NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Region 3
New Paltz, New York

WORK PLAN FOR SUB-SLAB VAPOR INVESTIGATION

Baldwin Place Mall
Somers, New York

NYSDEC SITE No. 36-0023

January 2008

HDR
Henningson, Durham & Richardson Architecture and Engineering, P.C.
in association with HDR Engineering, Inc.
One Blue Hill Plaza
Pearl River, NY 10965

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CHAPTER 1

INTRODUCTION AND PURPOSE

Although the soil vapor pathway has been historically evaluated at New York State sites, improvements in analytical techniques and knowledge gained from sites in New York and in other states has lead to a more complete understanding of soil vapor as an environmental media of concern. Based on this additional information, New York has re-evaluated previous assumptions and decisions regarding the potential for vapor intrusion at sites. To this effort, in early 2007, the State conducted a limited soil vapor investigation at the former Baldwin Place Shopping Center to evaluate the vapor intrusion pathway.

The results of the early 2007 study are documented in an undated report issued by the New York State Department of Environmental Conservation (NYSDEC) in consultation with the New York State Department of Health (NYSDOH): *Site Investigation Summary Report, Vapor Intrusion Evaluations for New York State Remedial Sites, Baldwin Place Shopping Center*. This report is referred to herein as the "2007 NYSDEC soil vapor report". The study documented in the 2007 NYSDEC soil vapor report uncovered elevated concentrations of tetrachloroethene (also referred to as perchloroethylene, or PCE) and to a lesser extent trichloroethene (TCE) in the soil vapor near two of the commercial buildings on the site. That report recommended additional investigation, specifically the collection of sub-slab vapor samples beneath the two buildings and an additional soil vapor sample to the east toward a residential area. This work plan describes how that additional investigation will be conducted.

Chapter 2 of this work plan provides a brief history of the site. Chapter 3 details how the investigation will be conducted and its rationale. Chapters 4, 5, 6, and 7 document, respectively, quality control/quality assurance procedures, health and safety plan, schedule/reporting, and citizen participation.

CHAPTER 2

SITE HISTORY AND DESCRIPTION

Baldwin Place Mall (the site), now known as Somers Common, is a 28-acre shopping center, in the Town of Somers, Westchester County, New York. The address of the site is 80 Route 6, Baldwin Place, NY 10505. Attached is a large scale fold-out drawing of the site. The subject buildings for this work plan are Building 5 (New York Sports Club) and Building 6 (Home Goods and Goodwill Industries). There are additional tenants in the two buildings, but the three referenced here account for most of the lease area.

The buildings have slab-on-grade construction with foundation footers around the perimeters of the structures. The developer placed crushed concrete (derived from the slabs of the original shopping center) as foundation material for many of the new buildings. Therefore, substantial vapor communication across the building sub-slab areas is expected. There is a truck loading dock for the Home Goods lease area. There are no basements to the buildings; however, after the initial development of the site, New York Sports club constructed an in-ground swimming pool that extends over much of the southern width of Building 5.

A localized area of the site has soil and groundwater contaminated primarily with PCE and, to a lesser extent, TCE and environmental degradation products of PCE and TCE, most notably 1,2-dichloroethene (DCE). The downgradient areas have groundwater contaminated with these constituents. NYSDEC concluded that the contamination was a result of activities by a former dry cleaner that had previously leased space at the site. Methyl tert butyl ether (MTBE) is also present in the groundwater in a portion of the site as a result of gasoline spills from nearby service stations.

As a result of the contamination, the Agency listed the site as an Inactive Hazardous Waste Site (ID No. 36-0023). A Remedial Investigation[1]/Feasibility Study[2] (RI/FS) was completed to address the soil and groundwater contamination. On November 9, 1995, NYSDEC issued its Record of Decision (ROD). The responsible party, Big V Supermarkets, Inc. (Big V) entered into a consent order with NYSDEC to implement the ROD, which required the following steps to remediate the presence of PCE and related compounds at the site:

- Excavation of source area contaminated soils. The purpose of this step was to remove the source of contamination to the groundwater. NYSDEC's standard soil cleanup target at the time for PCE in soil was 1.4 mg/kg. However, the cleanup target established in the ROD for the excavation was 10 mg/kg, the higher concentration being allowed because an active groundwater remediation system (discussed below) was included with the ROD. The design for the excavation specified that, in order to achieve the remedial goal of 10 mg/kg, soil would be excavated to a depth of 15 feet over an area 7 ft by 16 feet-3 inches and to a depth of 10 feet in an adjacent area 12 feet by 17 feet, representing an in-place volume of 138.8 yd^3. The center of the excavated area is approximately 20 feet north of well RW-2D, shown in the attached large-scale drawing.

[1] Prepared by Vincent Uhl Associates, Inc. (VUA), 1994.
[2] Lawler, Matusky & Skelly Engineers, LLP (LMS), 1996.

The excavation, completed in February 1997, is documented in a report prepared by LMS in March 2000. The initial work entailed the excavation of the shallow soil above the footers of the building foundation grade beams in the cleanup area. Sheet pile was then installed to form the walls of the remainder of the excavation. Altogether, 236 tons of contaminated soil were removed. The mass of chemical removed during the excavation has not been estimated with any reliability. Assuming the chemical quality of the excavated soil is represented by the average of all soil samples collected within the excavation zone during the RI (650 mg/kg of PCE), the mass removed would then be approximately 300 lbs. Four post-excavation samples were collected. The two samples in the western 15-ft.-deep portion contained 0.033 and 0.058 mg/kg PCE, well within the cleanup target of 10 mg/kg. The samples collected from the eastern 10-ft.-deep portion of the pit contained 1.6 and 6.5 mg/kg PCE.

Because of the sheet pile, no post-excavation sidewall samples could be collected. With the sheet pile in place, the contaminated soil below the foundation footers and in the corrugations of the sheet pile exterior could not be removed and remains in place. (The sheet pile was subsequently removed.) Additional contamination might also have been present in and around the source area. This possible additional chemical might not have been identified during the RI because of heterogeneity of the subsurface soil or (in the case of the borings advanced through the building slab) because the chemical is deeper in the soil than could be feasibly sampled during the RI.

- Installation and operation of a groundwater pump and treat system (Plant No. 1) to capture residual contaminated groundwater in the overburden and weathered bedrock aquifer in the source area. The purpose of this measure was to capture chemical that might leach to the groundwater from residual contaminated soil left around the excavation and thereby prevent further contamination of the underlying bedrock aquifer. This facility, which started up on April, 15 1998, is one of the two on-site pump and treat systems.

- Additional pumping of the Site's water supply wells (Plant No. 2) to further remediate the Site's rock aquifer beyond that provided by the excavation and source area pump and treat system and to prevent further off-site migration of contaminated groundwater. The additional pumping of the water supply[3] wells will speed the remediation of the rock aquifer. Groundwater contamination beyond the control of the water supply wells will be allowed to dissipate, given that the excavation and source area pump and treatment steps were designed to prevent further contamination of the rock aquifer. Start-up of the additional pumping of the water supply wells at the site began on August 17, 1998 with a series of long-term pump tests on supply well P-1. Long-term operation of the additional pumping commenced in February 1999. Until November 30, 2001, Severn Trent Environmental Services operated this water plant. Reports on Severn Trent's operations were provided by Vincent Uhl Associates (VUA). Effective December 1, 2001, Lawler, Matusky & Skelly Engineers LLP (LMS)* assumed operation (see below) and prepared the subsequent reports to document

[3] These wells continue to be pumped as part of the site remediation, but are no longer used for potable water supply.

*In May 2005, Lawler, Matusky & Skelly Engineers LLP (LMS) merged its operations into Henningson, Durham &

Plant No. 2 operations.

- Continued maintenance of the point-of-use activated carbon water treatment systems in the houses along Meadow Park Road (and Route 6 wells with PCE levels above standards), or connection to a community water supply system initially supplied by the Site's own water supply system. The community water supply system was constructed in 1998 and started up with the site's own water supply system (Plant No. 2) during February 1999. Seventeen houses on Meadow Park Road are now connected to the water distribution system. Two houses (25 and 29 Meadow Park Road) were not connected, because Big V was not granted permission to enter onto the properties. The individual supply wells serving these two houses were sampled quarterly until 2003. Subsequently, annual samples were collected in 2004, 2005 and 2006; the test results demonstrate that these wells have not been impacted by the Baldwin Place Mall site.

  In November 2001, construction was completed for a connection of the Meadow Park Road distribution system to the water main for the local public water supply district. Therefore, the connection between the site's water plant (Plant No. 2) and Meadow Park Road was severed. Plant No. 2 no longer supplies potable water but continues to operate as a groundwater pump and treat system. The public water main was extended to Mahopac Avenue; therefore, in November 2001, the homes on Mahopac Avenue that had activated carbon treatment systems (258, 260, 261, 262, and 266 Mahopac Avenue and 218 Northview Avenue) and one additional house that did not have a treatment system (268 Mahopac Avenue) were connected by Big V to the new public water supply. During May and June 2002, the four Route 6 businesses that had point-of-use carbon systems to treat their well supplies were connected by Big V to the new public water line (63, 71, 75, and 77 Route 6). The restaurant (PJ's Pub) and Shell gasoline station north of Route 6 opposite the shopping center subsequently connected to the new water line; the supply wells for these locations have not been impacted by the dry cleaner spill, but were contaminated by gasoline.

  Because of limitations in the capacity of the public supply in November 2001, the remaining houses and businesses along Mahopac Avenue and Route 6 were not immediately allowed to connect to the new water main. After additional capacity was installed, the owners of the remaining properties were allowed to connect if they chose to. As of this report, the following properties, in addition to those listed above, are now connected: 249 Mahopac Avenue, 250 Mahopac Avenue, 251 Mahopac Avenue, 253 Mahopac Avenue, 257 Mahopac Avenue and 259 Mahopac Avenue. Several wells remain in service, three of which are included in a routine monitoring program: 1 County Line Drive (Jear), 264 Mahopac Avenue (Ramos – formerly Coppolecchia), 57 Route 66 (GolfWorx golfing range).

In 2000, Big V declared bankruptcy. On August 6, 2003 the judge overseeing the liquidation of Big V's assets ended the asset's funding of the remedial operations at the site; on that day, the NYSDEC assumed responsibility for the site remediation. The NYSDEC now contracts to Miller Environmental Services for operation, maintenance, and related work for the continued remediation

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Richardson Architecture and Engineering P.C. (HDR). All former LMS staff are now HDR employees and continue to work on the Baldwin Place Mall project.

of the site. Miller in turn subcontracts to HDR.

CHAPTER 3

WORK PLAN OBJECTIVES, SCOPE AND RATIONALE

3.1 FINDINGS OF THE 2007 NYSDEC SOIL VAPOR REPORT

Figure 1, taken from the NYSDEC study, summarizes the concentrations of VOCs found in the soil vapor at seven probes placed throughout the site. As indicated the highest concentrations were found in probe 360023-SV-1S, which was located adjacent to monitoring well MW-12S. The sample contained 9,986 ug/m^3 of PCE and 53.6 ug/m^3 TCE, among other chemicals. Two probes (360023-SV-2S and 360023-SV-4S) on the opposite (south) side of Building 5 from 360023-SV-1S also yielded soil vapor samples with elevated concentrations of PCE (289 and 247 ug/m^3, respectively). Based on these findings, the report recommended that sub-slab vapor samples be collected beneath Buildings 5 and 6. In addition, the report recommended additional investigation of vapor migration to the east toward the residential area along Meadow Park Road.

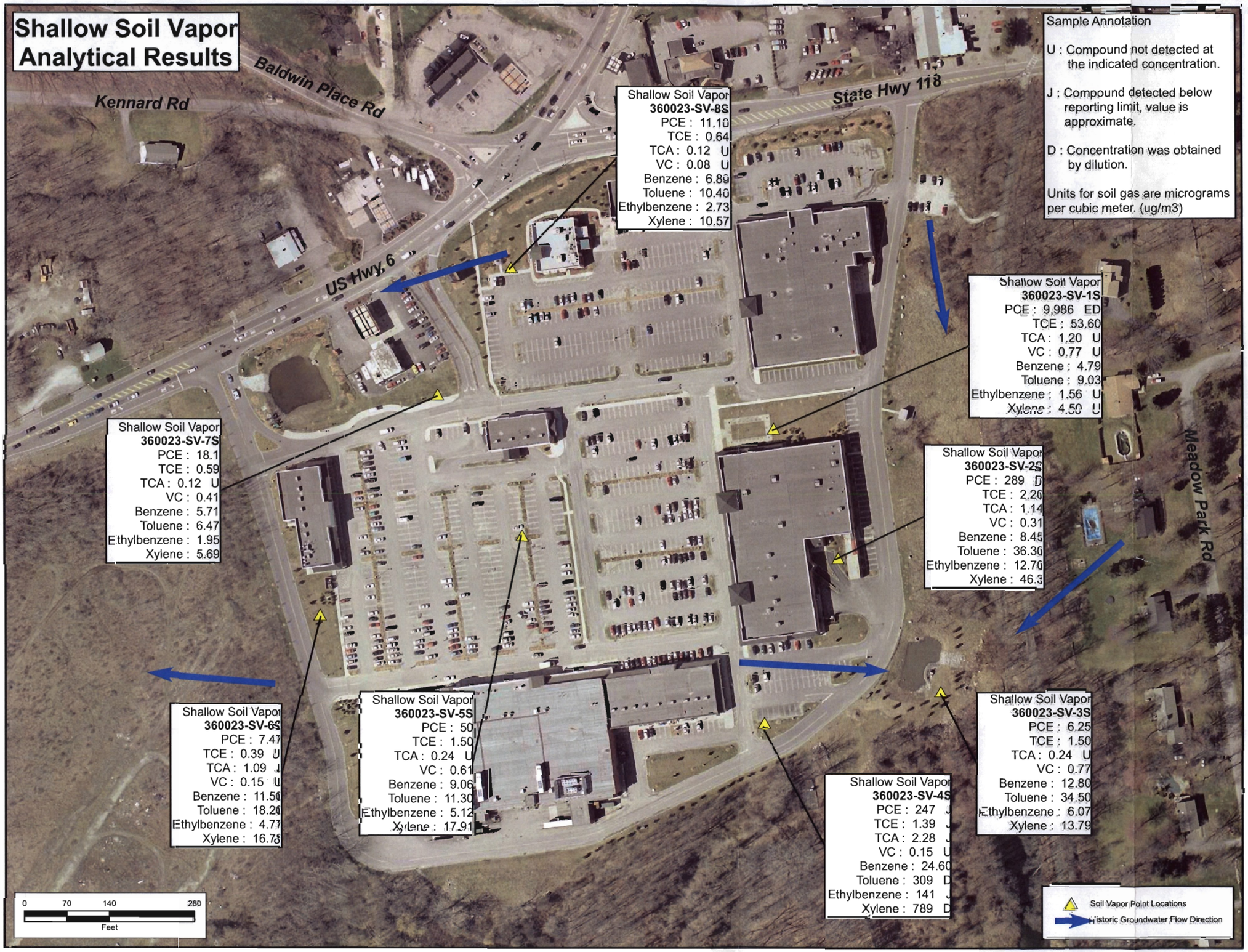
3.2 SUB-SLAB VAPOR SAMPLE LOCATIONS

The large-scale fold-out drawing attached to this plan shows the approximate locations of the planned sub-slab vapor samples. Actual locations will be selected pending clearance for sub-slab utilities. Locations have been selected to provide information where vapor concentrations are expected to be highest and to provide information across the area of the slabs to determine if concentrations lessen with distance from the source area. There will be five locations, described below:

1. 360023-SS-1 New York Sports Club storage room, accessed from the Employee's Lounge, in the northeast corner of the lease area.
2. 360023-SS-2 New York Sports Club Mechanical Room (or Adjacent Laundry Room, depending on the clearance for sub-slab utilities), in the southwest corner of the Building 5.
3. 360023-SS-3 Home Goods corridor leading to the rest rooms (adjacent to the water cooler) in the northeast corner of Building 6. This location is approximately due south of the dry cleaner spill area.
4. 360023-SS-4 Home Goods storage room near ladder to the roof, in the middle of the eastern side of Building 6.
5. 360023-SS-5 Goodwill storage room at the south side of Building 6.

A representative of the property owner approved the five locations during a November 28, 2007 on-site meeting with staff from NYSDEC, NYSDOH, and HDR. Actual locations will be selected pending clearance for sub-slab utilities. The planned locations in Building 6 appear to be clear of sub-slab utilities, based on currently available information. During its remodeling of its lease area, New York Sports Club appears to have added a substantial network of sub-slab utilities. HDR is presently attempting to obtain from the property owner as-built drawings for Building 5 prepared by the architect for New York Sports Club. Clearance activities will depend on the quality of information available in those drawings. Third-party utility clearance will be performed at all planned sampling locations.

Shallow Soil Vapor Analytical Results



New York State
Department of Environmental Conservation

Division of Environmental Remediation

FIGURE *1*
Soil Vapor Results - 2007

Created by B. Rung

Date of Last Revision: 06/26/2007

Source: 2007 NYSDEC Soil Vapor Study

Baldwin Place
Shopping Center
Site No. 3-60-023

Westchester County
Town of Somers

DEC Contact:
Rung

DOH Contact:
Obermeyer

Spring 2004
Aerial Photography

N
W E
S

North American Datum 1983
UTM Zone 18N

Ambient indoor air samples will be collected at the location of each sub-slab vapor sample. The samples will be identified as 360023-IA-1, 360023-IA-2, etc.

3.3 PROBE CONSTRUCTION

Permanent brass probes, flush to the floor, will be installed. Figure 2 presents a photograph of the probe. The construction sequence is as follows:

1. Drill a ¾-inch hole through the floor slab and underlying vapor barrier.
2. Ream the top 7/8 inch (as measured from the top of the concrete floor) of the hole with a minimum 1 1/8-inch drill bit.
3. Place Permagum putty around the periphery of the bottom of the 1 1/8-inch hole to provide a seal for the upper portion of the brass probe.
4. Place the brass probe in the hole, pushing it onto the Permagum seal, so that the top of the probe is flush with the top of the concrete floor. Do not allow Permagum to plug the bottom of the brass tube.
5. Fill the annular space between the brass probe and the 1 1/8-inch hole with cement.

3.4 SAMPLING PROCEDURES

Samples will be collected in laboratory-supplied and certified-clean 6-L Summa canisters. For both the sub-slab vapor and ambient air samples, the flow control valves on the Summa canisters will be set by the analytical laboratory to collect the samples over a nominal 6-hour period, which will result in a rate of approximately 16.7 mL/min. Figure 3 is a photograph of a typical arrangement of paired sub-slab vapor and ambient air sampling trains.

Procedures for sampling the sub-slab vapor probes will be as follows:

1. Remove the brass plug in the probe with a hex-head wrench.
2. Slip a nipple and compression fittings over flexible Teflon or polyethylene tube and connect to the probe.
3. Attach the flexible tube to a personal air sampler (PAS).
4. Evacuate at least three volumes of air in the probe (including the volume of the drilled hole). Evacuate additional air and measure organic vapor concentrations with a photoionization detector (PID), equipped with a lamp rated to at least 10.2 eV. If needed to achieve a stable measurement, collect the PAS exhaust with a Tedlar bag, and make the PID reading from the bag.
5. Disconnect the flexible tube from the PAS and attach the tube to a 6-L Summa Canister.
6. Record the vacuums on the canister connected to the sub-slab vapor probe and the canister for the ambient air sample.
7. Open the valves to both canisters.
8. During the 6-hour sampling period, periodically record the vacuum on the canisters. Photograph the canisters. Measure the locations of the sub-slab vapor probes from reference locations on the site plan drawing, or if available, building floor plans. Prepare a sketch drawing of the partition layout if building floor plans are not available.
9. At the end of the targeted 6-hour sampling period, but before the vacuum on the canisters is

FIGURE 2
Brass Sub-Slab Vapor Probe

FIGURE 3
Sampling Train

completely exhausted, close the canister valves. Record the final vacuums on the canisters, and prepare the canisters for return shipment to the analytical laboratory. Replace the threaded plug in the sub-slab vapor probe.

10. There will be one duplicate sample (with Sample 360023-IA-1). The duplicate ambient air sample will be collected with a Summa canister placed next to the canister for the primary sample. The duplicate will be labeled 360023-IA-1A.

NYSDOH guidance states that a chemical products inventory should be conducted during these investigations. An inventory will be completed in the rooms where the samples will be collected.

3.5 LABORATORY PROCEDURES

Analysis of the samples will be conducted by Chemtech of Mountainside, NJ, the same laboratory that conducted the vapor analyses for the 2007 NYSDEC soil vapor report. Chemtech is certified by the NYSDOH for both commercial laboratory work and Contract Laboratory Protocol (CLP) (ELAP Laboratory Certification 11376).

The samples will be analyzed with EPA Method TO-15. Based on a 6-L sample, the laboratory will be able to achieve a reporting limit (RL) of 0.2 parts per billion by volume (ppbV) for all VOCs of concern for the site; for most analytes, this RL equates to 1 ug/m^3, or less. Higher limits might be required for individual samples if the laboratory has to dilute the samples because of high concentrations of a target analyte or other chemicals found during the preliminary screen of the samples. A copy of the laboratory's Standard Operating Procedure (SOP) for Method TO-15 is presented in Appendix A. The SOP addresses quality control, calibration and standardization, cleaning, procedures, reporting, calculations, etc. The laboratory will provide an Extended Data Package (Category B equivalent) to report the analytical test results, including:

- case narrative
- chain of custody
- TO-15 volatile QC summary
- TO-15 volatile standards
- TO-15 volatile raw QC data
- organic sample preparation
- sample handling

3.6 SOIL VAPOR SAMPLE EAST OF THE SOURCE AREA

As noted above, the 2007 NYSDEC soil vapor report recommended soil vapor sampling east of the source area toward the residential area along Meadow Park Road. The intervening area between the site and Meadow Park Road has a large wetland drained by an unnamed tributary of the Muscoot River. The tributary has two branches that parallel each side of the former railroad embankment (now a bicycle/hiking rails-to-trails path) that lies about mid-way between the site and Meadow Park Road. Groundwater is at or near the surface. This hydrology provides an effective barrier against shallow groundwater migration (the source of potential vapor intrusion) from the site to Meadow Park Road. Therefore, no soil vapor sampling will be conducted in this area.

3.7 OUTDOOR AMBIENT AIR SAMPLE

One outdoor ambient air sample will be collected over a 6-hour period on the same day as the other air samples. The sample canister will be positioned inside the Plant No. 1 fence. The samples will be identified as 360023-OA-1. In addition to the starting and ending vacuums, weather conditions (temperature, wind direction, precipitation) at the time of the sampling will be noted in the field data sheet.

CHAPTER 4

QA/QC PROTOCOLS

The Quality Assurance Project Plan (QAPP) for the sampling described in Chapter 3 is presented in Appendix A.

CHAPTER 5
HASP

Field work will be completed by two entities. Miller Environmental Services will construct the sub-slab vapor probes, including screening the locations for interference from sub-slab utilities, and will retain the analytical laboratory (Chemtech). HDR will collect the samples and otherwise interface with Chemtech.

The health and safety plan (HASP) for the investigation, taken from the HASP for O&M activities at the site, is presented in Appendix B.

CHAPTER 6

SCHEDULE AND REPORTING

The sampling will be conducted during the 2008 heating season (ending March 31 2008). The actual day for the sampling is contingent on the construction of the sub-slab vapor probes; however, sampling within one week following probe installation is anticipated. Approximately three weeks will be required to obtain the test report from the analytical laboratory. Laboratory data review/validation will be performed by HDR, and a data usability summary report (DUSR) will be prepared and included in the draft investigation report. Four weeks thereafter, HDR will submit a draft report on the investigation.

The report on the investigation will include copies of the field data sheets and laboratory report. A summary of the results will be provided with a comparison with applicable NYSDOH guidelines. The text of the report will include a synopsis of the sampling and a discussion of any deviations to this work plan that were required to complete the sampling. Recommendations will be provided for no further action, or if more action is warranted, additional investigation and/or mitigation.

CHAPTER 7

CITIZEN PARTICIPATION

No formal citizen participation activities are planned as part of the activities covered by this work plan. However, the owner and tenants will be notified of the pending work as part of the need to access the lease areas. The owner will be provided a copy of the laboratory results, in accordance with New York State law.

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN (QAPP)
FOR SUB-SLAB VAPOR INVESTIGATION

1.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This QAPP includes requirements for additional analyses beyond those required for the sub-slab vapor investigation that are applicable to the ongoing, long-term groundwater monitoring program, groundwater pump and treat system sampling, as well as any soil boring/sampling work that may be required. Portions of this QAPP may be updated, as appropriate, to cover the long-term monitoring program activities.

1.1 Organization

To ensure the successful completion of the project, each individual responsible for a given component of the project must be aware of the quality assurance objectives of his/her particular work and of the overall project.

At HDR, the project manager, Stuart Bassell, P.E., will be directly responsible to the client for the overall project conduct and quality assurance/quality control (QA/QC) for the project. The project manager will be responsible for overseeing all technical and administrative aspects of the project and for directing QA/QC activities through the Quality Assurance Officer (QAO), Dr. Bradley C. Williams. Reporting directly to the project manager will be the crew chief, to be assigned; laboratory coordinator, and health and safety officer (HSO), and any subcontractors. The HSO will be responsible for preparing a health and safety plan (HASP) and overseeing all health and safety aspects of the project. The QAO will coordinate his efforts directly with the project manager and will be responsible for the supervision of the laboratory subcontractors and data review. Subcontractors and HDR task staff in the areas of soil gas survey, soil borings/sampling, groundwater well installation/sampling, groundwater treatment system sampling, tank removal and sampling will be directed by the project manager.

1.2 QAO Responsibilities

The QAO reports directly to the project manager and is responsible for ongoing surveillance of project activities, for ensuring conformance to this Quality Assurance Project Plan (QAPP), and for evaluating the effectiveness of its requirements. The QAO has access to any personnel or subcontractors, as necessary, to resolve technical problems and take corrective action as appropriate and has the authority to recommend that work be stopped when that work appears to jeopardize quality. The QAO will be available to respond to immediate QA/QC problems. The primary responsibilities of the QAO are as follows:

- Monitor the correction of QC problems and alert task leaders to where similar problems might occur.

- Develop and maintain project QA files for sampling, monitoring, and field QA records.
- Participate in QA audits.
- Recommend changes to the project manager to improve the effectiveness of the project in attaining its QA objectives for field sampling and monitoring activities.
- Review proposed additions and changes to this QAPP.
- Review deliverables for technical content and quality objectives.

1.3 Organization of QA/QC Tasks

Project QA will be maintained under the direction of Dr. Williams, in accordance with this QAPP. QC for specific tasks will be the responsibility of the individuals and organizations listed below, under the direction of the QAO.

GENERAL RESPONSIBILITY	SCOPE OF WORK	RESPONSIBILITY OF QUALITY CONTROL
Field Crew Chief	Observation of probe installation, environmental sampling	Barry Babcock
Field Operations	Environmental sampling	To Be Assigned
Laboratory analyses	Analysis of soil vapor and ambient air samples by EPA Method TO-15	Chemtech (NYSDOH ELAP-Certified Laboratory)
Data review	Review for completeness and compliance	Dr. B.C. Williams

2.0 QUALITY ASSURANCE PROJECT PLAN OBJECTIVES

2.1 Overview

Overall project goals are defined through the development of Data Quality Objectives (DQOs), which are qualitative and quantitative statements that specify the quality of the data required to support decisions. DQOs, as described in this section, are based on the end uses of the data as described in the work plan. In this plan, "Quality Assurance" and "Quality Control" are defined as follows:

- Quality Assurance - The total integrated program for assuring reliability of monitoring and measurement data.

- Quality Control - The routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process.

2.2 QA/QC Requirements for Analytical Laboratory

This section includes requirements for additional analyses beyond those required for the sub-slab vapor investigation.

Samples will be analyzed by a New York State Department of Health (NYSDOH)-certified laboratory. Data generated from the laboratory will be used primarily to evaluate on-site contaminant levels in soil gas and air. The QA requirements for all subcontracted analytical laboratory work performed on this project are described below. QA elements to be evaluated include accuracy, precision, sensitivity, representativeness, and completeness. The data generated by the analytical laboratory for this project are required to be sensitive enough to achieve detection levels low enough to meet required quantitation limits as specified in NYSDEC Analytical Services Protocol (NYSDEC ASP, 07/2005). The analytical results meeting the required quantitation limits will provide data sensitive enough to meet the data quality objectives of this remedial program as described in the work plan. Reporting of the data must be clear, concise, and comprehensive. The QC elements that are important to this project are completeness of field data, sample custody, sample holding times, sample preservation, sample storage, instrument calibration and blank contamination.

2.2.1 ***Initial Instrument Calibration***. Calibration curves will be developed for each of the compounds to be analyzed. Standard concentrations and a blank will be used to produce the initial curves. The development of calibration curves and initial calibration response factors must be consistent with method requirements presented in the most recent version of NYSDEC ASP (07/2005).

For Target Analyte List (TAL) metals, an atomic absorption calibration curve is obtained with the use of a blank and at least three calibration standards which cover a range of concentrations appropriate for the sample, for each metal analyzed. One atomic absorption standard must be at the contract required quantitation limit (CRQL), with the exception of mercury. For ICP systems, the instrument will be calibrated according to the manufacturer's recommendations; at least two standards must be used. Results for the standards must be within $\pm$5% of the true value.

2.2.2 ***Continuing Instrument Calibration***. The initial calibration curve will be verified every 12 hrs by analyzing one calibration standard. The standard concentration will be the midpoint concentration of the initial calibration curve. The calibration check compound must come within 25% relative percent difference (RPD) of the average response factor obtained during initial calibration. If the RPD is greater than 25%, then corrective action must be taken as provided in the specific methodology.

TAL initial calibration curves will be verified by analyzing a standard at every wavelength used for a given analyte, at a frequency of 10% or every 2 hours during an analysis run, whichever is more frequent. The standard used for continuing calibration purposes will be at or near the mid-point concentration of the calibration curve. Deviations of the continuing calibration standards from the original curve must be within control limits specified by the methodology.

2.2.3 ***Method Blanks***. Method blank or preparation blank is prepared from an analyte-free matrix which includes the same reagents, internal standards and surrogate standards as the related samples. It is carried through the entire sample preparation and analytical procedure. A method blank analysis will be performed once for each 12 hr period during the analysis of samples for volatiles. An acceptable method blank will contain less than five (5) times the CRQL of methylene chloride, acetone, and 2-butanone. For all other target compounds, the method blank must contain less than or equal to the CRQL of any single target compound. For non-target peaks in the method blank, the peak area must be less than 10 % of the nearest internal standard. The method blank will be used to demonstrate the level of laboratory background and reagent contamination that might result from the analytical process itself.

2.2.4 ***Trip Blanks.*** Trip blanks consist of a single set of sample containers filled at the laboratory with deionized, laboratory-grade water. The water used will be from the same source as that used for the laboratory method blank. The containers will be carried into the field and handled and transported in the same way as the samples collected that day.

Analysis of the trip blank for VOCs is used to identify contamination from the air, shipping containers, or from other items coming in contact with the sample bottles. (The bottles holding the trip blanks will be not opened during this procedure.) A complete set of trip blanks will be provided with each shipment of samples to the certified laboratory.

2.2.5 ***Field Blanks.*** Field blank collection begins with two sets of identical bottles; one set filled with demonstrated analyte free water provided by the laboratory performing the sample analysis, and one empty set of bottles. At the field location, in an area suspected to be contaminated, the water is passed from the full set of bottles through the dedicated or field decontaminated sampling device(s) and into the empty set of bottles. This will constitute identical bottle to bottle transfer. Field blanks will be preserved in the same manner as samples.

Field blanks will be analyzed for VOCs when soil samples are being collected, and will be analyzed for the full set of parameters when water samples are being collected.

2.2.6 ***Duplicate Analyses***. Duplicate samples are two or more samples considered representative sub-samples of the same source. The samples are identically processed through the measurement system. A soil vapor field duplicate (blind duplicate) will be analyzed for the appropriate parameters. Laboratory duplicate analyses will be performed on liquid and solid matrices at a rate of one for every twenty field samples in a batch or one for every batch of field samples (whichever is more frequent). The results of the duplicate analyses will be used to assess the precision of the measurement systems. Duplicate samples will be collected and analyzed for the full set of parameters.

2.2.7 ***Surrogate Spike Analysis***. For organic analyses, all samples and blanks will be spiked with surrogate compounds before purging or extraction in order to monitor preparation and analyses of samples. Surrogate spike recoveries shall fall within the advisory limits in accordance with the NYSDEC ASP protocols for samples falling within the quantitation limits without dilution.

2.2.8 ***Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank (MS/MSD/MSB) Analysis***. MS, MSD and MSB analyses will be performed to evaluate the matrix effect of the sample upon the analytical methodology along with the precision of the instrument by measuring recoveries. The MS/MSD/MSB samples will be analyzed for each group of samples of a similar matrix, at a rate of one for every 20 field samples. The RPD will be calculated from the difference between the MS and MSD. Matrix spike blank analysis will be performed to indicate the appropriateness of the spiking solution(s) used for the MS/MSD. MS/MSD analyses will be performed for the full set of parameters.

2.2.9 ***Ambient Air Sample.*** An ambient air sample will be collected at each sub-slab vapor sample collection area during sub-slab vapor sampling. The ambient air samples will be collected using a Summa canister in the same manner as the sub-slab vapor samples and analyzed for the same parameters.

2.3 Accuracy

Accuracy is defined as the nearness of a real or the mean (x) of a set of results to the true value. Accuracy is assessed by means of reference samples and percent recoveries. Accuracy includes both precision and recovery and is expressed as percent recovery (% REC). The MS sample is used to determine the percent recovery. The matrix spike percent recovery (% REC) is calculated by the following equation:

$$\%\ REC = \frac{SSR - SR}{SA} \times 100 \qquad \textbf{2-1}$$

where:

SSR = spike sample results
SR = sample results
SA = spike added from spiking mix

2.4 Precision

Precision is defined as the measurement of agreement of a set of replicate results among themselves without assumption of any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analyses.

Analytical precision is expressed in terms of RPD. The RPD is calculated using the following formula:

$$RPD = \frac{D_1 - D_2}{(D_1 + D_2)/2} \times 100 \qquad \textbf{2-2}$$

where:

RPD = relative percent difference
D_1 = first sample value
D_2 = second sample value (duplicate)

2.5 Sensitivity

The sensitivity objectives for this plan require that data generated by the analytical laboratory achieve quantitation levels low enough to meet the required detection limits specified by NYSDEC ASP and to meet all site-specific standards, criteria and guidance values (SGCs) established for this project. All the appropriate quantitation limits and SGCs are presented in Table 2-1.

TABLE 2-1
QUANTITATION LIMITS AND SGCs

PARAMETER	METHOD REQUIRED DETECTION LIMITS	SCG
VOCs	1 ppbv 6L canisters	EPA 2002/NYSDOH

NYSDOH – air guidelines for specific VOCs including tetrachloroethene or PCE (100 ug/m^3), methylene chloride (60 ug/m^3), and trichloroethene or TCE (5 ug/m^3).
See attached Chemtech SOP for detection limits for specific compounds.

2.6 Representativeness

Representativeness is a measure of the relationship of an individual sample taken from a particular site to the remainder of that site and the relationship of a small aliquot of the sample (i.e., the one used in the actual analysis) to the sample remaining on site. The representativeness of samples is assured by adherence to sampling procedures described in the investigative work plan.

2.7 Completeness

Completeness is a measure of the quantity of data obtained from a measurement system as compared to the amount of data expected from the measurement system. Completeness is defined as the

percentage of all results that are not affected by failing QC qualifiers, and should be between 70 and 100% of all analyses performed. The objective of completeness in laboratory reporting is to provide a thorough data support package. The laboratory data package provides documentation of sample analysis and results in the form of summaries, QC data, and raw analytical data. The laboratory will be required to submit data packages that follow NYSDEC ASP reporting format which, at a minimum, will include the following components:

1. All sample chain-of-custody forms.

2. The case narrative(s) presenting a discussion of any problems and/or procedural changes required during analyses. Also presented in the case narrative are sample summary forms.

3. Documentation demonstrating the laboratory's ability to attain the contract specified detection limits for all target analytes in all required matrices.

4. Tabulated target compound results and tentatively identified compounds.

5. Surrogate spike analysis results (organics).

6. Matrix spike/matrix spike duplicate/matrix spike blank results.

7. QC check sample and standard recovery results.

8. Blank results (field, trip, and method).

9. Internal standard area and RT summary.

2.8 Comparability

Comparability is the degree to which analytical data generated from an individual laboratory can be compared with those from another laboratory, in terms of use of standardized industry methods and equivalent instrumentation techniques. No split samples are expected to be taken for this project.

3.0 FIELD EQUIPMENT CALIBRATION AND MAINTENANCE PROCEDURES

Calibration of all field equipment used by HDR will follow manufacturer instructions. The calibration of each instrument will be checked prior to each day's use. Date and time of the calibration check, serial and model number, and signature of the calibrating technician will be entered into the field logbook. If the instrument readings are incorrect, the instrument will be either recalibrated by the technician or returned to the HDR warehouse. At the warehouse, the technical equipment coordinator will calibrate and/or repair the instrument as necessary. For major overhauls, the instruments will be returned to the manufacturer.

Preventive maintenance of field equipment is performed routinely before each sampling event; more extensive maintenance is performed based on hours of use. The HDR equipment coordinator under the supervision of the laboratory director has overall responsibility for the preventive maintenance program. Routinely, manually operated sampling equipment is checked to ensure it operates properly and that excessive wear has not occurred. If necessary, equipment is taken out of service for repair or replacement.

4.0 SAMPLE CUSTODY

4.1 Overview

The handling of samples in the field and in the laboratory will conform to the sample custody procedures presented in this section. Field custody procedures involve proper sample identification, chain-of-custody forms, and packaging and shipping procedures. Laboratory custody begins with the receipt of samples at the laboratory and continues through sample storage, analysis, data reporting, and data archiving. This section provides the procedures that will be followed during the course of the project to ensure proper sample custody.

4.2 Field Custody Procedures for Off-Site Laboratory

The following elements are important for maintaining the field custody of samples:

- Sample identification
- Sample labels
- Custody records
- Shipping records
- Packaging procedures

Sample labels will be attached to all sampling bottles before field activities begin; each label will contain an identifying number. Each number will have a suffix that identifies the site and where the sample was taken.

Approximate sampling locations will be marked on a map with a description of the sample location. The number, type of sample, and sample identification will be entered into the field logbook.

A chain-of-custody form, initiated at the analytical laboratory, will accompany the sample bottles from the laboratory into the field. Upon receipt of the bottles and cooler, the sampler will sign and date the first "Received" blank space. After each sample is collected and appropriately identified, entries will be made on the chain-of-custody form that will include:

- Site name and address
- Samplers' names and signatures
- Names and signatures of persons involved in chain of possession

- Sample number
- Number of containers
- Sampling station identification
- Date and time of collection
- Type of sample and the analyses requested
- Preservatives used (if any)
- Pertinent field data (PID/FID, etc.)

After sampling has been completed, the sampler will return the samples to the laboratory. The sampler will sign and date the next "Relinquished" blank space. One copy of the custody form will remain in the field and the remaining copies will accompany the samples to the laboratory. All samples will be received by the laboratory within 24 hrs of collection. Samples will be received by laboratory personnel, who will assume custody of the samples and sign and date the next "Received" blank.

4.3 Laboratory Custody Procedures

Upon receipt by the analytical laboratory, samples will proceed through an orderly processing sequence specifically designed to ensure continuous integrity of both the sample and its documentation.

All samples will be received by the laboratory's sample control group and will be carefully checked for label identification and completed accurate chain-of-custody records. The sample will be tracked from storage through the laboratory system until the analytical process is completed and the sample is returned to the custody of the sample control group for disposal. Generally, access to NYSDOH-certified laboratories is restricted to prevent any unauthorized contact with samples, extracts, or documentation.

5.0 ANALYTICAL PROCEDURES

Analytical procedures to be used are presented below. A summary of the analyses to be performed on the environmental and QA/QC samples collected at the site is included in Tables 5-1 and 5-2. Containers, preservatives, and holding times relevant to this project are listed in Table 5-3.

TABLE 5-1
ANALYTICAL SUMMARY TABLE

SUBTASK	MATRIX	ESTIMATED No. OF SAMPLES	ANALYSES	PROTOCOL	METHOD
soil gas/air	air	12	VOCs	ASP	TO-15

TABLE 5-2
QC ANALYSES SUMMARY TABLE

SUBTASK	PARAMETERS	ANALYSES*	QUANTITY
soil gas/air	field duplicate	VOCs	1

* Protocol and methods: as listed in Table 5-1 for the related environmental samples.

TABLE 5-3
CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

PARAMETER	CONTAINER	PRESERVATIVE	MAXIMUM HOLDING TIME
VOCs	6-L Summa canister	--	30 days

5.1 Laboratory Analyses

This section includes requirements for additional analyses beyond those required for the sub-slab vapor investigation. Soil samples will be analyzed by the NYSDEC ASP laboratory for VOCs by NYSDEC ASP Method 8260B, SVOCs by NYSDEC ASP Method 8270C, PCBs by NYSDEC ASP Method 8082, Target Analyte List (TAL) metals by NYSDEC ASP Methods 6010B and 7470A. If any modifications or additions to the standard procedures are anticipated, and if any nonstandard sample preparation or analytical protocol is to be used, the modifications and the nonstandard protocol will be explicitly defined and documented. Soil vapor and air samples will be analyzed for VOCs by EPA Method TO-15. Groundwater samples will be analyzed for VOCs by the NYSDEC ASP Method 8260B, SVOCs by NYSDEC ASP Method 8270C, PCBs by Method 8082, and TAL by Methods 6010B and 7470A. Prior approval by HDR's QAO is necessary for any nonstandard analytical or sample preparation protocol used by the laboratory, i.e., dilution of samples or extracts by greater than a factor of five (5).

6.0 DATA REDUCTION, REVIEW, AND REPORTING

6.1 Overview

The process of data reduction, review, and reporting ensures that assessments or conclusions based on the final data accurately reflect actual site conditions. This plan presents the specific procedures, methods, and format that will be employed for data reduction, review, and reporting of each measurement parameter determined in the laboratory and field. Also described in this section is the process by which all data, reports, and work plans are proofed and checked for technical and numerical errors prior to final submission.

6.2 Data Reduction

Data reduction is the process by which raw analytical data generated from the laboratory instrument systems is converted into usable mass concentrations. The raw data, which may take the form of area counts, instrument responses, or observations, is processed by the laboratory and converted into concentrations expressed in μg/kg for soil samples, ug/l for water samples, and ug/m^3 for air/vapor samples. The analytical laboratory will be required to follow ASP data reduction procedures.

Field data obtained during sampling is summarized on appropriate field forms. This information will be used to assess field conditions at the time of sampling and is summarized and analyzed along with the chemistry data in the final report. Occasionally, the reduction of actual field data requires correcting measurement data for the measurement system's baseline value. The data will be adjusted only after the raw data has been submitted to HDR's QAO and prior to preparation of the final report.

6.3 Review

HDR's QAO will review the data prior to use in the reports. The QAO will evaluate the analytical laboratory's ability to meet the DQOs.

6.3. ***Field Data***. Data collected and/or reduced in the field will be reviewed initially for correctness of format, calculation, and completeness by the crew chief. The criteria used to review field data will include the following:

- Checking to see that inventory and station numbers are correct
- Checking to see that specified sampling and preservation methods (if used) were followed
- Verifying that sufficient sample volume is collected to conduct requested analyses
- Noting any anomalies or unusual circumstances in the data sampling and collection
- Verifying that calibration procedures were followed

- Verifying that data are reported in correct units
- Checking 100% of all field calculations
- Verifying that samples were properly shipped with the appropriate chain-of-custody documentation
- Verifying that QC samples were prepared and taken

Further review of such data will be performed by the HDR crew chief prior to data integration and evaluation. All assigned data reduction or analytical procedures will be verified for accuracy and content by at least two professionals qualified and experienced in evaluating the particular technical specialty.

6.3.2 ***Laboratory Data***. The QAO or designee, under the QAO's supervision, will review each analytical data package for completeness (i.e., have all the analyses requested been performed?) and general protocol compliance, such as holding times, detection limits, spike recoveries, and surrogate recoveries. The results of this review will be summarized and included in the final report. If information is found to be missing from the data package the analytical laboratory will be contacted and requested to submit any lacking information.

6.3.3 ***Usability Report***. Upon completion of data review, HDR's QAO will prepare a data usability summary report (DUSR) consistent with NYSDEC's "Guidance for the Development of Data Usability Summary Reports." The DUSR will determine whether the final results can be used as reported, qualified to indicate limitations, or rejected outright. DUSRs are required for all final contamination delineation samples and post-remediation endpoint/confirmatory samples.

6.4 Reporting

6.4.1 ***Field Data Reporting***. All field real-time measurements and observations will be recorded in project logbooks or field data records. Field measurements will include FID and/or PID. All data will be recorded directly and legibly into field logbooks, with all entries signed and dated. If entries are changed, the change will not obscure the original entry. The reason for the change will be stated, and the correction and explanation will be signed and dated at the time the correction is made. Field data records will be organized into standard formats whenever possible, and retained in permanent files.

6.4.2 ***Laboratory Data Reporting***. All sample data packages submitted by the analytical laboratory for final contamination delineation samples and post-remediation endpoint/confirmatory samples and the initial round of sub-slab/indoor air/outdoor air sampling will be required to be reported in conformance to the NYSDEC ASP (07/2005), Category B data deliverable requirements as applicable to the method utilized. Packages for sampling conducted under the Routine Monitoring Plan (pump & treat O&M, groundwater monitoring, etc.) are data-only.

6.5 Data Usage

The data will be used to determine the concentration of VOCs in the sub-slab and air media associated with the site.

7.0 INTERNAL QUALITY CONTROL

7.1 Overview

QC checks will be performed to ensure the collection of representative and valid data. Internal QC refers to all data compilation and contaminant measurements. QC checks will be used to monitor project activities to determine whether QA objectives are being met. All specific internal QC checks to be used are identified in this section.

7.2 Laboratory Quality Control

This section includes requirements for additional analyses beyond those required for the sub-slab vapor investigation.

The analytical laboratory is required to exercise internal control in a manner consistent with the requirements of this plan. Control checks and internal QC audits are required by the NYSDEC ASP methods. These include reference material analysis, blank analysis, MS/MSD analysis, cleanups, instrument adjustments and calibrations, standards, and internal audits.

The laboratory will perform the QC checks with the following frequency:

- Reagent and method blanks will be analyzed at a rate of one per batch.
- One MS and one MSD will be analyzed per 20 samples.
- Performance evaluation samples will be analyzed at a rate of once per calendar quarter.

Chemtech's SOP is attached.

7.3 Field Quality Control

On each day of field sampling, approximately 5% of all field measurements will be checked by duplicate measurement. The crew chief will spot-check sampling procedures and containers to check against possible contamination. The crew chief will double-check that all sample containers are properly sealed and labeled and that all field forms, including the chain-of-custody forms, are properly completed, dated, and signed.

After field work is completed, a comparison of equipment blank data will be used to check on the quality of the field work. Also, the results of duplicate and spiked samples will be used to check on the accuracy of sampling techniques. If the QAO and crew chief find that corrective action is needed, such action will be implemented immediately. If the analysis of equipment rinseate blanks indicates extensive contamination, resampling may be necessary.

7.4 Office Quality Control

7.4.1 ***Technical Checks.*** One qualified professional will proof and check all final reports for technical errors and/or inconsistencies. Twenty percent of all final reports will be subsequently checked again by a qualified professional. Checks will be made of all references and protocols cited to ensure they are correct. Procedural descriptions will be reviewed to ensure they are accurate with referenced protocol.

7.4.2 ***Numerical Checks***. One qualified professional will proof and check all final reports for transcription and/or calculation errors. Twenty percent of all final reports will be subsequently checked again by a qualified professional. All data tables will be checked to ensure no transcription errors have occurred. Data tables will also be checked to see that any criteria cited for comparison purposes is appropriate and correctly referenced. All calculations will be checked to ensure that they will be properly presented and that resulting values are achievable. If any results cannot be duplicated the calculations will be independently checked for accuracy.

8.0 PERFORMANCE AND SYSTEMS AUDITS

Performance audits, when performed, will be used to monitor project activities to assure compliance with project DQOs. The following text summarizes the field audits that are conducted periodically.

8.1 Field Audits

Internal audits of field activities are periodically conducted by HDR. Where subcontractors are used for field activities, HDR will assume overall responsibility for the field procedures used. All field activities will be routinely monitored by the HDR on-site crew chief to ensure that work is done correctly. Field audits will be periodically conducted by HDR's QAO to ensure that appropriate procedures are being utilized by all crews. All sampling and analyses work will be reviewed routinely by the crew chief in charge of the particular task. All data sheets obtained in the field will be initialed and dated by crew chief after review and acceptance of the services performed.

If a field audit is required, it will include monitoring and evaluation of sample collection, sample holding times, preservation techniques, field QC, and equipment calibration. These audit forms will be kept on file with HDR's QAO for one year after completion of the project, then will be transferred to storage and held for an additional five years.

9.0 ANALYTICAL CORRECTIVE ACTION

9.1 Laboratory Corrective Action

Corrective actions will be implemented if unsatisfactory performance and/or system audit results indicate that problems exist. Corrective action may also be implemented if the results of a data assessment or internal QC check warrant such action.

Instances of nonconformance identified in internal audits or by data assessments will be addressed by taking corrective action. Such action(s) will be initiated by the analytical laboratory QA manager who is responsible for assessing the action for its appropriateness and completeness. The QA manager will also be responsible for filing a noncompliance report to laboratory management. QC charts will be used to monitor day-to-day variations in precision and accuracy.

Short-term corrective actions will be initiated as a result of malfunctioning equipment or improper use of analytical methodologies. Long-term actions will be initiated through the laboratory QAO who assigns personnel to investigate the problem. A series of evaluations will then follow to assure the action is appropriate and the results complete.

9.2 Field Corrective Action

In the event a field audit is conducted by HDR's QAO, instances of nonconformance will be identified and reported to the HDR project manager, who will initiate corrective actions, if necessary. These actions can range from altering solvent washes used in decontamination to changing the sampling strategy to obtain representative samples. The project QAO and the project manager will have the ability to stop all work if audit results warrant such action.

10.0 REPORTS TO MANAGEMENT

10.1 Overview

An important aspect of the QA/QC program is the communication between the QA department and upper management. Regular appraisal by management of the quality aspects related to data gathering efforts will provide the mechanism whereby the established objectives will be met.

Reports to management will include:

- Periodic assessment of measurement data accuracy, precision, and completeness
- Results of performance audits
- Results of system audits
- Significant QA/QC problems and recommended solution
- Resolutions of previously stated problems

10.2 Laboratory

Laboratory noncompliance reports will be filed with the laboratory project manager. These reports will include a summary of accuracy and precision data, quality problems, and the status of any corrective actions implemented.

Meetings will be held between the laboratory management and the laboratory QA personnel to alert the appropriate staff of problems needing corrective action. The laboratory will submit a case narrative with each set of sample analyses. The narrative will describe any QA/QC problems encountered during sample analysis and any corrective actions taken by the laboratory.

10.3 Field Activities

HDR will be responsible for documenting the results of all field audits. Audit results will be documented in the logbook for field audits. Status reports will be periodically submitted to describe the progress of the project. These will include compiled field data sheets, schedule corrective action documentation at appropriate intervals, and progress of the actions.

11.0 ATTACHMENTS

Chemtech's SOP for TO-15 analysis is attached.

QA Control Code: A2070131

SOP Name:	Determination of Volatile Organic Compounds in Air by method TO-15
SOP ID:	MTO15-Air VOC-05
Revision #:	05
Date Created:	October 11, 2004
Reviewed Date:	December 19, 2005
Effective Date:	December 19, 2005
Reason for Revision:	standard and compound list update.
SUPERCEDS:	MTO15-Air VOC-04

Approvals:

_____	_____
QA/QC Director	Date
_____	_____
Technical Director	Date

DETERMINATION OF VOLATILE ORGANIC COMPOUNDS IN AIR BY EPA METHOD TO-15

1. Test Method

1.1 Determination of Volatile Organic Compounds in Air by EPA method TO-15.

2. Applicable Matrices

2.1 Air

3. Detection Limit

3.1 0.1-1.0ppbv

4. Scope and Application

4.1 This method covers the procedure for the measurement Volatile Organic compounds. See table 1.

4.2 This method applies to ambient concentrations of VOCs above 0.1 ppbv and typically requires VOC enrichment by concentrating up to one liter of a sample volume.

4.3 The method applies under most conditions encountered in sampling of ambient air into canisters.

4.4 Tedlar bags also may be analyzed using this method

5. Summary

5.1 The Air sample is introduced into a specially prepared stainless steel canister.

5.2 After the sample is collected, the canister valve is closed and identification tag is attached to the canister. The canister is transported to the laboratory for analysis.

5.3 Once in the laboratory the canister data is recorded and the canister is stored until analysis.

5.4 The analysis consist of a known volume of sample directed from the canister through a solid multisorbent concentrator. To reduce the water content of the sample a dry purge with helium is applied to the concentrator.

5.6 The VOCs are thermally desorbed into a multisorbent trap. Then thermally desorbed into the GC/MS for analysis.

6. Definitions

6.1 Analyst: the designated individual who performs the “hands-on” analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality.

6.2 Batch: Environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents.

6.2.1 Preparation Batch: is composed of one to 20 environmental samples of the same matrix, meeting the above-mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours.

6.2.2 Analytical Batch: is composed of prepared environmental samples (extracts, digestates or concentrates), which are analyzed together as a group. An analytical

batch can include prepared samples originating from various environmental matrices and can exceed 20 samples.

6.3 Blank: A sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis the blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results.

6.4 Corrective Action: The action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence.

6.5 Duplicate Analyses: The analysis or measurements of the variable of interest performed identically on two sub-samples of the same sample. The results from duplicate analyses are used to evaluate analytical or measurement precision but not the precision of sampling, preservation or storage internal to the laboratory.

6.6 Holding Times (Maximum Allowable Holding Times): The maximum times that samples may be held prior to analysis and still be considered valid or not compromised.

6.7 Method Blank: A sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest, which is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations tat impact the analytical results for sample analyses.

6.8 Preservation: Refrigeration and/or reagents added at the time of sample collection (or later) to maintain the chemical and/or biological integrity of the sample.

6.9 Pure Reagent Water: Water (defined by national or international standard) in which no target analytes or interferences are detected as required by the analytical method.

6.10 Standard: The document describing the elements of laboratory accreditation that has been developed and established within the consensus principles of NELAC and meets the approval requirements of NELAC procedures and policies.

6.11 Standard Operating Procedures (SOPs): A written document which details the method of an operation, analysis or action whose techniques and procedures are thoroughly prescribed and which is accepted as the method for performing certain routine or repetitive task.

6.12 Test Method: An adoption of a scientific technique for a specific measurement problem, as documented in a laboratory SOP.

6.13 Volatile Organic Compound: Any compound containing carbon and hydrogen or containing carbon and hydrogen in combination with any other element which has a vapor pressure of 1.5 psi absolute (77.6 mm Hg) or greater under actual storage conditions.

6.14 Verification: confirmation by examination and provision of evidence that specified requirements have been met.

6.15 Absolute Canister Pressure (PgtPa)-gauge pressure in the canister (kPa, psi) and Pa = barometric pressure.

6.16 Absolute Pressure-pressure measured with reference to absolute zero pressure (as opposed to atmospheric pressure), usually expressed as kPa, mm Hg or psig.

6.17 Cryogen-a refrigerant used to obtain very low temperatures in the cryogenic trap of the analytical system. A typical cryogen is liquid nitrogen (bp. -195.8^{o}C) or liquid argon (bp. -185.7 ^{o}C).

6.18 Dynamic Calibration-calibration of an analytical system using calibration gas standard concentrations in a form identical or very similar to the samples to be analyzed and by introducing such standards into the inlet of the sampling or analytical system in a manner very similar to the normal sampling or analytical process.

6.19 Gauge Pressure-pressure measured above ambient atmospheric pressure (as opposed to absolute pressure). Zero gauge pressure is equal to ambient atmospheric (barometric) pressure.

6.20 GC/MS SCAN-the GC is coupled to a MS programmed in the SCAN mode to scan all ions repeatedly during the GC run. As used in the current context, this procedure serves as a qualitative identification and characterization of the sample.

7. Interferences

7.1 Chloromethane and Vinyl Chloride can display peak broadening and co-elution with other species if the compounds are not delivered to the GC column in a small volume of carrier gas.

7.2 Interferences in canister samples may result from improper use or from contamination of the canisters, the canister cleaning apparatus and the sampling or analytical system.

8. Safety

8.1 Wear appropiate safety clothing and eye protection.

8.2 Use protective gloves when handling corrosive chemicals

8.3 Always use safety carts when transporting large bottles of chemicals.

8.4 Read material safety data sheet (MSDS) for the chemical used in the laboratory for the identity of the ingredients, the physical and chemicals characteristics of the substance, the physical hazards, and safe handling and safety precautions.

9. Equipment and Supplies

9.1 Sample containers

- 9.1.1 6 Liter passivated (have an inert coating) Summa Canisters. Restek Catalog # 24157 or equivalent.
- 9.1.2 1.4 Liter Summa Canisters
- 9.1.3 3.0L Summa Canisters
- 9.1.4 Tedlar bags

9.2 Syringes

- 9.2.1 50 mL glass gas-tight with shut-off valve – Restek Catalog #009670
- 9.2.2 25 µL (RESTEK Corp Catalog #24722) and 100 µL (RESTEK Corp Catalog #81300) glass gas-tight microsyringes.

9.3 Glass Septum capped bulb 2.0

9.4 Air Instrument

- 9.4.1 Entech 7500 Head Space autosampler with 3 channel temperature controller
- 9.4.2 Entech 7100A pre-concentrator
- 9.4.3 Entech 7016 CA autosampler

9.5 Gas Chromatograph:

9.5.1 GC used for analysis is a Hewlett Packard 5890 or 6890.

- GC column is a 60m capillary column with a 1.0-micron film thickness from JW Scientific Cat # 1231063 or equivalent.
- The interface between the GC and MS systems is a direct one with a portion of the carrier flow being split off at the injection port.

9.9 Mass Spectrometer:

9.9.1 Hewlett Packard 5970 and 5975 mass selective detectors are used for this method.

9.9.2 The models scans from 35-300 amu every 1-second or less, utilizing 70 volts (nominal) electron energy in the electron impact ionization mode.

9.9.3 The MS used is capable of producing a mass spectrum which meets all instrument performance criteria Table 2 when 50 ng of p-Bromofluorobenzene (BFB) is introduced through the GC inlet.

9.10 Data Systems:

9.10.1 Hewlett Packard Enviroquant Software, Aug. 2003 Edition is used to view, evaluate, quantitate and print the data.

9.10.2 Mass spectral library, 2002, from HP Analytical NIST MS Spectral Database that contains 125,000 reference compounds that are used in tentative identification of unknown peaks.

9.10.3 Store all GC/MS data on backup server for five years, so that it may be retrieved as needed once the hard disk has been cleared.

9.11 Mass Flow Controller System: Tylan Mass Flow Controller Model FC-280s with a Dyna Mass Model KM-4 controller.

9.12 Absolute Pressure Gauge: Wallace and Tiernan Model 61C-1A-0030.

9.13 Canister Cleaning Assembly:

- Stainless steal, custom made eight canister plumbing unit.
- Edwards vacuum pump
- Precision Scientific Mechanical Convention Oven Model 645

9.14 Tenax Tube- 16mm Supelco or equivalent

10. REAGENTS AND STANDARDS

10.1 Reagents:

10.1.1 Water- analyte free. Generated by boiling deionized water and transferring the hot water to a clean glass jar for cooling before use.

10.1.2 Methanol- purge and trap grade. Used in the preparation of stock standards - JT Baker Catalog #9077-02. or equivalent.

10.1.3 UHP Nitrogen

10.2 Standards and Solutions:

10.2.1 Internal Standard/Surrogate Mix-Spectra Gases 1.0ppm
Bromochloromethane
1-Bromo-4-fluorobenzene
1,4-Difluorobenzene

Chlorobenzene-d5

Prepare a 100ppbv in Nitrogen by taking 2PSIA to a 6Liter canister diluted with Nitrogen to 20PSIA.

10.2.2 Calibration Standard

10.2.2.1 Calibration stock standard

Restek Cat # 34425, 25 compounds at 100ppb each

Restek Cat # 34421 39 compounds at 100ppb each. Additional compounds standards may be purchased if necessary for any specific project.

10.2.3 Calibration mix

Prepare as follows:

Standard Concentration	Amount used from 100ppb stock	Final volume (dilute with nitrogen)
25ppbv	7.5 PSIA and 80uL of water	30 PSIA
2.0ppbv	0.6 PSIA and 80uL of water	30 PSIA

From this standard, prepare a five level calibration curve using the following amount. (This standard are subject to change)

Standard concentration	Amount from 25 ppbv working standard	Concentration of Stock	Amount from 10ppbv internal/ surrogate standard
0.1ppbv	20mL	2.0	100mL
0.2ppbv	40mL	2.0	100mL
0.5ppbv	100mL	2.0	100mL
1.0ppbv	200mL	2.0	100mL
2.0ppbv	400mL	2.0	100mL
5.0ppbv	80mL	25.0	100mL
10.0ppbv	160mL	25.0	100mL
20.0ppbv	320mL	25.0	100mL
I Blank-BFB	N/A		100mL

11. Sample Collection, Shipment, and Storage

- Obtain a clean, evacuated and tagged 6 Liter SUMMA Canister, 3L Summa Canister or a 1.4L canister from the laboratory.

- Follow all external and internal chain of custody procedures during the transportation of the canister.
- Once at the area whose ambient air is to be tested, open the canister by turning the valve on the top of the canister counter clockwise.
- The sampler should hear a hissing sound associated with the ambient air going into the canister.
- Firmly close the canister by turning the valve clockwise.
- Record all information about the location of the site on the chain of custody or other field notebook.
- Immediately return the sample (canister) to the laboratory.
- Store samples at ambient temperature.
- Analyze all samples within 30 days of sampling date.
- Analyze Tedlar bags within 48 hours of sampling.

12. Quality Control

12.1 BFB-MS Tuning Check Compound

12.1.1 Analyze daily to verify instrument performance.

12.1.2 Spectrum produced must meet criteria outlined in Table 2.

12.2 Initial Calibration

12.2.1 Analyze a minimum of 5 concentration levels: 0.1 to 20ppbv for regular targeted compounds.

12.2.2 Lowest initial calibration concentration must be near MDL. The rest of the concentration levels must define the linear range of this method.

12.2.3 Assure that % Relative Standard Deviation (%RSD) criteria are met. The acceptance criterion is listed in Section 13 of this SOP.

12.3 Continuing Calibration

12.3.1 Analyze each day to verify initial calibration.

12.3.2 Recovery of each analyte must meet acceptance criteria in Section 13.3.3.

12.4 Method Blanks**:**

12.4.1 Analyze immediately after the calibration standards each day.

12.4.2 Analyze a method blank after calibration standards to insure that the system is free from carry-over or any other interferences.

12.4.3 Make sure method blank meets criteria listed in Section 18.4.

12.5 Accuracy and Precision

12.5.1 Each analyst must perform an initial, one time demonstration of accuracy and precision. Documentation must be delivered to the QA officer for inclusion in personnel folder.

12.5.2 Prepare four aliquots of a 5 ppbv QC check sample from a source other than that used for calibration.

12.5.3 Analyze these four aliquots under the same conditions used for sample analysis.

12.5.4 Calculate the average recovery (X) in µg/L and the standard deviation of the recovery (S) for each analyte.

12.5.5 X should be between 70 and 130 % and S should be less than 20%. If X and S meet criteria for all analytes, begin sample analysis.

12.5.6 If any individual X or S fails, repeat the entire procedure, or repeat it only for the analytes that failed.

12.5.7 Repeated failure for a particular analyte indicates a system or training problem which requires further attention.

12.6 Method Detection Limits

12.6.1 Determine MDL by analyzing seven replicate standards each containing analytes at a concentration of 0.2ppbv.

12.6.2 After analysis, down load the data to a personal computer where Excel and use standardized MDL templates to perform the statistical calculations.

12.6.3 Calculate the MDL by determining the standard deviation of the values and multiplying by the "t" value of 3.143.

12.6.4 The calculated MDL must be below the quantitation limits for the method. If they are not, the data is reviewed again for possible sources of error and the procedure will be repeated.

12.6.5 Perform an MDL study annually for all normally targeted compounds or when conditions change (different column installed).

12.6.6 Perform an MDL study for extra targeted compounds as required.

12.6.7 Standard templates for MDL calculations are mandatory for use, and available from the QA officer.

13. Calibration and Standardization

13.1 GC/MS Tuning and Performance Check

13.1.1 Prior to the analysis of calibration standards, tune the GC/MS system using 4-BFB.

13.1.2 Tune the mass axis and abundance scales such that the analysis of the instrument performance check solution (BFB) meet the criteria outlined in Table 2.

13.1.3 Retune the MS and reanalyze the BFB if the spectrum does not meet criteria.

13.1.4 Analyze the BFB solution daily to verify acceptable instrument performance.

13.1.5 Do not make any adjustment to the system once an acceptable BFB has been acquired, instrumental conditions must remain the same throughout the calibration and sample analyses.

13.2 Initial Calibration

13.2.1 After tuning criteria has been met, analyze an initial calibration consisting of 5 calibration standards at the following levels: 0.1, 0.2, 0.5, 1.0,2.0, 5.0, 10ppbv and 20ppbv.

13.2.2 Tabulate the area response of the characteristic ions against the concentration for each target analyte and each internal standard.

13.2.3 Calculate response factors (RF) for each target analyte relative to one of the internal standards.

13.2.4 The RF is calculated as follows:

$$RF = \frac{A_s \times C_{is}}{A_{is} \times C_s}$$

where:
A_s = Peak area of the analyte or surrogate
A_{is}= Peak area of the internal standard
C_s = Concentration of the analyte or surrogate
C_{is}= Concentration of the internal standard

13.2.5 Calculate the %RSD for all target analytes from the initial calibration.

$$\%RSD = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100$$

13.2.6 The %RSD should be less than 30% for each target analyte.

13.2.6.1 Up to two compounds may fail to meet 30% criteria but must be below 40%.

13.2.7 If this criterion is not met, check instrument conditions and analyze a new initial calibration.

13.2.8 If the %RSD of any target analyte is less than 30% it is assumed to be constant over the calibration range, and the average response factor may be used for quantitation.

13.2.9 If the client requests extra target compounds the curve for these compounds will be deemed acceptable only when a 30% RSD is achieved over the 5 initial calibration responses factors.

13.2.10 For compounds exceeding 30% RSD linear regression maybe used if correlation coefficient is $\geq$ 0.995 or r^2 is $\geq$ 0.99

13.3 Continuing Calibration

13.3.1 Analyze a BFB. Make sure it meets criteria listed in Table 2.

13.3.2 Analyze a midrange standard (10ppbv) every 24 hours.

13.3.3 The acceptance criteria for the %D for each compound is $\pm$30%.

14. Procedure

14.1 Obtain the current GC/MS VOA Laboratory Instrument Logbook for instrument MSVOAM, fill it out with all of the required information.

14.2 Allow all standards to warm to ambient temperature prior to use.

14.3 Rinse all syringes to be used with nitrogen prior to use.

14.4 BFB Tuning

14.4.1 Analyze the BFB standard by injecting 100mL of 10ppbv Internal/ Surrogate solution from a 6L canister.

14.4.2 Analyze the BFB as follows:

- Click on the instrument icon.
- Edit sequence to run BFB
- Click on OK
- Click on run sequence
- Wait for instrument to complete the run

14.4.3 Use the HP ChemStation software to acquire the spectrum of BFB in the following manner:

- Integrate m/z 95 (the major ion of BFB) to find the max scan or apex of the peak.
- Average three scans; the max scan and the scans immediately before and after the max.

Note: Background subtract, must be a scan chosen before the elution of the BFB peak but no more than 20 scans from the beginning of the BFB peak.

14.4.4 Check the resulting spectrum; it must meet the ion abundance criteria outlined in Table 2.

14.5 Initial Calibration

14.5.1 After tuning criteria has been met, initially calibrate the GC/MS system at five levels (Section 13.2).

14.5.2 Analyze all standards, blanks, and samples using the following steps:

- Click on the instrument icon.
- Click on Edit sequence to run the curve
- Click on OK
- Click on run sequence
- Wait for instrument to complete the run

14.5.3 Use the following temperature program for the instrument :

Initial Temperature	40°C
Initial Hold	2 min
Rate A	6°C/min
Temperature A	150°C
Hold A	0
Rate B	16°C/min
Final Temp	220°C
Final Hold	4 min
Injection Port	220°C
Detector B	250°C
Total Run time 28.71 min	

Note: The GC column separates the analytes that are then detected by the mass spectrometer.

14.5.4 Acquire data for each of the five calibration points.
14.5.4.1 Compare the data using a METHOD FILE set up for the target, internal standard, and surrogate compounds, containing expected retention times, and ion ratios for each analyte.
14.5.4.2 A quant ion and one or two secondary ions have been chosen (Table 3) for each analyte and make up a characteristic ratio used to identify each compound.
14.5.4.3 The quant ion for each compound is integrated and these areas are used to generate RFs.
14.5.5 Create a calibration file inside the METHOD from the data points run for the initial curve.
14.5.5.1 The METHOD shows a RF for each analyte at each concentration level.
14.5.5.2 The average RF, the relative retention time (each analyte's distance from the internal standard), and the Relative Standard Deviation (RSD) are calculated.
14.5.6 Monitor standard areas and retention times from initial calibration.
14.5.6.1 The extracted ion current profile (area of the quantitation ion) must not change by more than a factor of -40% to +80% from the midpoint of the initial calibration.
14.5.6.2 The retention time for any analyte must not change by more than 0.33 minutes.
14.5.6.3 Should either of these two items be out of limits, the GC/MS system must be inspected for potential problems and corrections made as needed.
14.5.7 Once a valid initial curve is run and evaluated, proceed with the analysis of blanks, spikes and samples.
14.5.7.1 Update the average response factors from the curve into the METHOD and they will be used for quantitation for all blanks and samples that follow.
14.5.7.2 If the BFB passes criteria, analyze the CCC.

14.6 Continuing Calibration
14.6.1 Analyze a BFB.
14.6.2 If the BFB passes criteria, analyze the CCC.
14.6.3 If the CCC meets the necessary criteria, proceed with the analysis of blanks and samples.
14.6.4 If CCC does not meet criteria analyze another one, if the second one also fails, analysis must stop and a new BFB and initial calibration must be run.
14.6.5 A CCC must be performed daily.

14.7 Method Blank

14.7.1 Analyze a method blank immediately following either the initial calibration or CCC and prior to analyzing any samples.

14.7.2 Prepare the method blank by injecting a 400mL aliquot of nitrogen from a clean SUMMA canister into the Entech 7100A.

14.7.3 Analyze the method blank after the calibration standards to ensure that the system is free from carryover or any other interferences that may be present.

14.7.4 The method blank must not have any analyte above the reporting limit.

14.8 Sample Analysis

Note: Samples may only be analyzed once the tune, calibration, and blank have all met criteria.

- *Measure and record the pressure of each canister upon arrival.*
- *If the pressureis below 12psig, pressurize up to 30 psig if necessary with UHP nitrogen before analysis.*

14.8.1 Inject the sample into the Entech 7100A noting the flow controller increase in reading while injecting.

14.8.2 Analyze appropriate sample volume.

14.8.3 Analyze the sample as follows:

- Click on the instrument icon
- Click on Edit sequence, add samples to sequence
- Click on OK
- Click on run sequence
- Wait for instrument to be ready

Note: The Entech 7100A unit goes through the same sequence for all samples, blanks, and standards.

- *Trap temperature of -150 ^{o}C during sample cryofocusing.*
- *The sample is desorbed for 10 minutes while rapidly heating the trap to 180^{o}C and backflushed with helium.*
- *The trap is then baked for 15 minutes at 150°C to remove any residue remaining on the trap.*
- *The trap is allowed to cool down to room temperature, and is then ready to accept the next sample.*

14.8.4 Use the temperature program in section 14.5.3.2 to chromatographically separate the volatiles transferred to the GC.

Note: Any analyte that exceeds the calibration range requires a dilution.

14.8.5 Sample Dilutions

14.8.5.1 If any target compound exceeds the initial calibration range in a sample, the sample must be diluted.
14.8.5.2 The dilution factor should get the largest analyte peak in the upper half of the initial calibration range.
14.8.5.3 All dilutions must meet the same QC requirements as non-diluted samples.

14.9 Air Canister Cleaning

14.9.1 See SOP P241-Air Canister Cleanup for details and corrective actions.

14.10 Analytical Sequence

Initial Analytical Run

- BFB
- STD level 1
- STD level 2
- STD level 3
- STD level 4
- STD level 5
- Blank
- SAMPLES
- LCS 10ppbv Second Source

Continuing Analytical Run

- BFB
- Mid range standard
- Blank
- Samples
- LCS

14.11 Manual Integration

14.11.1 Integrate the area of the quantitation ion of the compound of interest.
14.11.2 Do not include baseline background noise, and include only the area between where the beginning and end of the peak intersects with the baseline.
14.11.3 Integrate the compound in the sample any time it is integrated in the calibration standard.
14.11.4 Flag the compound with an "m" in the hardcopy (quantitation report) when a manual integration is performed.
14.11.5 Sign all compounds flagged with an "m" by initialing and dating them on the quantitation report.
14.11.6 Print out the EICP for all compounds that have been manually integrated.
14.11.7 If more than one compound is flagged, sign and date the compounds individually or bracket all compounds, sign and date once to indicate that all-manual integrations have been reviewed.
14.11.8 Document the reason for each manual integration on each quantitation report.
14.11.9 Report the before and after chromatograms of every manual integration.

14.12 Data Interpretation

- Maintain all GC and mass spectral data generated with each run of the instrument within a data file.

- Store data files on the computer hard drive, and archived on backup server for retrieval as needed once the hard drive has been cleared.
- For quantitation, send data files through **Enviroquant**, where the computer compares known information about target compounds to what is present in each data file.
- Information contained in the Method File used by the program **Enviroquant** includes:
- The relative retention time of each analyte
- The ion to be used for quantitation and one or two secondary ions which are characteristic to each compound (Table 3).
- The response factor for each analyte to be used in determining the concentration.

14.12.1 Procedure Enviroquant

14.12.1.1 Highlight every run on a copy of the instrument logs that are applicable to the SDG you are processing.

14.12.1.2 Put the instrument logs in date order with the initial calibration analytical run instrument log first.

14.12.1.3 Go to the processing PC and click the **Eviroquant** icon.

14.12.1.4 Load the EPA T0-15 method by using the pull down menu top left choice and click on select method.

14.12.1.5 Load the first BFB Data File from the first instrument log using the pull down menu top left choice and click on select data file.

14.12.1.6 Find the BFB peak on the chromatogram and click on the max scan (max ion 95).

- Note the scan number.

14.12.1.7 Determine where the scan to the left and the scan to the right are located by clicking slightly to the right and left of the max scan noting the scan numbers.

14.12.1.8 Drag the cursor from the max scan –1 to the max scan +1.

- Click on a background scan directly to the left of the BFB peak and click on subtract in the pull down menu called Tuner.

14.12.1.9 Click on “evaluate BFB”.

14.12.1.10 Click on Save BFB to Forms File under the Tuner pull down menu.

14.12.1.11 Click on Print BFB under the Tuner menu.

- The criterion is listed in Table 2.

14.12.1.12 Load the low point file (0.1ppbv) from the initial calibration.

14.12.1.13 Click on quantitate to screen

14.12.1.14 Click on clear all calibration responses

14.12.1.15 Click on calibrate

- Add new level
- Enter standard level

14.12.1.16 Load the next initial calibration data file.
- Repeat steps 14.12.1.12 – 14.12.1.15
- Do this for calibration points.

14.12.1.17 Print out the initial calibration using the pull down menu, click on response factors to printer.

14.12.1.18 Carefully review all information on the printout.
- Look for isomeric pairs that separate chromatographically and have the same retention time and response factors (ethylbenzene and o&m/p-xylene).
- Go to step 14.12.1.19 to edit.
- Verify that all compounds are picked up. Check to see if the initial calibration meets criteria.

14.12.1.19 Qarea using the pull down menu, each point that needs editing and repeat step 14.12.1.15 choosing recalibrate. Refer to Section 14.11.

14.12.1.20 Load the second BFB.

14.12.1.21 Pass it by repeating steps 14.12.1.5 – 14.12.1.9.

14.12.1.22 Load the check standard data file.
- Send to quant using the pull down menu.
- Click on View Results on screen and verify that the program is picking up all of the compounds correctly. If not repeat step 14.12.1.19.

14.12.1.23 Click on calibrate, add new level, enter standard level CC (QC Check sample), enter 2.5 for internal standard concentration and standard level concentration.

14.12.1.24 Verify that Quantitate using Initial Calibration is clicked on.

14.12.1.25 Load next data file (blank), quantitate it and review in qarea, checking surrogate recoveries, and correct integration of peaks, internal standard area recoveries and any necessary dilutions of target compounds.

14.12.1.26 Repeat step 14.12.1.25 for each blank and sample that is associated with the SDG maintaining the order of steps 14.12.1.20 – 14.12.1.26 when you get to the next BFB. See Section 14.12.2 for Data Interpretation.

14.12.1.27 Send each blank and sample to the tentative identified program using the software pull down menus. Use information from the summary discussion to review the non-target data.

14.12.1.28 Print out each run, standards and spikes in medium format (quant report and chromatogram), blanks and samples in full format (quant report + Chromatogram + spectra).

14.12.1.29 Put the reports in data file order with the BFB report first. Put the instrument logs with each set of reports.
- Data is now ready for **Enviroforms.**

14.12.2 Data Interpretation for Enviroquant

14.12.2.1 Examine all spectra for all possible "hits" or matches made to target compounds from printed out file by an analyst trained in the interpretation of mass spectra by doing the following:

14.12.2.2 Generate a reference spectrum for each analyte by running known standards (QREF from pulldown menu).

14.12.2.3 Compare this reference to the spectrum of the peak found in the sample.

14.12.2.4 Compare the criteria required for positive identification of an analyte as follows:

- The analyte in the sample must elute at the same relative retention time as in the daily calibration standard (±0.06 RRT units).
- All ions present in the reference spectrum >10% of the largest ion must be found in the sample spectrum.
- The ratio of the ions found in the sample must agree within ±20% of the ions found in the reference spectrum.
- Ions >10% in the sample spectrum but not found in the reference spectrum must be accounted for.
- Quantitative analysis is done once a target compound is identified by the internal standard method using the equations below. The relative response factor from the initial calibration standard is used to calculate the concentration of the sample.

14.12.2.5 Send all samples and blanks through a library search program in an effort to identify 15 non-target compounds or as requested.

14.12.2.6 Do <u>not</u> report the following compounds:

- Compounds less than 10% of the nearest internal standard area,
- Compounds which elute earlier than 30 seconds before the first target compound or three minutes after the last purgeable compound,
- carbon dioxide, and
- semivolatile target compounds.

14.12.2.7 The computer software provides a mass spectral library of 125,000 compounds for comparison to unknown compounds found in samples. Criteria for making tentative identifications are:

- Ions >10% of the largest ion in the reference spectrum must be present in the sample spectrum.
- The relative intensities of major ions should agree within ±20%.

- Molecular ions present in the reference spectrum must be present in the sample spectrum.
- Ions present in the sample spectrum, but not the reference spectrum should be reviewed for possible background contamination or presence of co-eluting compounds.
- Ions present in the reference but not the sample should be verified by performing manual background subtraction to remove interferences.
- If after review, the analyst is at a loss to identify the compound use the following method:
    - If the computers match probability is 85% or greater report that compound.
    - If the computer match probability is <85%, try to classify the compound and give it a name like "unknown chlorinated hydrocarbon" if it can be determined.

14.12.2.8 Do the quantitation of tentatively identified compounds based on comparison of the total ion area of an unknown peak to the total ion area of the nearest internal standard:

- Do not identify peaks that have an area <10% of the nearest internal standard.
- Since no calibrations are run for these unknown peaks, use response factor of 1 to calculate concentrations.

14.13 Documentation Requirements

14.13.1 Assure that GC Instrument log contains the following:

- CHEMTECH sample ID
- Client sample ID
- Tag number
- Dilution details
- All standards, samples, blanks, etc., run on the instrument in the order they were analyzed
- Date and time of injection of each sample and standard
- Computer data file number
- mL of sample analyzed
- Column ID and temperature program
- Analyst signature
- Supervisor signature

14.13.2 Label all chromatograms as follows:

- CHEMTECH and client sample number
- Volume injected
- Date and time of injection

- GC column ID
- GC Instrument ID
- Identified compound names

14.13.3 The following quant reports and chromatograms and data system printouts must be included in the data package:

- All standards and blanks from initial calibrations and QC Check sample
- All samples and blanks

14.14 Instrument Maintenance

14.14.1 For routine maintenance, flush the autosampler inlet ports and bake out the traps daily using Entech sequence.

14.14.2 Replace traps if recoveries of the analytes are failing.

14.14.2 Clean the MSD source when the BFB no longer meets ion ratio criteria. Or when the low level standard is not showing a response greater than 2.5 times the noise level of the instrument.

14.14.3 Replace column when peak tailing is observed.

14.14.4 Call 1-800-COMPCO6 with the details of the problem and schedule a service call.

14.14.5 Record all maintenance in the Maintenance Logbook adjacent to the Instrument Logbooks.

14.15 Record in the logbook if there are any instrument errors.

- Rerun the samples.

Note: Errors include

- *Leaked samples*
- *Electric shutdown*

15. CALCULATIONS

15.1 Calculation in ppbv

$$\text{Concentration ppbv.} = \frac{Ax \; Cis \; DF}{Ais \; \overline{RRF}}$$

Ax = Area of the characteristic ion for the compound to be measured, counts.
Ais = Area of the characteristic ion for the specific internal standard, counts.
Cis = Concentration of the internal standard spiking mixture, ppbv

$\overline{RRF}$ = Mean relative response factor from the initial calibration.

15.2 Calculation in ug/m3

$$\text{Concentration in ug/m3} = \frac{\text{ppbv X molecular weight}}{24.45}$$

16. METHOD PERFORMANCE

Analysis is performed in accordance with the method. All quality control and quality assurance procedures are followed. Please refer to P203-MDL SOP for further information.

Each analyst will make a one-time demonstration of the ability to generate acceptable accuracy and precision with this method. Please refer to P&A SOP for further information.

17. POLLUTION PREVENTION

17.1 Use only the amounts of chemicals required. Do not make large quantities of solutions.
17.2 Use hood when working with solvents.
17.3 Keep the area clean and clutter free in the lab and around the instruments in order to avoid any mishaps.
17.4 Vent the exhaust from the canister cleaning assembly.
17.5 Trap septum vent and split vent on GC.
17.6 Keep chemicals away from drains.
17.7 Properly collect and dispose of waste according to Chemtech's Waste Disposal SOP.
17.8 Laboratory is properly equipped with spill cleanup equipment and laboratory personnel trained. Depending upon the size and type of spill, it may be handled by the individual or department creating the spill or by specially trained personnel.
17.9 Small spills may occur routinely and shall be handled by the individual person or department creating the spill. Spill kits are stored in a blue basket or blue cover bin located in each laboratory and chemical storage area. The spill kits can handle water based, solvent and mercury spills. Specially trained personnel handle larger spills, which may pose a threat to health or environment involves a large volume not easily contained.
17.10 A detailed description of the procedure for handling a spill or accident is covered in the CHEMTECH Emergency and Contingency Plan.
17.11 The Safety Coordinator is responsible for implementing the Chemical Hygiene and the CHEMTECH Emergency and Contingency Plans. It is the responsibility of various company personnel to assist in implementing the different aspects of the Plan. These include: Laboratory Coordinator, Technical Director, Operations Manager, Department Managers and Supervisors.

18. DATA ASSESSMENT AND ACCEPTANCE CRITERIA FOR QC

18.1 BFB
18.1.1 Resulting spectrum must meet criteria in Table 2.
18.2 Initial Calibration
18.2.1 Analyze 5 points defining the calibration range.

18.2.2 %RSD criteria must be <30%.
18.2.3 Up to two compounds may fail to meet 30% criteria but must be below 40%.
18.2.4 Any extra compounds requested by the client must also meet the <30% RSD criteria.
18.2.5 MDL verification standard must meet ± 50%

18.3 Continuing Calibration
18.3.1 Recovery of each analyte must meet acceptance criteria ±30%.

18.4 Method Blank
18.4.1 The method blank must not contain any analyte above the reporting limit.

18.5 Lab Control Sample(LCS)
18.5.1 Recovery of each analyte must meet acceptance criteria of 30% or in-house control limits.

18.6 Internal Standard
18.6.1 The internal standard must not vary more than 40% on area response from the most recent valid CCC.

18.7 Retention time
18.7.1 Retention time for internal standards must meet ± .33min of the most recent CCC.

19. CORRECTIVE ACTION FOR OUT-OF-CONTROL DATA

19.1 BFB-MS Tuning Check Compounds
19.1.1 Rerun the BFB tune.
19.1.2 If it still fails, clean the source.

19.2 Initial Calibration
19.2.1 If the %RSD criteria is not met, analyze a new initial calibration.

19.3 Continuing Calibration
19.3.1 If the criteria for CCC are not met, rerun the CCC.
19.3.2 If the CCC sample fails again follow the steps given in Section 19.2

19.4 Method Blank
19.4.1 Rerun the method blank if it fails the first time.
19.4.2 If it fails second time, evaluate the system and contact the department supervisor.

19.5 Lab Control Sample
19.5.1 If LCS fails criteria reanalyze a second aliquot.
19.5.2 If the second LCS fails criteria again reanalyze the entire batch.

19.6 Internal Standards
19.6.1 If the internal standard vary more than ±40%, then the instrument must be inspected for malfunction and reanalyze all samples that ran during the instrument malfunction.
19.6.2 Report the data from the analysis that meets the criteria.

19.7 Retention time

19.7.1 If the retention time falls outside the criteria reanalyze the samples and report the data from the analysis that meets the criteria.

19.8 General Contingencies

19.8.1 Verify that the mass spectrometer is operating under the proper vacuum.

- Attach a vacuum to the mass spectrometer. The vacuum should be in the 10-5 range. If it is not, call 1-800-COMPCO6 to arrange for a repair.

19.8.2 Verify that there isn't any other background mass spectrometer problem.

- Go into Mtune on the PC that is running the instrument.
- Open the Calibration valve which will release PFTBA into the system.
- Load the tune file for the instrument you are using (MTVOAC) for instrument A.
- Click on Profile Scan.
- The Profile Scan should have ion 69 as 100%, 131 at approximately 55% and ion 219 also at approximately 55%.
- Other ions will be present but they should be <10% of these.
- If they are not call 1-800-COMPCO6 to arrange for a repair.

19.8.3 Trap and/or Column replacement may be necessary if a particularly bad sample contaminated the system.

- Bake the system overnight.
- Test operation starting with BFB, check Standard and Blank.
- If trap and/or column are suspected problems are suspected, replace with a new one, and condition overnight before use.

20. CONTINGENCIES FOR HANDLING OUT-OF-CONTROL OR UNACCEPTABLE DATA

20.1 Issue a corrective action form any time there is a deviation from the SOP or the client requirements are not met.

20.2 If a sample is damaged, broken or volume is inadequate, contact the project manager and issue a corrective action.

21. WASTE MANAGEMENT

Keep samples for 28 days after analysis and set the canister aside for cleaning, evacuation and re-use according to the procedures explained in this SOP.

22. REFERENCES

Compendium Method TO-15, Determination of Volatile Organic Compounds (VOCs) In Ambient Air Using Specially Prepared Canisters with Subsequent Analysis By Gas Chromatography. Center for Environmental Research Information, Office of Research and Development, US EPA January, 1999.
USEPA Method TO-15 for Ambient Air NJDEP Regulatory Reporting Format

23. LIST OF TABLES/ATTACHMENTS

Table 1 Target Compound List/Method Detection Limits

Table 2 BFB Tuning Criteria
Table 3 Characteristic Ions and Molecular weights for Volatile Target Compounds.

Attachment 1 Daily Analysis Rung for GC/MS

TABLE 1
TARGET COMPOUND LIST/METHOD DETECTION LIMITS

Compound Name	MDL (ppbV)
Dichlorodifluoromethane	0.031
Chloromethane	0.031
Vinyl Chloride	0.031
Bromomethane	0.022
Chloroethane	0.024
Dichlorotetrafluoroethane	0.028
Propene	0.047
Heptane	0.028
Trichlorofluoromethane	0.041
1,1,2-Trichlorofluoroethane	0.024
Bromoethene	0.042
Acetone	0.126
1,3-Butadiene	0.069
1,1-Dichloroethene	0.034
Isopropyl Alcohol	0.142
Methylene Chloride	0.047
Allyl Chloride	0.025
Trans-1,2-Dichloroethene	0.038
Vinyl Acetate	0.025
1,1-Dichloroethane	0.030
Ethyl Acetate	0.022
Hexane	0.024
Carbon Disulfide	0.022
Methyl Butyl Ether	0.043
Chloroform	0.022
Cyclohexane	0.070
cis-1,2-Dichloroethene	0.043
1,1,1-Trichloroethane	0.028
2-Butanone	0.070
Carbon Tetrachloride	0.061
Benzene	0.031
1,2-Dichloroethane	0.065
Trichloroethene	0.043
1,2-Dichloropropane	0.054
Benzene	0.031
1,4-Dioxane	0.054
Tetrahydrofuran	0.060
Bromodichloromethane	0.035

TABLE 1
TARGET COMPOUND LIST/METHOD DETECTION LIMITS

Compound Name	MDL (ppbV)
2,2,4-Trimethylbenzene	0.026
t-1,3-Dichloropropene	0.047
cis-1,3-Dichloropropene	0.024
1,1,2-Trichloroethane	0.043
Dibromochloromethane	0.041
Bromoform	0.035
4-Methyl-2-Pentanone	0.060
2-Hexanone	0.040
Tetrachloroethene	0.038
Toluene	0.054
1,2-Dibromoethane	0.041
Chlorobenzene	0.047
Ethyl Benzene	0.034
m/p-Xylenes	0.084
o-Xylene	0.050
Styrene	0.040
1,1,2,2-Tetrachloroethane	0.047
Benzyl Chloride	0.035
4-Ethyltoluene	0.036
1,3,5-Trimethylbenzene	0.054
1,2,4-Trimethylbenzene	0.048
1,3-Dichlorobenzene	0.065
1,4-Dichlorobenzene	0.054
1,2-Dichlorobenzene	0.049
1,2,4-Trichlorobenzene	0.051
Hexachloro-1,3-butadiene	0.066

TABLE 2
BFB TUNING CRITERIA

Mass	Ion Abundance Criteria[1]
50	8.0-40.0 percent of mass 95
75	30.0-66.0 percent of mass 95
95	Base peak, 100 percent relative abundance
96	5.0-9.0 percent of mass 95
173	Less than 2.0 percent of mass 174
174	50.0-120.0 percent of mass 95
175	4.0-9.0 percent of mass 174
176	93.0-101.0 percent of mass 174
177	5.0-9.0 percent of mass 176

[1]All ion abundance must be normalized to mass 95, the nominal base peak even though the ion abundance of mass 174 may be up to 120% of mass 95.

TABLE 3
CHARACTERISTIC IONS FOR VOLATILE TARGET COMPOUNDS

Compound	CAS No.	Primary Ion	Secondary Ion
Methyl chloride (chloromethane); CH3Cl	74-87-3	50	52
Carbonyl sulfide; COS	463-S8-1	60	62
Vinyl chloride (chloroethene); C2H3Cl	7S-01-4	62	64
Diazomethane; CH2N2	334-88-3	42	41
Formaldehyde; CH2O	50-00-0	29	30
1,3-Butadiene; C4H6	106-99-0	39	54
Methyl bromide (bromomethane); CH3Br	74-83-9	94	96
Phosgene; CCl2O	75-44-5	63	65
Vinyl bromide (bromoethene); C2H3Br	593-60-2	106	108
Ethylene oxide; C2H4O	75-21-8	29	44
Ethyl chloride (chloroethane); C2H5Cl	75-00-3	64	66
Acetaldehyde (ethanal); C2H4O	75-07-0	44	29, 43
Vinylidene chloride (1,1-dichloroethylene); C2H2Cl2	75-35-4	61	96
Propylene oxide; C3H6O	75-56-9	58	57
Methyl iodide (iodomethane); CH3I	74-88-4	142	127
Methylene chloride; CH2Cl2	75-09-2	49	84, 86
Methyl isocyanate; C2H3NO	624-83-9	57	56
Allyl chloride (3-chloropropene); C3H5Cl	107-05-1	76	41, 78
Carbon disulfide; CS2	75-15-0	76	44, 78
Methyl tert-butyl ether; C5H12O	1634-04-4	73	41, 53
Propionaldehyde; C2H5CHO	123-38-6	58	29, 57
Ethylidene dichloride (1,1-dichloroethane); C2H4Cl2	75-34-3	63	65, 27
Chloroprene (2-chloro-1,3-butadiene); C4H5Cl	126-99-8	88	53, 90
Chloromethyl methyl ether; C2H5ClO	107-30-2	45	29, 49
Acrolein (2-propenal); C3H4O	107-02-8	56	55
1,2-Epoxybutane (1,2-butylene oxide); C4H8O	106-88-7	42	41, 72
Chloroform; CHCl3	67-66-3	83	85, 47
Ethyleneimine (aziridine); C2H5N	151-56-4	42	43
1,1-Dimethylhydrazine; C2H8N2	57-14-7	60	45, 59
Hexane; C6H14	110-54-3	57	41, 43
1,2-Propyleneimine (2-methylazindine); C3H7N	75-55-8	56	57, 42
Acrylonitrile (2-propenenitrile); C3H3N	107-13-1	53	52
Methyl chloroform (1,1,1 trichloroethane); C2H3Cl3	71-55-6	97	99, 61
Methanol; CH4O	67-56-1	31	29
Carbon tetrachloride; CCl4	56-23-5	117	119
Vinyl acetate; C4H6O2	108-05-4	43	86
Methyl ethyl ketone (2-butanone); C4H8O	78-93-3	43	72

TABLE 3

CHARACTERISTIC IONS FOR VOLATILE TARGET COMPOUNDS (continue)

Compound	CAS No.	Primary Ion	Secondary Ion
Benzene; C6H6	71-43-2	78	77,50
Acetonitrile (cyanomethane); C2H3N	75-05-8	41	40
Ethylene dichloride (1,2-dichloroethane); C2H4Cl2	107-06-2	62	64, 27
Triethylamine; C6H15N	121-44-8	86	58, 101
Methylhydrazine; CH6N2	60-34-4	46	31, 45
Propylene dichloride (1,2-dichloropropane); C3H6Cl2	78-87-5	63	41, 62
2,2,4-Trimethyl pentane; C8H18	540-84-1	57	41, 56
1,4-Dioxane (1,4 Diethylene oxide); C4H8O2	123-91-1	88	58
Bis(chloromethyl) ether; C2H4Cl2O	542-88-1	79	49, 81
Ethyl acrylate; C5H8O2	140-88-5	55	73
Methyl methacrylate; C5H8O2	80-62-6	41	69, 100
1,3-Dichloropropene; C3H4Cl2 (cis)	542-75-6	75	39, 77
Toluene; C7H8	108-88-3	91	92
Trichloethylene; C2HCl3	79-01-6	130	132, 95
1,1,2-Trichloroethane; C2H3Cl3	79-00-5	97	83, 61
Tetrachloroethylene; C2Cl4	127-18-4	166	164, 131
Epichlorohydrin (l-chloro-2,3-epoxy propane); C3H5ClO	106-89-8	57	49, 62
Ethylene dibromide (1,2-dibromoethane); C2H4Br2	106-93-4	107	109
N-Nitrso-N-methylurea; C2H5N3O2	684-93-5	60	44, 103
2-Nitropropane; C3H7NO2	79-46-9	43	41
Chlorobenzene; C6H5Cl	108-90-7	112	77, 114
Ethylbenzene; C8H10	100-41-4	91	106
Xylenes (isomer & mixtures); C8H10	1330-20-7	91	106
Styrene; C8H8	100-42-5	104	78, 103
p-Xylene; C8H10	106-42-3	91	106
m-Xylene; C8H10	108-38-3	91	106
Methyl isobutyl ketone (hexone); C6H12O	108-10-1	43	58, 100
Bromoform (tribromomethane); CHBr3	75-25-2	173	171, 175
1,1,2,2-Tetrachloroethane; C2H2Cl4	79-34-5	83	85
o-Xylene; C8H10	95-47-6	91	106
Dimethylcarbamyl chloride; C3H6ClNO	79-44-7	72	107
N-Nitrosodimethylamine; C2H6N2O	62-75-9	74	42
Beta-Propiolactone; C3H4O2	57-57-8	42	43
Cumene (isopropylbenzene); C9H12	98-82-8	105	120
Acrylic acid; C3H4O2	79-10-7	72	45, 55
N,N-Dimethylformamide; C3H7NO	68-12-2	73	42, 44
1,3-Propane sultone; C3H6O3S	1120-71-4	58	65, 122

TABLE 3

CHARACTERISTIC IONS FOR VOLATILE TARGET COMPOUNDS (continue)

Compound	CAS No.	Primary Ion	Secondary Ion
Acetophenone; C8H8O	98-86-2	105	77,120
Dimethyl sulfate; C2H6O4S	77-78-1	95	66,96
Benzyl chloride (a-chlorotoluene); C7H7Cl	100-44-7	91	126
1,2-Dibromo-3-chloropropane; C3H5Br2Cl	96-12-8	57	155, 157
Bis(2-Chloroethyl)ether; C4H8Cl2O	111-44-4	93	63, 95
Chloroacetic acid; C2H3ClO2	79-11-8	50	45, 60
Aniline (aminobenzene); C6H7N	62-53-3	93	66
1,4-Dichlorobenzene (p-); C6H4Cl2	106-46-7	146	148, 111
Ethyl carbamate (urethane); C3H7NO2	51-79-6	31	44, 62
Acrylamide; C3H5NO	79-06-1	44	55, 71
N,N-Dimethylaniline; C8H11N	121-69-7	120	77, 121
Hexachloroethane; C2Cl6	67-72-1	201	199, 203
Hexachlorobutadiene; C4Cl6	87-68-3	225	227, 223
Isophorone; C9H14O	78-59-1	82	138
N-Nitrosomorpholine; C4H8N2O2	59-89-2	56	86, 116
Styrene oxide; C8H8O	96-09-3	91	120
Diethyl sulfate; C4H10O4S	64-67-5	45	59, 139
o-Cresol; C7H8O	95-48-7	108	107
Catechol (o-hydroxyphenol); C6H6O2	120-80-9	110	64
Phenol; C6H6O	108-95-2	94	66
1,2,4-Trichlorobenzene; C6H3Cl3	120-82-1	180	182, 184
Nitrobenzene; C6H5NO2	98-95-3	77	51, 123

ATTACHMENT 1

CHEMTECH 284 Sheffield Street, Mountainside NJ 07092 (908) 789-8900

Daily Analysis Runlog For GC/MS #: MSVOA L

Method:_____

Start Date: __ / __ / ____ End Date: __ / __ /____ Analyst _____ Review By: _____

STD. NAME	STD REF. #:	STD NAME	STD REF. #:
BFB/ISTD/ Surr	MSV1-	Initial Calibration Stds.	MSV1-
CCC/ISTD/Surr	MSV1-	Spike Std.	MSV1-
----------	----------	HP Processing Method	_____
----------	----------	ICV	_____

SR #:	Sample ID	Data File Name	Initial Pressure (psi)	Final Pressure (psi)	Injection Volume (mL)	Initial Dilution factor	Final Dilution factor	Autosampler Position	Manual Integration Peak number/ Reason	RE, DL - Data file	Comments
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

Calculation Check:

Ppbv in sample = Area of Compound in Sample x Conc Int. Standard (ppbv) x Dilution
Area of Int. Standard in Sample x ICAL RRF

Manual Integration key:

Poor Resolution of peaks exhibited on chromatograms **(A)**
Peak Integrated by software incorrectly **(B)**
Other- explain in the comment section **(D)**

CHEMTECH 284 Sheffield Street, Mountainside, NJ 07092 (908) 789-8900

READ RECEIPT

Employee Name: _____

Department: _____

_____ MTO15-Air VOC -05_____
Method or Document Read (Include Title, Number, Revision, as applicable).

Employee Statement: I have read and understood the information in the above mentioned method or document.

_____ _____
Employee Signature Date

Supervisory Statement: I have reviewed this document or method with the employee.

_____ _____
Supervisor Signature Date

Note: This receipt is to be returned to the Quality Assurance/Quality Control Department for incorporation into employee training record files. If you have questions or would like to review your train record files, please see QA/QC Director.

APPENDIX B

HASP

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Region 3
New Paltz, New York

PROJECT SPECIFIC HEALTH AND SAFETY PLAN

For:

BALDWIN PLACE MALL (Somers Plaza)
80 Route 6
Somers, NY 10589

NYSDEC Site No. 36-0023

Dates in Effect:
January 2008 through Contract CON0014842 Completion

Project Number 39762

HDR
Henningson, Durham & Richardson Architecture and Engineering, P.C.
in association with HDR Engineering, Inc.
One Blue Hill Plaza
Pearl River, NY 10965

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List of Appendices

List of Attachments

SITE SPECIFIC HEALTH & SAFETY PLAN:
TITLE PAGE

PROJECT NAME**: Baldwin Place Mall**	PROJECT COMPANY: Miller Environmental Group, Inc. (prime contractor to NYSDEC)
JOB SITE ADDRESS: 80 Route 6, Somers, NY 10589	JOB NUMBER: 39762
PROJECT MANAGER: Stuart E. Bassell, P.E.	PHONE NO. : (845) 735-8300
SITE CONTACT: Janet Brown (NYSDEC)	PHONE NO. : (845) 256-3826 (NYSDEC)
Robert Hulihan (Miller Environmental Group, Inc.)	PHONE NO. (845) 569-1200 ext. 18 (Miller Environmental Group, Inc.)

(X) AMENDMENT NO. _0___ TO EXISTING APPROVED HASP - DATE EXISTING APPROVED HASP January 17, 2008

OBJECTIVES OF FIELD WORK:

Perform O&M at groundwater pump & treat plants and sampling

Field Activities Include:
1. Install and sample on- and off-site monitoring wells and soil vapor probes. Sample pump & treat systems and off-site potable wells.
2. O&M at pump & treat plants, including system adjustments, parts replacement, carbon rebeds, and related work per O&M manuals.

SITE TYPE: *Check as many as applicable*

(X) Active	( ) Landfill	( ) Natural
( ) Inactive	( ) Uncontrolled	( ) Military
(**X**) Secure	( ) Industrial	( ) Other specify**: commercial**
(X) Unsecured	( ) Residential	
(X) Enclosed space	( ) Well Field	

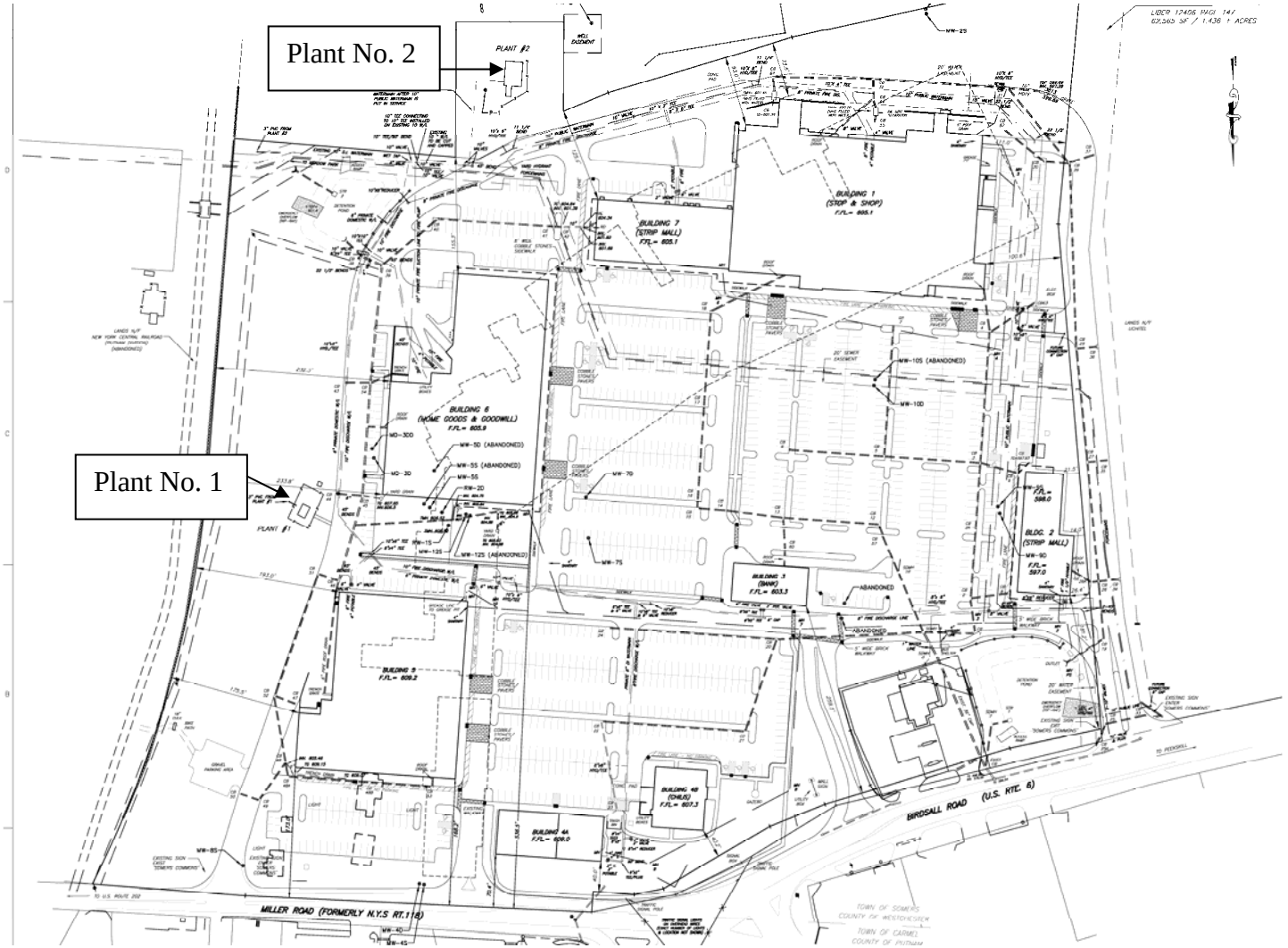
DESCRIPTION AND FEATURES: *Summarize below. Include principal operations and unusual features (containers, buildings, dikes, power lines, hills, slopes, rivers)*

Site soil, soil vapor, and groundwater are impacted by chemical spills from a former dry cleaner. Chemicals of concern are tetrachloroethene (PCE), trichloroethene (TCE), and 1,2-dichloroethene (DCE). Source area was excavated, but residual contamination remains. Site was recently redeveloped with a new suburban shopping center. There are two groundwater pump & treat systems that are incorporated into this HASP. Plant No. 1 runs at a rate of 1 to 2 gpm and treats groundwater pumped near the source area. Plant No. 2 runs at a rate of 30 to 40 gpm and treats less contaminated groundwater pumped from the downgradient bedrock aquifer.

SURROUNDING POPULATION: (**X**) Residential ( ) Industrial ( ) Rural ( ) Urban (X) Commercial: (**X**) Other: Suburban

SITE SPECIFIC HEALTH & SAFETY PLAN
SITE LOCATION PLAN / SITE SKETCH
HDR

THIS PAGE RESERVED FOR SITE LOCATION PLAN AND SITE SKETCH



SITE SPECIFIC HEALTH & SAFETY PLAN
EMERGENCY CONTACTS & APPROVAL PAGE
HDR Engineering, Inc.

EMERGENCY CONTACTS	NAME	PHONE	EMERGENCY CONTACTS	NAME	PHONE
Miller Environmental Group, Inc. Project Manager	Robert Hulihan	(845) 569-1200 ext. 18 cell (914) 755-2669	Project Manger HDR	Stuart Bassell	office (845) 735-8300 cell (617) 894-0679
			Health and Safety Officer HDR	Barry Babcock	office (845) 297-0666 cell (845) 642-8870
			Other (specify) Property Owner (Urstadt Biddle)	Daniel Logue	(203) 863-8234
Poison Control Center		(800) 522-6337	NYSDEC, Region 3 Case Manager	Janet Brown	(845) 256-3826
NYSDEC, Region 3 Regional Water Engineer		(845)332-1835	National Response Center		(800)-424-8802
			State Spill		(800)457-7362
			Fire Department		911
1. Evacuation Routes will be specified by the HSO and communicated to all personnel on site. 2. Personnel will evacuate under conditions specified by air monitoring or as directed by the HSO. 3. An INCIDENT REPORT form will be completed for all accidents (see Appendix A).			Police Department		911
QA REVIEW: John Guzewich HDR Office Safety Coordinator		Date: January 17, 2008 (845) 735-8300 Ext. 252	**Nearest Hospital Emergency Room Number:**	Putnam Hospital Center	(845)279-5711
HEALTH AND SAFETY PLAN APPROVALS			**Number of 24-Hour Ambulance:**		**911**
Project Manager: Stuart E. Bassell		Date January 17, 2008	Route to Hospital is described on the following page with a map to the hospital on the next page.		
HDR Office Safety Coordinator: John Guzewich		Date: January 17, 2008			

SITE SPECIFIC HEALTH & SAFETY PLAN
HOSPITAL MAP ROUTE
HDR Engineering, Inc.

THIS PAGE RESERVED FOR HOSPITAL ROUTE MAP

Directions to Putnam Hospital Center from the site:

670 Stoneleigh Avenue, Carmel, NY 10512

Leave the site and turn right (northeast) onto Route 6. Continue 5.2 miles to Drewville Road. Turn right (east) onto Drewville Road and travel 2.7 miles to Stoneleigh Avenue. Turn right (south) onto Stoneleigh Avenue and continue 0.2 miles. Hospital is on the left (east) side of Stoneleigh Avenue

SITE SPECIFIC HEALTH & SAFETY PLAN
HISTORY AND WASTE CHARACTERIZATION PAGE
HDR.

HISTORY: Summarize site specific information below or attach information behind this page.

WASTE TYPES: (X) Liquid (X) Solid ( ) Sludge ( ) Gas ( ) Unknown ( ) Other **specify**:

WASTE CHARACTERISTICS: Check as many as applicable.

( ) Corrosive ( ) Flammable ( ) Radioactive

(X) Toxic (X) Volatile ( ) Reactive

( ) Inert Gas ( ) Unknown ( ) Other **specify**:

HAZARDS OF CONCERN: Check as many as applicable.

(X) Heat Stress attach guidelines See HDR H&S Pro #28
(X) Noise See HDR H&S Pro #26

(X) Cold Stress attach guidelines See HDR H&S Pro #29
( ) Inorganic Chemicals

( ) Explosive/Flammable
(X) Organic Chemicals

(X) Oxygen Deficient
(X) Motorized Traffic

( ) Radiological
(X) Heavy Machinery

( ) Biological See HDR H&S Pro #34
(X) Slips, Trips & Falls See HDR H&S Pro #3

(X) Other **specify**: non-permit confined spaces (Plant No. 1 manholes and Plant No. 2 carbon tanks. Prior to entry, manhole access require air testing with LEL-O2-HS meter and allowance for airing out; one stand-by person is required for entry. Carbon tanks have not required entry to date; prior to entry, check air for O2 and allow to vent, since oxygen can be scavenged by activated carbon.

WORK ZONES: Describe how the Exclusion, Contamination Reduction, and Support Zones will be delineated in terms that on-site personnel will recognize. Work zones will be shown on "WORK ZONE MAP PAGE."

1. Treatment plant work zones are the fenced areas for each plant. Work zones are around existing wells and do not require delineation. Future work zones for drilling will be delineated by caution tape or traffic safety cones, if in an area accessed by the public. Contaminant reduction zones are at the treatment plants.

PRINCIPAL DISPOSAL METHODS AND PRACTICES: Summarize Site Specific Conditions Procedures Below:

Spent activated carbon, treatment plant filters, and pump well redevelopment water are drummed and transported and disposed off-site as hazardous waste. Pre-sampling purge water for on-site monitoring wells in pavement and MW-12S is drummed and treated at Plant No. 1 (allowed to sink into the ground adjacent to wells for remaining on-site wells). Pre-sampling purge water for off-site monitoring wells is allowed to sink into the adjacent ground, except at 13 Meadow Park Road, where the water is filtered and treated with activated carbon with a mobile system stored at Plant No. 1. Method of disposal for drill cuttings for well construction will be determined on a case by case basis (spread on ground, non-hazardous off-site disposal, hazardous off-site disposal). All other waste is bagged and disposed off-site as non-hazardous solid waste.

SITE SPECIFIC HEALTH & SAFETY PLAN
HAZARDOUS MATERIAL SUMMARY PAGE
HDR

HAZARDOUS MATERIAL SUMMARY: **Underline and bold waste type** and estimate amounts by category (if possible)

CHEMICALS Amounts/Units:	SOLIDS Amounts/Units:	SLUDGES Amounts/Units:	SOLVENTS Amounts/Units:	OILS Amounts/Units:	OTHER Amounts/Units:
Acids	Flyash	Paint	Halogenated (chloro, bromo) Solvents	Oily Wastes	Laboratory
Pickling Liquors	Asbestos	Pigments	Hydrocarbons	Gasoline	Pharmaceutical
Caustics	Milling/Mine Tailings	Metal Sludges	Alcohols	Diesel Oil	Hospital
Pesticides	Ferrous Smelter	POTW Sludge	Ketones	Lubricants	Radiological
Dyes/Inks	Non-ferrous Smelter	Aluminum	Esters	PCBs	Municipal
Cyanides	Metals	Distillation Bottoms	Ethers	Polynuclear Aromatics	Construction
Phenols	Other	Other	Other	Other	Munitions
Halogens (unknown amt)	Specify:	Specify**:**	Specify:	Specify:	Other
Dioxins					Specify:
Other Specify:					

OVERALL HAZARD EVALUATION: ( ) High ( ) Medium (X) Low ( ) Unknown (Where tasks have different hazards, evaluate each. Attach additional sheets if necessary)
JUSTIFICATION: relatively low levels in groundwater and remaining soils

FIRE/EXPLOSION POTENTIAL: ( ) High ( ) Medium (X) Low ( ) Unknown

BACKGROUND REVIEW: (X) COMPLETE ( ) INCOMPLETE

SITE SPECIFIC HEALTH & SAFETY PLAN
CHEMICAL HAZARD TABLE PAGE
HDR

KNOWN CONTAMINANTS	HIGHEST OBSERVED CONCENTRATION* (specify units and media)	PEL/TLV ppm	IDLH ppm or mg/m^3	SYMPTOMS/EFFECTS OF ACUTE EXPOSURE	PHOTOIONIZATION POTENTIAL
PCE	6.5 mg/Kg (S) 6,700 ug/L (GW)	100/25	150	irritation of eyes, respiratory system; CNS depressant	9.6
TCE	<0.12 (S) 110 ug/L	100/10	500	Irritation of eyes nose throat; nausea; flush face, neck; vertigo, dizziness, incoordination; headache; somnolence; skin erythema; liver damage; carcinogen	9.3
DCE	<0.12 (S) 120 ug/L (GW)	200/200	1000	Irritation of eyes, skin; headache; vertigo; visual distortion; fatigue; giddiness; tremor; somnolence; nausea, vomiting; dermatitis; cardiac arrhythmias; paresthesia; liver injury; carcinogen	9.4

* Highest concentration observed in groundwater over the last five years. Highest concentration in source area, post-excavation soil samples. (Higher concentrations may exist beneath grade beams that border a portion of the excavation area. However, these higher concentration soils are limited in extent and are under remaining concrete from the old building foundation.)

NA = Not Available NE = None Established U = Unknown
S = Soil SW = Surface Water T = Tailings W = Waste SD = Sediment
A = Air GW = Groundwater SL = Sludge D = Drums OFF = Offsite

HAZARD COMMUNICATIONS STANDARD

This Site Specific Health and Safety Plan will be kept at Plant No. 1. A current inventory of chemicals to be brought on-site and appropriate MSDSs will accompany these chemicals in the vehicle.

SITE SPECIFIC HEALTH & SAFETY PLAN
TASK DESCRIPTION PAGE
HDR Engineering, Inc.

FIELD ACTIVITIES COVERED UNDER THIS PLAN - **ATTACH ACTIVITY HAZARD ANALYSIS FOR EACH TASK** (See attached Project Safety Guide.)				HAZARD		
TASK DESCRIPTION/SPECIFIC TECHNIQUE-STANDARD OPERATING PROCEDURES/SITE LOCATION(Attach additional sheets as necessary)	Type	Primary	Contingency	SCHEDULE		
Sample wells. Sample vapor probes. Treatment plant inspections, adjustments. Watch for traffic in shopping center. Slip/trip. Temperature. Low hazard.	Non-intrusive	D Modified*	Exit Area			Low
Pump replacements. Cut electric to wells. Use of mechanical equipment. Low hazard.	Non-intrusive	D Modified	Exit Area			Low
Monitoring well construction. Use of mechanical equipment. Work around drill rigs. Noise. Possible chemical exposure. Low hazard.	Intrusive	D Modified	Exit Area			Low
Vapor probe construction. Use of mechanical equipment. Possible chemical exposure. Noise. Low Hazard.	Non-intrusive	D Modified	Exit Area			Low
Plant No. 1 manhole entry. Non-permit confined space entry. Slip/trip. Low hazard.	Non-intrusive	D Modified	Exit Area			Low
Plant No. 2 carbon tank entry (not required to date). Non-permit confined space entry. Possible oxygen deficiency (activated carbon). Low hazard.	Non-intrusive	D Modified	Exit Area			Low

* Work clothes for all tasks, plus disposable nitrile or equivalent gloves for groundwater sampling or when contaminated equipment or media will be handled. Plus safety glasses for vapor probe construction. Plus hard-hat and hearing protection for work around drill rigs. Plus Tyvek for well redevelopment.

PERSONNEL AND RESPONSIBILITIES (Include subcontractors) Responsibilities and the reporting organizational structure are described on the following page.

NAME	PHONE 845 area	DATE OF LAST TRAINING	DATE OF HEALTH CLEARANCE	RESPONSIBILITIES	ON-SITE? List task numbers
Stuart Bassell	735-8300	1/25/08 (scheduled)	N.A.	PROJECT MANAGER	all tasks
John Guzewich	735-8300	1/25/08 (scheduled)	N.A.	OFFICE HEALTH AND SAFETY OFFICER/COORDINATOR	not on-site
Barry Babcock	297-0666	1/25/08 (scheduled)	N.A.	SITE COORDINATOR and ON-SITE SAFETY OFFICER	all tasks

SITE SPECIFIC HEALTH & SAFETY PLAN
DESCRIPTION OF RESPONSIBILITIES AND ORGANIZATIONAL STRUCTURE PAGE
HDR Engineering, Inc.

1. Site Safety and Health Personnel.

The Site Health and Safety Officer (HSO), in conjunction with the Site Coordinator, ensures that the provisions of this HASP are adequate and implemented in the field. The Project Manager is to take all necessary actions to guarantee site safety. Changing field conditions may require decisions to be made concerning adequate protection programs and may require deviations or additions to this HASP. All deviations and/or additions must be documented and approved by the HSO on the DEVIATIONS AND ADDITIONS form, located in Appendix B. Personnel assigned as HSO must be experienced and meet the additional training requirements specified by OSHA in 29 CFR 1910.120 and this HASP. The HSO is also responsible for conducting site inspections on a regular basis in order to ensure the effectiveness of this plan.

2. Organizational Structure and Responsibilities

Briefly describe the responsibilities of all team members and denote the reporting structure.

1. Project Manager
- **a.** Overall responsibility for project schedule;
- **b.** Develop cost estimates for work identified.
- **c.** Identify scope of work and estimate schedule for work;
- **d.** Determine the technical/field team;

2. Site Coordinator (reports to "1" when "1" is on-site, otherwise in charge)
- **a.** Enforce disciplinary action when unsafe acts or practices occur;
- **b.** Grant permission for site access (including visitors, see Appendix C);
- **c.** Designate site security;
- **d.** Enforce the buddy system.
- **e.** Attend all Site pre-entry safety briefings
- **f.** Serve as the facilitator of communications in emergencies

3. Site Health and Safety Officer (HSO) (reports to "2")
- **a.** Maintain daily field log book and a health and safety file for the project;
- **b.** Conduct safety meetings.
- **c.** Monitor on-site hazards and conditions;
- **d.** Enforce safety procedures;
- **e.** Designate facilities, and equipment for health and safety;
- **f.** Select, dispense, and ensure availability of Personal Protective Equipment (PPE);
- **g.** Maintain copies of instrument operation manuals and maintain records of usage and calibration;
- **h.** Periodically inspect PPE and ensure proper storage and maintenance;
- **i.** Monitor for heat and cold stress;
- **j.** Set up decontamination lines, control decontamination, prepare decontamination solutions, and monitor;
- **k.** Train employees on emergency procedures and evacuation routes;
- **l.** Control entry and exit at the Access Control Points;
- **m.** Confirm an employee's suitability for work based on the physician's recommendation.

4. Other On-Site Personnel (report to "2")

SITE SPECIFIC HEALTH & SAFETY PLAN
PPE BY TASK PAGE
HDR Engineering, Inc.

PROTECTIVE EQUIPMENT: Specify by task. Indicate type and/or material as necessary. Use copies of this sheet if needed.

TASKS: All except as listed (X) Primary
LEVEL: D - Modified ( ) Contingency

Respiratory: (X) Not Needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: (X) Not Needed
( ) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: (X) Not Needed
( ) Boots: Leather steel-toed work boots
( ) Over boots:
( ) Rubber:

Protective Clothing: (x) Not Needed
( ) Encapsulated Suit:
( ) Splash Suit:
( ) Apron
( ) Tyvek Coverall:
( ) Saranex Coverall:
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not Needed
( ) Under gloves:
(X) Gloves:
( ) Over gloves: disposable nitrile or equivalent when handling contaminated media/equipment

(X) Other - specify below:
Safety vest if working near traffic

TASKS: Vapor probe construction (X) Primary
LEVEL: D - Modified ( ) Contingency

Respiratory: (X) Not Needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not Needed
(X) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: (X) Not Needed
( ) Boots: Leather steel-toed work boots
( ) Over boots:
( ) Rubber:

Protective Clothing: (X) Not Needed
( ) Encapsulated Suit:
( ) Splash Suit:
( ) Apron
(x) Tyvek Coverall: OPTIONAL
( ) Saranex Coverall:
( ) Cloth Coverall:
( ) Other:

Gloves: (X) Not Needed
( ) Under gloves: disposable nitrile
( ) Gloves:
( ) Over gloves: Chemical Resistant (Nitrile)

(X) Other - specify below:
Safety vest if working near traffic

TASKS: Well Construction (X) Primary
LEVEL: D - Modified ( ) Contingency

Respiratory: (X) Not Needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not Needed
(X) Safety Glasses:
( ) Face Shield:
( ) Goggles:
(X) Hard Hat:
(X) Other: Hearing protection during during air-rotary drilling

Boots: () Not Needed
(X) Boots: Leather steel-toed work boots
( ) Over boots:
( ) Rubber:

Protective Clothing: (X) Not Needed
( ) Encapsulated Suit:
( ) Splash Suit:
( ) Apron
( ) Tyvek Coverall:
( ) Saranex Coverall:
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not Needed
( ) Under gloves:
(X) Gloves:
( ) Over gloves: disposable nitrile or equivalent when handling contaminated media/equipment

(X) Other - specify below: hearing
Safety vest if working near traffic

TASKS: well redevelopment (X) Primary
LEVEL: D - Modified ( ) Contingency

Respiratory: (X) Not Needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not Needed
( ) Safety Glasses:
( ) Face Shield:
(X) Goggles:
(X) Hard Hat: if near drill rig
( ) Other:

Boots: (X) Not Needed
( ) Boots: Leather steel-toed work boots
( ) Over boots:
( ) Rubber:

Protective Clothing: ( ) Not Needed
( ) Encapsulated Suit:
( ) Splash Suit:
( ) Apron
(X) Tyvek Coverall:
( ) Saranex Coverall:
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not Needed
( ) Under gloves:
(X) Gloves:
( ) Over gloves: disposable nitrile or equivalent when handling contaminated media/equipment

(X) Other - specify below:
Safety vest if working near traffic

SITE SPECIFIC HEALTH & SAFETY PLAN
AIR MONITORING BY TASK PAGE
HDR Engineering, Inc.

MONITORING EQUIPMENT: Specify by task. Indicate type as necessary. Attach additional sheets as necessary.

INSTRUMENT	TASK	ACTION GUIDELINES	COMMENTS (Includes schedules of use)
Combustible Gas Indicator	confined space entry	0-10% LEL — No explosion hazard 10-25% LEL — Potential explosion hazard; notify HSO. **>25% LEL — Explosion hazard; interrupt task/evacuate** 21.0% 02 — Oxygen normal <20.5% 02 — Oxygen deficient; notify HSO. **<19.5% 02 — Interrupt task/evacuate**	( ) Not Needed
Radiation Survey Meter	1 - 2 - 3 - 4 - 5 -___	3X Background — Notify SHSC **>2mR/hr — Interrupt task/evacuate**	(X) Not Needed
Photo ionization Detector Type _____ ( ) 11.7 ev (X 10.2 eV ( ) 9.8 ev ( ) ___ ev	Vapor probe and monitoring well (if near source area) construction	**Specify:** If TOTAL VOC's ≥ 5 PPM above background in the breathing zone, sustained for 5 or more minutes, all personnel shall evacuate the site. Contact Project HSO and the site shall be reevaluated after 30 minutes. The HSO will re-enter the site upwind and monitor with the PID. Once the volatile levels are below 1 PPM, work can continue.	( ) Not Needed
Flame Ionization Detector Type	1 - 2 - 3 - 4 - 5 -___	**Specify:**	(X) Not Needed
Detector Tubes/Monitox Type Type	1 - 2 - 3 - 4 - 5 -___	**Specify:**	(X) Not Needed
Respirable Dust Monitor Type Type	1 - 2 - 3 - 4 - 5 -___	**Specify:**	(X) Not Needed
Other **Specify**	1 - 2 - 3 - 4 - 5 -___	**Specify:**	

Notes:
1. Personal air samples and area samples taken during unique project activities must be documented on the INDUSTRIAL HYGIENE SAMPLING SHEET (see Appendix D).
2. When area samples are collected for routine project activities, the following information must be recorded in the field log book: date and time; location; air temperature; wind direction and speed; cloud cover and type of precipitation; sampler; instrumentation used; activity being sampled; result; sample duration time; applicable comments.

SITE SPECIFIC HEALTH & SAFETY PLAN
DECONTAMINATION PAGE
HDR Engineering, Inc.

DECONTAMINATION PROCEDURES

ATTACH SITE MAP INDICATING EXCLUSION, DECONTAMINATION, AND SUPPORT ZONES AS PAGE TWO

Personalized Decontamination Summarize below and/or attach diagram; discuss use of work zones. Dispose of gloves, Tyvek ( ) Not Needed	Sampling Equipment Decontamination, Parts Summarize below and/or attach diagram; discuss use of work zones. Dispose of single use bailers or return to warehouse for cleaning. On-site decontamination will consist of potable water/de-ionized water rinse and treatment of water at Plant No. 1 (or allowed to sink into adjacent ground, unless at paved area or near source area). ( ) Not Needed	Heavy Equipment Decontamination Summarize below and/or attach diagram; discuss use of work zones. A decontamination area will be established at a location adjacent to each site. The rig and drilling tools (both auger and drill rod) will be cleaned using a high temperature, high pressure cleaner filled with potable water. All work surfaces and the vehicle's wheels will be cleaned. Any other vehicle suspected of being contaminated will be cleaned in the same manner. Decontamination will occur at the completion of drilling every borehole. Run-off may be left on location if not near the source area. Otherwise, drum, transport, and dispose off-site. ( ) Not Needed
Containment and Disposal Method Non-hazardous solid waste.	Containment and Disposal Method Drain free water on-site and dispose as non-hazardous solid waste	Containment and Disposal Method Run-off may be left on location if work activity is not near the source area. Otherwise, drum, transport, and dispose off-site.

SITE SPECIFIC HEALTH & SAFETY PLAN
WORK ZONE PAGE
HDR

THIS PAGE RESERVED FOR MAP (Show Exclusion, Contamination Reduction, and Support Zones. Indicate evacuation and reassembly points.)

Map not required. Plant No. 1 shown on Page 2 is the Contamination Reduction and Support Zone. Exclusions zones are the fences around Plant No. 1 and Plant No. 2, shown on Page 2. Other Exclusion zones are (as yet not needed) new well construction areas (distance of mast head). Other work outside the fenced areas does not require an Exclusion Zone.

SITE SPECIFIC HEALTH & SAFETY PLAN
SIGNATURE PAGE
HDR Engineering, Inc.

The following personnel have read and fully understand the contents of this Site Health and Safety Plan and referenced HDR H&S procedures and further agree to all requirements contained herein. Furthermore, the individuals are fully trained and have required clearances in accordance with HDR H&S Procedure #20. Attach copies of current HTRW and first aid training, medical clearance, and respiratory fit test records.

Name	Affiliation	Date	Signature

Appendix A
Accident Reporting

All accidents, injuries and illnesses which occur from performing project activities in this HASP require that the injured person and the Site Health and Safety Officer complete an INCIDENT REPORT and forward it to the Corporate Director of Safety, Mr. Jim Woolcott, in Omaha, Nebraska.

Incident Report

HDR Engineering, Inc.
8404 Indian Hills Drive
Omaha, NE 68114-4049
(402) 399-1000

Project Name:	Incident Location:
Project No.:	Date/Time of Incident:
Project Manager/ employee supervisor:	Reported to Omaha, Date/Time/to Whom:

Person(s) affected:

Name:	Phone:

Witnesses:

Name:	Phone:

Health Care Treatment Facility Used:

Name:	Address:	Phone:

Treating Physician/Health Care Provider:

Name:	Phone:

Person(s) Treated:

Name:	Extent of Injuries:

Describe the Incident, the project activity being performed, and just how the incident occured (please be descriptive, use proper names, etc.):

Continued on Reverse

Specific recommendations, to prevent this incident from reoccuring:

Comments:

Reported by | Date of Report | Phone

For Use by Health and Safety Manager:

Number of Sheets Attached:

Forwarded:

Appendix B
Deviations and Additions Form

Deviations from and additions to this HASP are permitted and sometimes required based on additional information obtained since the preparation date of the HASP. The DEVIATIONS AND ADDITIONS form will be used to authorize and record all deviations and additions that occur after any one individual has signed this document. Changes in this HASP are only permitted with the following:

1. Written documentation of what the deviation or addition is and reference to the appropriate section from this HASP;
2. Written justification for the change;
3. Verbal communication of the change to all personnel who are directly affected and answering all questions regarding the change to the satisfaction of those same individuals; and
4. Signatures from all personnel who are affected by the change prior to commencing project activities on site with an approval signature from the Site Health and Safety Officer.

Health and Safety Plan Deviations and Additions

HDR Engineering, Inc.
8404 Indian Hills Drive
Omaha, NE 68114-4049
(402) 399-1000

Change 1: Section:

Description of Change:

Justification:

Safety Impact:

Signatures of Acknowledgement:

Resident Field Representative Date Date

Date Date

Date Date

Change 2: Section:

Description of Change:

Justification:

Safety Impact:

Signatures of Acknowledgement:

Resident Field Representative Date Date

Date Date

Date Date

Appendix C
Visitors Log

Visitors to the site may be permitted entrance into the exclusion and contamination reduction zones based upon approval of the Site Coordinator. Otherwise, they must remain in the support zone. The Site Coordinator will be responsible for documenting the name and identity of all visitors in the VISITORS LOG.

VISITORS LOG

Name	Company or Agency	Purpose of Visit	Area(s) to be entered	Date and Time on Site	Checked in by:

Appendix D
Industrial Hygiene Sampling Sheet

Personal air samples and area samples taken during the performance of unique project activities must be documented on the INDUSTIRAL HYGIENE SAMPLING SHEET. A unique project activity is defined as any activity that requires special health and safety training over and above that required in 29 CFR 1910.120. This includes handling drums; climbing, entering or working near confined spaces; entering excavated trenches or pits; walking or climbing on elevated platforms, walkways or ladders; and those project activities involving unmanned heavy machinery or industrial power equipment.

AIR MONITORING AND SAMPLING FORM

Project Name: _____ **Project Number:** _____

Type of Sample: Personal/Area

Location		Date	
Employee/Area		Sampler #	
SSN#		Job Title	
Area			
Operation Monitored			

Personal Protective Equipment:

Eye Protection		Clothing	
Respirator		Other	
Gloves/Boots		Other	

Pump Number: _____

Start Calibration		Sample Start Time	
End Calibration		Sample End Time	
Sample Badge #		Sample Duration	
Manufacturer		Sample Volume	

Remarks (i.e., possible interference, weather conditions, level of exertion, etc.)

_____

Samples Collected By:	
Analysis Requested	
Sampling Method	
Laboratory	
Sample Results	
Collection Media	

HDR Project Name and Number: Baldwin Place Mall - 39762
Date: January 2008
Project Manager: Stuart Bassell
Department: 147
Client/Owner: Pearl River, NY
Local Safety Contact/OSC: John Guzewich

PROJECT SAFETY GUIDE

Emergency Action Plan

1.0 OVERVIEW

When preparing to begin site services on any project site, thought should be given to possible emergencies that could arise while onsite, and how best to handle them. This is particularly important when site operations are for an extended time and involve the setup and operation of a field headquarters, such as a site trailer or locally rented space. When working on a project that is smaller or more transient in scope, a condensed version EAP should be completed. The EAP should be transmitted to project employees via verbal discussion, and (a) posted at the jobsite in any office space, and/or (b) maintained in project vehicles. This information should be updated as necessary.

2.0 REQUIRED INFORMATION

Emergency Contact Numbers

See Site HASP

Medical Facilities

On first project site visit (unless identified earlier), find the nearest medical facility in project vicinity, and drive the route to it. Record the directions/hours of operation/admissions policy to complete this section.

See Site HASP

3.0 FIRST AID/CPR CAPABILITY

If the planned project work will be remote (e.g., more than 15 minutes away from the nearest medical facility listed in Section 2.1), then at least one person currently trained in first aid/CPR must be present when project staff are onsite. On multi-employer worksites, this may be a contractor or client employee, as long as they agree to provide coverage. At initial project kick-off meeting, identify all First aid responders, so staff know who to go to if the need arises.

Individuals identified in the Site HASP have current first aid/CPR training.

4.0 PROJECT "OFFICE" SETUP *(NOT APPLICABLE FOR BALDWIN PLACE MALL)*

All office space must be setup with the following:

a) Trailers, once sited, must be securely tied down and grounded;

b) A 20 lb ABC dry powder fire extinguisher must be placed in the space, upright and fully charged, in an easily accessible location;

c) An OSHA "Employee Right to Know" Poster (Federal poster #2203 or state equivalent) should be prominently posted (plus other non-safety employment regulatory posters – minimum wage, discrimination, etc.);

d) At a minimum, an HDR Field Guide for Construction should be maintained in the office for reference. For significant long term projects (lasting a year or more), a full HDR H&S Program (2 Manual set) should be obtained from Corporate Safety.

e) A first aid kit, of sufficient size for the anticipated number of project staff should be maintained in the trailer (reference HDR H&S *Field Guide for Construction*, Chapter 14, for specific kit requirements).

f) If project will be of extended duration, a weather radio is strongly recommended.

5.0 PROJECT VEHICLES

a) If the project will provide leased or company vehicles, the question of whether they should be equipped with fire extinguishers arises. This is the project manager's call – OSHA does not mandate they be present, if you do not plan to fight it when a vehicle catches on fire. Typically, however, we want to extinguish some electrical harness fire and save the vehicle, and in these cases, we will locate a 10 lb ABC Fire Extinguisher under the seat, or in the cab. These are small and will empty in a few seconds, so they can only be used for very small fires. The operator must have received training on the use and limitations of fire extinguishers, and they should be visually inspected monthly to ascertain they remain fully charged and operable.

b) A copy of the project EAP must also reside in each project vehicle – place in glove compartment or equivalent place to keep from being destroyed by normal activity.

6.0 INCLEMENT WEATHER AND FIRE EMERGENCY

The project EAP should also address the anticipated inclement weather conditions that may impact the project staff. These will vary by geographical region and season, and may include lightning, thunderstorm activity, hurricanes, earthquakes, avalanches, high wind and tornadoes. Typically, the response to inclement weather will mirror those to be taken when facing a fire, so if possible write this Section of the EAP to address both hazards. A short presentation on the proper actions of project staff when facing these conditions should be developed and placed in writing, for inclusion with the above information. Specific items to include or consider:

a) Who will make evacuation decisions;

b) How these decisions will be communicated;

c) Where should staff go when evacuating;

d) Who is the central person to contact when in a remote location and seeking guidance.

7.0 OTHER PROJECT-SPECIFIC EMERGENCY ISSUES

There may be potential emergency issues connected with your specific locale or client – e.g., is your project next to an industrial chemical manufacturing operation, where a sudden release of hazardous chemical could affect your staff? Does your client have rigid evacuation procedures they want us to follow? If so, enter these here.

Upon completion, this Section can now be used as the project EAP.

8.0 REGULATORY REQUIREMENTS/REFERENCES

- HDR Health and Safety Program Procedure # 24 – EAP
- HDR Health and Safety Program Procedure # 27 – Portable Fire Extinguishers
- HDR Health and Safety Program Procedure # 30 – First Aid/CPR
- Videos:
  - "Fire Extinguisher Training, Digital 2000, Inc., 8 minutes, HDR Safety Dept. #0067 & #0068 (2 copies)

Remote Site Safety

The purpose of this procedure is to address safety concerns when HDR employees perform services at remote sites. Its objective is to protect HDR employees from the hazards associated with working in remote locations where employees are isolated from nearby human contact, or not easily accessed by potential rescue equipment.

Potential Hazards

The primary hazards associated with working in remote locations are (1) isolation of employees from public rescue services; (2) limited means of communication; (3) exposure of employees to adverse severe weather; and (4) danger to employees from crime.

Exposure to outdoor elements result in many deaths each year. Usually these hazards can be avoided by having an understanding of the hazards and by proper planning and preparation. Two of these outdoor elements—lightning and conditions leading to hypothermia—are described in greater detail in HDR H&S Procedure #38.

Personal Protective Equipment (PPE)

For any remote site, regardless of conditions, HDR employees are required to carry a cellular phone. In addition, depending on the degree of isolation, the climate, and the topography, the equipment and supplies listed below should be carried by employees.

- U.S. Geological Survey Topographic Map and Magnetic Compass
- Flashlight (with extra batteries and bulb)
- Extra clothing (including mittens, hat, jacket and rain gear)
- Sunglasses
- Extra Food and Water
- Waterproof Matches in Waterproof Container
- Candle/Fire Starter
- Pocket Knife
- First Aid Kit
- Insect repellents and medications to treat exposure to biological hazards such as insect bites, poison ivy, etc.
- Space blanket or two large heavy-duty trash bags.

Training Recommended/Required

None specific to this procedure.

Regulatory Requirements/References

All project personnel shall read, understand and follow the contents of HDR H&S Procedure #38, Remote Site Safety, when engaged in site activities at remote locations. In addition, any or all of the procedures listed below may be applicable.

- HDR H&S Procedure #3 Slip, Trip and Fall Protection
- HDR H&S Procedure #12 Fall Protection
- HDR H&S Procedure #28 Heat Stress
- HDR H&S Procedure #29 Cold Stress
- HDR H&S Procedure #31 Firearm Safety
- HDR H&S Procedure #33 Violence in the Workplace
- HDR H&S Procedure #34 Biological Hazards

Applicable Form(s)

None specific to this procedure.

Excavation Safety

Most of the sections of this procedure apply to all excavations, including trenches made in the earth's surface. The competent person must decide specifically which sections apply and how all hazards presented by the excavation are being controlled. A "competent person" is one who is capable of identifying the hazards of excavations, knowledgeable regarding applicable excavation safety requirements, and with the authority to correct any unsafe condition. A competent person is required to be on-site whenever personnel enter the excavation.

Potential Hazards

Excavation activity exposes HDR personnel and subcontractors to many dangers which, if not recognized, can cause death or serious injury. Among these are surface hazards such as debris, structures and surface protrusions; compromised underground utilities, such as water, gas or electrical lines; exposure to vehicular traffic, falling loads, or on-site mobile equipment; hazardous atmospheres; water accumulation, instability of adjacent structures; loose soil or rock or other materials or equipment that could pose a hazard by falling or rolling into excavations; and the potential for cave-ins. In addition, where employees or equipment are required or permitted to cross over excavations, the danger of falling is always present.

Personal Protective Equipment (PPE)

The primary protection for employees in an excavation is with protective systems such as sloping and benching systems, support- or shield systems. A protective system may not be required if the excavation is made in stable rock or the excavation is less than five feet in depth. Whether with or without a protective system, personal protective equipment must include hard hats, protective shoes/boots, and any other equipment deemed advisable by the competent person.

Training Recommended/Required

HDR employees who have the potential to be exposed to excavation hazards will receive formal excavation training. HDR's safety department also has the following related videos available:

- "*Digging up Trouble*", Safety Shorts, 10:00 minutes, HDR Safety Dept. #0056
- "*Hydraulic Shoring Installation*", Coastal, 13 minutes, HDR Safety Dept. #0434
- "*On Solid Ground – A Plan for Safe Excavation and Trenching*", AGC, 18:30 minutes, HDR Safety Dept. #0075 and #0454
- "*Soil Classification Techniques – Cave In!!*", Coastal, 18 minutes, HDR Safety Dept. #0435
- "*Trench Box Installation*", Coastal, 13 minutes, HDR Safety Dept. #0433
- "*Trench Emergency*", Coastal, 16 minutes, HDR Safety Dept. #0432
- "*Trenching and Shoring*", Envirowin, 12 minutes, HDR Safety Dept. #0051, #0052 and #0053

Regulatory Requirements/References

These safety procedures are governed by OSHA's 29 CFR 1926, Subpart P - Excavations. For in-depth coverage of this procedure, see HDR Health & Safety Procedure #5: "*Excavations*" on HDR's Health and Safety intranet website

http://healthsafety.intranet.hdr/Corporate_HS_Program/Part_2.asp

Applicable Forms

HDR has created a Safety Inspection Checklist specific to excavation and trenching. A copy of this form follows.

HDR EXCAVATION SAFETY INSPECTION CHECKLIST

Date of Inspection: / /

HDR Office:	Project Name/Number:
Inspected by (Signature)	Location

	EXCAVATION AND TRENCHING NOTE: OSHA Construction Safety & Health (29 CFR 1926) references in parentheses.	Yes	No	N/A
1	When operations are near highways; are danger, caution, traffic control signs and/or signal lights provided?			
2	When near public traffic, are signal persons provided to direct operations? (.651(d))			
3	(A) Are adequate brakes provided on mobile equipment? (.602(a)(4)); and (B) Are adequate haul roads provided for hauling units? (.602(a)(3))			
4	Have underground utilities been located and marked prior to excavating? (.651 (b))			
5	Will employees ever enter the excavation? If not, stop here--the rest of the checklist does not apply. If yes, continue with the rest of the checklist.			
6	Is a trenching "competent person" on-site at all times when employees are in the excavation (at any depth)? Is he/she identified in company written project H&S document? (.650(b) & .32(f))			
7	Is the excavation more than 5 feet deep? (.652(a)(1)(ii)) If so, some type of protective system (sloping/shoring/trench box) must be employed. (.652(a))			
8	Is sloping selected as the protective system? Are the sides of excavations sloped to (1.5H:1V) angle of repose? (Assume Type C soil) (.652(b)(1)).			
9	Is benching selected as the protective system? If so, does the benching configuration follow the acceptable configurations presented in 1926.652, Appendix B?			
10	Is aluminum hydraulic shoring used? If so, does the system follow the design configuration presented in .652, Appendix D or is tabulated data available? (.652(c)).			
11	Is a trench box employed as the protective system? If so, is there tabulated data on-site to indicate it will withstand the calculated soil stresses for the type of soil and depth? (.652(c)).			
12	Is the excavation more than 20 feet deep? If so, a protective system designed and stamped by a registered professional engineer is required, with system design data available on-site. (.652)			
13	Is safe access into excavations provided? NOTE: Ramps, stairs or mechanical man hoists shall be used for depths over 20 feet Properly placed and constructed ladders as well as ramps, stairs, or mechanical man hoists may be used up to 20 feet. (.651(c))			
14	Do workers have to travel less than 25 feet to reach a ladder or other exit? (.651(C)(2))			
15	If the excavation is more than 4 feet deep, a means of exiting the excavation must be present. If a ladder is used, does it extend above the surface at least 3 feet? (.1053(b)(1))			
16	Is excavated material stored and retained at least 2 feet from the excavation's edge? (.651(j)(2))			
17	Where vehicular or haulage traffic is near excavation, are adequate stop logs provided so as to prevent equipment from falling into excavation? (.651(f))			
18	Is ground water and surface water adequately controlled to prevent its entering the excavation? (.651(h))			
19	Are adequate guardrails, barricades, lights and warning signs provided, to prevent workers/public from falling in?			
20	Where personnel must cross excavations, are crossover walkways present and if the excavation is 6+ feet deep, are adequate guardrails present? (.651(l))			
21	Are bracing, shoring, cribbing inspected daily and after rains? (.651(k))			

22	When used in conjunction with a sloping/benching system, do the sides of trench box/shoring extend above the excavation at least 18 inches?			
REMARKS:				

Drill Rig Safety

This procedure addresses the hazards associated with the use of mobile drilling equipment and the safety requirements to be implemented to avoid these hazards. Although it is not anticipated that HDR employees will ever operate mobile drilling equipment, they may often work near or with drilling teams and be exposed to the associated hazards. Several other HDR Health and Safety Procedures may also be pertinent and should be reviewed by HDR employees when working on these sites. The purpose of this procedure is to ensure the safety of HDR personnel when working near mobile drill rigs. The HDR Drilling Operations Safety Program implemented in this Procedure applies to all HDR personnel at HDR project sites.

Potential Hazards

The hammer, a 140-pound weight, dropped 30 inches into a bore hole, could cause serious damage to any body part under it when it falls; the cathead's associated rope ("catline") presents an entanglement hazard; and improper discharge of drilling fluids in the work area creates slipping hazards and ponding of water.

Specific Hazards during Drilling:

Possible chemical exposure (low potential) during drilling in source area.

Personal Protective Equipment (PPE)

When working near mobile drilling equipment or any rotating machinery, jewelry and loose fitting clothing should not be worn. The personal protective equipment listed below should be worn by HDR employees at all times while engaged in drilling activities. Additional PPE may be required depending on the hazards present at the site.

- Hard hat
- Safety goggles or glasses with sideshields
- Safety boots with steel toes
- Appropriate work gloves
- Safety vest when working near traffic

Training Recommended/Required

All HDR employees will be trained prior to working on drill teams or working in close proximity to mobile drill rigs, via a safety meeting to be held with the drill rig operator, where personnel responsibilities and safety features of the drill rig are explained prior to the commencement of drilling activities. This training should include:

- The operation, inspection and maintenance of the equipment (including the location of all kill switches);
- The safety features and procedures to be used during the operation;
- Overhead electrical line and underground hazards.

It is also recommended that HDR employees who are working in close proximity to mobile drill rigs review the HDR H&S Procedure #37, Drill Rig Safety, prior to field mobilization.

Regulatory Requirements/References

HDR H&S Procedure #3	Slip, Trip and Fall Protection
HDR H&S Procedure #4	Electrical Safety
HDR H&S Procedure #9	Respiratory Protection
HDR H&S Procedure #12	Fall Protection
HDR H&S Procedure #20	Hazardous and Toxic Waste
HDR H&S Procedure #21	PPE
HDR H&S Procedure #37	Drill Rig Safety

Applicable Form(s)

Potentially Unsafe Condition Report

POTENTIALLY UNSAFE CONDITION REPORT

Project Name: _____

Project Number: _____

Date of Observation: _____ Time: _____

HDR Employee Observing: (Print) _____

Location on Project: _____

Description of Observed Potentially Unsafe Condition:

_____

_____

_____

_____

_____

_____

_____

_____

_____

Report Submitted to: _____ _____
NAME TITLE

Date: _____

Did the condition impact your ability to conduct your HDR project activities?

(check one) ☐ YES ☐ NO

If "Yes", when was the condition resolved? ☐ YES ☐ NO

How? _____

_____

_____

_____

DISTRIBUTION:

CONTROLLING EMPLOYER
PROJECT FILE
CORPORATE SAFETY

Demolition

Although it is not anticipated that HDR employees will ever perform physical demolition activities, it is important that all HDR employees present on demolition project sites be aware of the types of demolition hazards, and the safe practices to be implemented to avoid injury. This procedure addresses hazards associated with the demolition of exterior structures, and the safety requirements to be implemented to avoid these hazards. Due to the multiple hazards created on demolition sites, several other HDR Health and Safety procedures (listed below under "References") may also apply.

Potential Hazards

Prior to any demolition activities, surveys must be taken to ascertain the presence of asbestos, lead, and hazardous materials. These substances must be removed from the site before any work can begin. HDR employees should be assured that these surveys have been performed and any hazardous substances have been removed. Falling matter and debris; glass fragmentation; and removal of walls, floors and steel all present hazards to employees on a demolition job site. Other specific hazards and precautions to be taken are given below.

- When debris is dropped through floor openings without chutes, the openings and the area onto which the material is dropped ("drop zone") will be enclosed with barricades, placed by the "competent person" in the demolition crew.
- To prevent injury from glass fragmentation, the glass should either be removed in bulk (by the demolition crew) prior to demolition, or all employees should be located so as to be shielded from glass shards generated by the demolition process.
- When floor arches are being removed, employees shall not be allowed in the area directly underneath. This area shall be barricaded to prevent access and a sign placed to warn of the hazard.
- Operation of mechanical equipment, especially in the tight spaces frequently encountered in interior demolition activities, presents crushing and "struck by" hazards to nearby personnel. Employees must maintain safe distances, to be determined by the "competent person," from all mechanical demolition equipment during use.
- Mechanical demolition by balling and/or clamming is inherently dangerous; HDR employees must remove themselves from the area of the demolition until it is concluded.
- Performance by HDR personnel of demolition using blasting procedures and equipment is not anticipated. HDR's Health & Safety Procedure #22 covers regulations and safety precautions and procedures on blast sites for information and awareness only.
- If a building is to be demolished at one time by any means, such as pushing, pulling it down; the use of shears, clams or balls, or the use of explosives, the site "competent person" shall first determine the area where the building debris will fall, called the "drop zone." This area will be barricaded, and all project personnel will be kept out of this area until active operations have ceased.

These hazards are addressed in detail in HDR's Health & Safety Procedure #22.

Personal Protective Equipment

Equipment and clothing recommended for personal protection will depend upon the individual site conditions. As a minimum, HDR employees must wear hard hats, and safety shoes and vests. HDR's

Health & Safety Procedure #21 gives guidelines for PPE in specific circumstances and should be reviewed as part of the preparation for work on a demolition project site.

References

29 CFR 1926.850-860 (Subpart T) *Demolition*,
29 CFR 1926.900-914 (Subpart U) *Blasting and the Use of Explosives*
HDR Health & Safety Procedure #1, Permit-Required Confined Spaces
HDR Health & Safety Procedure #2, Portable Ladders
HDR Health & Safety Procedure #3, Slip, Trip and Fall Protection
HDR Health & Safety Procedure #4, Electrical Safety
HDR Health & Safety Procedure #9, Respiratory Protection
HDR Health & Safety Procedure #10, Asbestos
HDR Health & Safety Procedure #11, Lead/Lead-Based Paint
HDR Health & Safety Procedure #12, Fall Protection
HDR Health & Safety Procedure #21, Personal Protective Equipment (PPE)

Applicable Forms

An Engineering Survey Form, or its equivalent pre-demolition survey, is to be completed by a competent representative of the company performing the demolition. (see attached)

See also 40 CFR Part 763 ("AHERA"), Subpart E, Appendix C.

ENGINEERING SURVEY FORM

Project Name _____ Project Number _____ Date _____

Type of Structure to be Demolished _____

Location _____ Basement _____

Stories or Height _____ Size of Structure _____

Locate Party Walls _____

Are Wall Ties Required? _____ How Many? _____ Type _____

Structural Hazards _____

_____

Is Shoring of Walls or Floors Required? _____

Type of Shoring and Location _____

_____

Protection for Adjacent Properties _____

_____

Methods of Demolition _____

_____

Utilities _____

Location of Power Lines _____

Location of Tanks _____

Tanks' Previous Use _____

Have Tanks Been Purged and Tested? _____ By Whom? _____

Material Safety Data Sheets Provided by Customer/Owner _____

_____

PCB's _____ Asbestos _____

Locate Pits or Open Holes _____

_____

Special Hazards and Remedies _____

_____

Other Comments _____

_____

Signed _____

Respiratory Protection

When HDR employees are exposed to atmospheres containing toxic levels of contaminants or low oxygen concentrations, and engineering controls cannot eliminate these hazards, HDR employees will be required to wear respiratory protection. HDR will provide training in the selection, use, care and limitations of respirators for individuals that will enter any area where the use of respiratory protective equipment is required.

Potential Hazards

Unprotected exposure to atmospheres containing toxic levels of contaminants or low oxygen concentrations can result in temporary or permanent difficulty breathing, to lung-related illnesses such as emphysema, and brain damage resulting from oxygen deprivation.

PPE

The entirety of this procedure addresses one form of personal protective equipment—respirators.

Conditions Requiring a Respirator

Engineering controls should always be the primary method of controlling employee exposure to airborne contaminants (i.e., eliminate the contamination source, ventilate the area, erect barriers, implement remote handling methods, etc.). Respirators shall be worn when engineering controls are unsuccessful and:

- The established OSHA Permissible Exposure Limit (PEL) or ACGIH Threshold Limit Value (TLV) for a particular material is approached or exceeded, as known by history or measured by direct reading and/or integrated air sampling; **OR**
- The workplace atmosphere is oxygen deficient (less than 19.5% oxygen by volume). Normal uncontaminated atmosphere contains 20.9% oxygen. **Note**: The National Director of Safety must pre-approve any entry into an oxygen-deficient atmosphere; **OR**
- As deemed appropriate by The National Director of Safety or designee.

Comfort/Dust Mask Exemption

Respirators that are designed for a limited or one-time use, where the facepiece is the filter, are called comfort or dust masks. In cases where an employee chooses to wear one for personal reasons (e.g., allergies, hypersensitivity of some agent, prevention of inhalation of nuisance dust); but where no overexposure is anticipated, they are exempted from all the requirements specified here IF these conditions are met:

- A NIOSH approved mask is selected and worn, and
- The user reads and provides the local OSC with a signed copy of Attachment 5 of H&S Procedure #9 – Respiratory Protection.

- Used comfort masks shall be discarded as soon as use is no longer needed; do not leave these lying around the client premises.

Respirator Types and Selection

There are two major classes of respirators – atmosphere-supplying and air purifying. Respirators within these two classes may be further divided by the type of hazard they protect against – gases/vapors, particulates, or Immediately Dangerous to Life or Health (IDLH) atmospheres. Consult with your OSC, Corporate Safety and/or someone with knowledge in respiratory protection in order to select the appropriate respirator for the hazards you will face. You must select and use the appropriate type of respiratory protection! Only NIOSH-approved respirators may be worn by HDR personnel.

Fit Test

Prior to in initial use of all respirators that fit tightly against the face, and at least annually thereafter, all wearers must be given a qualitative fit test to ensure proper fit is obtained. The fit test is specific to the respirator; therefore, a new fit test must be conducted whenever a different respirator facepiece is used. Thus, it is best if each employee has their own facepiece, rather than attempt to use shared respirators. Fit tests will be obtained from local safety equipment vendors (always at the time of initial purchase, and then just prior to a new project requiring the use of a respirator). The fit test procedures shall follow the protocol in Appendix A of 29 CFR 1910.134.

User Seal Check

For all tight-fitting Air Purifying Respirators (APR), employees shall perform a user seal check each time they put on the respirator, using both a negative pressure and a positive pressure seal check. The user must perform these checks to verify that a proper facepiece-to-face seal has been obtained. To perform these checks, follow the instructions in HDR H&S Procedure #9 – Respiratory Protection or the respirator's manufacturer recommended procedures. A worker may not enter a contaminated area if conditions prevent a good seal of the respirator facepiece to the face.

Respirator Inspection

All respirators used shall be inspected by the user before each use and during cleaning. A record of respirator inspections, including date, employee signature and inspection results, shall be completed daily for routine wear, and following the use of any emergency respiratory equipment.

Cleaning of Respirators

Respirators assigned and worn by one individual must be cleaned after each day’s use (except limited use or disposable respirators). Emergency-use, visitors’ or multi-assigned respirators must be cleaned and disinfected after each use. A respirator spray disinfectant can be used to disinfect between continuous uses, but for cleaning and sanitizing after each day’s use – disassemble, use mild liquid soap solution and warm water, dry and reassemble. Store out of the

contaminated environment in a sealed container – large zip-lock bags with the owner's name on it work well.

Medical Screening

Using a respirator may place a physiological burden on employees that will vary with the type of respirator worn, the workplace condition and the employee's medical status. Prior to assigning personnel to perform tasks requiring the use of respirators, the employee must be medically evaluated in compliance with the requirements of 29 CFR 1910.134(e). Contact Corporate Safety to schedule a medical evaluation.

Training Recommended/Required

Respirators may only be used by those employees who have been properly trained and qualified on the type of respirator to be worn. All employees required to wear cartridge-style respirators shall receive Formal Training in accordance with HDR Health and Safety Program Procedure #9 – Respiratory Protection. Training within one year of the dates of usage is mandated by OSHA. Corporate Safety offers this training on a semi-annual basis via web-based *Microsoft Live Meeting.* If a supplied air style respirator is to be worn, hands-on training on that specific unit must be arranged from a local vendor, under the overall approval of the Corporate Director of Safety.

Regulatory Requirements/References

- 29 CFR 1910.134 "Respiratory Protection"
- HDR Health and Safety Program Procedure #9 – Respiratory Protection
- In addition to the above, the HDR Safety Department has the following videotape available: "Respiratory Protection in the Construction Industry – Selection, Fitting and Maintenance," AGC, 19 minutes, HDR Safety Dept. #0026.

Applicable Form(s)

The form that follows is a checklist created to assist the HDR employee in making a thorough examination of the respirator he or she is using.

RESPIRATOR INSPECTION/CLEANING FORM

This form is to be used as a checklist for daily and periodic inspections of respirators. It is to be used in conjunction with the Respirator Inspection Section of this program and serves as the primary document to provide evidence of an ongoing inspection program. The employee is given a copy of this form to serve as a guideline for the daily respirator maintenance.

Person Conducting Inspection/Cleaning _____ Date _____

Respirator Used By _____ Frequency of Use _____

Type of Respirator _____ Brand _____

Respirator cleansed in warm soapy water and rinsed? ☐ Yes ☐ No

	OK	Needs Repair	Comments
I. FACEPIECE			
no excessive dirt	☐	☐	_____
no cracks or tears	☐	☐	_____
face seal surface	☐	☐	_____
cartridge holder	☐	☐	_____
cartridge gasket	☐	☐	_____
no distortion	☐	☐	_____
flexibility	☐	☐	_____
metal nose clip	☐	☐	_____
II. STRAPS			
elasticity	☐	☐	_____
attachments	☐	☐	_____
buckles	☐	☐	_____
III. EXHALATION VALVE			
no foreign material	☐	☐	_____
valve seat	☐	☐	_____
no cracks or tears	☐	☐	_____
cover in position	☐	☐	_____
no distortions	☐	☐	_____

Asbestos

This procedure is designed to provide guidance for all HDR project activities involving asbestos, so HDR employees can consistently address and control the hazards associated with exposure to asbestos. Further, it is the objective of this procedure to standardize our activities in order to comply with applicable Federal, State and local regulations. Because of its unique properties, asbestos is found in over 5,000 materials. Materials with greater than one percent asbestos are defined by the EPA and OSHA as Asbestos Containing Materials (ACM).

Potential Hazards

The inhalation of asbestos fibers by workers can cause serious diseases of the lungs and other organs that may not appear until years after the exposure has occurred. Asbestosis can cause a buildup of scar-like tissue in the lungs and result in loss of lung function that often progresses to disability and death.

Personal Protective Equipment (PPE)

To prevent exposure, all HDR Inspectors shall wear PPE appropriate for the type of work performed. In general, most asbestos sampling requires the wearing of a full-face negative-pressure respirator suitable for protection against asbestos. Respiratory protection is required when conducting asbestos sampling or at any time that an employee may exceed OSHA-defined permissible exposure limits (PEL) for asbestos. Generally, the level of exposure determines the type of respirator needed. In addition, the standards specify the type of respirator to be used for certain asbestos work. (See CFR 1910.134.)

In addition, latex gloves shall be worn to prevent skin contact with ACM and eye protection is required when collecting samples overhead. In situations where the sampling location or ambient condition presents vision problems, half-mask negative-pressure respirators may be more appropriate. This decision shall be made by the Inspector at the sampling site. All respirator use will be in accordance with the HDR Respiratory Protection Program, as outlined in the HDR H&S Procedure #9.

Training Recommended/Required

Prior to exposure to ACMs, the HDR employee must received formal training equivalent to that specified in EPA's Model Accreditation Plan, 40 CFR 763 Subpart E, Appendix C, at the Inspector level (at a minimum). Additionally, the employee must receive annual refresher training, in accordance with 40 CFR 763 Subpart E, Appendix C. An employee engaged in asbestos-related project activities must carry a valid training pocket card, attesting to the completion of this training, when sampling activities on-site.

Employees whose potential for exposure to ACM requires the use of a respirator must have respirator training and medical clearance to use respirators.

Regulatory Requirements/References

- OSHA Asbestos standard, 29 CFR 1926.1101 covers construction work, including alteration, repair, renovation and demolition of structures containing asbestos.
- 40 CFR 763 Subpart E, Appendix C (EPA inspector accreditation)
- 29 CFR 1926.1101 (m) lists provisions for annual medical screening for asbestos exposure.
- 29 CFR 1910.120/29 CFR 1926.65 contain provisions for annual medical screening – hazardous waste)
- EPA NESHAPS 40 CFR Part 61, Subpart M
- EPA AHERA 40 CFR Part 763, Subpart E-G
- HDR Health & Safety Procedure #10: Asbestos
- Available through HDR Health & Safety:

  Asbestos in Buildings: Simplified Sampling Scheme for Friable Surfacing Materials

  Managing Asbestos in Place (EPA – Office of Pesticides and Toxic Substances TS-799/20T-2003)

  Guidance for Controlling Asbestos Containing Materials in Buildings (EPA – 560/5-85-024)

  Asbestos, Lead-Based Paint, and PCBs PowerPoint presentation created by HDR.

Applicable Form(s)

HDR's Health & Safety office gives each new employee who would potentially work around asbestos a lengthy questionnaire and a physical examination. Once this is on file, an annual follow-up questionnaire and examination are performed to assess the employee's exposure and the possibility of any related harm done during the preceding year. A copy of this re-examination form is attached.

Part 2

PERIODIC MEDICAL QUESTIONNAIRE – ANNUAL RE-EXAMS*

1. NAME _____

2. SOCIAL SECURITY # ___ ___ ___ ___ ___ ___ ___ ___ ___

3. EMPLOYEE NUMBER ___ ___ ___ ___ ___ ___ ___

4. PRESENT OCCUPATION _____

5. OFFICE _____

6. ADDRESS _____

7. _____ (Zip Code)

8. TELEPHONE NUMBER _____

9. INTERVIEWER _____

10. DATE _____

11. MARITAL STATUS? 1. Single ___ 2. Married ___ Divorced ___ 3. Widowed ___ 4. Separated _____

12. OCCUPATIONAL HISTORY

12A. In the past year, did you work full time (30 hours per week or more) for 6 months or more? Yes _____ No _____

IF YES TO 12A:

12B. In the past year, did you work in a dusty job? Yes _____ No _____ N/A _____

12C. If yes to 12B, was dust exposure Mild _____ Mod. _____ Severe _____

12D. In the past year, were you exposed to gas or chemical fumes in your work? Yes _____ No _____

12E. If yes to 12D, was exposure Mild _____ Mod. _____ Severe _____

12F. In the past year, what was your:

Job/occupation? _____

Position/job title? _____

13. RECENT MEDICAL HISTORY

13A. Do you consider yourself to be in good health? Yes _____ No _____

If NO, state reason _____

13B. In the past year, have you developed:

Epilepsy?	Yes _____	No _____
Rheumatic fever?	_____	_____
Kidney disease?	_____	_____
Bladder disease?	_____	_____
Diabetes?	_____	_____
Jaundice?	_____	_____
Cancer?	_____	_____

14. CHEST COLDS AND CHEST ILLNESSES

14A. If you get a cold, does it usually go to your chest? Yes _____ No _____

(usually means more than 1/2 the time) Don't get colds

15A. During the past year, have you had any chest illnesses that have kept you off work, indoors at home, or in bed? Yes _____ No _____ N/A _____

IF YES TO 15A:

15B. Did you produce phlegm with any of these chest illnesses? Yes _____ No _____ N/A _____

15C. In the past year, how many such illnesses (with increased phlegm) did you have which lasted a week or more? _____ No such illnesses _____

16. RESPIRATORY SYSTEM

In the past year have you had:					Further Comment on Positive Answers
Asthma	Yes	____	No	____	_____
Bronchitis	Yes	____	No	____	_____
Hay Fever	Yes	____	No	____	_____
Other Allergies	Yes	____	No	____	_____
Pneumonia	Yes	____	No	____	_____
Tuberculosis	Yes	____	No	____	_____
Chest Surgery	Yes	____	No	____	_____
Other Lung Problems	Yes	____	No	____	_____
Heart Disease	Yes	____	No	____	_____
Do you have:					
Frequent colds	Yes	____	No	____	_____
Chronic cough	Yes	____	No	____	_____
Shortness of breath when walking or climbing one flight of stairs	Yes	____	No	____	_____
Do you:					
Wheeze	Yes	____	No	____	_____
Cough up phlegm	Yes	____	No	____	_____
Smoke cigarettes	Yes	____	No	____	Packs/day ____ No. of years ____

Date _____ Signature _____

Firearm Safety

This procedure describes firearm safety practices that will eliminate accidental discharge of firearms, and thereby prevent the injuries associated with these types of accidents. The intent is to prevent firearm injuries, minimize the hazards associated with the carrying of firearms, and prohibit the unlawful discharge of the weapons.

HDR personnel occasionally perform project tasks in remote wilderness areas, where a real threat of injury from large animals exists. While personal injury hazards can be minimized by prudent field behavior, the threat of attack from predators cannot be eliminated in certain situations and seasons. In these cases, it may become necessary for HDR personnel to carry firearms for personal protection.

Potential Hazards

Large wild animals may be found in remote wilderness areas. If provoked or afraid, these animals—wolves, bears, alligators, sharks—may attack, causing injury or death. The prudent use of firearms may save a life. More frequently than attack by wild animals is the hazard of the accidental discharge of firearms.

Further, guns are loud and the noise can cause hearing damage. They can also emit debris and hot gas that could cause eye injury.

Personal Protective Equipment (PPE)

This procedure covers the safe handling of firearms, which are, of themselves, personal protective equipment.

Although HDR does not own or provide firearms to employees, employees are allowed to carry privately owned firearms for their personal protection if and only if all of the following conditions apply:

- There is a recognizable danger of attack by a large mammal;
- The employee has successfully completed a formal training class (and refresher training, as required) on firearm safety;
- The Department Manager grants permission for the employee to carry firearms while working; and
- The employee chooses to carry a firearm.

Training Recommended/Required

An employee who desires to use a firearm for his own safety as described above must have successfully completed a formal training class (and refresher training, as required) on firearm safety. The class may be sponsored by the National Safety Council, National Rifle Association or other nationally recognized safety organization. He or she must also provide a copy of the training records to the OSC for retention and an additional copy to be forwarded to Corporate Safety.

Regulatory Requirements References

National Rifle Association, www.hrahq.org
Americans for Gun Safety Foundation, www.agsfoundation.com, Universal Firearm Safety Rules
National Shooting Sports Foundation, www.nssf.org
American Medical Association Policy H-145.000, Firearms: Safety and Regulation

Applicable Form(s)

There are no HDR forms applicable to this procedure.

Electrical Safety

HDR recognizes that the use of electricity is necessary, and provides energy for many essential activities. This procedure specifies the requirements of the use of temporary electricity and electrical equipment commonly encountered on project sites and during office renovations.

Potential Hazards

The use of temporary electricity and electrical equipment poses serious hazards to HDR personnel. Among these are electrocutions, burns and shock associated with exposure to unwanted electrical current.

Personal/Protective Equipment (PPE)

HDR has not set forth any specific PPE for working with temporary sources of electricity; the emphasis is more on ensuring that the source itself is safe. Nevertheless, common sense dictates that those who work with or around temporary electricity wear safety gloves, hard hats and safety shoes. Additional PPE may be required or recommended by the lead person in charge of the project on-site.

Training Recommended/Required

HDR Employees will receive awareness training to present an overview of electric hazards and provide employees with information on the recognition and avoidance of potentially unsafe conditions. Employees who use power tools or other electrical equipment (other than office equipment) will receive formal training to provide information on types and use of GFCIs, types and use of extension cords, requirements for the use of portable electrical generators, and training specific to the use of the equipment that the employee will be required to operate.

Regulatory Requirements/References

- HDR Health and Safety Program Procedure # 4 – *Electrical Safety*
- 29 CFR 1926 Subpart K, "*Electrical"*

HDR's Health & Safety department has the following videos available:

"*Electrical Related Work Practice*", Envirowin, 13 minutes, HDR Safety Dept. #0032

"*Portable Generators*", Safety Shorts, 10 minutes, HDR Safety Dept. #0034

"*Power Tool Safety*" (some electrical info), AGC, 14 minutes, HDR Safety Dept. #0029, #0076 and #0455

"*Temporary Electricity*", (*BEST Video),* AGC, 17:30 minutes, HDR Safety Dept. #0033, #0079 and #0458

Applicable Forms

An HDR Inspection Checklist, Temporary Electrical Wiring, is to be completed by the on-site lead. A copy of the checklist is attached.

HDR ELECTRICAL INSPECTION CHECKLIST					
Date of Inspection: / /					
HDR Office:		Project Name/Number:			
Inspected by (Signature):		Location:			
TEMPORARY ELECTRICAL WIRING NOTE: OSHA Construction Safety and Health (29 CFR 1926) references in parentheses.			Yes	No	N/A
1	Is the temporary wiring guarded, isolated by elevation or buried so as to prevent accidental contact? (.416(a)(1))				
2	Are extension cords being used designed for hard or extra-hard usage? (they should be marked with the first letter of the marking "S") (.405(a)(ii)(j))				
3	Are all switch boxes, receptacle boxes, metal cabinets and temporary power lines marked to indicate the maximum operating voltage? (.403(g))				
4	Are all circuits protected against overload? (.404(b))				
5	Does each fuse cabinet have close fitting doors that can be locked? (.405(d))				
6	Are disconnect boxes securely fastened to a surface and fitted with a cover? (.405(d))				
7	Is the incoming service or supply circuit readily accessible? (.405(a)(2)(ii)(B))				
8	Are all circuit breakers, switches and fuses marked or labeled identifying the circuits or equipment supplied through them? (.403(h))				
9	Are all switches, circuit breakers, fuse panels, or motor controllers that are located out-of-doors or in wet locations in a weatherproof enclosure or cabinet? (.405(e))				
10	Are all circuits grounded? In accordance with the NEC. (.403(h))				
11	Are ground fault circuit interrupters installed in circuits used by portable electric tools? (.404(b))				
12	Is the vertical clearance above walkways 10-15 feet or more for circuits carrying 600 volts or less? (.404(c)(1)(ii))				
13	Are temporary lights suspended by their electric cords designed for this means of suspension? (.405(a)(2)(ii)(F))				
14	Are flexible cords and cables protected from damage such as sharp corners, closing doors and projections? (.405(a)(2)(ii)(I))				
15	Are guards provided for bulbs on temporary lighting strings and extension cords? (.405(a)(2)(ii)(E))				
REMARKS:					

Permit-Required Confined Spaces

A Confined Space is any space that: (1) Is large enough and so configured that an employee can bodily enter (any part of the body) and perform assigned work; and (2) has limited or restricted means for entry or exit; and (3) is not designed for continuous human occupancy.

Potential Hazards

Confined spaces do not necessarily have a hazard associated with them. They are just configured in a way that limits easy entry/escape, do not have typical office ventilation and lighting and/or safety design and are big enough that an employee can insert any part of his or her body into the

space. Nevertheless, confined spaces may pose special hazards such as toxic, flammable or asphyxiating atmospheres, inwardly converging walls or engulfment. If a confined space is found to contain a physical or chemical hazard, it becomes a Permit-Required Confined Space (PRCS).

Personal Protective Equipment (PPE)

Personal Protective Equipment needs are based on the potential for the confined space to contain: (1) a hazardous atmosphere; (2) a material with the potential for engulfing an entrant; (3) potential for entrapment; or (4) any other recognized serious safety or health hazard such as heat or electrocution.

Training Recommended/Required

HDR Employees who have the potential to be exposed to hazards of permit required confined spaces, whether at work areas controlled by entities other than HDR, or at HDR controlled work sites or offices will receive awareness training. The training will provide the employee with the knowledge and skills required for recognition and avoidance of confined space hazards.

HDR's corporate safety department has the following videos available, which are recommended for confined spaces awareness training:

- "Confined Space", (BEST Video), Envirowin, 10 minutes, HDR Safety Dept. #0014
- "Confined Space Entry (Construction)", AGC, 18:20 minutes, HDR Safety Dept. #0015, #0071 and #0453
- "Scott Air Pack SCBA Training", Scott Corp., 25 minutes, HDR Safety Dept. #0442

HDR employees who anticipate entering permit-required confined spaces are to receive in-depth formal training.

Regulatory Requirements/References

This permit space program also complies with the OSHA Permit-Required Confined Space (PRCS) standard(s), 29 CFR 1910.146 & 29 CFR 1926.21(b)(6)(I) & (ii), and the American National Standards Institute (ANSI) Z117.1-1995, *Safety Requirements for Confined Spaces* (available from Corporate Safety). For complete documentation of this procedure, the employee is referred to HDR's Health and Safety Program Procedure #1: "*Permit-Required Confined Space*."

Applicable Form(s)

Prior to engaging in any activity involving enclosed or confined spaces, the HDR on-site team leader is to inspect and evaluate space conditions and to complete the form "HDR Safety Inspection Checklist: Enclosed Spaces and Confined Spaces" (attached) and submit it to _____ .

HDR SAFETY INSPECTION CHECKLIST

Date of Inspection: / /

HDR Office:	Project Name/Project Number:
Inspected by (Signature):	Location:

	ENCLOSED SPACES & CONFINED SPACES NOTE: OSHA Construction Safety and Health (29 CFR 1926) references in parentheses.	Yes	No	N/A
1	Does the space have a limited means of access (porthole, hatch, only one door, etc.)? If not, it is not a confined space.			
2	Is the space large enough, or has openings large enough, that a worker may place any portion of his/her body into it? If not, it is not a confined space.			
3	Is the space NOT designed or intended for continuous human occupancy (Is it missing an HVAC system, lighting, workstations, etc)? If answer is "NO" (It IS intended for continuous human occupancy), then it is not an enclosed space OR confined space.			
	IF ITEMS # 1, 2 and 3 ARE ALL ANSWERED "YES", THEN IT IS AN "ENCLOSED SPACE".			
4	Does the space contain a hazardous atmosphere, physical hazard (heat, electrocution) explosive atmosphere (>10% LEL), potential for engulfment (water/grain) or have inwardly converging walls? If "YES" has been answered to all items # 1, 2, 3, 4, then it is a Permit Required Confined Space (PRCS). Complete questions # 5-20.			
5	Are employees going to enter the PRCS? If not, is the space sealed so that it is inaccessible to entry? (.146(c)(3)). If space will not be entered, just seal space, answer "NO" and stop here - items #6-20 will not apply.			
6	Is the corporate H&S Permit Space Program being followed? (.146(c)(4))			
7	Do the entrants/attendants understand their respective duties? (.146(h)).			
8	Have the entrants/attendants received formal Confined Space Training? (.146(g)).			
9	Has the space atmosphere been sampled for oxygen deficiency, explosive concentrations and the presence of toxic gasses, in that order? (.146(d)(5)).			
10	Is a sign posted near the entrance, stating "DANGER—PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" or equivalent language? (.146(C)(2)).			
11	Has a written Confined Space permit been completely filled out, been signed by the entry supervisor, and been posted at the space entrance? (.146(e)).			
12	Is a communication system implemented, such that the entrant is in constant communication (Visual, Voice, Signs, Hand Signals) with the attendant at all times?			
13	Is the entrant equipped with a lifeline/body harness, and if a vertical descent over 5 feet is required, is the entrant attached via retrieval line to a mechanical winch? (.146(k)(3)).			
14	Are there trained rescue workers standing by to assist in case of an emergency, or has an outside rescue organization been contracted to act? (.146(k)).			
15	Is natural lighting sufficient, and if not, is explosion-proof lighting being used due to the presence of combustible gasses/vapors? (.146(d)(4)).			
16	Are the entrant(s) using all needed Personal Protective Equipment (gloves, Tyvek, respirators, hard hats, steel-toed safety shoes)? (.146(d)(3)).			
17	If the space contains a harmful atmosphere, Is a blower w/hose on-site and being utilized at least 30 minutes prior to entry? (.146(c)(5)).			
18	If another employer is working nearby, such that an HDR entry could affect the employer's workers, have they been notified of the existence of the space and the HDR entry? (.146(c)(8) & (9)).			
If any of the questions #6-19 were answered "No", then a further review of the space/situation is required prior to entry. Contact HDR safety for clarification.				
REMARKS:				

Hazard Communication

All employers who use hazardous chemicals must establish a hazard communication program. The program must be in writing and provide information—through labels on containers, material safety data sheets (MSDS), and training programs—to employees on the hazards of the chemicals they are exposed to or potentially exposed to.

Potential Hazards

OSHA requires that chemical manufacturers and importers evaluate the hazards of the chemicals that they produce or import and, using that information, prepare container labels and MSDS. The manufacturers and distributors of these chemicals are required to provide the labels and MSDS to employers. The hazards associated with these chemicals are as varied as the chemicals themselves.

Personal Protective Equipment (PPE)

No specific personal protective equipment could cover all potential hazards in all situations. The clothing and equipment needed to adequately protect an employee in the presence of specific chemical hazards are to be determined by the Office Safety Coordinator or on-site lead, whichever is appropriate in the circumstances.

Training Recommended/Required

All HDR employees should receive awareness-level "informational" training on the general requirements of HDR's Hazard Communication Program. In addition, each employee who may be "exposed" to hazardous chemicals when working must be provided information and training prior to initial assignment to work with a hazardous chemical, and whenever the hazard changes.

Upon assignment to a particular job site, employees should receive formal training in the specific chemical hazards that they are likely to be exposed to. At any time that new products are received, the employer must review the accompanying MSDS to determine the degree of training required.

Also available to employees and trainers is the videotape "*Hazard Communication*", published by Envirowin, HDR Safety Department #0021, #0417 and #0472.

Regulatory Requirements/References

29 CFR 1910.1200, "*Hazard Communication*"

HDR Health & Safety Program, Procedure #6, "*Hazard Communication*"

Applicable Form(s)

The “Checklist for HazCom Compliance – HDR Health & Safety Program” is worded for regular, periodic use in an office setting. It can be used just as well to assess a project site’s incidence of hazardous materials. A copy of the checklist is attached.

CHECKLIST FOR HAZ-COM COMPLIANCE
HDR HEALTH AND SAFETY PROGRAM

HDR Office:

Office Safety Coordinator (OSC):

PREPARE LIST OF HAZARDOUS CHEMICALS		DATE COMPLETED
1	Develop a preliminary list using a broad interpretation of what should be included.	
a	To develop the list, survey the office (especially storage rooms and closets).	
b	Check purchase records.	
c	Check field vehicles.	
d	Interview office and field staff.	
2	Evaluate the list to eliminate items that do not qualify (i.e., articles, food and beverages, cosmetics, over the counter and prescription drugs, first aid supplies, wood or wood products, biological hazards, ionizing and non-ionizing radiation).	
3	Evaluate the remaining items to determine whether they qualify for exemption as consumer products. (Consumer products can be eliminated if they are being used for the purpose intended and the use results in exposure which is not greater than could be reasonably expected by home consumers when they use the product as advertised).	

COLLECT MSDSs AND LABEL CONTAINERS		DATE COMPLETED
4	Collect MSDSs for all of the chemicals on your List of Hazardous Chemicals. (MSDSs can be collected from the internet, via the HDR intranet or other internet sources, or from the distributor/supplier/manufacturer/importer).	
5	Cross-index each MSDS to the List of Hazardous Chemicals in a manner that will allow the reader of the list to quickly find the corresponding MSDS.	
6	Place the List of Hazardous Chemicals and MSDSs together in a central location that is easily accessible to all employees.	
7	Assure that all of the containers of chemicals included on your List of Hazardous Chemicals have a manufacture's label or a label with the same information as the original container.	

EMPLOYEE TRAINING AND DOCUMENTATION		DATE COMPLETED
9	Provide information to all employees on the following topics: explanation of the OSHA standard, explanation of the requirements of the HDR HazCom Program, location of the List of Hazardous Chemicals and MSDSs, how to read and interpret labels and the MSDSs, how to prevent exposure and general information of chemical hazards.	
10	Require each trained employee to answer a written quiz on the HazCom information.	
11	Provide formal training to employees for the specific chemical hazards which they will be exposed to, including the following topics: chemical routes of exposure, proper storage and labeling, procedures to follow in an overexposure occurs, emergency spill procedures, and health and physical hazards specific to the chemical.	
12	Document the training and quiz results using a program for safety training records and/or the creation of safety training files.	
13	Maintain safety training records in your office.	

REMARKS:

Hazardous & Toxic Waste ("HazWoper")

Various HDR offices perform services at sites that may contain hazardous substances. Hazardous substances may exist in gaseous, liquid or solid form and can enter the body by inhalation, direct skin contact, ingestion, or through a puncture wound (injection). A contaminant can cause damage at the point of contact (local effect), or cause an adverse reaction at other points in the body (systemic effect). It is the objective of HDR to provide employees with adequate equipment and training to reduce the potential for harm from exposure to hazardous substances.

NYSDEC SPILL HOTLINE: 1-800-457-7362

Purpose

The purpose of this procedure is to provide guidance for ensuring the health and safety of HDR site personnel who work with hazardous substances or who work at hazardous waste sites. This procedure is in accordance with the requirements of OSHA Standards 29 CFR 1910.120/1926.65, Hazardous Waste Operations and Emergency Response (commonly referred to as "HazWoper") and EPA regulations contained in 40 CFR Part 311.

This section is applicable to HDR employees who are exposed or potentially exposed to hazardous substances, including hazardous wastes, and who are engaged in the any of the following operations:

- Clean-up operations required by a governmental body, whether federal, state, local or other involving hazardous substances;
- Corrective actions involving clean-up operations at sites covered by the Resource Conservation and Recovery Act of 1976 (RCRA),
- Voluntary Client [hazardous substance] clean-up operations,
- Operations involving hazardous wastes conducted at a Treatment, Storage, and Disposal (TSD) facilities regulated under 40 CFR Parts 264 and 265 pursuant to RCRA, or by agencies under agreement with U.S. Environmental Protection Agency to implement RCRA regulations.

Potential Hazards

Due to the extensive breadth of material and the variety of hazards inherent in each of these materials, this topic could not be adequately covered and a suitable treatment could not be presented here. Refer to HDR H&S Procedure #20 – *Hazardous and Toxic Waste.*

Personal Protective Equipment (PPE)

The purpose of PPE is to shield or isolate individuals from the environmental chemical, physical, and biological hazards present on-site. No single combination of protective clothing and equipment, however, is capable of protecting against all hazards. Therefore, PPE should be used in conjunction with (not in place of) engineering controls and safe work practices. Key factors to consider in selecting PPE are:

- Identification of the hazardous site contaminants.
- Potential exposure routes (e.g., inhalation, ingestion, skin absorption, etc.).
- The performance of the PPE materials and seams in providing a barrier to these hazards (consider chemical resistance, permeation, penetration, durability flexibility, temperature effects, ease of decontamination, and compatibility with other equipment).

In accordance with 29 CFR § 1910.120(g), the project Health and Safety Plan (HASP) must describe the different PPE ensembles that will be used to address potential hazards during site activities. The HASP should also include or refer to a comprehensive PPE program that addresses site hazards, duration of site activities, limitations of PPE during temperature extremes, PPE selection, maintenance, storage, decontamination, and training for PPE use, inspection, and monitoring.

Training Requirements

All site workers must be able to recognize and understand the potential health and safety hazards associated with the site. Site workers must be trained to work safely wherever there is a potential for exposure to a safety or health hazard. Specifically, 29 CFR § 1910.120(e)(2) requires that the HazWoper training presented include the following information:

- Names of personnel and alternates responsible for site safety and health.
- Safety, health, and other hazards present on site.
- Use of personal protective equipment.
- Work practices by which the employee can minimize risks from hazards.
- Safe use of engineering controls and equipment on the site.
- Medical surveillance techniques, and recognition of symptoms and signs that might indicate over-exposure to hazards.
- An emergency response plan meeting the requirements for safe and effective responses to emergen-cies, including all necessary equipment.
- Confined space entry procedures.
- A spill containment program.
- Decontamination procedures.

It is also recommended that training cover the proper use of field equipment, employee rights and responsibilities, and first aid.

Regulatory Requirements/References

- 29 CFR 1910.120, “Hazardous Waste Operations and Emergency Response”
- 29 CFR 1926.65, “Hazardous Waste Operations and Emergency Response”
- EPA regulations contained in 40 CFR, Part 311
- HDR Health and Safety Program Procedure #20 – Hazardous and Toxic Waste
- Resource Conservation and Recovery Act of 1976 (RCRA)

The following HDR safety procedures may also be applicable, depending on the tasks to be performed and the site conditions. As applicable, employees are required to adhere to these provisions, as well as those in this procedure:

Procedure #1 – Permit-Required Confined Spaces
Procedure #3 – Slip, Trip and Fall Prevention
Procedure #5 – Excavation Safety
Procedure #9 – Respiratory Protection
Procedure #12 – Fall Protection
Procedure #21 – Personal Protective Equipment
Procedure #25 – Air Monitoring
Procedure #30 – First Aid/CPR
Procedure #35 – Medical Monitoring

HAZWOPER Form/Checklist

1. Has a **Corporate Health and Safety Program** been developed? (Y) N

2. Has a comprehensive **Site-Specific Workplan** been written? Y N

The workplan incudes the following elements:

- ☐ normal operating procedures for accomplishing the project goals
- ☐ extent of contamination is defined
- ☐ means by which contamination and remediation are to be accomplished
- ☐ if HDR is prime, have remedial clean-up goals been established?.
- ☐ strategies for implementing the training
- ☐ strategies for implementing compliance procedures
- ☐ strategies for implementing medical surveillance programs

Available information has been reviewed, including

- ☐ site records
- ☐ waste inventories
- ☐ manifests
- ☐ sampling data
- ☐ site photos
- ☐ other records (specify) _____
- ☐ work objectives have been defined
- ☐ methods for accomplishing the objectives have been determined
- ☐ personnel requirements have been determined
- ☐ any need for additional training has been determined
- ☐ equipment requirements have been determined.

Notes/Comments _____

_____

3. Has a **Site-Specific Health and Safety Plan** (HASP) been developed? (Y) N

The HASP includes the following elements:

- ☐ Key Personnel and Hazard Communications Plan (29 CFR § 1910.120(b)(2))
- ☐ Health and Safety Risk Analyses (29 CFR § 1910.120(b)(4))
- ☐ Site Control Measures (29 CFR § 1910.120(d))
- ☐ Employee Training Assignments (29 CFR § 1910.120(e))
- ☐ Medical Surveillance (29 CFR § 1910.120(f))
- ☐ Personal Protective Equipment (PPE) (29 CFR § 1910.120(g))
- ☐ Air and Personnel Monitoring (29 CFR § 1910.120(h))
- ☐ Spill Containment Program (29 CFR § 1910.120(j))
- ☐ Confined Space Entry Procedures (29 CFR § 1910.120(b)(9))
- ☐ Decontamination Procedures (29 CFR § 1910.120(k))
- ☐ Emergency Response Plan (29 CFR § 1910.120(l))

Notes/Comments _____

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4. Has a **preliminary evaluation of the site's characteristics** been made? (Y) N

The preliminary evaluation includes:

- ☐ Site location and size.
- ☐ Description of response activity and/or the project objectives.
- ☐ Duration of the planned activity.

- ☐ Site topography and accessibility.
- ☐ Site safety and health hazards expected.
- ☐ Pathways for hazardous substance dispersion.
- ☐ Present status and capabilities of emergency response teams that would provide assistance for on-site emergencies.
- ☐ Hazardous substances and health hazards expected at the site

Notes/Comments _____

_____

5. Has a **site control program** to protect employees from contamination been established? (Y) N

The following elements are included:

- ☐ Development of a Site Map.
- ☐ Establishment of Work Zones at the Site.
- ☐ Organization of Workers Using the Buddy System.
- ☐ Establishment of a Communications Network and Procedures.
- ☐ Worker Safety Procedures.
- ☐ Identification of Nearest Medical Assistance.

Notes/Comments _____

_____

6. Do employees have specific training for and certification in hazardous waste operations? (Y) N

29 CFR § 1910.120(e)(2) requires that the HazWoper training include the following information:

- ☐ Names of personnel and alternates responsible for site safety and health.
- ☐ Safety, health, and other hazards present on site.
- ☐ Use of personal protective equipment.
- ☐ Work practices by which the employee can minimize risks from hazards.
- ☐ Safe use of engineering controls and equipment on the site.
- ☐ Medical surveillance techniques, and recognition of symptoms and signs that might indicate overexposure to hazards.
- ☐ An emergency response plan meeting the requirements for safe and effective responses to emergencies, including all necessary equipment.
- ☐ Confined space entry procedures.
- ☐ A spill containment program.
- ☐ Decontamination procedures.

It is also recommended that training cover the following:

- ☐ Proper use of field equipment.
- ☐ Employee rights and responsibilities.
- ☐ First Aid.

Notes/Comments _____

_____

7. Are annual medical surveillance procedures in place? (Y) N

(If potential contaminants can be identified, Table 2 of HDR Health and Safety Procedure #35 lists applicable OSHA Standards for the type of medical surveillance procedures.)

It is the responsibility of project personnel and project managers to determine if there is a potential for such exposure for each project site. Dr. Elayne Theriault of ADP Screening & Selection Services (Formerly ClinNet Solutions) (see Section 6.0 of H&S Procedure #35) is available for assistance in determining medical monitoring requirements for specific project sites and specific chemicals/ hazards.

8. Have appropriate personnel protective equipment (PPE), engineering controls, work practices or a combination of these methods been implemented? (Y) N
   - ☐ Hazardous site contaminants have been identified.
   - ☐ Potential exposure routes e.g., inhalation or skin absorption, etc., are defined
   - ☐ The performance of the PPE materials and seams in providing a barrier to these hazards have been considered, e.g., chemical resistance, permeability, etc.

   Notes/Comments _____

9. Has initial air monitoring been performed to identify and quantify levels of hazardous substances. (Y) N

   Notes/Comments _____

10. Are decontamination procedures in place? (Y) N

    The decontamination procedures must accomplish the following:
    - ☐ methods and procedures are established to minimize worker contact with contaminants during removal of PPE.
    - ☐ procedures to prevent contamination of clean areas are established.
    - ☐ appropriate decontamination methods have been determined.
    - ☐ the number and layout of decontamination stations needed has been determined.
    - ☐ incompatible wastes requiring separate decontamination stations have been identified.
    - ☐ the decontamination equipment needed has been determined.
    - ☐ methods for disposing of clothing and equipment that are not completely decontaminated are established.
    - ☐ the target level of decontamination is established

    Notes/Comments _____

11. Has an **Emergency Response Plan** been developed? (Y) N

    The plan includes:
    - ☐ Pre-emergency planning.
    - ☐ Personnel roles, lines of authority, and communication.
    - ☐ Emergency recognition and prevention.
    - ☐ Safe distances and places of refuge.
    - ☐ Site security and control.
    - ☐ Evacuation routes and procedures.
    - ☐ Decontamination procedures.
    - ☐ Emergency medical treatment and first aid.

☐ Emergency alerting and response procedures.
☐ Critique of response and follow-up.
☐ PPE and emergency equipment.
☐ Site topography, layout, and prevailing weather conditions.
☐ Procedures for reporting incidents to local, state, and federal governmental agencies.

Notes/Comments _____

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Slip, Trip & Fall Prevention

Each year, physical injuries due to common slips, trips and falls account for a significant percentage of all reportable accidents in the USA. Most of these accidents are preventable through proper housekeeping, correct walking surfaces and proper precautions. It is the objective of HDR to prevent injuries or "near misses" occurring from slip, trip or fall hazards by the identification, elimination and/or control of these hazardous conditions.

This procedure describes work practices that will reduce or eliminate slips, trips and falls and thereby reduce or prevent the injuries associated with these types of accidents. The intent is to prevent injuries, maintain a safe workplace and a healthy workforce.

Potential Hazards

Potential tripping hazards include poor housekeeping, debris, raised edges of walkways and gratings, loose extension cords, running, and inadequate lighting. Precursors to slipping are spills or other walking surface contaminants, steel decks, winter (icy) conditions, and wet conditions. Falls may result from the following conditions: lower level access points—inadequate railings; jumping; unsecured tools; unsecured and unenclosed elevated work platforms; and windy conditions.

Personal Protective Equipment (PPE)

PPE of hard hat and steel-toed shoes is required on any HDR field site. In the prevention of falls and slips in any area, HDR recommends that employees avoid irregular or overlong strides and that they wear shoes with good traction and slip resistant soles.

Fall hazards of 4 feet or more should be evaluated to determine what fall preventive steps might be implemented. Fall protection is required at heights of 6 feet or greater. The 6-foot rule also applies if walking/stepping across an excavation.

Training Recommended/Required

Training in the form of videotapes is available through HDR's safety department and includes:

- "*Housekeeping on the Jobsite*", AGC, 13:10 minutes, HDR Safety Dept. #0082 and #0461; and
- "*Slips and Falls: Construction*", AGC, 10 minutes, HDR Safety Dept. #0017

In addition, a Pittsburgh *Slip, Trip and Fall* PowerPoint presentation is available through HDR's intranet site.

Regulatory Requirements/References

29 CFR 1926, Subpart C: "General Safety and Health Provisions"

HDR Health & Safety Manual, Procedure #3: “Slip, Trip & Fall Prevention”
HDR Health & Safety Manual, Procedure #12: “Fall Protection”
HDR Field Health & Safety Guide for Construction, Chapter 5: “Slip, Trip & Fall Prevention”
HDR Health & Safety Bridge Inspection Safety Manual, Chapter 4: “Fall Protection”
HDR Health & Safety Bridge Inspection Safety Manual, Chapter 8: “Slip, Trip & Fall”

Applicable Form(s)

HDR has not developed any forms or checklists specific to this area of health and safety.

Portable Ladders

This procedure establishes criteria for the procurement, construction, care and use of all portable ladders in order to ensure personnel safety under normal conditions of usage. The HDR Ladder Program implemented in this Procedure applies to all HDR personnel at HDR client sites and at all HDR facilities. All employees, regardless of HDR Department, will be impacted by this program.

Potential Hazards

A ladder is the ideal tool; it requires little maintenance and is highly reliable. Ladders, however, are also fertile ground for accidents. This is because ladders provide us a mechanism to ascend to dangerous heights but neither generate the normal respect when using other dangerous tools, nor provide any fall protection when mistakes are made. If neglected, abused, or used for some unintended purpose, ladder use can result in injury or death.

Personal Protective Equipment (PPE)

Requirements for the use of personal protective equipment are dependent upon those generally needed at any job site such as steel-toed shoes and hard hats. The employee is urged to use his or her best judgment in determining if other PPE (such as fall protection equipment or safety gloves) will be required on the job.

Training Recommended/Required

HDR employees who use ladders will be trained in their departments to recognize hazards related to ladder use and the procedures to minimize these hazards. This training is to include: (1) the different types of ladders; (2) location and meaning of ANSI approvals; (3) the proper method of ascending/ descending ladders and the transportation of small tools, etc.; and (4) the correct procedures for transporting, erecting, handling, maintaining, and disassembling the different types of ladders to be used.

The following training materials are available through HDR’s corporate safety department:

- “Ladder Safety”, AGC – Tool Box Talks, 5:58 minutes, HDR Safety Dept. Videotapes #0083 and #0463
- “Ladder (& Stairway) Safety for the Construction Industry”, AGC, 17:20 minutes, HDR Safety Dept. Videotapes #0064 and #0449

- Portable Ladders section of HDR's intranet website:

  http://healthsafety.intranet.hdr/Training_Resources/sign_in_handout_PP.asp

Regulatory Requirements/Reference(s)

OSHA standards for portable ladders are found in:

29 CFR 1910.25 29 CFR 1926-1053 "*Ladders*"

29 CFR 1910.26 29 CFR 1926.1060

ANSI standards for portable ladders are:

A14.1 - Safety Codes for Portable ladders

A14.2 - Portable Metal Ladders

A14.4 - Job-Made Ladders

A14.5 - Portable Reinforced Plastic Safety Ladders

See also HDR's Health and Safety Procedure No. 2, "*Portable Ladders*," and HDR Field H&S Guide for Construction, Chapter 4: "*Portable and Job-Made Ladders*"

Applicable Form(s)

There are no HDR forms or checklists that are specific to portable ladders. Prior to using any portable ladder, the employee may determine the ladder's fitness and appropriateness for use by reviewing the HDR Field H&S Guide for Construction, Chapter 4: *Portable and Job-Made Ladders*. This chapter is formatted in a way that it can be used as an informal checklist.

Lead and Lead-Based Paint

Lead may be found in soil and sediments; in certain consumer products, such as gasoline and paint; and in air, water, and waste. OSHA and the EPA have established standards in effect since 1978; therefore, the possibility of exposure today is very limited. Likely sources of lead exposure for HDR employees include lead based paint (LBP) and soil contaminated with lead compounds. HDR field professionals are responsible for evaluating project locations to determine whether exposure to lead is a concern at this location.

Potential Hazards

Lead is a highly toxic substance that can affect virtually every system in the body. At high exposure levels, lead poisoning can result in coma, convulsions and death. HDR employees are not likely to suffer these effects, but those who are routinely exposed to lead hazards could

experience chronic health effects, such as headaches, poor appetite, irritability, tiredness, muscle and joint pain, and chronic digestive track discomfort if appropriate preventive measures are not taken.

PPE

The three primary routes of occupational exposure to lead are

1. Inhalation of lead-contaminated dust particles;
2. Ingestion of lead paint chips, particles or lead-contaminated soil or dust; and
3. Inhalation of lead fumes resulting from the volatilization of lead during hot cutting of lead-containing structural members.

If contact with lead sources as listed above cannot be avoided, HDR employees should wear appropriate PPE (Tyvek© oversuit, gloves, booties) to prevent the contamination of personal clothing and properly dispose of this PPE at the project site. In addition to protective clothing, respirators may protect against inhalation of lead-contaminated dust particles or lead fumes.

The two most commonly encountered sources of lead exposure are lead-based paint (LBP) and lead-contaminated soils.

Lead Based Paint: In 1978, the use of lead in residential paints was banned. Because of the previously widespread use of lead in paint, most structures built before 1978 contain some level of LBP. Exposure can result from the deterioration of the paint (generating dust) or through disturbance of the paint or painted surface.

Lead Contaminated Soils: Industrial smokestack operations, such as smelting, until recently released high concentrations of lead, cadmium, arsenic and other metal particulates in their smoke and slag. Other contributors to soil lead levels include auto emissions from leaded gasoline, contaminated engine oil, spent ammunition, improper disposal of lead acid batteries, and LBP.

ACTIVITIES WHERE HDR EMPLOYEES MAY BE EXPOSED TO LEAD

HDR does not provide any services that would generate lead dust concentrations above the OSHA action level. Nevertheless, during the course of providing services, HDR personnel may encounter elevated concentrations of lead contaminant during the following site activities:

Renovation/Remodeling: Renovation and remodeling projects nearly always result in the disturbance of painted surfaces. Since these projects are often associated with structures built before 1978, there is a high probability of exposure to LBP.

Demolition: Demolition is defined as the removal of all or part of a structure. If the lead survey indicates the presence of lead, whether in LBP or another source, follow the procedures given below.

Soil Sampling: Generally, soil sampling is a low hazard activity, and does not present an inhalation hazard.

Hazardous Waste Site Activities: Along with other materials, lead is a frequent contaminant of concern on hazardous waste sites.

RECOMMENDED PREVENTION PRACTICES

All employees with any exposure to lead will be trained on information concerning lead hazards via the HDR Hazard Communication Procedure (HDR H&S Procedure #6).

In all cases, HDR employees will implement the methods below to minimize their exposure to lead. Additional measures required in specific circumstances are detailed within the forms/sources that follow.

- Check to be sure that the facility owner has had a lead survey conducted by a State Certified Inspector prior to beginning the project.

  (If a lead survey has not been conducted and an HDR employee is concerned about potential exposure to lead contamination, the employee should consult with the Project Manager, OSC, or Corporate Safety.)

- Avoid contact with any potential sources of lead wherever feasible.
- Receive training on lead hazards and, if appropriate, the use of PPE.
- If contact cannot be avoided, wear appropriate PPE (Tyvek© oversuit, gloves, booties) to prevent the contamination of personal clothing.
- Properly dispose of any PPE at the project site.
- Use good hygiene practices.

Renovation/Remodeling projects are the most likely source of an HDR employee's exposure to LBP. If the employee is in an area where LBP is present and is being disturbed, the employee must be enrolled in the HDR Medical Surveillance Program and wear a respirator.

At the completion of renovation or remodeling projects where LBP was disturbed, clearance wipe samples must be collected and analyzed, preferably by the contactor. Procedures for the sampling are detailed in H&S Procedure #11, Page 7.

Demolition. Because demolition involves structural members, a lead survey must be conducted before any demolition begins. The survey may also include sampling for the presence of lead in the soils surrounding the foundation of the structure, and if the demolition involves disturbing those soils in any way, employees must follow the procedures given below for soil sampling.

Soil Sampling. Generally soil sampling is a low-hazard activity unless high dust levels are generated. Most often respirators will not be required. However, to prevent inadvertent ingestion and body contamination, employees are to wear latex gloves, full body Tyvek© suits and disposable booties when sampling. To minimize the generation of dust, employees are to pre-wet the area to be sampled. As in any situation, prudent work practices are to be implemented.

Hazardous Waste Site Activities. HDR employees who work on hazardous waste sites containing lead will be required to meet additional requirements: they are required to obtain blood lead/ZPP evaluations prior to and following site work, regardless of the expected exposure; and they are to be enrolled in the HDR medical surveillance program. (Refer to HDR H&S Procedure #35 for further details on this program.)

Construction Sites rarely pose a lead-related risk to employees. However, HDR offers biological monitoring for any employee who is exposed to lead at or above the OSHA action level (30 $\mu g/m^3$) for more than one day per year. Employees interested in receiving biological monitoring should contact the Corporate Health & Safety Medical Monitoring Coordinator at (402) 399-1106, or ADP Screening & Selection Services in Norcross, Georgia, at (800) 229-3674, Extension 430. The Corporate Health & Safety Medical Monitoring Coordinator can also answer questions and give assistance.

Training

All employees with any exposure to lead will be trained on information concerning lead hazards via the HDR Hazard Communication Procedure (HDR H&S Procedure #6).

References

- 29 CFR 1910.1025, *Lead*. OSHA General Industry Lead Standard
- 29 CFR 1026.62, *Lead*. OSHA Construction Lead Standard
- *Guidelines for the Evaluation and Control of Lead-Based Paint Standards in Housing, June 1995.* Department of Housing and Urban Development published guidelines.
- ASTM E1728, *Practice for Field Collection [of Lead], latest edition.* American Standards for Testing Materials
- 40 CFR Subchapter I - Solid Waste
- 40 CFR Subchapter R - Toxic Substances Control Act, Section 745, *Lead-Based Paint Poisoning Prevention In Certain Residential Structure*s
- Video, *"Exposing the Facts: Lead Exposure in the Construction Industry"*, HDR # 0010.

The following HDR Health & Safety Procedures touch on many of the issues presented in this procedure.

HDR H&S Pro #5 Excavation Safety
HDR H&S Pro #6 Hazard Communication
HDR H&S Pro #9 Respiratory Protection
HDR H&S Pro #20 Hazard and Toxic Waste
HDR H&S Pro #21 Personal Protective Equipment
HDR H&S Pro #22 Demolition
HDR H&S Pro #25 Air Monitoring
HDR H&S Pro #35 Medical Monitoring

Applicable Forms

There are no forms created for HDR employee use that are specific to lead and lead-based paint.

Fall Protection

HDR, Inc. (HDR) employees will be protected from the fall hazards associated with elevated work areas, such as unprotected edges six feet or more above the next lower level, by learning to recognize fall hazards and how to implement controls including the appropriate selection, use, and maintenance of fall protection equipment. This procedure addresses the elements of the HDR Fall Protection Program and conforms to the requirements of OSHA. In some cases this procedure incorporates specific HDR requirements which may be more stringent than the federal OSHA regulation.

Potential Hazards

Potentially hazardous situations include falling from a height of 6 feet or more on a job site, being hit by a falling object from overhead, and tripping or getting tangled in waste, debris, or clutter. Any of these can result in serious accidents, injuries, or death.

Personal Protective Equipment

A personal fall arrest system may be employed when guardrails are not feasible. Components of a Personal Fall Arrest System (PFAS) include a body system (harness); connecting device (rope

or web lanyard, shock absorbing lanyard, self-retracting lifeline); and a tie-off or anchorage point (eye bolt or beam, cross-arm strap connector), with a minimum tensile strength of 5,000 lbs. per worker.

All components of a Personal Fall Arrest System must be routinely inspected for defects and must be replaced at the end of their serviceable life. These mandatory inspection and replacement guidelines for PFAS components are contained in Appendix A to HDR Health & Safety Procedure #12.

Employees working in an area where falling object hazards exist are required to wear hardhats.

Training Recommended/Required

HDR employees who may be exposed to fall hazards during the course of their work will receive formal training. Training will teach employees to recognize fall and falling object hazards at work and to implement procedures to control these hazards. Training will also address procedures for erecting, maintaining, disassembling, inspecting and storing fall protection equipment. Retraining will be conducted as needed.

Use of an alternative fall protection system, such as manbaskets or crane-supported personnel platforms, will require topic-specific formal training.

The HDR Corporate Safety Department also has available the following videotapes:

- *"Fall Protection"*, 21 minutes, HDR Safety Dept. #0038, #0039, #0043 and #0044
- *"Fall Protection in the Construction Industry"*, AGC, 18:45 minutes, HDR Safety Dept. #0072 and #0452
- *"Falling Objects,"* Safety Shorts, 15 minutes, HDR Safety Department No. 0042
- *"Miller Fall Equipment"*, Miller, 20 minutes, HDR Safety Dept. #0040

Requirements for use of personal fall arrest systems (PFAS) are also detailed in Chapter 4 of HDR's *Bridge Inspection Safety Guide* and in Chapter 2 of HDR's *Field Guide for Construction*.

Regulatory Requirements/References

OSHA 29 CFR 1926, Subpart M, *"Fall Protection.*"
OSHA 29 CFR 1910, Subpart D, *"Walking/Working Surfaces"*
ANSI Z359.1
HDR Health and Safety Program Procedure #12, *"Fall Protection"*

Applicable Forms

A form on which to record regular inspection of PFAS is included on the following page.

HDR Personal Fall Arrest System
Semi-Annual Inspection Form

Please put a **P** (pass) or **F** (fail) and the inspector's initials under each inspection with the inspection date underneath

OFFICE:

	Date of First Use	1/2 Year Inspection		1 Year Inspection		1-1/2 Year Inspection		2 Year Inspection		2-1/2 Year Inspection		3 Year Inspection		3-1/2 Year Inspection		4 Year Inspection		4-1/2 Year Inspection	
		P or F	Init.	P or F	Init.	P or F	Init.	P or F	Init.	P or F	Init.	P or F	Init.	P or F	Init.	P or F	Init.	P or F	Init.
Item																			
Serial No.	Date:																		
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Item																			
Serial No.	Date:																		

Items are inspected according to HDR H&S Procedure #12 and are listed as a PASS or FAIL. If they fail, they must be removed from service immediately.

* * * * * * * * * * * * * * * * END OF FALL * * * * * * * * * * * * * * * *

Personal Protective Equipment

HDR personnel frequently perform services at sites that present hazards requiring the use of personal protective equipment (PPE) to prevent bodily harm. The purpose of PPE is to shield or isolate individuals from the environmental chemical, physical, and biological hazards present on-site. HDR will provide training and access to personal protective equipment for HDR employees when PPE use is required.

Potential Hazards

PPE is necessary for body protection when engineering or administrative controls are not feasible or effective in eliminating hazards. No single combination of protective clothing and equipment, however, is capable of protecting against all hazards.

Personal Protective Equipment

PFDs - USCG-approved Type III (Flotation Aid) or Type V (Special Use Device) personal flotation devices (PFD) (life vests), which are designed to be worn around the body at all times of exposure. Type III inflatable PFDs are prohibited for work. Type V PFDs are of various constructions and are acceptable as long as the manufacturer's label does not exclude them from use in the planned work activity.

Respirators - Respirators are to be worn when the employee's exposure to airborne contaminants cannot be eliminated or controlled; when the established Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV) for a particular material is approached or exceeded; when the workspace to be entered is oxygen-deficient; or as deemed appropriate by the National Director of Safety or the local Office Safety Coordinator. See also HDR Health & Safety Procedure #9 – Respiratory Protection.

Head Protection – Affected HDR employees will be provided with and directed to wear a protective helmet (hard hat) when working in areas where there is a potential for injury to the head from falling objects. Standards for protective headwear are covered in ANSI Z89.1-1986.

Protective clothing for head protection includes:

Safety helmet (hard hat, made of hard plastic or rubber). May include a helmet liner to insulate against cold. The hard hat protects the head from impact, must meet OSHA requirements at 29 CFR § 1910.135 & ANSI Z89.1(1986).

Hood (commonly worn over a helmet) protects against chemical splashes, particles and rain.

Protective hair covering protects against chemical contamination of hair, prevents hair from tangling in equipment and keeps hair away from respiratory devices.

Eye and Face Protection – HDR employees will use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid checmicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. For more detail, see 29 CFR 1910.133 and ANSI Z87.1-1989.

Face shield (full-face coverage, eight-inch minimum) or splash hood protects against chemical splashes, but does not protect adequately against projectiles. Provides limited eye protection.

Safety glasses protect eyes against large particles and projectiles.

Goggles, depending on their construction, can protect against vaporized chemicals, splashes, large particles and projectiles.

Foot Protection – HDR will ensure that each affected employee uses protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where such employee's feet are exposed to electrical hazards. See ANSI Z41-1991.

Chemical-resistant safety boots protect feet from contact with chemicals.

Steel-shank or steel-toe safety boots protect feet from compression, crushing, or puncture by falling, moving, or sharp objects. They should provide good traction and must meet 29 CFR 1910.136 & ANSI Z41.

Non-conductive or spark-resistant safety boots protect the wearer against electrical hazards and prevent ignition of combustible gases or vapors.

Disposable shoe or boot covers (slips over regular foot covering), often called "Booties", protect safety boots from contamination and protect feet from contact with chemicals. Use of disposable covers reduces decontamination efforts.

Hand Protection – HDR will select and require employees to use appropriate hand protection when employees' hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes.

Gloves and sleeves (may be integral, attached, or separate from other protective clothing) protect hands and arms from chemical contact. Wearer should tape-seal gloves to sleeves to provide additional protection and to prevent liquids from entering sleeves. Disposable gloves should be used when possible to reduce decontamination efforts.

Full-Body Protective Clothing

Fully-encapsulating suit (one-piece garment); boots and gloves may be integral, attached and replaceable, or separate. This suit protects against gases, dusts, vapors, and splashes. Disadvantages are that it does not allow body heat to escape and, as such, will contribute to heat stress in wearer; it also limits visibility and dexterity.

Non-encapsulating suit (jacket, hood, pants, or bib overalls, and one-piece coverall) protects against splashes, dust, and other materials but not against gases and vapors. Does not protect parts of head and neck. Do not rely on this type of suit where gas-tight or pervasive splashing protection is required.

Aprons, leggings, and sleeve protectors (may be integral or separate) are often worn over a non-encapsulating suit. They provide additional splash protection of chest, forearms, and legs and are useful for sampling, labeling, and analysis operations.

Radiation-contamination protective suit protects against alpha and beta particles but does NOT protect against gamma radiation. This type of protective suit is designed to prevent skin contamination.

Flame/fire retardant coveralls, normally worn as an undergarment, provide protection from flash fires. They may exacerbate heat stress and are rarely used on sites where hazardous and toxic waste is likely.

Training Recommended/Required

Any worker required to wear PPE shall receive training from his local OSC in the proper use and care of PPE. Training is to include what and when PPE is necessary; how to put it on, take it off, adjust it, and wear it; what its limitations are; how to care for and maintain the equipment; and

what it's expected useful life would be and how it is to be disposed of. Periodic retraining will be conducted as needed.

Regulatory Requirements/References

The table below provides a list of OSHA standards with PPE requirements.

OSHA Regulations Specifying Use of Personal Protective Equipment	
29 CFR 1910.95	Noise
29 CFR 1910.120/1926.65	Hazardous Waste Operations and Emergency Response ("HazWoper")
29 CFR 1910.132 (41 CFR 50-204.7)	General Requirements for Personal Protective Equipment (PPE)
29 CFR 1910.133(a) (ANSI Z87.1-1989)	Eye and Face Protection
29 CFR 1910.134 (ANSI Z99.2-1969)	Standard Practice for Respiratory Protection
29 CFR 1910.135 (ANSI Z89.1-1997)	Safety Requirements for Industrial Head Protection
29 CFR 1910.136 (ANSI Z41.1-1991)	Men's Safety Toe Footwear
29 CFR 1926.100	Head Protection
29 CFR 1926.101	Hearing Protection
29 CFR 1926.102	Eyes and Face Protection
29 CFR 1926.102	Respiratory Protection

Additional Regulatory/References Include:

29 CFR 1926, Subpart E – Personal Protective and Life Saving Equipment
ANSI Z87.1-1989 – Eye and Face Protection
ANSI Z89.1-1997 – Head Protection
ANSI Z41.1-1991 – Foot Protection
HDR Health & Safety Procedure #9 – Respiratory Protection
HDR Health & Safety Procedure #21 – Personal Protective Equipment

Applicable Forms

PPE Inspection Checklist(s) (on next sheet)

See also in Procedure #9, *Respirators*:

SCBA Monthly Inspection Checklist
Respirator Inspection/Cleaning Form

PPE INSPECTION CHECKLIST

	Before use:	During Work		
	Yes	No	Yes	No
Clothing				
Are the clothing materials correct for the specified task at hand?	☐	☐	☐	☐
• Are any of the following visible?				
- imperfect seams		☐	☐	☐ ☐
- non-uniform coatings		☐	☐	☐ ☐
- tears/punctures		☐	☐	☐ ☐
- malfunctioning closures		☐	☐	☐ ☐
- Are there any pinholes visible when held up to light?		☐	☐	
• Flex product:				
- Are there any cracks?		☐	☐	
- Are there any other signs of shelf deterioration?		☐	☐	
• Are there any signs of chemical attack?				
- Discoloration		☐	☐	☐ ☐
- Swelling		☐	☐	☐ ☐
- Stiffness		☐	☐	☐ ☐
- Softening				☐ ☐
Gloves				
• Are there any pinholes (check for air escape)?		☐	☐	
Fully-Encapsulating Suits				
• Are the pressure relief valves operational?		☐	☐	
• Do the wrists, ankles, and neck fit properly?		☐	☐	
• Is the face shield free of cracks?		☐	☐	
• Is the face shield clear of fog?		☐	☐	

Respirators

The Respirator Inspection/Cleaning Form (see H&S Procedure #9) is to be used as a checklist for daily and periodic inspections of respirators. It is to be used in conjunction with the Respirator Inspection Section of this program and serves as the primary document to provide evidence of an ongoing inspection program. The employee is given a copy of this form to serve as a guideline for daily respirator maintenance.

* * * * * * * * * * * * * * * * * END OF PPE * * * * * * * * * * * * * * * * * *

Heat Stress

HDR employees frequently perform project services in high temperature/humidity areas, where extended exposure could result in heat-related disorders. This procedure describes the hazards associated with exposure to high temperatures, and the proper responses to prevent or minimize adverse health effects. The guidelines contained in this procedure are in conformance with both the Occupational Safety and Health Administration's (OSHA) 5(a)(1) general duty clause, and the recommendations presented in the publication, *Threshold Limit Values for Chemical Substances and Physical Agents* (latest year), published by the American Conference of Governmental Industrial Hygienists (ACGIH).

Potential Hazards

Prolonged exposure to heat could result in heat rash (prickly heat), heat cramps, heat exhaustion, or heat stroke. This last is life-threatening and requires immediate professional medical attention. Expanded descriptions of each of these ailments can be found in HDR's Health & Safety Procedure #28.

Personal Protective Equipment (PPE)

Unfortunately, there is no known PPE to prevent heat-related illnesses. It is recommended, however, that clothing be light, loose-fitting, and breathable. The use of impermeable PPE clothing such as those made of Tyvek®, is discouraged, as the risks of heat-related illness are significantly elevated.

Training

All HDR employees who work on project sites should receive awareness training on heat stress. HDR's Health & Safety Intranet website offers a PowerPoint presentation, Module E2A – Outdoor Settings Part 1, which includes a component on heat stress.

References

- OSHA 5(a)(1) General Duty Clause
- American Conference of Governmental Industrial Hygienists (ACGIH), *Threshold Limit Values for Chemical Substances and Physical Agents*
- NIOSH/OSHA/USCG/EPA *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities,* October 1985. (Available from Corporate safety, this manual also applies to heat stress.)
- HDR Health and Safety Program Procedure # 28 - Heat Stress
- HDR's Health & Safety Intranet website offers a PowerPoint presentation, Module E2A – Outdoor Settings Part 1
- An HDR employee may also borrow either of the two following videotapes from the HDR Safety Department library:
- "Heat Stress Prevention in Construction", Don Brown Production, 9 minutes, HDR Safety Dept. #0065 and #0066
- "Sun Safety: A Growing Health Concern", National Safety Council, 11:46 minutes, HDR Safety Dept. #0440 and #0441

Applicable Form(s)

HDR Heat Stress Log

HDR HEAT STRESS LOG

Name	**Date & Time**	**Air Temp. (Fº/% Sunshine)**	**Resting Heart Rate** (if over 110 bpm, reduce work period)	**Aural/Oral** (circle one) **Temp.** (if over 100.4º F, remove from heat)

Cold Stress

This procedure describes the hazards associated with exposure to low temperatures, and the proper responses that will prevent or minimize adverse health effects. The guidelines contained in this procedure are in conformance with both the Occupational Safety and Health Administration's (OSHA) 5(a)(1) general duty clause, and the recommendations presented in the publication, *Threshold Limit Values for Chemical Substances and Physical Agents* (latest year), published by the American Conference of Governmental Industrial Hygienists (ACGIH).

Purpose/Potential Hazards

HDR Inc., (HDR) employees frequently perform project services in cold environmental temperatures, where prolonged exposure to freezing temperatures could result in cold-related disorders. Cold-induced injuries include trench foot, frostbite, hypothermia, and Raynaud's Phenomenon, all or most of which can result in loss of a limb or death if not properly treated.

Personal Protective Equipment

Eye protection out-of-doors in a snow and/or ice covered terrain should be supplied. Safety glasses/ goggles with ultraviolet/glare protection should be worn when snow could cause blowing ice crystals or reflective radiation.

Other personal protection involves clothing rather than equipment. In general, wear adequate insulating dry clothing in air temperatures below 40° F (4° C) or when wind chill reaches -25° F (-32° C). If subjected to the extreme cold, cover all exposed skin with clothing, layering as necessary. Wear mittens or gloves; an outer layer of clothing impermeable to water when the possibility of becoming wet through splashing is present; a light windbreaker-type jacket to protect against the wind. If steel-toed safety shoes become uncomfortable, substitute alternative protective footwear, such as high impact plastic/rubber footwear.

In brief, many layers of light clothing are better than one or two heavy layers. The outer layer should be wind-resistant, and the layers should be capable of being vented at the wrist, neck and waist to reduce wetting by perspiration. Moisture (sweat) reduces the ability of the clothing to trap air, as well as removing heat from the skin surface as sweat evaporates.

Training

All HDR employees who work on project sites in cold weather should be provided awareness training on cold stress, including proper clothing practices, proper eating and drinking habits, recognition of impending frostbite, signs/symptoms of hypothermia, and cold injury avoidance work practices. HDR's "Cold Stress" PowerPoint presentation, available through the Health & Safety Department, fulfills this requirement.

References

Occupational Safety and Health Act, Section 5(a)(1), "general duty clause"
ACGIH, *Threshold Limit Values for Chemical Substances and Physical Agents*
HDR Safety Procedure # 29 - Cold Stress
HDR PowerPoint presentation "Cold Stress"

Applicable Forms

None that pertain specifically to this area of concern.

Wind Chill Chart

Wind (mph)	Temperature (°F)																	
Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times — 30 minutes — 10 minutes — 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

First Aid/CPR

This procedure presents HDR's program for providing the ready availability of emergency medical services for treatment of injured employees. The objective of this procedure is to present information on HDR's first aid/CPR program, including the providing of training and the requirements for the availability of first aid supplies at both office and project sites.

Serious accidents may occur at any time. When prompt medical care is distant, the quick accessibility to first aid and cardiopulmonary resuscitation (CPR) may often minimize the severity of the injury. OSHA Standard 29 CFR 1910.151 states, in part:

> http://www.osha.gov/pls/oshaweb/owalink.query_links?src_doc_type=STANDARDS&src_unique_file=1910_0151&src_anchor_name=1910.151(b)**1910.151(b)**
> In the absence of an infirmary, clinic, or hospital in near proximity to the workplace which is used for the treatment of all injured employees, a person or persons shall be adequately trained to render first aid. Adequate first aid supplies shall be readily available.

Personal Protective Equipment (PPE)

All employees on a job site (or in the office) must use whatever personal protective equipment is required by the situation. In addition, if there is a reasonable expectation of exposure to blood or other potentially infectious materials, Designated First Aid Responders are to be offered the Hepatitis B vaccination.

> **1910.1030(d)(3)**
>
> When there is occupational exposure, the employer shall provide, at no cost to the employee, appropriate personal protective equipment such as, but not limited to, gloves, gowns, laboratory coats, face shields or masks and eye protection, and mouthpieces, resuscitation bags, pocket masks, or other ventilation devices. Personal protective equipment will be considered "appropriate" only if it does not permit blood or other potentially infectious materials to pass through to or reach the employee's work clothes, street clothes, undergarments, skin, eyes, mouth or other mucous membranes under normal conditions of use and for the duration of time which the protective equipment will be used.

Training Recommended/Required

If HDR offices or project sites are located such that the response time for medical treatment cannot be met, at least one employee at the office or job site (herein referred to as the Designated First Aid Responder) must be trained in first aid (CPR optional). Designated First Aid Responders must also receive formal training in the HDR Bloodborne Pathogen Exposure Control Plan.

The American Red Cross routinely offers courses in first aid, CPR and AED, to which training in blood-borne pathogens can be added. For information on these courses from a local Red Cross office, go to http://www.redcross.org/services/hss/courses/ on the Internet.

Regulatory Requirements/References

29 CFR 1910.151 and 29 CFR 1926.50, "*Medical Services and First Aid*"
29 CFR 1910.1030(d)(3), "*Occupational Exposure to Blood borne Pathogens*"
ANSI Z308.1-1998, "*Minimum Requirements for Workplace First-Aid Kits*"
ANSI Z358.1-1990, *"Emergency Eyewash and Shower Equipment"*
HDR Health and Safety Program Procedure # 30 - *First Aid/CPR*
HDR Health and Safety Program Procedure # 8 - *Bloodborne Pathogens*

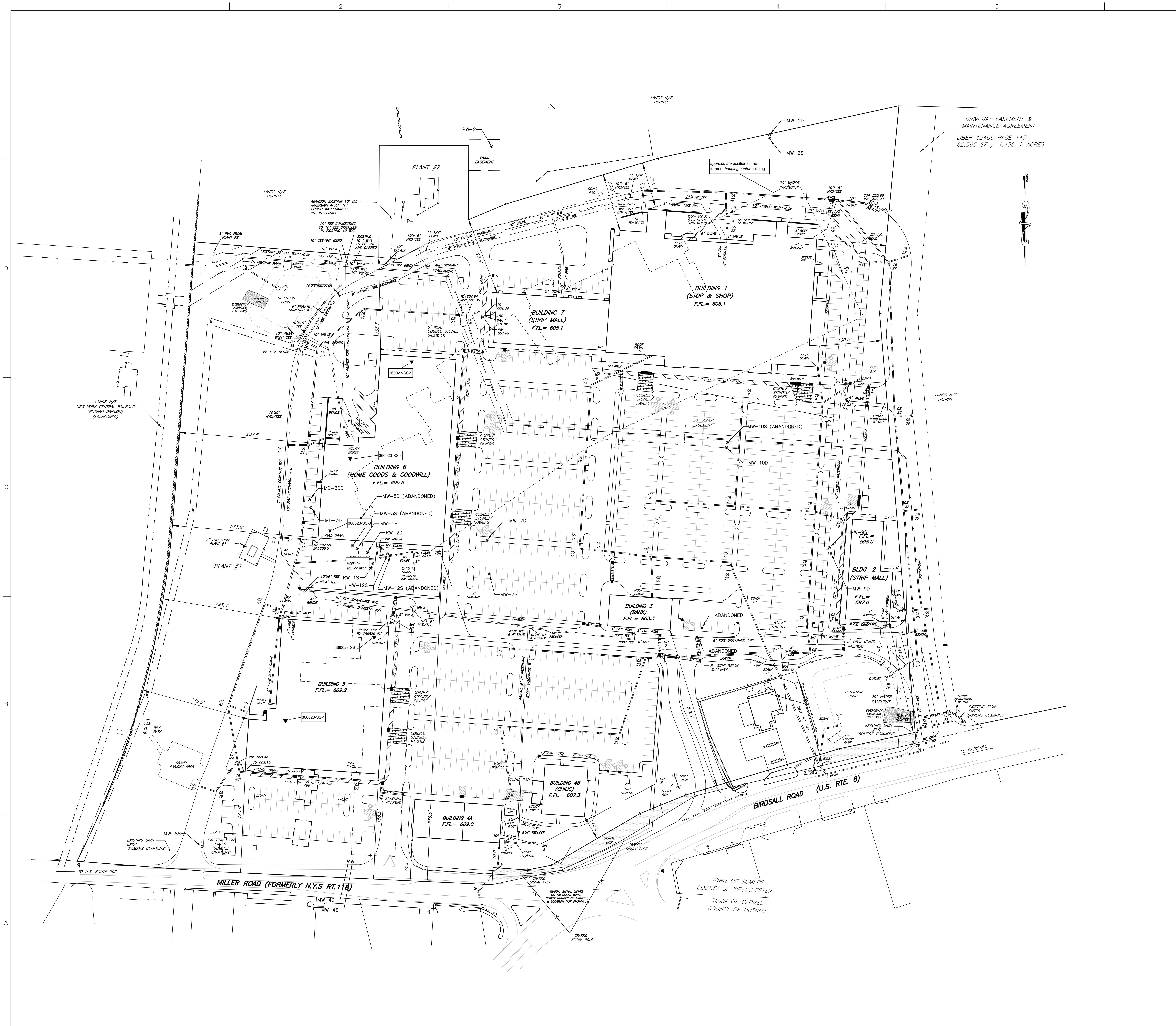
Applicable Form(s)

None specific to this procedure.

Accident/Incident Report

Any Accident (serious or minor), Catastrophe, Near-Miss Incident or Illness should be reported to your Office Safety Coordinator (OSC) and an Accident/Incident Report filed with the Corporate Health & Safety Department.

http://healthsafety.intranet.hdr/Accident_Information/files/Accident_Report_Final.doc



![HDR logo]

Henningson, Durham & Richardson, Architecture and Engineering, P.C. In Association with HDR Engineering, Inc.

LEGEND

360023-SS-2 — location of planned sub-slab vapor probe

NOTES

Existing site plan information is based on a survey and CAD file provided by Eustance & Horowitz, P.C. The footprint of the former shopping center building is taken from a print of "Site Survey" (October, 20, 1986), superimposed upon the Eustance & Horowitz, P.C. site plan; because of paper stretch and possible change of scale for the 1986 print, the position of the former building is approximate. The locations of the planned sub-slab vapor probes depicted in this drawing are approximate; actual locations will be measured during probe installation and shown with a drawing that will accompany the report on the sampling.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
BALDWIN PLACE MALL
NYSDEC SITE NO. 36-0023
SOMERS, NEW YORK

ISSUE	DATE	DESCRIPTION
–	–	–

PROJECT NUMBER	39762
PROJECT MANAGER	S. B.
DRAWN BY	W. P. S.

0 25' 50' 100'

SIGNATURE DATE

WARNING: It is a violation of the New York State Education Law for any person unless acting under the direction of a licensed professional engineer, to alter any item on these plans in any way. If alterations to these plans are made, the alterations shall be made in accordance with 145–subsection 7209 of the New York State Education Law.

BASE MAP

SCALE 1" = 50'

-

FILENAME –