QUALITY ASSURANCE PROJECT PLAN

Former General Latex and Chemical Corporation Site
Ashland, Ohio

RCRA Facility Investigation

August 2008

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Rev.0

Prepared by: CH2M HILL Date: August 2008

Approved by:

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Ohio EPA,

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CH2M HILL Project Manager
Eric Kroger

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CH2M HILL Project Chemist
Dan Moore

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Laboratory Operations Manager

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Laboratory Quality Assurance Manager

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Acronyms and Abbreviations

%R	percent recovery
°C	degrees Celsius
a.m.u.	atomic mass unit
CCV	continuing calibration verification
COC	chain-of-custody
GLCC	The General Latex and Chemical Corporation
DQO	data quality objective
ESL	environmental screening level
FTL	field team leader
HHRA	human health risk assessment
ICP	inductively coupled plasma
ICV	initial calibration verification
ID	identification
L	liter
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LIMS	Laboratory Information Management System
MS	matrix spike
MSD	matrix spike duplicate
NELAC	National Environmental Laboratory Accreditation Conference
NIST	National Institute of Standards and Technology
PRG	preliminary remediation goal
QA	quality assurance
QAM	quality assurance manager
QAPP	quality assurance project plan
QC	quality control
RCRA	Resource Conservation and Recovery Act

RF	response factor
RFI	Resource Conservation and Recovery Act facility investigation
RPD	relative percent difference
RSD	relative standard deviation
SOP	standard operating procedure
SPCC	spill prevention, control, and countermeasure
SVOC	semivolatile organic compounds
TAL	target analyte list
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOA	volatile organic analysis
VOC	volatile organic compounds

SECTION 1

Project Management

1.1 Introduction

CH2M HILL is scoped to perform a Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) at former General Latex and Chemical Corporation (GLCC) site in Ashland, Ohio. This quality assurance project plan (QAPP) presents the organization, objectives, functional activities, and specific quality assurance (QA) and quality control (QC) activities for the site. The elements included in this QAPP are consistent with those specified by the U.S. Environmental Protection Agency (USEPA) *Requirements for Quality Assurance Project Plans, EPA QA/R-5* (March 2001).

This section provides an overall approach for managing the project, including:

- Project organization, roles, and responsibilities
- Problem definition and background information
- Project description and schedule
- Data quality objectives (DQOs) and criteria for measurement data
- Instructions for special training requirements/certification
- Instructions for documentation and records management

1.2 Project/Task Organization

The primary goal of the RFI is to address gaps in the existing data so that the site can be closed under the most appropriate regulatory program as soon as possible. The recommended approach is to take advantage of the USEPA Region 5 Pilot Portfolio opportunity and to enter the site into the RCRA Voluntary Corrective Action Program. The site was previously under the Ohio Voluntary Action Plan but is now under the Voluntary Corrective Action Program at direction of USEPA Region 5. CH2M HILL is responsible for all phases of the RFI. The QA and management responsibilities of key project personnel are defined below and detailed in Figure 1.

1.2.1 CH2M HILL Project Manager: Eric Kroger

- Work with senior consultant to develop site strategy with input from the client
- Develop scope/schedule budget
- Identify project team support project execution
- Provide health and safety leadership
- Assemble and charter project team
- Drive scope delivery consistent with schedule and budget
- Project level financial management
- Achieve project performance metrics
- Health and safety leadership.

1.2.2 CH2M HILL Project Chemist: Dan Moore

- Approve and adhere to QA/QC requirements specified in this QAPP
- Provide guidance regarding environmental analytical chemistry methods and QC procedures applicable to environmental analytical chemistry
- Manage project tasks associated with the coordination of sample collection and analysis with the field team leader (FTL); provide liaison between the FTL and the laboratories
- Manage sample tracking, sample analysis, and data reporting from each laboratory
- Coordinate or perform validation of the analytical data
- Perform quality audits and surveillance, prepare QA reports, implement QC activities, and suggest corrective actions as necessary
- Evaluate data usability
- Communicate QA/QC issues to the project manager and the FTL
- Recommend resolution for anomalies or out-of-control events that arise during the analysis of samples
- Coordinate with the FTL to facilitate data transfer into the project database
- Coordinate the output of data from the database to the data users (for example, project manager and technical staff) and providing QC for all data outputs.

1.2.3 CH2M HILL Field Team Lead: TBD

- Procure field equipment (if necessary), supplies, and subcontractors
- Develop field forms and field instructions
- Assist in writing the health and safety plan

1.2.4 CH2M HILL Health and Safety Lead: Brian Parsley

CH2M HILL's health and safety lead, is responsible for developing the health and safety plan for the field investigation.

1.3 Problem Definition/Background Information

The purpose of the project is to fill data gaps on the extent of site constituents in groundwater and soil so the site can be closed under the appropriate regulatory program as soon as possible. The following data gaps will be addressed:

- Horizontal and vertical extent of volatile organic compounds (VOCs) in groundwater
- VOCs, semivolatile organic compounds (SVOCs) and target analyte list (TAL) metals in site soils associated with the former treatment lagoons and former underground storaget tank (UST) area
- VOCs, SVOCs, and TAL metals in surface soil to supplement the human health risk assessment (HHRA) associated with the drainage conveyance ditch
- VOCs, SVOCs, and TAL metals in surface water and sediment to supplement the HHRA associated with the former South Lagoon and conveyance ditch terminal pond

- VOCs in soil gas to determine the need for supplemental vapor intrusion investigation inside the building

1.4 Site History

The General Latex and Chemical Corporation owned and operated the facility from 1954 to 2000. Facility operations consisted of latex and polyurethane plants that included storage tanks, agitators, mixers, and vulcanizers for the production of liquid latex and polyurethane products. The key raw chemicals included trichlorofluoromethane (Freon-11); natural latex; neoprene; isoprene GRS 2000-type latex; toluene diisocyanate, which was replaced in the mid-1980s with methyl diphenyl diisocyanate; and polymeric diphenyl methane diisocyanate. By February 2002, the equipment was removed from the property.

The 7-acre site is in the northeastern part of Ashland, Ohio, within the planned city wellhead protection area. The site is relatively flat, zoned as heavy industrial, and consists primarily of a building that was constructed in 1954, with expansions to the building occurring in 1967 and 1970, and two former wastewater lagoons located in the western portion of the property. A former rail spur and a small drainage ditch lie between the western side of the building and the former lagoons.

1.4.1 Previous Investigations

GLCC has been conducting site investigations at the facility since 2001. Until January 2008, the site was under environmental management of Roffman Associates, Inc. The facility was never entered into a regulatory program, but the site investigations and reports were completed in accordance with Ohio Voluntary Action Plan regulations. This procedure apparently was followed so the facility could exercise the option to enter the Ohio Voluntary Action Plan. Activities conducted include investigation activities to support preparation of a Phase II property investigation report, including a Phase I property investigation report (Roffman 2003a); soil and groundwater fate and transport modeling report (Roffman 2003b), remedial action planning and remediation (soil) report (Roffman 2004), and various quarterly groundwater monitoring reports from December 2004 to September 2007. The site will soon be formally entered into the USEPA Region 5 RCRA Voluntary Corrective Action Program.

1.5 Project Description and Schedule

1.5.1 Project Description

The investigation will be performed under the guidance of USEPA Region 5. Analytical soil and water results will be compared to the USEPA Regional Screening Levels Analytical soil gas data will be compared to 10 time the residential and industrial EPA Regional Screening Levels for shallow soil gas and 100 times the residential and industrial EPA Regional Screening Levels for deep soil gas

The investigation will be performed in two phases to support confirmation of residual soil impacts, sediment impacts delineation, groundwater impacts delineation, hydrogeologic evaluation, and abandonment of existing monitoring wells, and installation of new monitoring wells. The investigation will consist of the following tasks:

- **Phase 1**
  - Collect 20 groundwater grab samples (9 shallow and 11 deep) to be analyzed for VOCs and log the lithology from DPT borings to bedrock to delineate horizontal and vertical extents of plume and establish hydrogeologic conditions,
  - Collect up to 12 soil samples from four borings (2 in each former lagoon) biased toward the historical location exhibiting the maximum concentration and analyze samples for VOCs, SVOCs, and TAL metals by methods that achieve a reporting level at or below the pertinent screening criteria, or best achievable technology
  - Collect up to 4 soil samples from two borings in the area of the former Freon UST biased toward the historical location exhibiting the maximum concentration and analyze samples for VOCs, SVOCs, and TAL metals by methods that achieve a reporting level at or below the pertinent screening criteria, or best achievable technology
  - Collect 4 surface soil samples equally spaced along the conveyance ditch invert to supplement the HHRA, and analyze them for VOCs, SVOCs, and TAL metals by methods that achieve a reporting level at or below the pertinent screening criteria, or best achievable technology
  - Collect 4 surface water and 4 sediment samples (0 to 6 inches): three from locations are within the limits of the remaining South Lagoon and one location is in the southern terminus of the drainage ditch, and analyze them for VOCs, SVOCs, and TAL metals by methods that achieve a reporting level at or below the pertinent screening criteria, or best achievable technology
  - Collect 6 soil vapor samples (three from the former Freon UST area and three from the MW-6, MW-15, and MW-12 areas), and analyze them for the full TO-15 VOCs list
  - Survey the site features including the existing monitoring wells, conduct a monitoring well inspection and evaluation, and markout the underground utilities
- **Phase 2**
  - Based on the results of the monitoring well inspection and evaluation in Phase 1, abandon an estimated four of the existing monitoring wells.
  - Based on the results of the well inspection and evaluation and the DPT groundwater grab sampling in Phase 1, install an estimated six new monitoring wells.
  - Collect an estimated 19 groundwater samples from the existing monitoring wells (13) and proposed monitoring wells (6) and analyze for VOCs to determine horizontal and vertical concentrations of plume.

1.5.2 Project Schedule

Field activities are scheduled to commence in September 2008 (pending permit approvals and access agreements).

1.5.3 Project Records / Reports

An RFI report documenting the methods, results, and conclusions of the investigation activities will be prepared for submittal to the USEPA Region 5.

1.6 Data Quality Objectives and Criteria for Measurement Data

DQOs are qualitative and quantitative statements that specify the quality of data required to support decisions made during or after site-related activities. Project-specific DQOs (Table 1) are developed using the following seven-step process:

1. **State the problem.** Describe concisely the problem to be studied.
2. **Identify the decisions.** State the decisions to be made to solve the problem.
3. **Identify inputs to the decisions.** Identify information and supporting measurements needed to make the decisions and describe the sources of the information.
4. **Define the boundaries of the study.** Specify conditions (time periods, spatial locations).
5. **Develop a decision rule.** Define the conditions by which a decision-maker will select alternatives, usually specified as "if/then" statements. For example, "If average concentration in soil is less than cleanup level, then the site achieves remedial action goals."
6. **Specify tolerable limits on decision errors.** Define in statistical terms.

Optimize the design for obtaining data. Evaluate the results of the previous steps and develop the most resource-efficient design for data collection.

1.6.1 Measurement Performance Criteria

Measurement performance criteria will be checked on several levels using the following methods:

- Built-in QC standards
- Senior review
- Management controls

The measurement data must abide by specific QC standards. Data that do not meet these standards are qualified accordingly. The analytical data and the QC results will be checked by the bench chemist, the laboratory's quality assurance manager (QAM), and CH2M HILL's project chemist.

CH2M HILL staff members with relevant technical experience will review all documents that pertain to the project's quality standards. The FTL will supervise field activities to assess whether standard operating procedures (SOPs) are being followed during field sampling activities. Section 2 describes specific QC checks and corrective action measures.

1.7 Instructions for Special Training Requirements/Certification

As noted, project team members with the necessary experience and technical skills were chosen to perform required project tasks. The subcontractor chosen to perform laboratory analyses will meet the project-specific requirements as well as any National Environmental Laboratory Accreditation Conference (NELAC) specifications associated with the project.

1.8 Instructions for Documentation and Records

1.8.1 Field Sampling Documentation

Field sampling activities will be recorded in field logbooks. Field logbook entries will be described with as much detail as possible so that persons going to the site may reconstruct a particular situation without reliance on memory. Modifications to field sampling protocols must be documented in the field logbook. The FTL is responsible for ensuring that modifications to sampling protocols are also documented.

Field logbooks will be bound field survey books or notebooks. Logbooks will be assigned to the field crew but stored in a secure location when not in use. Project-specific document numbers will identify each logbook, the title page of which will contain the following:

- Name of person to whom the logbook is assigned
- Logbook number
- Project name
- Project start date
- Project end date

At the beginning of each entry, the date, start time, weather, names of all sampling team members present, and the signature of the person making the entry will be documented.

Specific information and observations will be recorded in the field notebook during all field investigation activities. The information to be documented includes the following:

- The names of all field team members present, and the level of personal protective equipment
- The names of site visitors, field sampling or investigation team personnel, and the nature of their visit
- Equipment model and calibration information
- Groundwater sample locations, identification, analyses to be performed, method of collection, odor, visual descriptions, date and time of collection
- Groundwater sample physical data–purge rate, total volume removed, water levels, temperature, pH, dissolved oxygen, turbidity, specific conductance, and oxidation-reduction potential

- Management of purge water
- Miscellaneous observations regarding other nearby site activities and equipment problems/troubleshooting measures

All entries will be made in ink, and no erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark and initialed. Blank pages will be noted as being intentionally blank.

Samples will be collected following the sampling procedures documented in the work plan. Sample collection equipment will be identified, along with the time of sampling, sample description, parameters being analyzed, and number of containers used. Unique sample identification numbers (IDs) will be assigned to each sample. Field duplicate samples, which will receive a unique sample ID, will be noted in the field logbook.

Field personnel will provide comprehensive documentation of all aspects of field sampling, field analysis, and sample chain-of-custody (COC). This documentation constitutes a record that allows for the reconstruction of all field events to aid in the data review and interpretation process. All documents, records, and information relating to the performance of the fieldwork will be retained in the project file.

TABLE 1
Data Quality Objectives
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Task	Step 1: Statement of Problem	Step 2: Identify the Decision	Step 3: Inputs to Decisions	Step 4: Study Boundaries	Step 5: Decision Rules	Step 6: Limits of Decision Errors	Step 7: Optimize the Sampling Design
Source verification	Confirm the magnitude and extent/depth of the residual source associated with the lagoons and the former Freon UST area.	What are the concentrations of site-related constituents in soil associated with the lagoons and the former Freon UST area? Do concentrations exceed screening levels (and background concentrations if appropriate)?I If so, do these constituents pose unacceptable risk to human health or the environment?	Historical site information to determine potential site related constituents. Potential human and ecological receptors and complete exposure pathways. Historical site information and available contaminant data (as provided by the previous consultant) from environmental media. USEPA Regional Screening Levels (USEPA, 2008). Applicable USEPA/Ohio EPA risk assessment procedures/guidance.	Location and size of the lagoons and former Freon UST area.	If maximum constituents concentrations do not exceed the screening level (or background as appropriate), then no further action will be proposed. If the maximum constituent concentrations are not below the screening level (or background level as appropriate), then compare to historical results. If results are within similar (± 25%), then source verification should be considered complete. Otherwise, source may have been diluted, transported downgradient, representation on drawing was inaccurate, or previous sampling methods biased results low. Additional sampling may be warranted.	Decision errors include determining that site-related analyte concentrations exceed the screening levels, when in reality they do not (or vice versa). Decision errors will be controlled by following standard operating procedures, quality control/quality assurance plan, and the established statistical analysis protocol.	Because of the availability of historic data, design optimization through the use of standard statistical methods was not warranted. Six DPT borings will be performed—two in each former lagoon and two in the area of the former Freon UST—biased toward the historic location exhibiting the greatest exceedance. Borings will be logged and VOC samples collected by EnCore sampler from each 2-foot interval to the invert of the lagoon or former Freon UST. The sample exhibiting the highest PID (or other appropriate field screening equipment) readings or visual impacts will be submitted and analyzed. If PID readings or visual impacts are not observed, then the sample that exhibits geology that appears to be sediments from the lagoon (if applicable) or is closest to the invert of the feature will be submitted and analyzed. Surface soil samples (0–2') will also be submitted. This yields a total of 12 samples to be analyzed for VOCs, SVOCs, and TAL metals by methods that achieve a reporting level at or below the pertinent screening criteria, or best achievable technology. Field sampling techniques will be in accordance with the standard operating procedures as outlined in the Work Plan such that they will be reproducible. The number and location of sampling locations may be modified during field investigation activities to optimize the data obtained.
Drainage conveyance ditch surface soil	Determine if contaminants are present in surface soils in the ditch at concentrations that pose unacceptable risk to human and ecological receptors.	What are the concentrations of potential site-related constituents in surface soil? Do concentrations exceed screening levels (and background concentrations, if appropriate)? If so, do these constituents pose unacceptable risk to human health or the environment?	Historical site information to determine constituents. Potential human and ecological receptors and complete exposure pathways. Site environmental setting information. Site-specific background levels for surface soil. USEPA Regional Screening Levels (USEPA, 2008). USEPA RCRA Facility Investigation Guidance (May 1989) Applicable USEPA/Ohio EPA risk assessment procedures/guidance.	The drainage ditch surface soils.	If maximum concentrations do not exceed the screening level (or background as appropriate), then no further action will be proposed. If the maximum constituent concentrations are not below the screening level (or background level as appropriate), then a HHRA and SLERA will be completed to evaluate potential risk. If the HHRA and SLERA assess unacceptable risk because of site-related constituents, then risk management decisions will be used to determine appropriate action (either further investigation or remedial measures).	Decision errors include determining that site-related analyte concentrations exceed the screening levels, when in reality they do not (or vice versa). Decision errors will be controlled by following standard operating procedures, QA/QC plan, and the established statistical analysis protocol.	Ditch is roughly 270 feet long. Collect up to four surface soil samples equally spaced along the ditch invert to supplement the HHRA, and analyze them for VOCs, SVOCs, and TAL metals by methods that achieve a reporting level at or below the pertinent screening criteria, or best achievable technology. Field sampling techniques will be in accordance with the SOPs outlined in the Sampling and Analysis Plan such that they will be reproducible. The number and location of sampling locations may be modified during field investigation activities to optimize the data obtained.

TABLE 1
Data Quality Objectives
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Task	Step 1: Statement of Problem	Step 2: Identify the Decision	Step 3: Inputs to Decisions	Step 4: Study Boundaries	Step 5: Decision Rules	Step 6: Limits of Decision Errors	Step 7: Optimize the Sampling Design
Lithology	Verify or resolve the stratigraphic data of the site.	Is the previous logging of soils accurate?	Historical boring logs. Industry accepted standards for soil logging (USGS).	Site boundaries.	If boring logs generated from current scope agree with historic boring logs, then the historic boring logs can be used with caution. If boring logs generated from current scope do not agree with historic boring logs, then the historic boring logs will need to be reevaluated.	Decision errors will be controlled by following standard operating procedures.	Draft geologic cross section(s) Perform up to eight borings to refusal (bedrock) for current lithology
Hydrogeology	Need to evaluate/refine monitoring well network to understand the localized groundwater flow direction and regime	What site wells are compromised in any way? What additional monitoring points do we need? Is the site survey accurate?	Historical site information to determine well construction. Historical information to determine well locations. Historical site information (e.g., groundwater flow direction, geology) and available contaminant data from environmental media collected as part of the SI. Historical site survey.	Site boundaries.	If site well is suspect, allocate for abandonment. After competent wells are identified, what additional monitoring points are needed? What features should be included with the new site survey?	Decision errors include determining that a well is suspect, when in reality it is not (or vice versa). Decision errors will be controlled by following standard operating procedures.	Perform a site visit to evaluate the monitoring wells for competency. Evaluate remaining monitoring well network for adequate coverage and install newly identified monitoring points. Perform site survey after all appropriate features to be included in that survey are identified.
Groundwater plume configuration	Determine the extent, both horizontally and vertically, of site-related groundwater contamination and plume boundaries relative to both sources (lagoons and the former Freon UST area) that may pose unacceptable risk to human and ecological receptors.	What are the onsite and offsite groundwater plume concentrations? Is the vertical stratification present in groundwater? Do the contaminants present pose risk when detected below the building?	Preliminary Conceptual Site Model as established by CH2M HILL Spring 2008. Cross sections as generated by lithology task. Monitoring well network as established by hydrogeology task. USEPA Regional Screening Levels (USEPA, 2008). Applicable USEPA/Ohio EPA risk assessment procedures/guidance.	Site boundaries and groundwater plume extent.	Do current monitoring wells define the extents (horizontal and vertical) of the site-related groundwater contamination? If not, collect additional DPT groundwater samples to delineate plume. After the site related groundwater contamination is adequately understood, a HHRA and SLERA will be completed to evaluate potential risk. If the HHRA and SLERA assess unacceptable risk because of site-related constituents, then risk management decisions will be used to determine appropriate action (either further investigation or remedial measures).	Decision errors include determining that site-related analyte concentrations exceed the screening levels, when in reality they do not (or vice versa). Decision errors will be controlled by following standard operating procedures, quality control/quality assurance plan, and the established statistical analysis protocol.	Collect up to 20 DPT groundwater samples to delineate horizontal and vertical extents of plume, and analyze for VOCs. Install monitoring wells as necessary to provide adequate coverage of the plumes and sentinel wells. Field sampling techniques will be in accordance with the standard operating procedures as outlined in the Sampling and Analysis Plan such that they will be reproducible. The number and location of sampling locations may be modified during field investigation activities to optimize the data obtained.
Surface water/ sediment sampling from the South Lagoon and conveyance ditch terminal pond.	Determine if contaminants are present in surface water or sediment in South Lagoon and the conveyance ditch terminal pond at concentrations that pose unacceptable risk to human and ecological receptors	What are the concentrations of the constituents? Do constituent concentrations exceed screening levels? If so, do the constituents pose unacceptable risk to human health or the environment?	Historical site information to determine constituents. Potential human and ecological receptors and complete exposure pathways. Historical site information and available contaminant data from environmental media. USEPA Regional Screening Levels (USEPA, 2008). Applicable USEPA/Ohio EPA risk assessment procedures/guidance.	The unfilled part of the South Lagoon.	If maximum constituents concentrations do not exceed the screening level (or background as appropriate), then no further action will be proposed. If the maximum constituent concentrations are not below the screening level (or background level as appropriate), then a HHRA and SLERA will be completed to evaluate potential risk. If the HHRA and SLERA assess unacceptable risk because of site-related constituents, then risk management decisions will be used to determine appropriate action (either further investigation or remedial measures).	A specification of tolerable limits on decision errors through the use of standard statistical methods was employed. Decision errors include determining that site-related analyte concentrations exceed the screening levels, when in reality they do not (or vice versa). Decision errors will be controlled by following standard operating procedures, QA/QC plan, and the established statistical analysis protocol.	The unfilled part of the South Lagoon covers 13,500 square feet (90 by 150 feet). Three surface water/ sediment samples (0–6″) will be taken evenly spaced within the limits of the remaining south lagoon and analyzed for VOCs, SVOCs, and TAL metals by methods that achieve a reporting level at or below the pertinent screening criteria, or best achievable technology. Field sampling techniques will be in accordance with the standard operating procedures as outlined in the Work Plan such that they will be reproducible. The number and location of sampling locations may be modified during field investigation activities to optimize the data obtained.

TABLE 1
Data Quality Objectives
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Task	Step 1: Statement of Problem	Step 2: Identify the Decision	Step 3: Inputs to Decisions	Step 4: Study Boundaries	Step 5: Decision Rules	Step 6: Limits of Decision Errors	Step 7: Optimize the Sampling Design
Vapor intrusion	Determine if contaminants may be present in soil vapor at concentrations that could potentially migrate into the building and pose unacceptable risk to humans when the building is reoccupied.	Is there potential for site-related constituents in groundwater/ soil vapor to migrate into the building? Do constituent concentrations exceed the screening levels; and if so, do these constituents present an unacceptable risk to human health?	Historical site information to determine potential site related VOC constituents. Historical site information and available contaminant data from environmental media (groundwater and soil) collected as part of the SI. Concentrations of site-related constituents in soil vapor. Concentrations of site-related constituents under the building slab. USEPA *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (November 2002), Table 4 Generic Screening Levels (1×10^{-6}). Applicable USEPA/Ohio EPA risk assessment procedures/guidance.	The interior of the building and 100 feet outside of the building perimeter.	If maximum concentrations of potential site-related constituents in soil vapor samples do not exceed the screening level, or USEPA's Vapor Intrusion Database (March 2008) as appropriate), no further action will be proposed. If the maximum constituent concentrations of the soil vapor samples exceed the screening level (or background level as appropriate), then subslab soil vapor samples will be collected from beneath the building floor. *As a potential follow-up based on the above:* If maximum constituent concentrations of the subslab soil vapor samples do not exceed the screening level, a HHRA to assess risk because of site-related constituents will be completed and appropriate measures taken. If the maximum constituent concentrations of the subslab soil vapor samples exceed the screening level, then indoor air samples will be collected, and a HHRA to assess risk because of site-related constituents will be completed and appropriate measures taken.	Proposed sample locations were based on the Vapor Intrusion Evaluation technical memorandum prepared (March 2, 2008. Decision errors will be controlled by following standard operating procedures, QA/QC plan, and the established statistical analysis protocol.	Standard industry protocols were used to determine the number of samples to provide the desired level of confidence in determining if there is a human health risk. Collect six soil vapor samples—three from the former Freon UST area and three from the MW-6, MW-15, and MW-12 areas—and them analyze for the full TO-15 VOCs list. If warranted based on the above results, collect four sub-slab soil vapor samples—two adjacent to the former Freon UST area and two adjacent to the MW-6, MW-15, and MW-12 areas. Indoor air sample will be determined, if this course of action is determined necessary. Field sampling techniques will be in accordance with the standard operating procedures as outlined in the Sampling and Analysis Plan such that they will be reproducible. The number and location of sampling locations may be modified during field investigation activities to optimize the data obtained.

1.8.2 Data Reporting

Hard copy deliverables, in Level 3 summary format, containing the necessary information to perform data evaluation/data validation are required. Reporting formats similar to those specified in the latest versions of USEPA Contract Laboratory Program Statements of Work for Organics and Inorganics are preferred (USEPA 1999, 2002). The laboratory data report will be organized in a format that facilitates identification and retrieval of data. Alternate reporting formats require approval from the project chemist.

A Level 3 report will include at least the following (when applicable):

- Cover letter complete with:
  - Report title and laboratory unique report identification (sample delivery group number)
  - Project name and location
  - Name and location of laboratory and second-site or subcontracted laboratory
  - Client name and address
  - Statement of authenticity, and signature and title of person authorizing report release
- Table of contents
- Summary of samples received that correlates field sample IDs with the laboratory IDs
- Laboratory qualifier flags and definitions
- Field ID number
- Sample matrix
- Sample collection date
- Date received
- Date prepared
- Date analyzed (and time of analysis if the holding time is ≤ 48 hours)
- Preparation and analytical methods
- Preparation, analysis, or other batch reference numbers
- Analyte name
- Result for each analyte (dry-weight basis for soils)
- Percent solids results for soil samples
- Data qualifiers, if used

- Dilution factor (provide both diluted and undiluted results when available)
- Sample-specific reporting limit adjusted for sample size, dilution/concentration
- Sample-specific method detection limit (MDL) adjusted for sample size, dilution/concentration (when project objectives require reporting less than the reporting limit)
- Units
- Case narrative that contains a table summarizing samples received, providing correlation between field sample ID and laboratory ID numbers, and analytical test methods performed
  - If a second-site or subcontracted laboratory was used, the table should show which analytical test methods were performed by each laboratory.
  - Samples that were received but not analyzed should be identified.
  - Holding time, calibration, or QC deviations should be noted.
  - Corrective actions taken by the laboratory in connection with these deviations should be discussed.
  - The case narrative should discuss any other information, such as sample temperature outside acceptable range, presence of air bubbles in VOC sample containers, presence of multiple sample phases or other visible signs of sample nonhomogeneity that could potentially affect the quality of the data.
- Surrogate percent recoveries, and associated QC limits
- Matrix spike (MS)/matrix spike duplicate (MSD) and laboratory control sample (LCS)/ laboratory control sample duplicate (LCSD) spike concentrations, native sample results, spiked sample results, percent recoveries, relative percent difference (RPD), and associated QC limits
- Method blank results
- Analytical batch reference number that cross references samples to QC sample analyses
- Executed COC and sample receipt checklist
- Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses
- Calibration blank results for inorganic analyses (required in hard copy format only)
- Inductively coupled plasma (ICP) interference check sample true and measured concentrations and percent recoveries (required in hard copy format only)
- Method of standard addition results (if applicable; required in hard copy format only)

- Post-digestion spike recoveries (if applicable; required in hard copy format only)
- Serial dilution results (if applicable; required in hard copy format only)
- Internal standard recovery and retention time information, as applicable
- Initial calibration summary, including standard concentrations, response factors (RFs), average RFs, relative standard deviations (RSDs) or correlation coefficients, and calibration plots or equations, if applicable (required in hard copy format only)
- Initial and continuing calibration verification summaries, including expected and recovered concentrations and percent differences (required in hard copy format only)
- Instrument tuning and mass calibration information for gas chromatography/mass spectrometry and ICP/mass spectrometry analyses
- Any other method-specific QC sample results

If a Level 4 report is requested, it will include all elements outlined above for the Level 3 report format and all the associated raw data. It is imperative that the chromatographic and other instrument data be supplied in a scale that facilitates review from hard copy. Sufficient "blow ups" of complex areas of sample chromatograms will be provided. Additional information to be supplied will include:

- Sample preparation logs that include the following information:
  - Preparation start and end times
  - Beginning and ending temperatures of water baths and digestion blocks
- Example calculation for obtaining numerical results from at least one sample for each matrix analyzed (provide algorithm)
- Reconstructed total ion chromatograms or selected ion current profiles for each sample (or blank) analyzed and mass spectra(s) for each compound identified including:
  - Raw compound spectra
  - Enhanced or background spectra
  - Laboratory-generated library spectra (for tentatively identified compounds provide the reference mass spectra from software spectra library.

1.8.2.1 Field Data Reporting

Information collected in the field through visual observation, manual measurement, and field instrumentation will be recorded in field notebooks and property worksheets and then entered into an electronic data log. The FTL or project chemist will review the data for adherence to project requirement and for consistency. Any concerns identified as a result of this review will be discussed with the project manager, corrected if possible, and incorporated into the data evaluation process.

Field data calculations, transfers, and interpretations will be conducted by the field crew and reviewed for accuracy by the FTL or project chemist. The data logs and documents will be checked for the following:

- General completeness

- Readability
- Use of appropriate procedures
- Whether modifications to sampling procedures are clearly stated
- Appropriate instrument calibration and maintenance records
- Reasonability of data collected
- Correctness of sample locations
- Correctness of reporting units, calculations, and interpretations

Where appropriate, field data forms and calculations will be processed and included as appendixes to the reports. Original field logs, documents, and data reductions will be kept in the project file.

1.8.2.2 Laboratory Data Reporting

Data reduction will be done manually or using appropriate application software. Quantitation procedures specified for each method must be followed. Calculations for analyses are based on regression analyses of calibration curves. Regression analysis is used to fit a curve through calibration standard data. Sample concentrations are calculated using the resulting regression equations. If data are reduced manually, the documentation must include the formulas used. Any application software used for data reduction must have been previously verified by the laboratory for accuracy. Documentation of the software's verification must be maintained on file in the laboratory. All documentation of data reduction must allow re-creation of the calculations.

Whenever possible, analytical data will be transferred directly from the instrument to a computerized data system. Raw data will be stored electronically, and a hard copy file will be maintained. Laboratory data entry will be sufficient to document the information used to arrive at reported values.

Electronic data storage will be used when possible. Electronic data must be maintained in a manner that prevents inadvertent loss, corruption, and inappropriate alteration. Electronic data will be accessible and retrievable for a period of 10 years after project completion.

Deviations from stated guidelines must be addressed through corrective action. Deviations caused by factors outside the laboratory's control, such as matrix interference, will be noted with an explanation in the report narrative. The laboratory will contact the project chemist to discuss any deviations before the final data are sent out. Calculations will be checked and reports reviewed for errors, oversights, or omissions. The hard copy and electronic laboratory reports for samples and analyses will contain the information necessary to perform data evaluation.

1.8.3 Electronic Analytical Record Format

Concurrently with the submittal of the hard copy deliverables, the laboratory will deliver electronic data in the CH2M HILL LabSpec7 format as defined in the project-specific laboratory statement of work. There shall be no discrepancies between the hard copy reports and the electronic reports.

1.8.4 Turnaround Time

Final reports, including both a hard copy data package (as specified above) and electronic data deliverables, shall be submitted simultaneously. The turnaround time will be specified in the laboratory statement of work.

1.8.5 Project Record Maintenance and Storage

Project records will be stored and maintained in accordance with CH2M HILL's data management policies and Subsection 2.3 of this QAPP. Each project team member is responsible for filing all project information or providing it to the project assistant familiar with the project filing system. Individual team members may maintain separate files or notebooks for individual tasks but must provide such materials to the project file room upon completion of each task.

The general project file categories are as follows:

- Correspondence
- Nonlaboratory project invoices and approvals by vendor
- Original unbound reports
- Nonlaboratory requests for proposals (solicitations), bids, contracts, and statements of work
- Field data
- Data evaluation and calculations
- Site reports from others
- Photographs
- Insurance documentation
- Laboratory analytical data and associated documents/memos
- Regulatory submittals, licensing, and permitting applications
- Site and reference material
- Health and safety plans
- Figures and drawings

A project-specific index of file contents must be kept with the project files at all times.

SECTION 2

Data Generation and Acquisition

This section describes procedures for acquiring, collecting, handling, measuring, and managing data in support of this sampling activity, addressing the following data generation and acquisition issues:

- Sampling process design
- Sample handling and custody requirements
- Sampling method requirements
- Laboratory analytical method requirements
- Laboratory QC requirements
- Field and laboratory instrument calibration and frequency
- Inspection and acceptance requirements for supplies and consumables
- Data acquisition requirements
- Data management
- Field and laboratory instrument and equipment testing, inspection, and maintenance requirements

2.1 Sampling Process Design

The number and location of samples are discussed in Section 2 of the work plan, as are the specific protocols for sampling, equipment decontamination, handling of investigation-derived wastes, and field QC. The sampling design is a function of the medium sampled, information about the sampling site, the type of data to be collected, and how the data are to be used. Table 2 lists the sample counts. Additional analyses may be performed that are not site constituents of concern and are not listed in Table 2. For these additional analyses, data review will follow laboratory SOPs and the laboratory's historical QC limits.

2.2 Sampling Method Requirements

Section 2 of the work plan addresses sampling methods.

2.3 Preservation and Holding Times

Laboratories will provide the required sample containers for all environmental and associated QC samples. Containers will be certified free of the analytes of concern for this project. No sample containers will be reused. The contract laboratory will add preservatives, if required, prior to shipping the sample containers to the field. Upon receipt of the samples, the laboratory will verify the adequacy of the preservation and add additional preservatives if necessary. Adjustments made by the laboratory will be documented on the appropriate sample receipt forms and noted in the case narrative.

Table 3 summarizes the containers, minimum sample quantities, required preservatives, and maximum holding times.

TABLE 2
Sample Counts
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analysis	Field Samples	Field Duplicates	Equipment Blanks	Trip Blanks	Total Samples
Phase 1					
Groundwater Grab Samples (11 deep and 9 shallow)					
VOCs	20	2	1	2	25
Soil Samples (12 from former lagoons, 4 from former Freon UST, and 4 from ditch)					
VOCs	20	2	1	2	25
SVOCs	20	2	1		23
TAL metals	20	2	1		23
Surface Water Samples					
VOCs	4	1		1	6
SVOCs	4	1			5
TAL metals	4	1			5
Sediment Samples					
VOCs	4	1		1	6
SVOCs	4	1			5
TAL metals	4	1			5
Soil Vapor Samples					
VOCs	6	1			7
Soil Waste Samples					
TCLP – VOCs	**18**	**2**			**20**
Phase 2					
Groundwater Monitoring Wells Samples					
VOCs	19	2	1	2	24

TABLE 3
Required Analytical Method, Sample Containers, Preservation, and Holding Times
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyses	Preparatory / Analytical Method	Sample Matrix	Container[b]	Qty	Preservative[c]	Holding Time[d]
VOCs	SW8260B	Water	40-mL glass*	3	Add HCl to pH < 2; cool to 4°C	14 days (preserved), 7 days (unpreserved)
		Soil	Encore samplers or equivalent	3	Cool to 4°C	Soil: 14 days (preserved); 7 days (frozen); 48 hours (unpreserved, not frozen)
TCLP VOC	SW1311/SW8260B	Soil	4-oz. glass	1	Cool to 4°C	14 days to TCLP extraction; 14 days to analysis
PAH	SW8270C-SIM (and low level)	Water	1-L amber glass	2	Cool to 4°C	7 days to extraction; 40 days to analysis
		Soil/Sediment	4-oz. glass	1	Cool to 4°C	14 days to extraction; 40 days to analysis
SVOC	SW8270C (and ultra low method)	Water	1-L amber glass	2	Cool to 4°C	7 days to extraction; 40 days to analysis
		Soil/Sediment	4-oz. glass	1	Cool to 4°C	14 days to extraction; 40 days to analysis
TAL metals	SW/6010B/6020/7000	Water	1-L plastic	1	Add nitric acid to pH < 2; cool to 4°C	180 days; 28 days for mercury
		Soil	4-oz. glass	1	Cool to 4°C	180 days; 28 days for mercury
VOCs in air	TO-15	Air	6-L SUMMA	1	None	14 days

Note: Sample containers and volume requirements will be specified by the analytical laboratory performing the tests. All containers will be sealed with Teflon®-lined screw caps. All samples will be stored promptly at 4°C in an insulated chest. Holding times are from the time of sample collection.

2.4 Sample Handling and Custody Requirements

2.4.1 Sample Identification System

CH2M HILL has devised a sample numbering system that will be used to identify each sample, including duplicates and blanks.

2.4.2 Sample Packaging and Transport

The following sections contain guidelines for sample packaging and transport that may be superseded, amended, or replaced in the work plan or addendum to this QAPP.

2.4.3 Sample Container Preparation

- The labels will be secured to each container with clear tape, if not previously done.
- Container lids will be checked for tightness. If the container is not full, the outside of the container will be marked with indelible ink at the sample volume level.
- Sample bottles will be double-bagged in heavy-duty plastic. Glass containers will be covered with bubble wrap to prevent breakage.

2.4.4 Shipping Cooler Preparation

- All previous labels used on the sample shipping cooler will be removed.
- The drain plugs will be sealed with fiberglass tape (outside and inside) to prevent melting ice from leaking.
- A cushioning layer of packing material such as bubble wrap will be placed at the bottom of the cooler (1 inch thick) to prevent breakage during shipment.
- The cooler will be lined with a large plastic bag (same type used to contain samples).
- Ice will be double-bagged in a resealable plastic bag.

2.4.5 Placing Samples in the Cooler

- The chain-of-custody form will be placed in a resealable plastic bag.
- Samples will be placed in an upright position in the cooler.
- Ice will be placed on top of samples and between samples. Ideally, ice will be placed in resealable plastic bags in duplicate to minimize leakage of ice melt into the cooler.
- Void space between samples will be filled with packing material.

2.4.6 Closing the Cooler

- The cooler lid will be taped with strapping tape, encircling the cooler several times.
- Custody seals may be affixed to the cooler lid to further ensure the integrity of the samples.

2.4.7 Transport

Sample coolers will be shipped to arrive at the laboratory the morning after sampling (priority overnight) or sent by a courier to arrive the same day. The laboratory will be notified that samples are being shipped.

2.4.7.1 Airbills

If samples are shipped, airbills will be retained to provide a record for sample shipment to the laboratory. Completed airbills will accompany shipped samples to the laboratory and be forwarded along with data packages. The airbill number will be documented on the COC form accompanying the samples to the laboratory for sample-tracking purposes. Airbills will be kept as part of the data packages in the project files.

2.4.8 Sample Custody

Accurate records and control of sample and data custody are necessary to provide relevant and defensible data. COC is addressed during field sample collection, data analyses in the laboratory, and through proper handling of project files. Persons will be considered to have custody of samples when samples are in their physical possession, in their view after being in their possession, or in their physical possession and secured to prevent tampering. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel.

COC forms will provide the record of responsibility for sample collection, transport, and submittal to the laboratory. Field personnel designated as responsible for sample custody will fill out COC forms at each sampling site, at a group of sampling sites, or at the end of each day of sampling. Original COC forms will accompany samples to the laboratory, and copies will be forwarded to the project files. The COC form must include at least the following:

- Site name
- Names, telephone numbers, and fax numbers for project manager, project chemist, and data manager
- Unique sample ID
- Date and time of sample collection
- Source of sample (including name, location, sample type, and matrix)
- Number of containers
- Designation of MS/MSD
- Preservative used
- Analyses required
- Name of sampler
- Custody transfer signatures and dates and times of sample transfer from the field to transporters and to the laboratories
- Bill of lading or transporter tracking number (if applicable)
- Turnaround time
- Laboratory name, address, and contact information
- Any special instructions

Erroneous entries on COC records will be corrected by drawing a line through the error and entering the corrected information. The person performing the correction will date and initial each change made on the COC form.

2.4.8.1 Field Custody Procedures

COC forms will be required for all samples. The sampling crew in the field will initiate COC forms. COC forms will contain the sample's unique ID, sample date and time, sample description, sample type, preservation (if any), and analyses required. Original COC forms, signed by the sampling crew, will accompany the samples to the laboratory. A copy of relinquished COC forms will be retained with the field documentation. COC forms will remain with the samples at all times. Samples and signed COC forms will remain in the sampling crew's possession until samples are delivered to the express carrier (Federal Express), hand delivered to the laboratory, or placed in secure storage.

2.4.8.2 Laboratory Custody Procedures

Once the samples reach the laboratory, they will be checked against information on the COC form for anomalies. The condition, temperature, and appropriate preservation of samples will be checked and documented on the COC form. Checking an aliquot of the sample using pH paper is an acceptable procedure. (Precautions must be taken to avoid contamination of the sample.) Samples requesting VOC analyses should not undergo preservation verification until the time of analysis. The occurrence of any anomalies in the received samples and their resolution will be documented in laboratory records. All sample information will then be entered into a tracking system, and unique analytical sample identifiers will be assigned. A copy of this information will be reviewed by the laboratory for accuracy.

Sample holding time tracking begins with the collection of samples and continues until the analysis is complete. **Samples not preserved or analyzed in accordance with the requirements in this QAPP will be resampled and analyzed at no additional cost to CH2M HILL.** Laboratory analyses will be documented on the COC form. Procedures ensuring internal laboratory COC also will be implemented and documented by the laboratory. Ideally, sample custody will be maintained using an internal custody system that requires samples to be kept in a secured and restricted area when not in use and to be checked out and checked back in by the analysts who use the samples. Internal custody records must be maintained by the laboratory as part of the documentation file for each sample. Specific instructions concerning the analysis specified for each sample will be communicated to the analysts. Analytical batches will be created, and laboratory QC samples will be introduced into each batch.

While samples are stored in the laboratory, samples will be stored in limited access, temperature-controlled areas. Refrigerators, coolers, and freezers will be monitored for temperature 7 days a week. Acceptance criterion for the temperatures of the refrigerators and coolers is 4 ± 2 degrees Celsius (°C). Acceptance criterion for the temperatures of the freezers will be less than 0°C. All cold-storage areas will be monitored by thermometers calibrated with a National Institute of Standards and Technology (NIST)-traceable thermometer. As indicated by the findings of the calibration, correction factors will be applied to each thermometer. Records that include acceptance criteria will be maintained. Samples for volatile organics determination will be stored separately from other samples, standards, and sample extracts. Samples will be stored after analysis (samples will be stored as defined in the project statement of work) until disposed of in accordance with

applicable local, state, and federal regulations. Disposal records will be maintained by the laboratory.

Along with sample receipt documentation, the following information will be documented on sample receipt forms by the sample custodian:

- Date samples received
- CH2M HILL sample ID number
- Laboratory sample ID number
- Analytical tests requested for the sample batch
- Sample matrix
- Number of samples in the batch
- Container description and location in the laboratory
- Verification of sample preservation

SOPs describing sample control and custody will be maintained by the laboratory.

2.4.8.3 Laboratory Sample Receipt

Upon sample receipt, the laboratory sample custodian will open the coolers, check temperature blanks (and record temperatures), verify sample integrity, and inspect contents against the COC. The laboratory project manager will be contacted to resolve any discrepancies between sample containers and COC forms. Once the shipment and COC form are in agreement, the sample custodian will initiate an internal COC form as well as supply the laboratory task manager with a sample acknowledgement letter or e-mail. Verification of the cooler temperature and sample preservation will be performed and documented. If the cooler temperature is outside the criterion (4° ± 2° C) upon receipt, or any other discrepancies are identified, the laboratory will contact the project chemist, who will determine the proper course of action.

Samples will be logged into the Laboratory Information Management System (LIMS), which assigns a unique laboratory number to each sample. LIMS will be used by all laboratory personnel handling samples, to ensure all sample information is captured. Analyses required will be specified by codes assigned to samples at log-in. Labels containing the laboratory sample number are generated and placed on sample bottles.

2.4.8.4 Laboratory Sample Storage

After the laboratory labels the samples, they will be moved to refrigerators where they will be maintained at 4°C. Access to the laboratory is limited by locked doors or front desk sign in.

When samples are required, laboratory staff will sign and date the appropriate internal COC forms. If entire samples are depleted during analysis, the notation "sample depleted" or "entire sample used" will be made on the internal COC forms.

Sample extracts will be stored in designated secure, refrigerated storage areas. Samples and sample extracts will be maintained in secure storage until disposal. No samples or extracts will be disposed of without prior written approval from an appropriate member of the project team. The sample custodian will note sample disposal date in the sample ledger. The laboratory will dispose of samples in accordance with applicable regulations.

2.4.8.5 Laboratory Logbooks

Workbooks, bench sheets, instrument logbooks, and instrument printouts will be used to trace the history of samples through the analytical process and document important aspects of the work, including associated QC. As such, all logbooks, bench sheets, instrument logs, and instrument printouts will be part of the laboratory's permanent record. Relevant information will be entered into the LIMS at the time information is generated.

Each page or entry will be dated and initialed by the analyst at the time of entry. Entry errors will be crossed out in indelible ink with a single stroke, corrected without obliterating or writing directly over the erroneous entry, and initialed and dated by the individual making the correction. Unused pages of logbooks will be completed by lining out unused parts and initialing them.

The analyst will record information regarding the sample, the analytical procedures performed, and the results on laboratory forms and enter this information in LIMS. The notes will be dated and will identify the analyst, instruments used, and instrument conditions.

Sufficient raw data records must be retained to permit reconstruction of initial instrument calibrations: calibration date, test method, instrument, analysis date, each analyte name, concentrations and responses, calibration curves, RFs, or unique equations or coefficients used to reduce instrument responses into concentrations.

From time to time, the laboratory group leaders will review laboratory notebooks for accuracy, completeness, and compliance with this QAPP. The laboratory group leader will verify all entries and calculations. If all entries on the pages are correct, the laboratory group leader will initial and date the pages. Corrective action will be taken for incorrect entries before the laboratory group leader signs.

2.4.8.6 Laboratory Project File

Documentation will be placed in a single, secured project file, maintained by the laboratory project manager. This file will consist of the following components, all filed chronologically:

- Agreements
- Correspondence
- Memorandums
- Notes and data

Reports (including QA reports) will be filed with correspondence. Analytical laboratory documentation and field data will be filed with notes and data. Filed materials may only be removed by authorized personnel on a temporary basis. The name of the person removing the file will be recorded. Laboratories will retain project files and data packages for at least 7 years unless otherwise specified.

2.4.8.7 Computer Tape and Hard Copy Storage

All electronic files will be maintained on CD-ROM or DVD (preferred media types), magnetic tape, or diskette for 10 years. Hard copy data packages (including

chromatograms) will be maintained in files for 7 years. The computer tape and hard copy storage should include notation of instrument run files and calibration.

2.5 Analytical Method Requirements

Once the samples have been properly collected and documented, the soil and water samples will be submitted to the selected laboratory subcontracted by CH2M HILL for analysis. Samples will be analyzed in accordance with this QAPP and the specified USEPA method.

Tables 4 to 14 specify the target analytes and the required reporting limit by method and matrix. All samples must be analyzed undiluted or at the lowest possible dilution. The laboratory will contact the project chemist when dilutions are required due to matrix interference. When a target analyte's concentration exceeds the calibration range, a dilution analysis will be performed to accurately determine the analyte's concentration. The laboratory will report the undiluted/lowest dilution performed and any diluted analyses that are required.

The laboratory uses analytical SOPs to ensure that the samples submitted are accurately and analyzed precisely. The laboratory will follow its analytical SOPs or USEPA method guidance when this QAPP does not specify QC criteria.

2.6 Quality Control Requirements

The analytical laboratory shall have a QC program to assess the reliability and validity of the analyses being performed. The purpose and creation of QC samples is discussed below. Laboratory QC checks indicate the state of control that prevailed at the time of sample analysis. QC checks that involve field samples, such as matrix, surrogate spikes, and field duplicates, also indicate the presence of matrix effects. Field-originated blanks provide a way to monitor for potential contamination to which field samples are subjected. This QAPP specifies requirements for method blanks, LCSs, surrogate spikes, and MS/MSDs that laboratories participating in the data collection effort must follow.

TABLE 4
Reporting Limit Objectives for Metals in Water Matrices by SW6010B/SW6020/SW7000 Series.
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/L)	RL (mg/L)	Minimum Screening Level (mg/L)	Screening Level Source
Aluminum	0.05	0.1	37	USEPA Regional Screening Levels
Antimony	0.00025	0.001	0.015	USEPA Regional Screening Levels
Arsenic	0.00025	0.001	0.000045	USEPA Regional Screening Levels
Barium	0.0005	0.003	7.3	USEPA Regional Screening Levels
Beryllium	0.0005	0.002	0.073	USEPA Regional Screening Levels
Cadmium	0.000125	0.0005	0.018	USEPA Regional Screening Levels
Calcium	0.1	0.2	NA	NA
Chromium	0.0005	0.002	55	USEPA Regional Screening Levels
Cobalt	0.00025	0.001	NA	NA
Copper	0.0005	0.002	1.5	USEPA Regional Screening Levels
Iron	0.025	1	26	USEPA Regional Screening Levels
Lead	0.00025	0.001	NA	NA
Magnesium	0.25	0.5	NA	NA
Manganese	0.0005	0.002	0.88	USEPA Regional Screening Levels
Mercury	0.0001	0.0002	0.00063	USEPA Regional Screening Levels
Nickel	0.001	0.004	0.73	USEPA Regional Screening Levels
Potassium	0.25	1	NA	NA
Selenium	0.0005	0.001	0.18	USEPA Regional Screening Levels
Silver	0.00025	0.001	0.18	USEPA Regional Screening Levels
Sodium	0.25	0.5	NA	NA
Thallium	0.00005	0.0002	0.0024	USEPA Regional Screening Levels
Vanadium	0.00025	0.001	0.18	USEPA Regional Screening Levels
Zinc	0.005	0.025	11	USEPA Regional Screening Levels

TABLE 5
Reporting Limit Objectives for Metals in Soil Matrices by SW6010B/SW6020/SW7000 Series.
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/kg)	RL (mg/kg)	Minimum Screening Level (mg/kg)	Screening Level Source
Aluminum	10	20	990000	USEPA Regional Screening Levels
Antimony	0.05	0.1	410	USEPA Regional Screening Levels
Arsenic	0.075	0.3	1.6	USEPA Regional Screening Levels
Barium	0.075	0.3	190000	USEPA Regional Screening Levels
Beryllium	0.012	0.5	2000	USEPA Regional Screening Levels
Cadmium	0.025	0.1	810	USEPA Regional Screening Levels
Calcium	5	10	NA	NA
Chromium	0.1	0.4	1500000	USEPA Regional Screening Levels
Cobalt	0.125	0.5	NA	NA
Copper	0.15	0.6	541000	USEPA Regional Screening Levels
Iron	1	2	720000	USEPA Regional Screening Levels
Lead	0.1	0.2	NA	NA
Magnesium	12	25	NA	NA
Manganese	0.05	0.2	NA	NA
Mercury	0.01	0.25	28	USEPA Regional Screening Levels
Nickel	0.2	0.8	20000	USEPA Regional Screening Levels
Potassium	25	50	NA	NA
Selenium	0.1	0.2	5100	USEPA Regional Screening Levels
Silver	0.05	0.2	5100	USEPA Regional Screening Levels
Sodium	5	25	NA	NA
Thallium	0.01	0.02	66	USEPA Regional Screening Levels
Vanadium	0.125	0.5	5200	USEPA Regional Screening Levels
Zinc	0.625	2.5	310000	USEPA Regional Screening Levels

TABLE 6
Reporting Limit Objectives for Volatile Organic Compounds in Water Matrices by SW8260B
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/L)	RL (mg/L)	Minimum Screening Level (mg/L)	Screening Level Source
1,1,1,2-Tetrachloroethane	0.00025	0.005	0.00052	USEPA Regional Screening Levels
1,1,1-Trichloroethane	0.00025	0.005	9.1	USEPA Regional Screening Levels
1,1,2,2-Tetrachloroethane	0.000125	0.005	0.000067	USEPA Regional Screening Levels
1,1,2-Trichloroethane	0.00025	0.005	0.00024	USEPA Regional Screening Levels
1,1-Dichloroethane	0.000125	0.005	0.0024	USEPA Regional Screening Levels
1,1-Dichloroethene	0.0005	0.005	0.34	USEPA Regional Screening Levels
1,2,3-Trichlorobenzene	0.00015	0.005	NA	NA
1,2,3-Trichloropropane	0.0005	0.005	0.0000096	USEPA Regional Screening Levels
1,2,4-Trichlorobenzene	0.0002	0.005	0.019	USEPA Regional Screening Levels
1,2-Dibromo-3-chloropropane	0.001	0.005	0.00000032	USEPA Regional Screening Levels
1,2-Dichlorobenzene	0.000125	0.005	0.37	USEPA Regional Screening Levels
1,2-Dichloroethane	0.00025	0.005	0.00015	USEPA Regional Screening Levels
1,2-Dichloropropane	0.0002	0.005	0.00039	USEPA Regional Screening Levels
1,3-Dichlorobenzene	0.00025	0.005	NA	NA
1,3-Dichloropropane	0.0002	0.005	0.73	USEPA Regional Screening Levels
1,4-Dichlorobenzene	0.000125	0.005	0.00043	USEPA Regional Screening Levels
2-Butanone (MEK)	0.0025	0.01	7.1	USEPA Regional Screening Levels
2-Chlorotoluene	0.000125	0.005	NA	NA
2-Hexanone	0.0025	0.01	NA	NA
4-Chlorotoluene	0.00025	0.005	NA	NA
4-Methyl-2-pentanone (MIBK)	0.0025	0.01	2	USEPA Regional Screening Levels
Acetone	0.0025	0.01	22	USEPA Regional Screening Levels
Benzene	0.000125	0.005	0.00041	USEPA Regional Screening Levels
Bromobenzene	0.000125	0.005	NA	NA
Bromochloromethane	0.0002	0.005	NA	NA
Bromodichloromethane	0.00025	0.005	0.0011	USEPA Regional Screening Levels
Bromoform	0.0005	0.005	0.0085	USEPA Regional Screening Levels
Bromomethane	0.0005	0.01	0.0087	USEPA Regional Screening Levels
Carbon disulfide	0.0005	0.005	1	USEPA Regional Screening Levels
Carbon tetrachloride	0.00025	0.005	0.0002	USEPA Regional Screening Levels
Chlorobenzene	0.000125	0.005	0.091	USEPA Regional Screening Levels
Chloroethane	0.0005	0.01	21	USEPA Regional Screening Levels
Chloroform	0.000125	0.005	0.00019	USEPA Regional Screening Levels

TABLE 6
Reporting Limit Objectives for Volatile Organic Compounds in Water Matrices by SW8260B
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/L)	RL (mg/L)	Minimum Screening Level (mg/L)	Screening Level Source
Chloromethane	0.00025	0.01	0.0018	USEPA Regional Screening Levels
cis-1,2-Dichloroethene	0.00025	0.005	0.37	USEPA Regional Screening Levels
cis-1,3-Dichloropropene	0.00025	0.005	NA	NA
Dibromochloromethane	0.00025	0.005	0.0008	USEPA Regional Screening Levels
Dibromomethane	0.00025	0.005	0.37	USEPA Regional Screening Levels
Dichlorodifluoromethane	0.00025	0.01	0.39	USEPA Regional Screening Levels
Ethylbenzene	0.00025	0.005	0.0015	USEPA Regional Screening Levels
Ethylene Dibromide	0.00025	0.005	0.0000065	USEPA Regional Screening Levels
Hexachlorobutadiene	0.00025	0.005	0.00086	USEPA Regional Screening Levels
Isopropylbenzene	0.00025	0.005	NA	NA
m,p-Xylenes	0.0005	0.005	NA	NA
Methyl iodide	0.0005	0.001	NA	NA
Methyl tertiary butyl ether	0.005	0.01	0.012	USEPA Regional Screening Levels
Methylene chloride	0.00025	0.005	0.0048	USEPA Regional Screening Levels
n-Butylbenzene	0.00025	0.005	NA	NA
n-Propylbenzene	0.000125	0.005	NA	NA
Naphthalene	0.0002	0.01	0.0062	USEPA Regional Screening Levels
o-Xylene	0.00025	0.005	1.4	USEPA Regional Screening Levels
p-Isopropyltoluene	0.00025	0.005	NA	NA
sec-Butylbenzene	0.00025	0.005	NA	NA
Styrene	0.000125	0.005	1.6	USEPA Regional Screening Levels
tert-Butylbenzene	0.00025	0.005	NA	NA
Tetrachloroethene	0.00025	0.005	0.00011	USEPA Regional Screening Levels
Toluene	0.00025	0.005	2.3	USEPA Regional Screening Levels
Total xylenes	0.0005	0.005	0.2	USEPA Regional Screening Levels
trans-1,2-Dichloroethene	0.00025	0.005	0.11	USEPA Regional Screening Levels
trans-1,3-Dichloropropene	0.0005	0.005	NA	NA
Trichloroethene	0.00025	0.005	0.0017	USEPA Regional Screening Levels
Trichlorofluoromethane	0.00025	0.01	1.3	USEPA Regional Screening Levels
Vinyl acetate	0.0025	0.01	0.41	USEPA Regional Screening Levels
Vinyl chloride	0.00025	0.01	0.000016	USEPA Regional Screening Levels

TABLE 7
Reporting Limit Objectives for Volatile Organic Compounds in Soil Matrices by SW8260B
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/kg)	RL (mg/kg)	Minimum Screening Level (mg/kg)	Screening Level Source
1,1,1,2-Tetrachloroethane	0.0005	0.005	9.8	USEPA Regional Screening Levels
1,1,1-Trichloroethane	0.0005	0.005	39000	USEPA Regional Screening Levels
1,1,2,2-Tetrachloroethane	0.0005	0.005	2.9	USEPA Regional Screening Levels
1,1,2-Trichloroethane	0.0005	0.005	5.5	USEPA Regional Screening Levels
1,1-Dichloroethane	0.001	0.005	17	USEPA Regional Screening Levels
1,1-Dichloroethene	0.0005	0.005	1100	USEPA Regional Screening Levels
1,2,3-Trichlorobenzene	0.001	0.005	NA	NA
1,2,3-Trichloropropane	0.001	0.005	0.41	USEPA Regional Screening Levels
1,2,4-Trichlorobenzene	0.0005	0.005	3100	USEPA Regional Screening Levels
1,2-Dibromo-3-chloropropane	0.002	0.005	0.073	USEPA Regional Screening Levels
1,2-Dichlorobenzene	0.0005	0.005	10000	USEPA Regional Screening Levels
1,2-Dichloroethane	0.0005	0.005	2.2	USEPA Regional Screening Levels
1,2-Dichloropropane	0.0005	0.005	4.7	USEPA Regional Screening Levels
1,3-Dichlorobenzene	0.0005	0.005	NA	NA
1,3-Dichloropropane	0.0005	0.005	20000	USEPA Regional Screening Levels
1,4-Dichlorobenzene	0.0005	0.005	13	USEPA Regional Screening Levels
2-Butanone (MEK)	0.0025	0.01	190000	USEPA Regional Screening Levels
2-Chlorotoluene	0.0005	0.005	20000	USEPA Regional Screening Levels
2-Hexanone	0.0025	0.01	NA	NA
4-Chlorotoluene	0.0005	0.005	72000	USEPA Regional Screening Levels
4-Methyl-2-pentanone (MIBK)	0.0025	0.01	52000	USEPA Regional Screening Levels
Acetone	0.005	0.01	61000	USEPA Regional Screening

TABLE 7
Reporting Limit Objectives for Volatile Organic Compounds in Soil Matrices by SW8260B
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/kg)	RL (mg/kg)	Minimum Screening Level (mg/kg)	Screening Level Source
				Levels
Benzene	0.0005	0.005	5.6	USEPA Regional Screening Levels
Bromobenzene	0.0005	0.005	NA	NA
Bromochloromethane	0.0005	0.005	NA	NA
Bromodichloromethane	0.0005	0.005	21	USEPA Regional Screening Levels
Bromoform	0.0005	0.005	220	USEPA Regional Screening Levels
Bromomethane	0.001	0.01	35	USEPA Regional Screening Levels
Carbon disulfide	0.0005	0.005	3000	USEPA Regional Screening Levels
Carbon tetrachloride	0.0005	0.005	1.3	USEPA Regional Screening Levels
Chlorobenzene	0.0005	0.005	1500	USEPA Regional Screening Levels
Chloroethane	0.001	0.01	NA	NA
Chloroform	0.0005	0.005	1.5	USEPA Regional Screening Levels
Chloromethane	0.002	0.01	8.4	USEPA Regional Screening Levels
cis-1,2-Dichloroethene	0.0005	0.005	10000	USEPA Regional Screening Levels
cis-1,3-Dichloropropene	0.0005	0.005	8.4	USEPA Regional Screening Levels
Dibromochloromethane	0.0005	0.005	21	USEPA Regional Screening Levels
Dibromomethane	0.0005	0.005	10000	USEPA Regional Screening Levels
Dichlorodifluoromethane	0.001	0.01	780	USEPA Regional Screening Levels
Ethylbenzene	0.0005	0.005	29	USEPA Regional Screening Levels
Ethylene Dibromide	0.0005	0.005	0.17	USEPA Regional Screening Levels
Hexachlorobutadiene	0.0005	0.005	22	USEPA Regional Screening Levels
Isopropylbenzene	0.0005	0.005	NA	NA
m,p-Xylenes	0.0005	0.005	20000	USEPA Regional Screening

TABLE 7
Reporting Limit Objectives for Volatile Organic Compounds in Soil Matrices by SW8260B
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/kg)	RL (mg/kg)	Minimum Screening Level (mg/kg)	Screening Level Source
				Levels
Methyl iodide	0.001	0.005	NA	NA
Methyl tertiary butyl ether	0.0005	0.005	190	USEPA Regional Screening Levels
Methylene chloride	0.001	0.005	54	USEPA Regional Screening Levels
n-Butylbenzene	0.0005	0.005	NA	NA
n-Propylbenzene	0.0005	0.005	NA	NA
Naphthalene	0.0005	0.01	20	USEPA Regional Screening Levels
o-Xylene	0.0005	0.005	23000	USEPA Regional Screening Levels
p-Isopropyltoluene	0.0005	0.005	NA	NA
sec-Butylbenzene	0.0005	0.005	NA	NA
Styrene	0.0005	0.005	38000	USEPA Regional Screening Levels
tert-Butylbenzene	0.0005	0.005	NA	NA
Tetrachloroethene	0.0005	0.005	2.7	USEPA Regional Screening Levels
Toluene	0.0005	0.005	46000	USEPA Regional Screening Levels
Total xylenes	0.0005	0.005	2600	USEPA Regional Screening Levels
trans-1,2-Dichloroethene	0.0005	0.005	500	USEPA Regional Screening Levels
trans-1,3-Dichloropropene	0.0005	0.005	NA	NA
Trichloroethene	0.0005	0.005	14	USEPA Regional Screening Levels
Trichlorofluoromethane	0.001	0.01	3400	USEPA Regional Screening Levels
Vinyl acetate	0.001	0.01	4200	USEPA Regional Screening Levels
Vinyl chloride	0.001	0.01	1.7	USEPA Regional Screening Levels

TABLE 8
Reporting Limit Objectives for Semi Volatile Organic Compounds in Water Matrices by SW8270C
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/L)	RL (mg/L)	Minimum Screening Level (mg/L)	Screening Level Source
1,2,4-Trichlorobenzene	0.0025	0.005	0.019	USEPA Regional Screening Levels
1,2-Dichlorobenzene	0.0025	0.005	0.37	USEPA Regional Screening Levels
1,2-Diphenylhydrazine	0.0025	0.005	0.000084	USEPA Regional Screening Levels
1,3-Dichlorobenzene	0.0025	0.005	NA	NA
1,4-Dichlorobenzene	0.0025	0.005	0.00043	USEPA Regional Screening Levels
2,4,5-Trichlorophenol	0.0025	0.005	3.7	USEPA Regional Screening Levels
2,4,6-Trichlorophenol	0.0025	0.005	0.0061	USEPA Regional Screening Levels
2,4-Dichlorophenol	0.0025	0.005	0.11	USEPA Regional Screening Levels
2,4-Dimethylphenol	0.0025	0.005	0.73	USEPA Regional Screening Levels
2,4-Dinitrophenol	0.0125	0.025	0.073	USEPA Regional Screening Levels
2,4-Dinitrotoluene	0.0025	0.005	0.073	USEPA Regional Screening Levels
2,6-Dinitrotoluene	0.0025	0.005	0.037	USEPA Regional Screening Levels
2-Chloronaphthalene	0.0025	0.005	2.9	USEPA Regional Screening Levels
2-Chlorophenol	0.0025	0.005	0.18	USEPA Regional Screening Levels
2-Methylnaphthalene	0.0025	0.005	0.15	USEPA Regional Screening Levels
2-Methylphenol	0.0025	0.005	1.8	USEPA Regional Screening Levels
2-Nitroaniline	0.0125	0.025	NA	NA
2-Nitrophenol	0.0025	0.005	NA	NA
3,3'-Dichlorobenzidine	0.0025	0.005	0.00015	USEPA Regional Screening Levels
3-Nitroaniline	0.0125	0.025	NA	NA
4,6-Dinitro-2-methylphenol	0.0125	0.025	NA	NA
4-Bromophenyl phenyl ether	0.0025	0.005	NA	NA
4-Chloro-3-methylphenol	0.0025	0.005	NA	NA
4-Chloroaniline	0.0025	0.005	0.15	USEPA Regional Screening

TABLE 8
Reporting Limit Objectives for Semi Volatile Organic Compounds in Water Matrices by SW8270C
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/L)	RL (mg/L)	Minimum Screening Level (mg/L)	Screening Level Source
				Levels
4-Chlorophenyl phenyl ether	0.0025	0.005	NA	NA
3,4-Methylphenol	0.0025	0.005	0.18	USEPA Regional Screening Levels
4-Nitroaniline	0.0125	0.025	NA	NA
4-Nitrophenol	0.0125	0.025	NA	NA
Acenaphthene	0.0025	0.005	2.2	USEPA Regional Screening Levels
Acenaphthylene	0.0025	0.005	NA	NA
Anthracene	0.0025	0.005	11	USEPA Regional Screening Levels
Benzidine	0.0125	0.025	0.000000094	USEPA Regional Screening Levels
Benzo(a)anthracene	0.0025	0.005	0.000029	USEPA Regional Screening Levels
Benzo(a)pyrene	0.0025	0.005	0.0000029	USEPA Regional Screening Levels
Benzo(b)fluoranthene	0.0025	0.005	0.000029	USEPA Regional Screening Levels
Benzo(g,h,i)perylene	0.0025	0.005	NA	NA
Benzo(k)fluoranthene	0.0025	0.005	0.00029	USEPA Regional Screening Levels
Benzoic acid	0.01	0.02	150	USEPA Regional Screening Levels
Benzyl alcohol	0.0025	0.005	18	USEPA Regional Screening Levels
Bis(2-chloroethoxy)methane	0.0025	0.005	0.11	USEPA Regional Screening Levels
Bis(2-chloroethyl) ether	0.0025	0.005	NA	NA
Bis(2-chloroisopropyl) ether	0.0025	0.005	NA	NA
Bis(2-ethylhexyl) phthalate	0.0025	0.005	NA	NA
Butyl benzyl phthalate	0.0025	0.005	7.3	USEPA Regional Screening Levels
Chrysene	0.0025	0.005	0.0029	USEPA Regional Screening Levels
Dibenzo(a,h)anthracene	0.0025	0.005	0.0000029	USEPA Regional Screening Levels
Dibenzofuran	0.0025	0.005	NA	NA
Diethyl phthalate	0.0025	0.005	29	USEPA Regional Screening Levels

TABLE 8
Reporting Limit Objectives for Semi Volatile Organic Compounds in Water Matrices by SW8270C
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/L)	RL (mg/L)	Minimum Screening Level (mg/L)	Screening Level Source
Dimethyl phthalate	0.0025	0.005	NA	NA
Di-n-butyl phthalate	0.0025	0.005	3.7	USEPA Regional Screening Levels
Di-n-octylphthalate	0.0025	0.005	NA	NA
Fluoranthene	0.0025	0.005	1.5	USEPA Regional Screening Levels
Fluorene	0.0025	0.005	1.5	USEPA Regional Screening Levels
Hexachlorobenzene	0.0025	0.005	0.000042	USEPA Regional Screening Levels
Hexachlorobutadiene	0.0025	0.005	0.00086	USEPA Regional Screening Levels
Hexachlorocyclopentadiene	0.0025	0.005	0.22	USEPA Regional Screening Levels
Hexachloroethane	0.0025	0.005	0.0048	USEPA Regional Screening Levels
Indeno(1,2,3-cd)pyrene	0.0025	0.005	0.000029	USEPA Regional Screening Levels
Isophorone	0.0025	0.005	0.071	USEPA Regional Screening Levels
Naphthalene	0.0025	0.005	0.00014	USEPA Regional Screening Levels
Nitrobenzene	0.0025	0.005	0.0034	USEPA Regional Screening Levels
n-Nitrosodiphenylamine	0.0025	0.005	0.014	USEPA Regional Screening Levels
n-Nitrosodipropylamine	0.0025	0.005	0.0000096	USEPA Regional Screening Levels
Pentachlorophenol	0.0125	0.025	0.00056	USEPA Regional Screening Levels
Phenanthrene	0.0025	0.005	NA	NA
Phenol	0.0025	0.005	11	USEPA Regional Screening Levels
Pyrene	0.0025	0.005	1.1	USEPA Regional Screening Levels

TABLE 9
Reporting Limit Objectives for Semi Volatile Organic Compounds in Soil Matrices by SW8270C
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/kg)	RL (mg/kg)	Minimum Screening Level (mg/kg)	Screening Level Source
1,2,4-Trichlorobenzene	0.0825	0.165	790	USEPA Regional Screening Levels
1,2-Dichlorobenzene	0.0825	0.165	10000	USEPA Regional Screening Levels
1,2-Diphenylhydrazine	0.0825	0.165	22	USEPA Regional Screening Levels
1,3-Dichlorobenzene	0.0825	0.165	NA	NA
1,4-Dichlorobenzene	0.0825	0.165	13	USEPA Regional Screening Levels
2,4,5-Trichlorophenol	0.0825	0.165	62000	USEPA Regional Screening Levels
2,4,6-Trichlorophenol	0.0825	0.165	160	USEPA Regional Screening Levels
2,4-Dichlorophenol	0.0825	0.165	1800	USEPA Regional Screening Levels
2,4-Dimethylphenol	0.0825	0.165	12000	USEPA Regional Screening Levels
2,4-Dinitrophenol	0.412	0.825	1200	USEPA Regional Screening Levels
2,4-Dinitrotoluene	0.0825	0.165	1200	USEPA Regional Screening Levels
2,6-Dinitrotoluene	0.0825	0.165	620	USEPA Regional Screening Levels
2-Chloronaphthalene	0.0825	0.165	82000	USEPA Regional Screening Levels
2-Chlorophenol	0.0825	0.165	5100	USEPA Regional Screening Levels
2-Methylnaphthalene	0.0825	0.165	4100	USEPA Regional Screening Levels
2-Methylphenol	0.0825	0.165	31000	USEPA Regional Screening Levels
2-Nitroaniline	0.412	0.825	NA	NA
2-Nitrophenol	0.0825	0.165	NA	NA
3,3'-Dichlorobenzidine	0.165	0.33	3.8	USEPA Regional Screening Levels
3-Nitroaniline	0.412	0.825	NA	NA
4,6-Dinitro-2-methylphenol	0.412	0.825	NA	NA
4-Bromophenyl phenyl ether	0.0825	0.165	NA	NA
4-Chloro-3-methylphenol	0.0825	0.165	NA	NA
4-Chloroaniline	0.0825	0.165	2500	USEPA Regional Screening

TABLE 9
Reporting Limit Objectives for Semi Volatile Organic Compounds in Soil Matrices by SW8270C
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/kg)	RL (mg/kg)	Minimum Screening Level (mg/kg)	Screening Level Source
				Levels
4-Chlorophenyl phenyl ether	0.0825	0.165	NA	NA
3,4-Methylphenol	0.0825	0.165	3100	USEPA Regional Screening Levels
4-Nitroaniline	0.412	0.825	NA	NA
4-Nitrophenol	0.412	0.825	NA	NA
Acenaphthene	0.0825	0.165	33000	USEPA Regional Screening Levels
Acenaphthylene	0.0825	0.165	NA	NA
Anthracene	0.0825	0.165	170000	USEPA Regional Screening Levels
Benzidine	0.625	1.25	0.0075	USEPA Regional Screening Levels
Benzo(a)anthracene	0.0825	0.165	2.1	USEPA Regional Screening Levels
Benzo(a)pyrene	0.0825	0.165	0.21	USEPA Regional Screening Levels
Benzo(b)fluoranthene	0.0825	0.165	2.1	USEPA Regional Screening Levels
Benzo(g,h,i)perylene	0.0825	0.165	NA	NA
Benzo(k)fluoranthene	0.0825	0.165	21	USEPA Regional Screening Levels
Benzoic acid	0.33	5	2500000	USEPA Regional Screening Levels
Benzyl alcohol	0.0825	0.165	310000	USEPA Regional Screening Levels
Bis(2-chloroethoxy)methane	0.0825	0.165	1800	USEPA Regional Screening Levels
Bis(2-chloroethyl) ether	0.0825	0.165	0.9	USEPA Regional Screening Levels
Bis(2-chloroisopropyl) ether	0.0825	0.165	17	USEPA Regional Screening Levels
Bis(2-ethylhexyl) phthalate	0.0825	0.165	120	USEPA Regional Screening Levels
Butyl benzyl phthalate	0.0825	0.165	120000	USEPA Regional Screening Levels
Chrysene	0.0825	0.165	210	USEPA Regional Screening Levels
Dibenzo(a,h)anthracene	0.0825	0.165	0.21	USEPA Regional Screening Levels

TABLE 9
Reporting Limit Objectives for Semi Volatile Organic Compounds in Soil Matrices by SW8270C
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/kg)	RL (mg/kg)	Minimum Screening Level (mg/kg)	Screening Level Source
Dibenzofuran	0.0825	0.165	NA	NA
Diethyl phthalate	0.0825	0.165	NA	NA
Dimethyl phthalate	0.0825	0.165	NA	NA
Di-n-butyl phthalate	0.0825	0.165	NA	NA
Di-n-octylphthalate	0.0825	0.165	NA	NA
Fluoranthene	0.0825	0.165	22000	USEPA Regional Screening Levels
Fluorene	0.0825	0.165	22000	USEPA Regional Screening Levels
Hexachlorobenzene	0.0825	0.165	1.1	USEPA Regional Screening Levels
Hexachlorobutadiene	0.0825	0.165	22	USEPA Regional Screening Levels
Hexachlorocyclopentadiene	0.0825	0.165	3700	USEPA Regional Screening Levels
Hexachloroethane	0.0825	0.165	120	USEPA Regional Screening Levels
Indeno(1,2,3-cd)pyrene	0.0825	0.165	2.1	USEPA Regional Screening Levels
Isophorone	0.0825	0.165	1800	USEPA Regional Screening Levels
Naphthalene	0.0825	0.165	20	USEPA Regional Screening Levels
Nitrobenzene	0.0825	0.165	280	USEPA Regional Screening Levels
n-Nitrosodiphenylamine	0.0825	0.165	350	USEPA Regional Screening Levels
n-Nitrosodipropylamine	0.0825	0.165	NA	NA
Pentachlorophenol	0.412	0.825	9	USEPA Regional Screening Levels
Phenanthrene	0.0825	0.165	NA	NA
Phenol	0.0825	0.165	180000	USEPA Regional Screening Levels
Pyrene	0.0825	0.165	17000	USEPA Regional Screening Levels

TABLE 10
Reporting Limit Objectives for Semi Volatile Organic Compounds in Sediment Matrices by SW8270C-SIM Low-Level
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/kg)	RL (mg/kg)	Minimum Screening Level (mg/kg)	Screening Level Source
2-Methylnaphthalene	0.0025	0.005	0.0202	USEPA Region 5 Sediment Environmental Screening Levels
Acenaphthene	0.0025	0.005	0.00671	USEPA Region 5 Sediment Environmental Screening Levels
Acenaphthylene	0.0025	0.005	0.00587	USEPA Region 5 Sediment Environmental Screening Levels
Anthracene	0.0025	0.005	0.0572	USEPA Region 5 Sediment Environmental Screening Levels
Benzo(a)anthracene	0.0025	0.005	0.108	USEPA Region 5 Sediment Environmental Screening Levels
Benzo(a)pyrene	0.0025	0.005	0.15	USEPA Region 5 Sediment Environmental Screening Levels
Benzo(b)fluoranthene	0.0025	0.005	10.4	USEPA Region 5 Sediment Environmental Screening Levels
Benzo(g,h,i)perylene	0.0025	0.005	0.17	USEPA Region 5 Sediment Environmental Screening Levels
Benzo(k)fluoranthene	0.0025	0.005	0.24	USEPA Region 5 Sediment Environmental Screening Levels
Chrysene	0.0025	0.005	0.166	USEPA Region 5 Sediment Environmental Screening Levels
Dibenzo(a,h)anthracene	0.0025	0.005	0.033	USEPA Region 5 Sediment Environmental Screening Levels
Fluoranthene	0.0025	0.005	0.423	USEPA Region 5 Sediment Environmental Screening Levels
Fluorene	0.0025	0.005	0.019	USEPA Region 5 Sediment Environmental Screening Levels
Indeno(1,2,3-cd)pyrene	0.0025	0.005	0.2	USEPA Region 5 Sediment Environmental Screening Levels
Naphthalene	0.0025	0.005	0.176	USEPA Region 5 Sediment Environmental Screening Levels
Phenanthrene	0.0025	0.005	0.204	USEPA Region 5 Sediment Environmental Screening Levels
Pyrene	0.0025	0.005	0.195	USEPA Region 5 Sediment Environmental Screening Levels

TABLE 11
Reporting Limit Objectives for Semi Volatile Organic Compounds in Sediment Matrices by SW8270C-Ultra Low
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/kg)	RL (mg/kg)	Minimum Screening Level (mg/kg)	Screening Level Source
1,2,4-Trichlorobenzene	0.0125	0.025	0.04	USEPA Region 5 Sediment Environmental Screening Levels
1,2-Dichlorobenzene	0.0125	0.025	0.0165	USEPA Region 5 Sediment Environmental Screening Levels
1,2-Diphenylhydrazine	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
1,3-Dichlorobenzene	0.0125	0.025	4.43	USEPA Region 5 Sediment Environmental Screening Levels
1,4-Dichlorobenzene	0.0125	0.025	0.11	USEPA Region 5 Sediment Environmental Screening Levels
2,4,5-Trichlorophenol	0.0125	0.025	0.208	USEPA Region 5 Sediment Environmental Screening Levels
2,4,6-Trichlorophenol	0.0125	0.025	0.208	USEPA Region 5 Sediment Environmental Screening Levels
2,4-Dichlorophenol	0.0125	0.025	0.0817	USEPA Region 5 Sediment Environmental Screening Levels
2,4-Dimethylphenol	0.0125	0.025	0.304	USEPA Region 5 Sediment Environmental Screening Levels
2,4-Dinitrophenol	0.05	0.1	0.00621	USEPA Region 5 Sediment Environmental Screening Levels
2,4-Dinitrotoluene	0.0125	0.025	0.0144	USEPA Region 5 Sediment Environmental Screening Levels
2,6-Dinitrotoluene	0.0125	0.025	0.0398	USEPA Region 5 Sediment Environmental Screening Levels
2-Chloronaphthalene	0.0125	0.025	0.417	USEPA Region 5 Sediment Environmental Screening Levels
2-Chlorophenol	0.0125	0.025	0.0319	USEPA Region 5 Sediment Environmental Screening Levels
2-Methylphenol	0.0125	0.025	0.0554	USEPA Region 5 Sediment Environmental Screening Levels
2-Nitroaniline	0.05	0.1	NA	USEPA Region 5 Sediment Environmental Screening Levels
2-Nitrophenol	0.0125	0.025	0.0133	USEPA Region 5 Sediment Environmental Screening Levels
3,3'-Dichlorobenzidine	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
3-Nitroaniline	0.05	0.1	NA	USEPA Region 5 Sediment Environmental Screening Levels
4,6-Dinitro-2-methylphenol	0.05	0.1	0.104	USEPA Region 5 Sediment Environmental Screening Levels

TABLE 11
Reporting Limit Objectives for Semi Volatile Organic Compounds in Sediment Matrices by SW8270C-Ultra Low
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/kg)	RL (mg/kg)	Minimum Screening Level (mg/kg)	Screening Level Source
4-Bromophenyl phenyl ether	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
4-Chloro-3-methylphenol	0.0125	0.025	0.388	USEPA Region 5 Sediment Environmental Screening Levels
4-Chloroaniline	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
4-Chlorophenyl phenyl ether	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
3,4-Methylphenol	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
4-Nitroaniline	0.05	0.1	NA	USEPA Region 5 Sediment Environmental Screening Levels
4-Nitrophenol	0.05	0.1	0.0133	USEPA Region 5 Sediment Environmental Screening Levels
Benzidine	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
Benzoic acid	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
Benzyl alcohol	0.0125	0.025	0.00104	USEPA Region 5 Sediment Environmental Screening Levels
Bis(2-chloroethoxy)methane	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
Bis(2-chloroethyl) ether	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
Bis(2-chloroisopropyl) ether	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
Bis(2-ethylhexyl) phthalate	0.125	0.25	0.182	USEPA Region 5 Sediment Environmental Screening Levels
Butyl benzyl phthalate	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
Dibenzofuran	0.0125	0.025	0.449	USEPA Region 5 Sediment Environmental Screening Levels
Diethyl phthalate	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
Dimethyl phthalate	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
Di-n-butyl phthalate	0.05	0.1	1.114	USEPA Region 5 Sediment Environmental Screening Levels
Di-n-octylphthalate	0.0125	0.025	40.6	USEPA Region 5 Sediment Environmental Screening Levels
Hexachlorobenzene	0.0125	0.025	0.02	USEPA Region 5 Sediment Environmental Screening Levels

TABLE 11
Reporting Limit Objectives for Semi Volatile Organic Compounds in Sediment Matrices by SW8270C-Ultra Low
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (mg/kg)	RL (mg/kg)	Minimum Screening Level (mg/kg)	Screening Level Source
Hexachlorobutadiene	0.0125	0.025	0.0265	USEPA Region 5 Sediment Environmental Screening Levels
Hexachlorocyclopentadiene	0.0125	0.025	0.00901	USEPA Region 5 Sediment Environmental Screening Levels
Hexachloroethane	0.0125	0.025	0.584	USEPA Region 5 Sediment Environmental Screening Levels
Isophorone	0.0125	0.025	0.432	USEPA Region 5 Sediment Environmental Screening Levels
Nitrobenzene	0.0125	0.025	0.145	USEPA Region 5 Sediment Environmental Screening Levels
n-Nitrosodiphenylamine	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
n-Nitrosodipropylamine	0.0125	0.025	NA	USEPA Region 5 Sediment Environmental Screening Levels
Pentachlorophenol	0.05	0.1	23	USEPA Region 5 Sediment Environmental Screening Levels
Phenol	0.0125	0.025	0.0491	USEPA Region 5 Sediment Environmental Screening Levels

TABLE 12
Reporting Limit Objectives for Volatile Organic Compounds in Air by TO-15
Comparison to Residential Screening Levels
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL ($\mu g/m^3$)	RL ($\mu g/m^3$)	Minimum Screening Level Residential Shallow Soil Gas ($\mu g/m^3$)	Minimum Screening Level Residential Deep Soil Gas ($\mu g/m^3$)
1,1,1-Trichloroethane	0.1693	5.55	52000	520000
1,1,2,2-Tetrachloroethane	0.2040	6.98	0.42	4.2
1,1,2-Trichloroethane	0.1237	5.55	1.5	15
1,1-Dichloroethane	0.0858	4.12	15	150
1,1-Dichloroethene	0.1790	4.03	2100	21000
1,2,4-Trimethylbenzene	0.6626	5.00	73	730
1,2-Dibromoethane	0.1016	7.82	0.041	0.41
1,2-Dichlorobenzene	0.8285	6.12	2100	21000
1,2-Dichloroethane	0.0858	4.12	0.94	9.4
1,2-Dichloropropane	0.5023	4.70	2.4	24
1,3,5-Trimethylbenzene	0.7586	5.00	NA	NA
1,3-Dichlorobenzene	0.6385	6.12	NA	NA
1,4-Dichlorobenzene	0.7011	6.12	2.2	22
2-Butanone (MEK)	0.2214	3	52000	520000
4-Methyl-2-pentanone	0.2177	4.17	31000	310000
Acetone	0.3117	2.42	320000	3200000
Benzene	0.0949	3.25	3.1	31
Bromodichloromethane	0.2929	6.82	NA	NA
Bromoform	0.3071	1	22	220
Bromomethane	0.3575	3.95	52	520
Carbon Disulfide	0.0660	1	7300	73000
Carbon tetrachloride	1.04	6.40	1.6	16
Chlorobenzene	0.0837	4.68	520	5200
Chloroethane	0.0839	2.68	NA	NA
Chloroform	0.1089	4.97	1.1	11
Chloromethane	0.3508	2.10	14	140
cis-1,2-Dichloroethene	0.0538	4.03	NA	NA
cis-1,3-Dichloropropene	0.1455	4.62	NA	NA
Dichlorodifluoromethane	0.1373	5.03	2100	21000
Ethylbenzene	0.4820	4.42	9.7	97

TABLE 12
Reporting Limit Objectives for Volatile Organic Compounds in Air by TO-15
Comparison to Residential Screening Levels
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (µg/m^3)	RL (µg/m^3)	Minimum Screening Level Residential Shallow Soil Gas (µg/m^3)	Minimum Screening Level Residential Deep Soil Gas (µg/m^3)
Heptane	0.4192	4.17	NA	NA
Hexachlorobutadiene	1.5	10.72	1.1	11
Hexane	0.3662	3.59	7300	73000
m,p-Xylenes	1.5	8.83	7300	73000
Methylene chloride	0.3710	3.53	52	520
Methyl tert-butyl ether	0.2889	1	94	940
Naphthalene	0.6112	1	0.72	7.2
o-Xylene	0.6939	4.42	7300	73000
Styrene	0.6065	4.33	10000	100000
Tetrachloroethene	0.1883	6.90	4.1	41
Toluene	0.2954	3.83	52000	520000
trans-1,2-Dichloroethene	0.1178	4.03	630	6300
trans-1,3-Dichloropropene	0.2113	4.62	NA	NA
Trichloroethene	0.2689	5.46	12	120
Trichlorofluoromethane	0.0545	5.72	7300	73000
Trichlorotrifluoroethane	0.1625	7.80	310000	3100000
Vinyl chloride	0.1898	2.60	1.6	16

TABLE 13
Reporting Limit Objectives for Volatile Organic Compounds in Air by TO-15
Comparison to Industrial Screening Levels
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (µg/m^3)	RL (µg/m^3)	Minimum Screening Level Industrial Shallow Soil Gas (µg/m^3)	Minimum Screening Level Industrial Deep Soil Gas (µg/m^3)
1,1,1-Trichloroethane	0.1693	5.55	220000	2200000
1,1,2,2-Tetrachloroethane	0.2040	6.98	2.1	21
1,1,2-Trichloroethane	0.1237	5.55	7.7	77
1,1-Dichloroethane	0.0858	4.12	77	770
1,1-Dichloroethene	0.1790	4.03	8800	88000
1,2,4-Trimethylbenzene	0.6626	5.00	310	3100
1,2-Dibromoethane	0.1016	7.82	0.2	2
1,2-Dichlorobenzene	0.8285	6.12	8800	88000
1,2-Dichloroethane	0.0858	4.12	4.7	47
1,2-Dichloropropane	0.5023	4.70	12	120
1,3,5-Trimethylbenzene	0.7586	5.00	NA	NA
1,3-Dichlorobenzene	0.6385	6.12	NA	NA
1,4-Dichlorobenzene	0.7011	6.12	11	110
2-Butanone (MEK)	0.2214	3	220000	2200000
4-Methyl-2-pentanone	0.2177	4.17	130000	1300000
Acetone	0.3117	2.42	1400000	14000000
Benzene	0.0949	3.25	16	160
Bromodichloromethane	0.2929	6.82	NA	NA
Bromoform	0.3071	1	110	1100
Bromomethane	0.3575	3.95	220	2200
Carbon Disulfide	0.0660	1	31000	310000
Carbon tetrachloride	1.04	6.40	8.2	82
Chlorobenzene	0.0837	4.68	2200	22000
Chloroethane	0.0839	2.68	NA	NA
Chloroform	0.1089	4.97	5.3	53
Chloromethane	0.3508	2.10	68	680
cis-1,2-Dichloroethene	0.0538	4.03	NA	NA
cis-1,3-Dichloropropene	0.1455	4.62	NA	NA
Dichlorodifluoromethane	0.1373	5.03	8800	88000
Ethylbenzene	0.4820	4.42	49	490

TABLE 13
Reporting Limit Objectives for Volatile Organic Compounds in Air by TO-15
Comparison to Industrial Screening Levels
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (µg/m^3)	RL (µg/m^3)	Minimum Screening Level Industrial Shallow Soil Gas (µg/m^3)	Minimum Screening Level Industrial Deep Soil Gas (µg/m^3)
Heptane	0.4192	4.17	NA	NA
Hexachlorobutadiene	1.5	10.72	5.6	56
Hexane	0.3662	3.59	31000	310000
m,p-Xylenes	1.5	8.83	31000	310000
Methylene chloride	0.3710	3.53	260	2600
Methyl tert-butyl ether	0.2889	1	470	4700
Naphthalene	0.6112	1	3.6	36
o-Xylene	0.6939	4.42	31000	310000
Styrene	0.6065	4.33	44000	440000
Tetrachloroethene	0.1883	6.90	21	210
Toluene	0.2954	3.83	220000	2200000
trans-1,2-Dichloroethene	0.1178	4.03	2600	26000
trans-1,3-Dichloropropene	0.2113	4.62	NA	NA
Trichloroethene	0.2689	5.46	61	610
Trichlorofluoromethane	0.0545	5.72	31000	310000
Trichlorotrifluoroethane	0.1625	7.80	1300000	13000000
Vinyl chloride	0.1898	2.60	28	280

TABLE 14
Reporting Limit Objectives for TCLP Volatile Organic Compounds by SW8260B
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Analyte	MDL (ug/L)	RL (ug/L)	USEPA TCLP Limit (ug/L)
Benzene	1.25	50	500
2-Butanone	25	100	200000
Carbon Tetrachloride	2.5	50	500
Chlorobenzene	1.25	50	100000
Chloroform	1.25	50	6000
1,2-Dichloroethane	2.5	50	500
1,1-Dichloroethene	5	50	700
Tetrachloroethene	2.5	50	700
Trichloroethene	2.5	50	500
Vinyl Chloride	2.5	400	200

A laboratory QC batch is defined as a method blank, LCS, MS/MSD, or a sample duplicate, depending on the method and 20 or fewer environmental samples of similar matrix that are extracted or analyzed together. For gas chromatography/mass spectrometry volatile analyses, a method blank, LCS, and MS/MSD must be analyzed in each 12-hour period. The number of environmental samples allowed in the laboratory QC batch is defined by the remaining time in the prescribed 12-hour period divided by the analytical run time. Each preparation or analytical batch will be identified in such a way as to be able to associate environmental samples with the appropriate laboratory quality control samples

2.6.1 Quality Control Samples

2.6.1.1 Quality Control Analyses/Parameters Originated by the Laboratory

Method Blank. Blanks are used to monitor each preparation or analytical batch for interference or contamination from glassware, reagents, and other potential sources within the laboratory. A method blank is an analyte-free matrix, laboratory reagent water for aqueous samples or Ottawa sand, sodium sulfate, or glass beads (metals) for soil samples, to which all reagents are added in the same amount or proportions as are added to the samples. It is processed through the entire sample preparation and analytical procedures along with the samples in the batch. There will be at least one method blank per preparation or analytical batch. If a target analyte is found at a concentration that exceeds the reporting limit, corrective action must be performed to identify and eliminate the contamination source. All associated samples must be re-prepared and reanalyzed after the contamination source has been eliminated. No analytical data may be corrected for the concentration found in the blank.

Laboratory Control Sample. The LCS will consist of an analyte-free matrix such as laboratory reagent water for aqueous samples or Ottawa sand, sodium sulfate, or glass beads (metals) for soil samples spiked with known amounts of analytes that come from a source different than that used for calibration standards. Target analytes specified in the QAPP will be spiked into the LCS. The spike levels will be less than or equal to the midpoint of the calibration range. If LCS results are outside the specified control limits, corrective action must be taken, including sample re-preparation and reanalysis, if appropriate. If more than one LCS is analyzed in a preparation or analytical batch, the results of all LCSs must be reported. Any LCS recovery outside QC limits affects the accuracy for the entire batch and requires corrective action.

Matrix Spike/Matrix Spike Duplicate. A sample matrix fortified with known quantities of specific compounds is called a matrix spike. It is subjected to the same preparation and analytical procedures as the native sample. For this project, all target analytes specified in the QAPP will be spiked into the sample. MS recoveries are used to evaluate the effect of the sample matrix on the recovery of the analytes of interest. An MSD is a second fortified sample matrix. The RPD between the results of the duplicate matrix spikes measures the precision of sample results. Only project-specific samples designated on the COC form will be spiked. The spike levels will be less than or equal to the midpoint of the calibration range. MS/MSD pairs will be analyzed at a frequency of one pair for every 20 samples. QA/QC precision and accuracy criteria are those stated in Tables 15 to 18.

2.6.1.2 Quality Control Analyses Originated by the Field Team

Field QC samples will be collected to determine the accuracy and precision of analytical results. QC sample frequencies are stated below. Sampling will be conducted in accordance with the Health and Safety Plan and handled in accordance with this QAPP. Table 3 summarizes sample containers, holding times, and preservation requirements.

Equipment Blank. Equipment blanks will be collected to monitor cleanliness of sampling equipment and the effectiveness of decontamination procedures. Contamination from sampling equipment can bias the analytical results high or lead to false positive results. Equipment blanks will be prepared by filling sample containers with laboratory grade analyte-free water that has been passed through a decontaminated or unused disposable sampling device. The required QC limits for equipment blank concentrations are to be less than the method's reporting limit. The blanks will be collected at a frequency of one per 20 samples, at a minimum frequency of one per week. Samples associated with equipment blanks that have detected target analytes will be assessed. The usability of the associated analytical data will be documented and affected data will be appropriately qualified.

Field Duplicate. Field duplicates are collected in the field from a single aliquot of sample to determine the precision and accuracy of the field team's sampling procedures. Field duplicates will be collected and analyzed at a frequency of one duplicate for every 10 samples. The precision criteria for the duplicate samples are specified in Tables 15 to 18.

TABLE 15
Accuracy and Precision for Metals by SW6010B/SW6020/7000 Series
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

	Water		Soil	
Analyte	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**
Aluminum	80–120	20	80–120	30
Antimony	80–120	20	80–120	30
Arsenic	80–120	20	80–120	30
Barium	80–120	20	80–120	30
Beryllium	80–120	20	80–120	30
Cadmium	80–120	20	80–120	30
Calcium	80–120	20	80–120	30
Chromium	80–120	20	80–120	30
Cobalt	80–120	20	80–120	30
Copper	80–120	20	80–120	30
Iron	80–120	20	80–120	30
Lead	80–120	20	80–120	30
Magnesium	80–120	20	80–120	30

TABLE 15
Accuracy and Precision for Metals by SW6010B/SW6020/7000 Series
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

	Water		Soil	
Analyte	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**
Manganese	80–120	20	80–120	30
Mercury	80–120	20	80–120	30
Nickel	80–120	20	80–120	30
Potassium	80–120	20	80–120	30
Selenium	80–120	20	80–120	30
Silver	80–120	20	80–120	30
Sodium	80–120	20	80–120	30
Thallium	80–120	20	80–120	30
Vanadium	80–120	20	80–120	30
Zinc	80–120	20	80–120	30

TABLE 16
Accuracy and Precision Limits for Volatile Organic Compounds by SW8260B
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

	Water		Soil	
Analyte	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**
1,1,1,2-Tetrachloroethane	80–130	20	71–137	30
1,1,1-Trichloroethane	80–134	20	70–135	30
1,1,2,2-Tetrachloroethane	79–125	20	55–130	30
1,1,2-Trichloroethane	80–125	20	60–125	30
1,1-Dichloroethane	80–125	20	75–125	30
1,1-Dichloroethene	80–132	20	65–135	30
1,2,3-Trichlorobenzene	55–140	20	60–135	30
1,2,3-Trichloropropane	75–125	20	65–130	30
1,2,4-Trichlorobenzene	65–135	20	65–130	30
1,2-Dibromo-3-chloropropane	50–130	20	40–135	30
1,2-Dichlorobenzene	80–125	20	70–130	30
1,2-Dichloroethane	80–129	20	63–133	30
1,2-Dichloropropane	80–120	20	70–130	30
1,3-Dichlorobenzene	80–120	20	70–130	30
1,3-Dichloropropane	80–120	20	65–128	30
1,4-Dichlorobenzene	80–120	20	70–130	30
2-Butanone (MEK)	30–150	20	37–172	30
2-Chlorotoluene	80–127	20	63–147	30
2-Hexanone	55–130	20	45–145	30
4-Chlorotoluene	80–126	20	70–138	30
4-Methyl-2-pentanone (MIBK)	64–140	20	47–146	30
Acetone	40–142	20	20–160	30
Benzene	80–121	20	70–139	30
Bromobenzene	80–120	20	72–131	30
Bromochloromethane	65–130	20	70–130	30
Bromodichloromethane	80–131	20	72–137	30
Bromoform	70–130	20	49–136	30
Bromomethane	30–145	20	37–143	30
Carbon disulfide	58–138	20	39–139	30

TABLE 16
Accuracy and Precision Limits for Volatile Organic Compounds by SW8260B
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

	Water		Soil	
Analyte	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**
Carbon tetrachloride	65–140	20	59–136	30
Chlorobenzene	80–120	20	70–130	30
Chloroethane	60–135	20	52–135	30
Chloroform	80–125	20	74–129	30
Chloromethane	40–125	20	30–131	30
cis-1,2-Dichloroethene	70–125	20	65–135	30
cis-1,3-Dichloropropene	70–130	20	70–142	30
Dibromochloromethane	60–135	20	59–136	30
Dibromomethane	75–125	20	59–137	30
Dichlorodifluoromethane	50–133	20	25–130	30
Ethylbenzene	80–122	20	70–130	30
Hexachlorobutadiene	72–132	20	65–135	30
Isopropylbenzene	80–122	20	68–129	30
Ethylene Dibromide	80–125	20	69–130	30
m,p-Xylenes	80–122	20	70–130	30
Methyl iodide	50–200	20	20–288	30
Methyl tertiary butyl ether	65–125	20	54–151	30
Methylene chloride	80–123	20	74–128	30
n-Butylbenzene	80–131	20	70–136	30
n-Propylbenzene	80–129	20	72–136	30
Naphthalene	59–149	20	50–146	30
o-Xylene	80–122	20	70–130	30
p-Isopropyltoluene	80–122	20	72–128	30
sec-Butylbenzene	80–127	20	71–132	30
Styrene	80–123	20	74–130	30
tert-Butylbenzene	80–126	20	72–130	30
Tetrachloroethene	80–124	20	72–130	30
Toluene	80–124	20	77–126	30
Total xylenes	80–122	20	70–130	30

TABLE 16
Accuracy and Precision Limits for Volatile Organic Compounds by SW8260B
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

	Water		Soil	
Analyte	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**
trans-1,2-Dichloroethene	80–127	20	65–139	30
trans-1,3-Dichloropropene	80–130	20	56–135	30
Trichloroethene	80–122	20	72–126	30
Trichlorofluoromethane	62–151	20	48–154	30
Vinyl acetate	10–150	20	10–150	30
Vinyl chloride	65–140	20	25–130	30
Surrogates				
4-Bromofluorobenzene	86–115		74–121	
Toluene-d8	88–110		81–117	
1,2-Dichloroethane-d4	80–120		80–120	
Dibromofluoromethane	86–118		80–120	

TABLE 17
Accuracy and Precision Limits for Semi-Volatile Organic Compounds by SW8270C
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

	Water		Soil	
Analyte	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**
1,2,4-Trichlorobenzene	25–105	30	35–100	40
1,2-Dichlorobenzene	25–110	30	35–95	40
1,2-Diphenylhydrazine	40–130	30	40–120	40
1,3-Dichlorobenzene	25–110	30	35–100	40
1,4-Dichlorobenzene	25–110	30	35–105	40
2,4,5-Trichlorophenol	35–120	30	40–110	40
2,4,6-Trichlorophenol	30–120	30	40–110	40
2,4-Dichlorophenol	20–110	30	35–110	40
2,4-Dimethylphenol	20–120	30	30–105	40
2,4-Dinitrophenol	20–140	30	40–130	40
2,4-Dinitrotoluene	50–139	30	50–130	40
2,6-Dinitrotoluene	50–120	30	50–125	40
2-Chloronaphthalene	25–120	30	40–105	40
2-Chlorophenol	25–110	30	35–105	40
2-Methylnaphthalene	25–120	30	35–115	40
2-Methylphenol	20–110	30	35–100	40
2-Nitroaniline	45–115	30	45–120	40
2-Nitrophenol	20–115	30	35–100	40
3,3'-Dichlorobenzidine	30–140	30	40–140	40
3-Nitroaniline	40–120	30	50–130	40
4,6-Dinitro-2-methylphenol	40–145	30	45–130	40
4-Bromophenyl phenyl ether	40–115	30	40–115	40
4-Chloro-3-methylphenol	25–110	30	40–100	40
4-Chloroaniline	25–120	30	35–100	40
4-Chlorophenyl phenyl ether	35–120	30	40–110	40
3,4-Methylphenol	20–110	30	35–105	40
4-Nitroaniline	53–135	30	35–140	40
4-Nitrophenol	10–132	30	45–140	40
Acenaphthene	30–120	30	40–110	40

TABLE 17
Accuracy and Precision Limits for Semi-Volatile Organic Compounds by SW8270C
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

	Water		Soil	
Analyte	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**
Acenaphthylene	30–120	30	40–110	40
Anthracene	55–130	30	55–130	40
Benzidine	0–155	30	0–155	40
Benzo(a)anthracene	60–130	30	50–130	40
Benzo(a)pyrene	55–135	30	50–130	40
Benzo(b)fluoranthene	45–125	30	45–125	40
Benzo(g,h,i)perylene	45–140	30	40–140	40
Benzo(k)fluoranthene	55–140	30	45–135	40
Benzoic acid	10–100	30	20–110	40
Benzyl alcohol	20–110	30	30–100	40
Bis(2-chloroethoxy)methane	20–105	30	30–100	40
Bis(2-chloroethyl) ether	25–110	30	30–100	40
Bis(2-chloroisopropyl) ether	20–110	30	20–115	40
Bis(2-ethylhexyl) phthalate	50–150	30	50–150	40
Butyl benzyl phthalate	55–150	30	50–150	40
Chrysene	55–130	30	55–150	40
Dibenzo(a,h)anthracene	45–125	30	40–140	40
Dibenzofuran	35–115	30	35–110	40
Diethyl phthalate	45–120	30	50–130	40
Dimethyl phthalate	25–112	30	45–115	40
Di-n-butyl phthalate	55–118	30	55–140	40
Di-n-octylphthalate	40–146	30	40–145	40
Fluoranthene	50–137	30	55–140	40
Fluorene	40–120	30	45–115	40
Hexachlorobenzene	50–130	30	45–120	40
Hexachlorobutadiene	24–105	30	30–100	40
Hexachlorocyclopentadiene	20–143	30	30–110	40
Hexachloroethane	25–95	30	30–100	40
Indeno(1,2,3-cd)pyrene	50–135	30	50–135	40

TABLE 17
Accuracy and Precision Limits for Semi-Volatile Organic Compounds by SW8270C
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

	Water		Soil	
Analyte	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**	**LCS/MS/MSD Accuracy (%R)**	**Precision (%RPD)**
Isophorone	30–110	30	35–100	40
Naphthalene	25–110	30	35–100	40
Nitrobenzene	30–110	30	35–100	40
n-Nitrosodiphenylamine	40–110	30	50–130	40
n-Nitrosodipropylamine	28–120	30	35–110	40
Pentachlorophenol	40–140	30	50–150	40
Phenanthrene	55–120	30	50–130	40
Phenol	10–120	30	35–100	40
Pyrene	55–130	30	45–135	40
Surrogates				
p-Terphenyl-d14	33–141		18–137	
Phenol-d5	10–94		24–113	
Nitrobenzene-d5	35–114		23–120	
2-Fluorophenol	21–100		25–123	
2-Fluorobiphenyl	43–116		30–115	
2,4,6-Tribromophenol	10–123		19–122	

TABLE 18
Accuracy and Precision Limits for Volatile Organic Compounds by TO-15
GENERAL LATEX AND CHEMICAL CORPORATION

Analyte	LCS/MS/MSD Accuracy Water	Precision Water
1,1,1-Trichloroethane	(%R)	(%RPD)
1,1,2,2-Tetrachloroethane	70-130	30
1,1,2-Trichloroethane	70-130	30
1,1-Dichloroethane	70-130	30
1,1-Dichloroethene	70-130	30
1,2,4-Trimethylbenzene	70-130	30
1,2-Dibromoethane	70-130	30
1,2-Dichlorobenzene	70-130	30
1,2-Dichloroethane	70-130	30
1,2-Dichloropropane	70-130	30
1,3,5-Trimethylbenzene	70-130	30
1,3-Dichlorobenzene	70-130	30
1,4-Dichlorobenzene	70-130	30
2-Butanone (MEK)	70-130	30
4-Methyl-2-pentanone	70-130	30
Acetone	70-130	30
Benzene	70-130	30
Bromodichloromethane	70-130	30
Bromoform	70-130	30
Bromomethane	70-130	30
Carbon Disulfide	70-130	30
Carbon tetrachloride	70-130	30
Chlorobenzene	70-130	30
Chloroethane	70-130	30
Chloroform	70-130	30
Chloromethane	70-130	30
cis-1,2-Dichloroethene	70-130	30
cis-1,3-Dichloropropene	70-130	30
Dichlorodifluoromethane	70-130	30
Ethylbenzene	70-130	30
Heptane	70-130	30
Hexachlorobutadiene	70-130	30
Hexane	70-130	30
m,p-Xylenes	70-130	30
Methylene chloride	70-130	30
Methyl tert-butyl ether	70-130	30
Naphthalene	70-130	30
o-Xylene	70-130	30
Styrene	70-130	30
Tetrachloroethene	70-130	30
Toluene	70-130	30

TABLE 18
Accuracy and Precision Limits for Volatile Organic Compounds by TO-15
GENERAL LATEX AND CHEMICAL CORPORATION

Analyte	LCS/MS/MSD Accuracy Water	Precision Water
trans-1,2-Dichloroethene	70-130	30
trans-1,3-Dichloropropene	70-130	30
Trichloroethene	70-130	30
Trichlorofluoromethane	70-130	30
Trichlorotrifluoroethane	70-130	30
Vinyl chloride	70-130	30

2.6.2 Data Precision, Accuracy, and Completeness

Field QA/QC samples and laboratory internal QA/QC samples are collected and analyzed to assess the data's usability. Tables 15 to 18state acceptance criteria for precision and accuracy requirements for these QC samples. The QA/QC criteria for the internal laboratory QC samples that are not referenced in the Tables 15 to 18 shall be those stated in the referenced methods. Completeness is the percentage of usable data obtained during the sampling event and its acceptance criteria is project-specific.

2.6.2.1 Precision

The precision of laboratory analysis will be assessed by comparing the analytical results between MS/MSDs. The precision of the field sampling procedures will be assessed by reviewing field duplicate sample results. The RPD will be calculated for the duplicate samples using the equation

$$\%RPD = \{(S - D)/[(S + D)/2]\} \times 100$$

where: S = first sample value (original value)
D = second sample value (duplicate value)

The precision criteria for the duplicate samples will be ± 35 percent in soil samples and ± 25 in water samples. Sample results will be qualified "J" as estimated in quantity when this QC limit is exceeded. The acceptable MS/MSD precision criteria are stated in Tables 15 to 18 if they are more stringent than the analytical SOPs.

2.6.2.2 Accuracy

Accuracy of laboratory results will be assessed for compliance with the established QC criteria using the analytical results of method blanks, reagent/preparation blanks, and MS/MSD samples. Laboratory results accuracy will be assessed for compliance with the established QC criteria described in the analytical SOPs. The percent recovery (%R) of laboratory control samples will be calculated using the equation

$$\%R = (A/B) \times 100$$

where: A = analyte concentration determined experimentally from the laboratory control sample

B = known amount of concentration in the sample

The accuracy criteria for the QA/QC samples are those stated in Tables 15 to 18.

2.6.2.3 Completeness

The data completeness of laboratory analyses results will be assessed for compliance with the amount of data required for decision making. Complete data are data that are not rejected. Data qualified with qualifiers such as a "J" or a "UJ" are still deemed acceptable and can still be used to make project decisions. The completeness of the analytical data is calculated using the equation

$$\% \text{ Completeness} = [(\text{Valid data obtained})/(\text{Total data planned})] \times 100$$

The percent completeness goal for this sampling event is 90 percent.

2.6.2.4 Representativeness

Representativeness is the degree to which sampling data accurately and precisely represent site conditions, and is dependent on sampling and analytical variability and the variability of environmental media at the site. Representativeness is a qualitative "measure" of data quality.

The goal of achieving representative data in the field starts with a properly designed and executed sampling program that carefully considers the project's overall DQOs. Proper location controls and sample handling are critical to obtaining representative samples.

The goal of achieving representative data in the laboratory is measured by assessing accuracy and precision. The laboratory will provide representative data when all the analytical systems are in control. Therefore, representativeness is a redundant DQO for laboratory systems if proper analytical procedures are followed and holding times are met.

In addition, laboratories must demonstrate that the staff is certified, qualified to perform the analyses, and proficient in the analytical methods being employed.

2.6.2.5 Comparability

Comparability is the degree of confidence to which one data set can be compared to another. Comparability is a qualitative "measure" of data quality.

The goal of achieving comparable data in the field starts with a properly designed and executed sampling program that carefully considers the project's overall DQOs. Proper location controls and sample handling are critical to obtaining comparable samples. The goal of achieving comparable data in the laboratory is measured by assessing accuracy and precision. The laboratory will provide comparable data when all of the analytical systems are in control. Therefore, comparability is a redundant DQO for laboratory systems if proper analytical procedures are followed and holding times are met.

2.6.2.6 Sensitivity

Sensitivity is the ability of the method or instrument to detect the contaminant of concern and other target compounds at the level of interest. Appropriate sampling and analytical methods will be selected that have QC acceptance limits that support the achievement of established performance criteria. (See Tables 4 to 14 for reporting limit objectives.) Assessment of analytical sensitivity will require thorough data validation. Soil samples do not require stabilization of any kind before sampling.

2.7 Instrument and Equipment Testing, Inspection, and Maintenance Requirements

2.7.1 Field Instrument Maintenance

Maintenance of field equipment will be conducted as necessary and recorded in a logbook traceable to each specific piece of equipment. Equipment maintenance procedures will be followed in accordance with manufacturers' specifications. Major repairs of field equipment will not be attempted by field staff. Equipment will be shipped to the manufacturer if repairs are required.

Before measurements are made, field equipment will be decontaminated according to the specifications in the work plan. Field equipment also will be decontaminated between sampling locations.

2.7.2 Laboratory Equipment/Instruments

Only qualified personnel will service instruments and equipment. Repairs, adjustments, and calibrations will be documented in the appropriate logbook or data sheet.

2.7.2.1 Instrument Maintenance

Preventive maintenance of laboratory equipment will follow guidelines recommended by the manufacturer. A malfunctioning instrument will be repaired by in-house staff or through a service call to the manufacturer.

The laboratory will maintain a sufficient supply of spare parts for its instruments to minimize downtime. Whenever possible, backup instrumentation will be on hand.

Whenever practical, analytical equipment should be maintained under a service contract. Such contracts allow for preventative system maintenance and repair on an as-needed basis. The laboratory should have sufficiently trained staff to allow day-to-day maintenance of equipment. Laboratory instruments will be maintained in accordance with manufacturer's specifications and within the requirements of the laboratory's quality assurance manual.

Maintenance must be documented in logbooks that are traceable to a specific instrument.

2.7.2.2 Equipment Monitoring

Operation of balances, ovens, refrigerators, and water purification systems will be checked daily and documented. Discrepancies will be reported immediately to the appropriate laboratory personnel for resolution. Specific laboratory preventive maintenance procedures are found in the laboratory's quality assurance manual.

2.8 Instrument Calibration and Frequency

2.8.1 Laboratory Instruments

Laboratory instruments will be calibrated by qualified personnel before sample analysis, according to the procedures specified in each method, analytical SOPs, and as noted below. Calibration will be verified at method-specified intervals throughout the analysis sequence. The frequency and acceptance criteria for calibration are specified for each analytical method, with supplemental requirements defined below for organic methodologies. When multipoint calibration is specified, the concentrations of the calibration standards should bracket those expected in the samples. Samples will be diluted if necessary to bring analyte responses to within the calibration range. Data that exceed the calibration range cannot be reported by the laboratory. The initial calibration curve will be verified as accurate with a standard purchased or prepared from an independent second source. The initial calibration verification involves the analysis of a standard containing all the target analytes, typically in the middle of the calibration range, each time the initial calibration is performed. Quantitation based on extrapolation is undesirable. Designated laboratory personnel performing QC activities will maintain and file records of calibration, repairs, or replacement. The records will be filed where the work is performed and subject to a QA audit.

Standards used in equipment must be traceable, directly or indirectly, to the NIST. All standards received will be logged into standard receipt logs maintained by the individual analytical groups. Each group maintains a standards log that tracks the preparation of standards used for calibration and QC purposes.

2.8.2 Instrument Calibration

Laboratory instruments shall be calibrated by qualified personnel before sample analysis according to the procedures specified in each method. Calibration shall be verified at method-specified intervals throughout the analysis sequence. The frequency and acceptance criteria for calibration are specified for each analytical method with supplemental requirements defined below for organic methodologies. When multipoint calibration is specified, the concentrations of the calibration standards should bracket those expected in the samples. Samples should be diluted, if necessary, to bring analyte responses within the calibration range. Data that exceed the calibration range cannot be reported by the laboratory. The initial calibration curve shall be verified as accurate with a standard purchased or prepared from an independent second source. The initial calibration verification involves the analysis of a standard containing all the target analytes, typically in the middle of the calibration range, each time initial calibration is performed. Quantitation based on extrapolation is undesirable.

2.8.2.1 Initial Calibration Models for the Determination of Organic Compounds

Organic methodologies often provide multiple options for initial calibration curve fits and associated acceptance criteria for use. The following sections outline required "good laboratory practices" that will be employed by the laboratory. The hierarchy that the laboratory will use when selecting the calibration curve fit for use in quantitation of sample results is outlined below.

Calibration Techniques Verify that correct instrument operating conditions and routine maintenance as specified in the method and laboratory SOP are employed. Document all maintenance activities in a laboratory notebook for troubleshooting and scheduling of future routine, periodic maintenance.

- Ensure that the instrument is free of contamination prior to calibration. Do NOT perform any blank subtraction.
- Perform the entire initial calibration before sample analyses. Calibration standards must be analyzed in sequential order, from the lowest to highest concentration. If one calibration standard fails to meet criteria, it may be reanalyzed at the end of the calibration sequence. Justification for removing a calibration point from the curve fit selected includes such items as improper purge, injection failure, nonspiked level, or other obvious failures. The failure of multiple standards suggests an instrument problem or operator error, and corrective action is required.
- Only the lowest calibration point or the highest calibration point can be removed from the calibration curve without justification. If the lowest standard is removed, the reporting limit for that compound increases to the level of the next lowest calibration standard. Approval to elevate reporting limits greater than the project specific objectives must be approved by the project chemist. If the highest standard is removed, the linear range is shortened for that compound. At all times, five calibration points must be included.
- The lowest standard in the calibration curve must be at or below the required reporting limit.
- The other standard concentrations must define the working range of the instrument or the expected range of concentrations found in the samples.
- Either external or internal calibration can be employed for methods not involving mass spectrometry detectors. Internal calibration must be used when a mass spectrometry detector is employed.
- Most compounds tend to be linear and a linear approach should be favored when linearity is suggested by the calibration data. Nonlinear calibration should be considered only when a linear approach cannot be applied. It is not acceptable to use an alternate calibration procedure when a compound fails to perform in the usual manner. When this occurs, it is indicative of instrument issues or operator error.
- If a nonlinear calibration curve fit is employed, at least six calibration levels must be used for second-order (quadratic) curves. A third order polynomial requires at least seven calibration levels.
- When more than five levels of standards are analyzed in anticipation of using second- or third-order calibration curves, all calibration points must be used, regardless of the calibration option employed. The highest or lowest calibration point may be excluded for the purpose of narrowing the calibration range, and meeting the requirements for a specific calibration option. Otherwise, unjustified exclusion of calibration data is expressly forbidden.

- Use of the average of all compound RSDs in a calibration curve at less than the criteria is not allowed. Calibration control must be shown for each individual compound.

Calibration Options The following section outlines the acceptable calibration options and the hierarchy the laboratory should use when selecting a specific option. The choice of calibration option may be based on previous experience or a priori knowledge of detector response. The most simple calibration model must be used first unless prior knowledge and previous experience dictate otherwise. It is not the intent of alternate calibration models to compensate for poor instrument operating conditions or extending requirements for instrument maintenance.

- Linear calibration using average calibration or RFs. RFs for internal calibrations must have RSDs not exceeding 15 percent to be used for quantitation. A minimum response factor (RF) of 0.05 for most target analytes and 0.01 for the least responsive target analytes must be achieved to ensure detectability.
- Linear calibration using a linear regression equation ($y = mx + b$). The correlation coefficient must equal 0.995 or better. The line should not be forced through the origin. The equation and a plot of the linear regression must be included in the raw data to be generated by the laboratory and made available in the data package upon the client's request.
- A nonlinear calibration model may be a second- or third-order polynomial. The model must be continuous without a break in the function and should not be forced through the origin. The coefficient of determination of the nonlinear regression must be 0.99 or better. The equation and a plot of the nonlinear regression must be included in the raw data to be generated by the laboratory and made available in the data package upon the client's request.

2.8.2.2 Continuing Calibration

The initial calibration must be calibrated from time to time in order to analytical data of known quality. The continuing calibration verification analyses ensure that the instrument has not been adversely affected by the sample matrix or other instrument failures that would increase or decrease the sensitivity or accuracy of the method. The laboratory will perform continuing calibration for all methods per the specific requirements in the method and laboratory SOP.

Use of percent drift or recovery of the average of all analytes to meet the continuing calibration requirements for the method will not be allowed. If a continuing calibration is accepted as compliant by the laboratory but has individual compounds that exceed criteria, a list of analytes that exceeded the criteria will be provided in the laboratory report. For analyses conducted under this QAPP, such notifications shall be accomplished through provision of the lists in the laboratory case narrative of those compounds outside these criteria and the actual values of the percent drift or recovery. The laboratory will perform continuing calibration for all methods according to the specific requirements in the National Functional Guidelines and measurement quality objectives listed in Tables 19 to 22.

2.9 Inspection/Acceptance Requirements for Supplies and Consumables

The required services must meet the task scope, specified levels of quality, and the submittal schedule. Project contractors or vendors should have contractual arrangements with their material suppliers.

2.10 Data Acquisition Requirements for Nondirect Measurements

This subsection describes the identity of the types of data needed for project implementation and decision making not obtained from direct measurements.

The project objectives are first identified to assess what information is needed in order to implement a project plan to meet the objectives stated in Section 1. Typically, the data needed to achieve project objectives include site maps, sampling location selection and sample identifiers, laboratory method selection, detection limit verification, analytical parameter lists, critical values, field measurement lists, and a project schedule. This information is included in this QAPP.

The sampling design and rationale of the sampling investigation activities were based upon previously collected data. Site maps and other site characterization data were used in the selection of sample locations.

2.11 Data Management

Data management entails storing, handling, accessing, and securing data collected during the project. Data gathered during this project will be consolidated and compiled into a project database that can be used to support project data reporting and exports for transfer to a data management system. The following subsections describe the project's data management process and associated project staff responsibilities.

2.11.1 Team Organization and Responsibilities

The following are the team members and overview of their responsibilities for the data management process:

- **Project Manager—**Ensures that the project team follows the work plan so that the team properly collects, documents, and implements the plan to ensure that all data collected are properly managed.
- **Project Chemist—**Oversees sample tracking, a data management process that includes data verification, data validation, and data conversion for other applications, and the preparation and review of required data tables.
- **Field Team Leader—**Responsible for managing and archiving all field information in the project files.

2.11.2 Sample Tracking

The project chemist is responsible for tracking samples and deliverable to ensure that the analytical results for all samples sent for analysis are received. The FTL will send the project chemist to initiate the sample tracking process.

2.11.3 Data Types

Activities performed at the site will involve accessing a number of different types of data collected or retained for various uses. The following subsections describe the overall contents of the project files/database.

2.11.4 Site Characterization Data

Data will be added to the project database as they become available. The data will include new data collected in the field and laboratory and reviewed by CH2M HILL. The data will be reviewed using CH2M HILL's semi-automated data validation system, VDMS, and retained in the project database for export to other applications.

2.11.5 Data Tracking and Management

CH2M HILL will maintain a tracking system for each COC/laboratory sample delivery group collected. The data will be tracked from collection through completion and review of the data verification process.

2.11.5.1 Electronic Data Deliverables

The laboratory will submit electronic data deliverables in the LabSpec7 format specified in the laboratory statement of work.

2.11.5.2 Hard Copy

All raw analytical laboratory data will be stored as the original hard copy. Hard copy information includes COC forms, analytical bench sheets, instrument printouts and chromatograms, certificates of analyses, and QA/QC report summaries.

2.11.5.3 Data Input Procedures

Sampling information, analytical results, QA/QC data, data validation qualifiers, and other field-related information will be applied to the electronic data using the VDMS system.

2.11.6 Evidence File

The final evidence file for the project will be the central repository for all documents that constitute evidence relevant to sampling and analysis activities. CH2M HILL's project manager is the custodian of the evidence file and maintains the contents of the evidence files, including relevant records, reports, logs, field notebooks, pictures, contractor reports, and data reviews in a secured area with limited access.

CH2M HILL will keep all records until project completion and closeout. Records may be transferred to an offsite records storage facility. The records storage facility must provide

secure, controlled access records storage. The subcontract laboratory must keep records of raw analytical laboratory data, QA data, and reports for at least 7 years.

2.11.7 Presentation of Site Characterization Data

Depending on the needs of the data user, data may be presented in any of the following formats:

- Tabulated results of data summaries or raw data
- Figures showing concentration isopleths or location-specific concentrations
- Tables providing statistical evaluation or calculation results

Other data, such as soil types, may be collected during field efforts. Such information may be stored in a project database. Other types of data elements may be added as the field investigation needs and activities evolve.

SECTION 3

Assessment and Oversight

3.1 Assessments and Response Actions

Field and laboratory assessments will be performed to assess technical and procedural compliance with this QAPP. Performance and system audits are imperative to ensuring this compliance. Audits are conducted for the following purposes:

- To confirm that appropriate documents are properly completed and kept current and orderly
- To ensure that measurement systems are accurate
- To identify nonconformance or deficiencies, and to initiate necessary corrective actions
- To verify that field and laboratory QA procedures called for in this QAPP are properly followed and executed

The project chemist and the laboratory QAM are responsible for ensuring conformance with this QAPP. The FTL is responsible for ensuring conformance with field QA/QC requirements. Activities selected for audit will be evaluated against specified requirements, and the audit will include an evaluation of the method, procedures, and instructions. Documents and records will be examined as necessary to evaluate whether the QA program is effective and properly implemented. Reports and recommendations must be prepared on all audits and submitted to the QAM for retention in the project files.

3.1.1 Field Audits

Planning, scheduling, and conducting QA audits and surveillance are required to verify that site activities are being performed efficiently in conformance with approved plans, standards, federal and state regulatory requirements, sound scientific practices, and contractual requirements. Planned and scheduled audits may be performed to verify compliance with aspects of the QA program and to evaluate the effectiveness of the QA program. Audits include the following:

- Objective examination of work areas, activities, and processes
- Review of documents and records
- Interviews with project personnel
- Review of plans and standards

The FTL will conduct regular internal reviews of the sampling program during the investigation and pay particular attention to the sampling program with respect to representativeness, comparability, and completeness of the specific measurement parameters involved.

The FTL or a designee will review field documentation (COC forms, daily field sheets, and logbooks) as it is generated for accuracy, completeness, and compliance with Work Plan and QAPP requirements. The FTL periodically will audit field sampling procedures for compliance with QAPP procedures. The auditor will check that the following are performed:

- Sampling protocols are followed.
- Samples are placed in proper containers.
- Samples are stored and transported properly.
- Field documentation is completed.

The USEPA and the state of Ohio hold the right to perform field audits during sampling.

3.1.2 Field Corrective Action

Any project team member may initiate a field corrective action process. The process consists of identifying a problem, acting to eliminate it, monitoring the effectiveness of the corrective action, verifying that the problem has been eliminated, and documenting the corrective action.

Corrective actions include correcting COC forms, problems associated with sample collection, packaging, shipping, field record keeping, or additional training in sampling and analysis. Additional approaches may include resampling or evaluating and amending sampling procedures. The FTL will summarize the problem, establish possible causes, and designate the person responsible for a corrective action. The FTL will verify that the initial action has been taken and appears effective and will follow up to verify that the problem has been resolved.

Technical staff and project personnel will be responsible for reporting suspected technical or QA nonconformances or suspected deficiencies by reporting the situation to the FTL. The FTL will be responsible for assessing suspected problems in consultation with the QAM and the site manager, and make a decision based on the situation's potential to impact data quality. If it is determined that the situation warrants a reportable nonconformance requiring corrective action, the FTL will initiate a nonconformance report.

The FTL will be responsible for ensuring that corrective actions for nonconformances are initiated by:

- Evaluating all reported nonconformances
- Controlling additional work on nonconforming items
- Determining disposition or action to be taken
- Maintaining a log of nonconformances
- Reviewing nonconformance reports and corrective actions taken
- Ensuring that nonconformance reports are included in the final documentation in the project files

3.1.3 Laboratory Audits

The laboratory QAM may conduct internal system audits, which are qualitative evaluations of all components of the laboratory QC measurement system. The audit serves to determine

if all measurement systems are used appropriately. The system audits are conducted to evaluate the following:

- Sample handling procedures
- Calibration procedures
- Analytical procedures
- QC results
- Safety procedures
- Record keeping procedures
- Timeliness of analysis and reporting

Laboratories also are subject to external audits, which focus on assessing general laboratory practices and conformance to this QAPP. Laboratory audits may be performed before the start of analyses and at any time during the course of the project as deemed necessary.

The laboratory QAM will review internal laboratory performance. The laboratory QAM will evaluate laboratory precision and accuracy by comparing results of duplicate samples, QC samples, spikes, and blanks. The laboratory QAM or other client services individual will check the analytical data before distribution when a beyond-control-limit situation is encountered.

External laboratory performance reviews may be conducted based on evaluation of the results of check samples analyzed as part of USEPA or state certification requirements. Performance audits may be conducted by sending "double blind" performance evaluation samples (those not discernable from routine field samples) to the analytical laboratory.

3.1.4 Laboratory Corrective Action

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

A corrective action program will be determined and implemented when a noncompliance problem is identified. The person identifying the problem will be responsible for notifying the proper project member. If the problem is analytical in nature, information on the problem will be communicated to the laboratory QAM and the project chemist, who will in turn direct information to proper project members.

Corrective actions are required whenever an actual or potential out-of-control event is noted. The specific investigative action taken will depend on the analysis and the event in question. Laboratory personnel are alerted that corrective action may be necessary if any of the following occur:

- QC data are outside the warning or acceptable windows for precision and accuracy.
- Blanks contain target analytes at concentrations above acceptable levels.
- Undesirable trends are detected in spike recoveries or relative percent difference between duplicates.

- Unusual changes in detection limits occur.
- Inquiries concerning data quality are received.
- Deficiencies are detected by the laboratory QAM during internal or external audits or from results of performance evaluation samples.

Corrective action procedures in the laboratory are often handled at the bench level by the analyst, who reviews preparation or extraction procedures for possible errors, checks instrument calibrations, spike and calibration mixes, and instrument sensitivity. If problems persist or cannot be identified, matters are referred to the laboratory supervisor, laboratory project manager, or laboratory QAM for further investigation. The laboratory project manager is to contact CH2M HILL's project chemist to discuss corrective actions. The project chemist is responsible for notifying the site manager of any corrective action needed. Once resolved, full documentation of the corrective action procedures is filed with the Laboratory QAM after approval by the site manager or the project chemist. Corrective action may include the following:

- Resampling and analyzing
- Evaluating and amending sampling procedures
- Evaluating and amending analytical procedures
- Accepting data and acknowledging the level of uncertainty
- Reanalyzing the samples, if sample or extract volume is adequate and holding time criteria permit

If resampling is deemed necessary because of laboratory problems, the project chemist and the project manager together must identify the appropriate course of action to be taken, including potential cost recovery from the laboratory for the additional sampling effort.

3.2 Reports to Management

Audit reports may be submitted to the project manager in accordance with this QAPP. In addition, the project manager prepares a monthly progress report that addresses project status, QA issues, and corrective actions proposed or taken. After sample results have been received from the laboratory and they have been evaluated, reduced, and tabulated, a data evaluation report documenting the field investigation is submitted to USEPA Region 5.

SECTION 4

Data Reduction, Validation, and Reporting

4.1 Laboratory Data Management

Data reduction will be done manually or by using appropriate application software. Quantitation procedures specified for each method must be followed. If done manually, the documentation must include the formulas used. Any application software used for data reduction must have been previously verified by the laboratory for accuracy. Documentation of the software's verification must be maintained on file in the laboratory. All documentation of data reduction must allow re-creation of the calculations.

All data will undergo at least three levels of review at the laboratory before release. The analyst performing the tests will review 100 percent of the data. After the analyst's review has been completed, 100 percent of the data will be reviewed independently by a senior analyst or by the section supervisor for accuracy, compliance with calibration, and QC requirements, holding time compliance, and completeness. Analyte identification and quantitation must be verified. Calibration and QC results will be compared with the applicable control limits. Reporting limits should be reviewed to make sure they meet the project objectives. Results of multiple dilutions should be reviewed for consistency. Discrepancies must be resolved and corrected. Laboratory qualifiers will be applied when there are nonconformances that could affect data usability. The qualifiers must be properly defined as part of the deliverables. All issues relevant to the quality of the data must be addressed in a case narrative. The laboratory QC manager will review at least 10 percent of the data or deliverables generated for the program against the project-specific requirements. The laboratory manager or client services representative will conduct a final data review to ensure that all required analyses were performed on all samples and that all documentation is complete.

The hard-copy and electronic laboratory reports for all samples and analyses will contain the information necessary to perform data evaluation.

Typical projects will use four types of reporting deliverables that depend upon the DQOs of the individual project. The following is a brief synopsis of what type of objectives are appropriate to use for each deliverable. Level 3 data deliverables will be used for this project.

Level 1 Appropriate for screening sample results. Noncritical project decisions are made using the data.

Level 2 Appropriate for investigative samples results that will be replaced with confirmatory data or results used for disposal purposes. Less critical project decision are made using the data.

Level 3 Appropriate for investigative, confirmatory, or closure results. Critical project decisions may be made using the data.

Level 4 Appropriate for investigative, confirmatory, or closure results. Critical decisions may be made using the data and should be used for projects that require a high degree of confidence in the accuracy of the data.

Hard copy deliverables as described in Section 1.8.2 are required. Other delivery formats are acceptable, such as that defined by the Air Force Center for Environmental Excellence as long as the format provides summarized, form-oriented reporting. Alternate reporting formats require approval from the Project Chemist. The laboratory data report should be organized in a format that facilitates identification and retrieval of data. A ***Level 1*** will include, at a minimum, the following information (when applicable):

- Cover letter complete with the following information:
  - Title of report and unique laboratory report ID (sample delivery group number)
  - Project name and site location
  - Name and location of laboratory and second-site or subcontracted laboratory
  - Client name and address
  - Statement of authenticity and official signature and title of person authorizing report release
- Table of contents
- Summary of samples received that correlates field sample IDs with the laboratory ids
- Laboratory qualifier flags and definitions
- Field ID number
- Date received
- Date prepared
- Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)
- Preparation and analytical methods
- Result for each analyte (dry weight basis for soils)
- Percent solids results for soil samples
- Dilution factor (provide both diluted and undiluted results when available)
- Sample-specific reporting limit adjusted for sample size, dilution/concentration
- Sample-specific MDL adjusted for sample size, dilution/concentration (when project objectives require reporting less than the RL)
- Units

A ***Level 2*** report consists of all the elements in a Level 1 deliverable plus the following:

- Case narrative that addresses the following information at a minimum:
  - Sample receipt discrepancies, such as bubbles in volatile organic analysis (VOA) samples, temperature exceedances, etc.
  - Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence.
  - Identification and justification for sample dilution.
- Surrogate percent recoveries.
- MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results. Associated QC limits must also be provided.
- Method blank results.
- Analytical batch reference number that cross references samples to QC sample analyses.
- Executed chain of custody and sample receipt checklist.

A ***Level 3*** report consists of all the elements in Level 1 and 2 reports plus the following:

- Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses.
- Confirmation results
- Calibration blank results for inorganic analyses (required in hard copy format only)
- ICP interference check sample true and measured concentrations and percent recoveries (required in hard copy format only)
- Method of standard addition results (if applicable; required in hard copy format only)
- Post-digestion spike recoveries (if applicable; required in hard copy format only)
- Internal standard recovery and retention time information, as applicable
- Initial calibration summary, including standard concentrations, RFs, average RFs, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hard copy format only)
- Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hard copy format only)
- Instrument tuning and mass calibration information for gas chromatography/mass spectrometry and ICP/mass spectrometry analyses
- Any other method-specific QC sample results

A ***Level 4*** report includes all elements outlined above for Level 1 through 3 report formats and all the associated raw data. It is imperative that the relative scale used for all

chromatographic and other instrument data be supplied in a scale that facilitates review from hard copy. Sufficient "blow ups" of complex areas of sample chromatograms will be provided. The additional information below will also be supplied:

- Sample preparation logs that include the following information:
  - Preparation start and end times
  - Beginning and ending temperatures of water baths, digestion blocks, etc.
- Example calculation for obtaining numerical results from at least one sample for each matrix analyzed; provide algorithm.
- Reconstructed total ion chromatograms or selected ion current profiles for each sample (or blank) analyzed and mass spectra for the compounds identified including:
  - Raw compound spectra
  - Enhanced or background spectra
  - Laboratory generated library spectra (for tentatively identified compounds provide the reference mass spectra from software spectra library
- Ion ratio information for dioxin/furan methods

4.2 Hard Copy and Electronic Deliverables

Within the period specified in the laboratory statement of work, contract, or purchase order from sample receipt, the laboratory shall deliver hard copy documentation as specified in this document. The laboratory shall also provide an electronic copy of the data as specified in the format described in the laboratory statement of work.

All electronic data files shall match the final hard copy results. CH2M HILL requires receipt of final hard copy results in conjunction with submittal of electronic files.

All raw data will be maintained on file in the laboratory and will be available upon request by project management. Complete documentation of sample preparation and analysis and associated QC information will be maintained in a manner that allows easy retrieval if additional validation or information is required. Data generated using gas chromatography/ mass spectrometry must be maintained on magnetic tape and made available to CH2M HILL upon request. All documentation must be retained for at least 10 years after data acquisition.

The primary responsibility for the implementation of these procedures within the laboratory will reside with the laboratory manager or equivalent. The laboratory manager will approve laboratory reports before transferring the information to the client.

4.3 Data Validation and Verification

Depending upon the project specific objectives, the analytical results of the data collection effort will undergo a Level 3 validation by CH2M HILL. The validation will always be performed by the project chemist, a designee, or by a qualified third party data validator and will include:

- Verification that samples were analyzed for the methods requested and review of the data for outliers and anomalies.
- Verification that samples were analyzed for the methods requested, review of the laboratory case narrative for events in the laboratory that affect the accuracy or precision of the data, review of QC indicator data and a "sanity" review of the data.
- Validation of the analytical data as described below without review of any raw data or analyte verification.

4.4 Validation Procedures

Personnel involved in the data validation function will be independent of any data generation effort. The project chemist will have responsibility for oversight of the data validation effort. Data validation will be carried out when the data packages are received from the laboratory. It will be performed on an analytical batch basis using the summary results of calibration and laboratory QC, as well as those of the associated field samples. Data packages will be reviewed for all contaminants of concern. Raw data will be reviewed when deemed necessary by the project chemist. Data validation procedures will include the following:

- Review of the data package for completeness
- Review of chain-of-custody records for discrepancies that might degrade data quality
- Review for compliance with holding time and QC frequency requirements
- Evaluation of all calibration and QC summary results against the project requirements
- Verification of analyte identification and calculations for at least 10 percent of the data
- Initiation of corrective actions, as necessary, based on the data review findings
- Qualification of the data using appropriate qualifier flags, as necessary, to reflect data usability limitations

Data validation will be patterned after the USEPA *Contract Laboratory National Functional Guidelines for Inorganic Data Review* (October 2004) and *Contract Laboratory National Functional Guidelines for Organic Data Review* (January 2005), substituting the calibration and QC requirements specified in this QAPP for those in the guidelines. The flagging criteria in Tables 19 to 22 will be used. The criteria are intended to meet typical project objectives, and will be used in the absence of project specific data validation definition in the project QAPP.

Data qualifier flags are defined in Table 23 and will be applied to the electronic sample results. If multiple flags are required for a result, the most severe flag will be applied to the electronic result. The hierarchy of flags from the most severe to the least severe will be R, J, UJ, U.

A validation report will be generated for each method and sample delivery group. A copy of the validation report will be submitted to the project management team, and a copy will be retained with the data package in the project file. Any significant data quality problems will be brought to the attention of the project chemist. The project chemist also will perform a review of the data validation report prepared by third party validators if used.

TABLE 19
Method Quality Objectives and Flagging Criteria for VOCs by SW8260B
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

QC Check	Evaluation	Flag	Samples Affected
Holding time	Holding time exceeded for extraction or analysis by less than a factor of two	J positive results; UJ nondetects	Sample
	Holding time exceeded by a factor of two	J positive results; R nondetects	
Temperature	> 6°C	J positive results; UJ nondetects	All samples in same cooler
Sample integrity	Bubbles in VOA vial > ¼-inch diameter	J positive results; UJ nondetects	Sample
GC/MS tune standard	Ion abundance method-specific criteria not met	R all results	All associated samples in analysis batch
Initial calibration	SPCCs: Average RF < 0.030[a]; RF for non-SPCC compounds < 0.05	J positive results; UJ nondetects	All associated samples in analysis batch
	RF for non-SPCC compounds < 0.01	J positive results; R nondetects	
	CCCs: %RSD for RFs > 30%	J positive results; UJ nondetects	
	%RSD > 15% for non-CCC compounds AND calibration curve not used, OR calibration curve used but with correlation coefficient < 0.995	J positive results; UJ nondetects	
Second source calibration verification	%D > 25%D high bias	J positive results	All associated samples in analysis batch
	%D > 25%D low bias	J positive results, UJ nondetects	
	%D > 50%D (> 70% for poor performers as designated by chemist on a case-by-case basis)	J positive results, R nondetects	
Continuing calibration verification	SPCCs: Average RF ≤ 0.030[a]	J positive results; UJ nondetects	All associated samples in analysis batch
	CCCs: %RSD for RFs > 20%	J positive results; UJ nondetects	
	%D > 20%D high bias	J positive results	
	%D > 20%D low bias	J positive results, UJ nondetects	
	%D > 50%D (> 70% for poor performers as designated by chemist on a case-by-case basis)	J positive results, R nondetects	

TABLE 19
Method Quality Objectives and Flagging Criteria for VOCs by SW8260B
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

QC Check	Evaluation	Flag	Samples Affected
Laboratory control sample	%R > UCL	J positive results	All samples in preparation batch
	%R < LCL	J positive results, UJ nondetects	
	%R < 10%	J positive results, R nondetects	
Method blank	Analytes detected > MDL	U positive sample results ≤ 5× highest blank concentration (10× for common lab contaminants[b])	All samples in preparation batch or analytical batch, whichever one applies, associated with method blank or calibration blank
Equipment Blank and Trip Blank	Analytes detected > MDL	U positive sample results ≤ 5× highest blank concentration (10× for common lab contaminants[b])	All samples, same site, matrix and date (water) or all samples, same site, matrix (soil) associated with equipment blank or all samples shipped in the same cooler as the trip blank
Matrix Spikes			
% Recoveries	%R > UCL	J positive results	Matrix spike analytes in parent sample and field duplicate, if any
	%R < LCL	J positive results, UJ nondetects	
	%R < 10%	J positive results, R nondetects	
RPDs	RPD > UCL	J positive results	Matrix spike analytes in parent sample and field duplicate, if any
Sample concentration > 4× spike concentration		None, note problem in data validation report	None
Surrogates	Surrogate with %R > UCL	J positive results	All analytes in same fraction in sample
	Surrogate with %R < LCL but not < 10%	J positive results; UJ nondetects	
	Any surrogate with %R < 10%	J positive results; R nondetects	
Internal standards	Area > +100%	J positive results; UJ nondetects	Associated analytes in sample
	Area < -50%	J positive results	

TABLE 19
Method Quality Objectives and Flagging Criteria for VOCs by SW8260B
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

QC Check	Evaluation	Flag	Samples Affected
	If extremely low area counts are observed or if performance exhibits a major abrupt drop off	R nondetects	
Field duplicates	Both sample results ≥RL, and RPD > UCL	J positive results	Normal and field duplicate
	One sample detected ≥RL and one sample nondetect AND difference > 3× RL for water and > 5× RL for soil	J positive result; UJ nondetect	Normal and field duplicate

[a] RF ≥ 0.1 for chloromethane, bromoform, and 1,1-dichloroethane
[b] common lab contaminants are acetone, methylene chloride and 2-butanone

TABLE 20
Method Quality Objectives and Flagging Criteria for SVOCs by SW8270C
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

QC Check	Evaluation	Flag	Samples Affected
Holding time	Holding time exceeded for extraction or analysis by less than a factor of two	J positive results; UJ nondetects	Sample
	Holding time exceeded by a factor of two	J positive results; R nondetects	
Temperature	> 6°C	J positive results; UJ nondetects	All samples in same cooler
GC/MS tune standard	Ion abundance method-specific criteria not met	R all results	All associated samples in analysis batch
Initial calibration	SPCCs: Average RF ≤0.050 (SW8270)	J positive results; UJ nondetects	All associated samples in analysis batch
	RF for non-SPCC compounds < 0.01	J positive results; R nondetects	
	CCCs: %RSD for RFs > 30%	J positive results; UJ nondetects	
	%RSD > 15% for non-CCC compounds AND calibration curve not used, OR calibration curve used but with correlation coefficient < 0.995	J positive results; UJ nondetects	
Second source calibration verification	%D > 25%D high bias	J positive results	All associated samples in analysis batch
	%D > 25%D low bias	J positive results, UJ nondetects	
	%D > 50%D (> 70% for poor performers as designated by chemist on a case-by-case basis)	J positive results, R nondetects	
Continuing calibration verification	SPCCs: Average RF ≤0.050	J positive results; UJ nondetects	All associated samples in analysis batch
	CCCs: %D ±20%	J positive results; UJ nondetects	
	%D > 20%D high bias %D > 20%D low bias	J positive results J positive results, UJ nondetects	
	%D > 50%D (> 70% for poor performers as designated by chemist on a case-by-case basis)	J positive results, R nondetects	
Laboratory control sample	%R > UCL	J positive results	All samples in preparation batch
	%R < LCL	J positive results, UJ nondetects	
	%R < 10%	J positive results, R nondetects	

TABLE 20
Method Quality Objectives and Flagging Criteria for SVOCs by SW8270C
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

QC Check	Evaluation	Flag	Samples Affected
Method blank	Analyte(s) detected > MDL	U positive sample results ≤ 5× highest blank concentration (10× for common lab contaminants[a])	All samples in preparation batch or analytical batch, whichever one applies, associated with method blank or calibration blank
Equipment blank	Analyte(s) detected > MDL	U positive sample results ≤ 5× highest blank concentration (10× for common lab contaminants[a])	All samples, same site, matrix and date (water) or all samples, same site, matrix (soil) associated with equipment blank or all samples shipped in the same cooler as the trip blank
Matrix spikes			
% Recoveries	%R > UCL %R < LCL %R < 10%	J positive results J positive results, UJ nondetects J positive results, R nondetects	Matrix spike analytes in parent sample and field duplicate, if any.
RPDs	RPD > UCL	J positive results	Matrix spike analytes in parent sample and field duplicate, if any.
Sample concentration > 4× spike concentration		None, note problem in data validation report	None
Surrogates (flags are not applied unless more than one surrogate per fraction is outside criteria)	Surrogate with %R > UCL Surrogate with %R < LCL but not < 10% Any surrogate with %R < 10%	J positive results J positive results; UJ nondetects J positive results; R nondetects	All analytes in same fraction in sample
Internal standards	Area > +100% Area < -50% If extremely low area counts are observed or if performance exhibits a major abrupt drop off	J positive results; UJ nondetects J positive results R nondetects	Associated analytes in sample
Field duplicates	Both sample results ≥RL, and RPD > UCL One sample detected ≥RL and one sample nondetect AND difference > 3× RL for water and > 5× RL for soil	J positive results J positive result; UJ nondetect	Normal and field duplicate Normal and field duplicate

[a] common lab contaminants are all phthalates

TABLE 21
Method Quality Objectives and Flagging Criteria for Metals by SW6010B/SW6020/SW7000
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Quality Control Check	Evaluation	Flag	Samples Affected
Holding time	Holding time exceeded for extraction, digestion or analysis by less than a factor of two	J positive results, UJ nondetects	Sample
	Holding time exceeded for digestion or analysis by a factor of two	J positive results; R nondetects	
Sample preservation	Sample not preserved (If sample preservation was not done in the field but was performed at the laboratory upon sample receipt, no flagging is required)	J positive results; UJ nondetects	Sample
MS tuning sample (SW6020)	RSD > 5% for at least four replicate analyses; resolution > 0.9 a.m.u. at 10% peak height; mass calibration > 0.1 a.m.u. from true value	R all results	All associated samples in analysis batch
Initial calibration (multipoint only)	Correlation Coefficient ≤ 0.995	J positive results; R nondetects	All associated samples in analysis batch
Calibration verification (ICV and CCV)	%R > 110%	J positive results	All associated samples in analysis batch
	%R < 90%	J positive results, UJ nondetects	
Low Level Calibration Check Standard (at or below RL)	%R > 120%	J positive results	All associated samples in analysis batch
	%R < 80%	J positive results, UJ nondetects	
Laboratory Control Sample (LCS)	%R > UCL	J positive results	All samples in preparation batch
	%R < LCL	J positive results, UJ nondetects	
	%R < 30%	J positive results, R nondetects	
Interference Check Sample (ICS	%R > 120%	J positive results	All samples in preparation batch
	%R < 80%	J positive results, UJ nondetects	
Internal Standards (SW6020)	Intensity must be within 30-120% of intensity of IS in the ICAL	R all results	Associated analytes in sample
Method Blank	Analyte(s) detected > MDL	U positive sample results ≤ 5× highest blank concentration	All samples in preparation batch or analytical batch, whichever one applies, associated with method blank
Calibration Blank	Analyte(s) detected > MDL	U positive sample	All samples in preparation

TABLE 21
Method Quality Objectives and Flagging Criteria for Metals by SW6010B/SW6020/SW7000
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Quality Control Check	Evaluation	Flag	Samples Affected
		results ≤ 5× highest blank concentration	batch or analytical batch, whichever one applies, associated with calibration blank
Equipment Blank	Analyte(s) detected > MDL	U positive sample results ≤ 5× highest blank	All samples, same site, matrix and date (water) or all samples, same site, matrix (soil) associated with equipment blank
Matrix Spikes	%R > UCL	J positive results	Matrix spike analytes in parent sample and field duplicate, if any.
	%R < LCL %R < 10%	J positive results, UJ nondetects	
	RPD > UCL	J positive results, R nondetects	
	Sample concentration > 4× spike concentration	J positive results	None
		None, note problem in data validation report	
Dilution Test	If concentration is > 25 times MDL and % difference > 10%	J positive results	Associated analyte in the sample if post digestion spike not performed.
Post Digestion Spike/Recovery Test	%R > 125%	J positive results	All samples in digestion batch if MSA not performed from same site as parent sample
	%R < 75%	J positive results, UJ nondetects	
Field duplicates	Both sample results ≥RL, and RPD > UCL	J positive results	Normal and field duplicate
	One sample detected ≥RL and one sample nondetect AND difference > 3× RL for water and > 5× RL for soil	J positive result;	Normal and field duplicate

a.m.u. - atomic mass unit
CCV - continuing calibration verification

TABLE 22
Method Quality Objectives and Flagging Criteria for VOCs by TO-15
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

QC Check	Evaluation	Flag	Samples Affected
Holding Time	Holding time exceeded for extraction or analysis by less than a factor of two	J positive results; UJ nondetects	Sample
	Holding time exceeded by a factor of two	J positive results; R nondetects	
GC/MS Tune Standard	Ion abundance method-specific criteria not met	R all results	All associated samples in analysis batch
Initial Calibration	%RSD > 30% for any analyte AND calibration curve not used, OR calibration curve used but with correlations coefficient < 0.995	J positive results; UJ nondetects	
Second Source Calibration Verification	%D > 25%D high bias	J positive results	All associated samples in analysis batch
	%D > 25%D low bias	J positive results, UJ nondetects	
	%D > 50%D (> 70% for poor performers as designated by chemist on a case-by-case basis)	J positive results, R nondetects	
Continuing Calibration Verification	%D > 20%D high bias	J positive results	All associated samples in analysis batch
	%D > 20%D low bias	J positive results, UJ nondetects	
	%D > 50%D (> 70% for poor performers as designated by chemist on a case-by-case basis)	J positive results, R nondetects	
Laboratory Control Sample	%R > UCL	J positive results	All samples in preparation batch
	%R < LCL	J positive results, UJ nondetects	
	%R < 10%	J positive results, R nondetects	
Method Blank	Analyte(s) detected > MDL	U positive sample results ≤ 5× highest blank concentration (10× for common lab contaminants[a])	All samples in preparation batch or analytical batch, whichever one applies, associated with method blank
Surrogates	Surrogate with %R > UCL	J positive results	All analytes in same fraction in sample
	Surrogate with %R < LCL but not < 10%	J positive results; UJ nondetects	
	Any surrogate with %R < 10%	J positive results; R nondetects	
Internal Standards	Area > +100%	J positive results; UJ nondetects	Associated analytes in sample
	Area < -50%	J positive results	

TABLE 22
Method Quality Objectives and Flagging Criteria for VOCs by TO-15
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

QC Check	Evaluation	Flag	Samples Affected
	If extremely low area counts are observed or if performance exhibits a major abrupt drop off	R nondetects	
Field duplicates	Both sample results ≥RL, and RPD > UCL	J positive results	Normal and field duplicate
	One sample detected ≥ RL and one sample nondetect AND difference greater than 3× RL	J positive result; UJ nondetect	Normal and field duplicate

[a] RF ≥ 0.1 for chloromethane, bromoform, and 1,1-dichloroethane

TABLE 23
Qualifier Flag Definitions
Former General Latex and Chemical Corporation Facility Site, Ashland, Ohio

Qualifier	Definition
U	The analyte was analyzed for but not detected. The value preceding the U is the method reporting limit.
J	The identification of the analyte is acceptable, but the quality assurance criteria indicate that the quantitative values may be outside the normal expected range of precision (i.e. the quantitative value is considered estimated).
R	Data are considered to be rejected and shall not be used. This flag denotes the failure of quality control criteria such that it cannot be determined if the analyte is present or absent from the sample. Resampling and analysis are necessary to confirm or deny the presence of the analyte.
UJ	This flag is a combination of the U and J qualifiers which indicates that the analyte is not present. The reported value is considered to be an estimated method reporting limit.
N	There is presumptive evidence that the analyte is present, but it has not been confirmed. The analyte is tentatively identified. There is an indication that the reported analyte is present, however, all quality control requirements necessary for confirmation were not met.

SECTION 5

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