appearance and is firm to the touch. Individuals with this condition are generally not aware of its seriousness, because the underlying nerves are frozen and unable to transmit signals to warm the body. Immediate first aid and medical treatment are required.
- **Third-degree frostbite** will appear as blue, blotchy skin. This tissue is cold, pale and solid. Immediate medical attention is required.
- **Hypothermia** develops when body temperature falls below a critical level. In extreme cases, cardiac failure and death may occur. Immediate medical attention is warranted when the following symptoms are observed:
  - Involuntary shivering;
  - Irrational behavior;
  - Slurred speech;
  - Sluggishness; and
  - Loss of consciousness.

Preventing Cold Related Illness/Injury

- Train personnel to identify the signs and symptoms of cold stress. Require field personnel to wear proper clothing for cold, wet and windy conditions, including layers that can be adjusted to changing weather conditions. It is important to keep hands and feet dry.
- Field personnel working in extremely cold conditions must take frequent short breaks in warm, dry shelters to allow their body temperature to increase. If possible, field work should be scheduled during the warmest part of the day. The buddy system should be used so that personnel can assist each other in recognizing signs of cold stress.
- Drink warm, sweet beverages and avoid drinks with caffeine and alcohol. Eat warm, high-calorie foods.
- Personnel with medical conditions such as diabetes, hypertension or cardiovascular disease or who take certain medications, may be at increased risk for cold stress.

Treatment of Cold Related Injuries

If cold stress symptoms are evident, the affected person must move into a warm, dry sheltered area and all wet clothing should be removed and replaced with dry clothing. If frostbite is suspected, the affected person should be treated by trained medical personnel.

Signs and Symptoms of Heat Stress

Wearing PPE also puts a worker at a considerable risk for developing heat stress. This can result in health effects ranging from heat fatigue to serious illness or death. Consequently, regular monitoring, remaining hydrated and other precautions are vital.

- **Heat Rash** may result from continuous exposure to heat and humid air.
- **Heat Cramps** are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:
  - ➢ Muscle spasms; and
  - ➢ Pain in the hands, feet and abdomen.
- **Heat Exhaustion** occurs from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:
  - ➢ Pale, cool, and moist skin;
  - ➢ Heavy sweating; and
  - ➢ Dizziness, fainting, and nausea.
- **Heat Stroke** is the most serious form of heat stress. Temperature regulation fails, and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Competent medical help must be obtained. Signs and symptoms are:
  - ➢ Red, hot, and unusually dry skin;
  - ➢ Lack of or reduced perspiration;
  - ➢ Dizziness and confusion;
  - ➢ Strong, rapid pulse; and
  - ➢ Loss of consciousness.

Preventing Heat Related Illness/Injury

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or heat exhaustion that person may be predisposed to additional heat injuries. To avoid heat stress, the following steps should be taken:

- Have workers drink 16 oz. (0.5 liter) of fluid (preferably water or diluted drinks) before beginning work. Urge workers to drink one to two (1 to 2) cups every fifteen (15) to twenty (20) minutes, or at each monitoring break. A total of 1 to 1.6 gallons (four (4) to six (6) liters) of fluid per day are recommended, however more may be necessary to maintain bodyweight.

- If possible, adjust work schedules to avoid the hottest parts of the day.
- Encourage workers to maintain an optimal level of physical fitness.
- Shelter (air-conditioned, if possible) or shaded areas should be provided to protect personnel during rest periods.
- Train workers to recognize, identify, and treat heat stress.

For workers wearing standard work clothes, recommendations for monitoring and work/rest schedules are those approved by American Conference of Governmental Industrial Hygienists (ACGIH) and National Institute of Occupational Safety and Health (NIOSH). Workers wearing semi-permeable PPE or impermeable PPE should be monitored when the temperature in the work area is above 70°F.

7.3.13 Noise Hazards

Work that involves the use of heavy equipment such as a drill rig or excavator can expose workers to noise during field activities that can result in noise-induced hearing loss. The SDHSO or Project Manager will monitor the noise exposure and will determine whether noise protection is warranted for each of the workers. The SDHSO or Project Manager will ensure either ear muffs or disposable foam earplugs are available and are used by the workers in the immediate vicinity of the field operation as required.

7.3.14 Slip, Trip and Fall Hazards

Ground intrusive locations can contain a number of slip, trip and fall hazards for workers, such as:

- Holes, pits, or ditches
- Excavation faces
- Slippery surfaces
- Steep grades
- Uneven grades
- Snow and ice
- Sharp objects

All workers must be instructed to keep back three (3) feet from the top edge of excavation faces.

Drill auger sections will be stored on the transport vehicle as long as possible to avoid creating a trip hazard. Drill auger sections and other tools will be stored in neat arrangements convenient to the driller, however sufficiently distant from the immediate area around the drill rig to minimize trip hazards.

Workers will be instructed to look for potential safety hazards and immediately inform the SDHSO or Project Manager regarding any new hazards. If the hazard cannot be immediately removed, actions must be taken to warn workers about the hazard.

7.3.15 Modifications to this Plan

Requirements and guidelines in this HASP are subject to modification by the Project Manager or the SDHSO in response to additional information obtained during field work regarding the potential for exposure to hazards.

7.4 MEDICAL SURVEILLANCE PROGRAM

7.4.1 General

Workers who participate in field activities that meet the following criteria will be included in the Medical Surveillance Program:

- All who may be exposed to hazardous substances or health hazards at or above permissible exposure limits, without regard to the use of respirators, for thirty (30) days or more per year, as required by 29 CFR 1926.65(f)(2)(i-iv).

- All who wear a respirator for thirty (30) days or more every year as required by 29 CFR 1926.62(f)(2)(i-iv).

- All who are injured because of overexposure from an incident involving hazardous substances or health hazards.

7.4.2 Frequency of Medical Exams

Medical examinations and consultations will be provided on the following schedule to the workers who meet qualifications outlines in Section 7.4.1:

- Prior to assignment to a work site, if any of the criteria noted in Section 7.4.1 are anticipated.

- At least once every twelve (12) months, unless the physician believes a longer interval (not greater than two (2) years) is appropriate.

- As soon as possible upon notification that a worker has developed signs or symptoms indicating possible overexposure to hazardous materials.

7.5 EMERGENCY ACTION PLAN

Workers will use the following standard emergency procedures. The SDHSO will be notified of any emergency and be responsible for ensuring that the appropriate procedures are followed and the Project Manager is notified. A first aid kit, an eye wash unit that can provide a minimum flow rate of 0.4 GPM for fifteen (15) minutes, and a fire extinguisher rated 20A-B-C (or higher) will be readily available to workers. All workers will be trained in use of emergency supplies. Questions regarding procedures and practices described in the HASP should be directed to the SDHSO.

7.5.1 Notification

Any symptoms of adverse health, regardless of the suspected cause, are to be immediately reported to the SDHSO.

Upon the occurrence of an emergency, including an unplanned chemical release, fire or explosion, workers will be alerted and the area evacuated immediately. The Project Manager or SDHSO will notify the ambulance service, fire department and/or police department, as required. Emergency contact telephone numbers are provided in Section 7.5.4. Re-entry to the work area will be limited to those required to assist injured workers or for firefighting or spill control. Anyone entering the work area following an emergency incident must wear appropriate protective equipment.

The following alarm systems will be utilized to alert workers to evacuate the restricted area:

- Direct Verbal Communication
- Radio Communication or Equivalent
- Portable or Fixed Telephone

The following standard hand signals will also be used as necessary:

Hand Signal	**Message**
Hand gripping throat	Can't breathe/out of air
Grip co-worker's wrist	Leave area immediately, no debate!
Hands on top of head	Need assistance
Thumbs up	Yes/O.K.
Thumbs down	No/Problem

Upon activation of an alarm, workers will proceed to a designated assembly area. The designated assembly area will be determined on a daily basis by the SDHSO or Project Manager and updated as necessary depending upon work conditions, weather, air monitoring, etc. The location of the designated assembly area will be clearly marked and communicated to employees daily or upon relocation of the area. Workers gathered in the designated assembly area will remain there until their presence has been noted. A tally of workers on the daily restricted area access roster will be made as necessary to ensure all workers have been properly evacuated and accounted for.

Workers may return to the designated work area following authorization by the SDSHO or Project Manager.

7.5.2 Personal Injury

If anyone within a work area is injured and cannot leave the restricted area without assistance, emergency medical services will be notified (see Section 7.5.4) and appropriate first aid will be administered by certified Emergency Medical Technicians (EMTs).

7.5.3 Fire/Explosion

Upon the occurrence of a fire beyond the incipient stage (where SHS property personnel could respond to extinguish), or an explosion anywhere on the SHS property, the fire department will be alerted and all personnel moved to a safe distance from the involved area.

7.5.4 Emergency Services

Emergency Services	Telephone Number
Owner: Elmira City School District (Superintendent)	607-735-3010
Fire Department	911 or 607-735-8600
Police Department	911 or 607-735-8600
Ambulance	911 or 607-734-5017
St. Joseph's Hospital	607-733-6541
Poison Control Center	800-333-0542
NYSDEC Spills Emergency Response Program	800-457-7362

A map showing the preferred route to the hospital with written directions is presented in Figure 7-1; and written directions are also included on the map.

7.5.5 Equipment Failure

If any equipment fails to operate properly, the Project Manager and/or SDHSO will determine the effect of this failure on continuing operations. If the failure affects the safety of workers (e.g., failure of monitoring equipment) or prevents completion of the planned tasks, all workers will leave the work area until appropriate corrective actions have been taken.

7.5.6 Record Keeping

The SDHSO will maintain records of reports concerning occupational injuries and illnesses in accordance with 29 CFR 1904.

7.6 DECONTAMINATION METHODS

7.6.1 Contamination Prevention Methods

The SDHSO will make all workers aware of the potential for contamination. The following procedures will be established to minimize contact with waste:

- Workers will not walk through areas obvious of contamination;
- Workers will not directly touch potentially hazardous substances;
- Workers will wear gloves when touching soil or waste;
- Workers will wear disposable outer garments where appropriate; and
- Excavated soils will be placed on plastic sheeting and covered with plastic sheeting at the end of the workday.

7.6.2 Decontamination Methods

All workers, clothing, and equipment leaving designated contaminated areas must be decontaminated, as presented in Appendix 7B, Equipment Cleaning and Decontamination Procedures. Decontamination of equipment will be the responsibility of the Project Manager.

8.0 COMMUNITY AIR MONITORING PLAN (CAMP)

The Community Air Monitoring Plan (CAMP) provides for real-time monitoring of VOCs and particulates (i.e., dust) at the downwind perimeter of each designated work area when ground-intrusive activities are implemented at the SHS property. The CAMP was developed from the NYSDOH Generic CAMP that is provided in the DER-10 Technical Guidance for Site Investigation and Remediation (December 2002). The CAMP provides a measure of protection for the downwind community (potential receptors include the school community, residences, businesses, and workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The CAMP also addresses ground intrusive activities within twenty (20) feet of a potentially exposed population or occupied structure and for indoor air monitoring activities. Contractors should employ Best Management Practices (BMPs) and common sense measures to minimize VOCs, dust, and odors around work areas.

Table 8-1 provides action levels and corresponding required actions for VOCs and particulate monitoring that include increased monitoring, corrective actions to abate emissions, and/or work shutdown.

8.1 VOLATILE ORGANIC COMPOUND (VOC) MONITORING, RESPONSE LEVELS AND ACTIONS

Real time air monitoring for VOCs and/or particulate levels is required at the perimeter of the Exclusion Zone.

Periodic monitoring for VOCs will be required during minor ground intrusive (< 20 cubic yards) or non-intrusive activities, such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic VOC monitoring of the breathing space area during a sample collection event will occur upon arrival at a sample location, while opening a well cap or overturning soil, during well baling/purging, and prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring will be required during sampling activities. Examples of such situations include groundwater sampling adjacent to or within twenty (20) feet of structures.

Continuous monitoring for VOCs and particulates will be required for all major ground intrusive activities (> 20 cubic yards) of excavated soil and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, however are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

VOCs will be monitored at the downwind perimeter of the immediate work area on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring equipment must be appropriate to measure the types of contaminants known or suspected to be present. The equipment must be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment must be capable of calculating fifteen (15) minute running average concentrations, which will be compared to the following levels:

- If the ambient air concentration of total VOCs at the downwind perimeter of the work area exceeds five (5) ppm above the determined background level for the fifteen (15) minute average, work activities must be temporarily halted and monitoring continued. If the total VOC level decreases rapidly to less than five (5) ppm over background, work activities can resume with continued monitoring.

- If total VOC levels at the downwind perimeter of the work area persist at levels in excess of five (5) ppm over background however less than twenty-five (25) ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided the total organic vapor level 200 feet downwind of the Exclusion Zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - however in no case less than twenty (20) feet, is below five (5) ppm over background for the fifteen (15) minute average.

- If the organic vapor level is above twenty-five (25) ppm at the perimeter of the Exclusion Zone, activities must be halted.

- All fifteen (15) minute readings must be recorded and should be available for review by the NYSDOH, NYSDEC and Chemung County Health Department, if requested. Instantaneous readings, if any, used for decision purposes should also be recorded.

8.2 PARTICULATE MONITORING, RESPONSE LEVELS AND ACTIONS

Periodic monitoring for particulates will be required during minor ground intrusive activities (< 20 cubic yards) and will include monitoring the breathing space for workers and at the downwind perimeter of the designated work area. Continuous monitoring will be required during sampling activities if ground intrusive activities occur within twenty (20) feet of a structure or if they are in the proximity of individuals potentially exposed.

Particulate concentrations must be monitored continuously for all major ground intrusive activities (> 20 cy) at the upwind and downwind perimeters of the work area at temporary particulate monitoring stations. The particulate monitoring must use real time monitoring equipment capable of measuring particulate matter that are less than ten (10) micrometers in size (PM-10) and is capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (ug/m^3) greater than background (upwind perimeter) for the fifteen (15) minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with the implemented dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 ug/m^3 above the upwind level and provided that no visible dust is migrating from the work area. See Section 2.5.8 of the SMP for a description of dust suppression techniques.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 ug/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

- All readings must be recorded and be available for review by the NYSDOH, NYSDEC and Chemung County Health Department, if requested.

8.3 INDOOR WORK REQUIREMENTS

Unless a self-contained, negative pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must vacate the room in which the work will occur. When work areas are within twenty (20) feet of potentially exposed populations or occupied rooms, the continuous monitoring locations for VOCs and particulates will be based on the nearest potentially exposed individuals and the location of ventilation system intakes for adjacent occupied rooms.

Additionally, the location of all exhaust vents in the room and the associated discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, will be identified and the air monitoring locations established accordingly. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices will be used to create negative air pressure within the work area during remedial activities which will prevent exposures related to the work activities and to control dust and odors. Consideration will be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends, school vacations or evening hours.

- If total VOC readings exceed one (1) ppm at locations that are next to the walls of occupied rooms or next to intake vents, monitoring will also occur within the adjacent occupied room(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels and response actions. Background readings in the occupied rooms must be measured prior to commencement of the planned work. Any background readings that are greater than one (1) ppm should be discussed with the NYSDEC and NYSDOH prior to commencement of the work.

- If total particulate readings exceed 150 ug/m^3 next to the walls of adjacent occupied room(s) or next to intake vents, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 ug/m^3 or less at the monitoring point. Particulate response levels and actions should be predetermined.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored.

8.4 GENERAL RECOMMENDATIONS FOR WORK AREAS WITHIN 20 FEET OF POTENTIALLY EXPOSED POPULATIONS OR OCCUPIED STRUCTURES

When work areas are within twenty (20) feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must be based on the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices will be considered to prevent exposures related to the work activities and to control dust and odors. Consideration will be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends, school vacations or evening hours.

- If total VOC readings exceed one (1) ppm at locations that are next to the walls of occupied rooms or next to intake vents, monitoring will also occur within the adjacent occupied room(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels and response actions. Background readings in the occupied rooms must be measured prior to commencement of the planned work. Any background readings that are greater than one (1) ppm should be discussed with the NYSDEC and NYSDOH prior to commencement of the work.

- If total particulate readings exceed 150 ug/m^3 next to the walls of adjacent occupied room(s) or next to intake vents, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 ug/m^3 or less at the monitoring point. Particulate response levels and actions should be pre-determined.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored.

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