# QUALITY ASSURANCE PROJECT PLAN
## Former York Naval Ordnance Plant
## 1425 Eden Road, Springettsbury Township
## York, Pennsylvania

**Prepared for:**

**Former York Naval Ordnance Plant Remediation Team**

**June 2012**
**Revision No. 1 – August 2014**
**Revision No. 2 – November 2020**

**Prepared by:**

**Groundwater Sciences Corporation**
**2601 Market Place Street, Suite 310**
**Harrisburg, PA 17110**

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QA/QC & Health and Safety Manager
Groundwater Sciences Corporation
November 30, 2020

Christopher D. O'Neil, P.G.
Project Director
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November 30, 2020

# A PROJECT MANAGEMENT

## A.1 Title and Approval Sheet

**Title of Plan:** Quality Assurance Project Plan (QAPP)

Former York Naval Ordnance Plant (fYNOP or Site)

1425 Eden Road, Springettsbury Township, York, Pennsylvania

**Implementing Organization:** fYNOP Remediation Team (Harley-Davidson Motor Company Operations, Inc. [Harley-Davidson] and United States Army Corps of Engineers [USACE])

**Effective Date:** November 30, 2020

**Approving Officials:**

- Facility Project Lead (FPL) – Sharon Fisher
- USACE Baltimore District Representative – Hamid Rafiee
- Trust Fund 3rd Party Coordinator/Project Coordinator – Ralph Golia

## A.2 Table of Contents

## Table of Tables

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## Table of Appendices



**Appendices C-1, C-2, and D are in portable document format (PDF) on the USB Drive attached to the hard copy of this report.*

The format of this Quality Assurance Project Plan (QAPP) is consistent with the structure outlined in the following documents:

- *EPA Requirements for Quality Assurance Project Plans (*EPA QA/R-5, March 2001),
- *Guidance for Quality Assurance Project Plans* (EPA QA/G-5, December 2002), and
- *Uniform Federal Policy for Quality Assurance Project Plans (EPA-505-B-04-900A, March 2005).*

## List of Acronyms and Abbreviations

| | |
|---|---|
| COC | constituents of concern |
| CPA | Central Plant Area |
| CSM | conceptual site model |
| CVOC | chlorinated volatile organic compound |
| DNAPL | dense non-aqueous phase liquid |
| DQI | data quality indicators |
| DQO | data quality objectives |
| eCOC | electronic chain-of-custody |
| EDD | electronic data deliverable |
| ELLE | Eurofins Lancaster Laboratories Environmental |
| ERLC | Eden Road Logistics Center |
| FCR | field change request |
| FID | flame ionization detector |
| FPL | facility project lead |
| FSP | Field Sampling Plan |
| fYNOP | former York Naval Ordnance Plant |
| GPS | global positioning system |
| GSC | Groundwater Sciences Corporation |
| GWTS | Groundwater Treatment System |
| Harley-Davidson | Harley-Davidson Motor Company Operations, Inc. |
| HASP | Health and Safety Plan |
| IDW | investigation-derived wastes |
| LCS | laboratory control spike |

| | |
|---|---|
| LCS/LCSD | laboratory control spike/laboratory control spike duplicate |
| M&TE | measuring and testing equipment |
| MNA | monitored natural attenuation |
| MS | matrix spike |
| MS/MSD | matrix spike/matrix spike duplicate |
| MSC | Medium Specific Concentrations |
| MSD | matrix spike duplicate |
| NCR | nonconformance report |
| NELAP | National Environmental Laboratory Accreditation Program |
| NIST | National Institute for Standards and Technology |
| NPDES | National Pollutant Discharge Elimination System |
| NP York | NP York 58, LLC |
| PAHs | polycyclic aromatic hydrocarbons |
| PADEP | Pennsylvania Department of Environmental Protection |
| Part 2 SRI | Part 2 of the Supplemental Groundwater Remedial Investigation |
| PCBs | polychlorinated biphenyls |
| PDF | portable document format |
| PID | photoionization detector |
| QA | quality assurance |
| QA/QC | quality assurance/quality control |
| QAPP | Quality Assurance Project Plan |
| QC | quality control |
| QCR | quality control report |
| RCRA | Resource Conservation and Recovery Act |
| RPD | relative percent difference |
| RSL | Regional Screening Level |
| SARM | Standard Analytical Reference Materials |
| SDG | sample delivery group |
| SOP | standard operating procedure |
| SPBA | Southern Property Boundary Area |
| SRI | Supplemental Remedial Investigation |
| TCE | trichloroethene |

| | |
|---|---|
| TI | technical impracticability |
| USACE | United States Army Corps of Engineers |
| USEPA | United States Environmental Protection Agency |
| VOC | volatile organic compounds |
| WPL | West Parking Lot |

## A.3 Distribution List

This Quality Assurance Project Plan (QAPP) will be distributed to project personnel involved in data collection and analysis. Each person on the distribution list will receive one copy of the QAPP unless otherwise requested. A distribution record of the QAPP will be maintained by the Groundwater Sciences Corporation (GSC) Project Director. The distribution record will contain a list of personnel and organizations who have received copies of the QAPP, the date of receipt, and the revision number that was received.

**Table A-1 Personnel Responsibilities and QAPP Receipt**

| Name | Organization | Project Title | Contact Information (Telephone and email) |
|---|---|---|---|
| Sharon Fisher, CHMM | Harley-Davidson Motor Company Operations, Inc. | Facility Project Lead | (717) 852-6544<br>sharon.r.fisher@harley-davidson.com |
| Ralph Golia, P.G. | AMO Environmental Decisions, Inc. | 3rd Party Project Coordinator | (267) 249-0417<br>rgolia@amoed.com |
| Hamid Rafiee | United States Army Corp of Engineers | Baltimore District Representative | (410) 962-7546<br>Hamid.rafiee@usace.army.mil |
| Griff Miller | U.S. Public Health Service, detailed to USEPA Region 3 | Remedial Project Manager | (215) 814-3407<br>Miller.Griff@epamail.epa.gov |
| James Rea, P.G. | PA Dept. of Environmental Protection | Project Officer | (717) 705-4850<br>jrea@pa.gov |
| Christopher O'Neil, P.G. | Groundwater Sciences Corporation | Project Director | (717) 901-8187<br>coneil@groundwatersciences.com |
| Charles Rine, P.G. | Groundwater Sciences Corporation | QA/QC and Health & Safety Manager | (717) 901-8188<br>crine@groundwatersciences.com |
| Casey Littlefield | Groundwater Sciences Corporation | Laboratory Coordinator, Sample/Data/Field Manager and Sampling Technician | (717) 901-8178<br>clittlefield@groundwatersciences.com |
| Erin Peeling, G.I.T. | Groundwater Sciences Corporation | Data Validator and Sampling Technician | (717) 901-8194<br>epeeling@groundwatersciences.com |
| Knut Torgerson | Leidos | Software Systems Engineer (Database Administrator) | (571) 526-7759<br>torgersonk@leidos.com |
| Rodney Myers, CHMM | Hydro-Terra Group | fYNOP Team Member | (717) 980-5150<br>rmyers@hydro-terra.com |
| Emily Wade | Hydro-Terra Group | fYNOP Team Member | (443) 974-3956<br>ewade@hydro-terra.com |
| Timothy Scripko | Buchart-Horn, Inc. | fYNOP Team Member | (717) 852-6096<br>timothy.scripko@harley-davidson.com |
| Wanfang Zhou | Hana Engineers | fYNOP Team Member | (865) 919-8842<br>wanfang.zhou@hanaengineers.com |

# A.4 Project / Task Organization

The project organizational chart for this QAPP is attached as **Figure A-1**. This chart defines the key personnel and organizations and shows their relationships and lines of communication. This organizational chart will be updated as necessary to reflect current project personnel and contractors. The functional responsibilities of key personnel are described in the following subsections.

## A.4.1 Facility Project Lead

The FPL ensures the overall management and quality of the activities covered by this QAPP. The FPL for the One Cleanup Program established by a Memorandum of Agreement between United States Environmental Protection Agency (USEPA) Region 3 and the Pennsylvania Department of Environmental Protection (PADEP) will ensure that project goals and objectives are met in a high-quality and timely manner. Quality Assurance (QA) and nonconformance issues will be addressed by this individual in coordination with the GSC Project Director.

## A.4.2 USACE Baltimore District Representative

The United States Army Corps of Engineers (USACE) Baltimore District representative for the Site reviews all matters with the FPL and the Trust Fund Project Coordinator concerning investigation or remediation of environmental impacts at the Site.

## A.4.3 Trust Fund Project Coordinator

The Trust Fund Project Coordinator is the liaison regarding shared cleanup responsibility for the project. The Trust Fund Project Coordinator activities involve interfacing with fYNOP Remediation Team Representatives, PADEP, USEPA and Contractor personnel, and tracking related budgets and schedules.

### A.4.4 USEPA Region 3 Remedial Project Manager

The USEPA Region 3 Remedial Project Manager works with the FPL and the PADEP representative to provide regulatory review and federal oversight for the project. The USEPA works directly with the PADEP to provide guidance for fYNOP under the One Cleanup Program.

### A.4.5 PADEP South Central Region Project Officer

The PADEP Site representative provides regulatory oversight to the project and represents the Commonwealth on environmental issues at fYNOP and is the PADEP primary lead for the One Cleanup Program initiative.

### A.4.6 GSC Project Director

The GSC Project Director is responsible for the overall coordination of all project activities at fYNOP for GSC, reports to the FPL, and coordinates with the Trust Fund Project Coordinator.

### A.4.7 GSC Quality Assurance / Quality Control (QA/QC) Manager

The GSC QA/QC Manager is responsible for the project QA/QC in accordance with the requirements of the project QAPP, other work plan documentation, and appropriate management guidance. The QA/QC Manager is independent from the project units generating data. In addition to maintaining the official, approved QA Plan, the GSC QA Manager, in coordination with the GSC field personnel, will be responsible for participating in the project field activity readiness review; approving variances during field activities before work continues; approving, evaluating, and documenting the disposition of Nonconformance Reports (NCRs); overseeing and approving required project training; and designing audit/surveillance plans followed by supervision of these activities. The GSC QA/QC Manager reports to the GSC Project Director.

### A.4.8 GSC Health and Safety Manager

The GSC Health and Safety Manager is responsible for ensuring that health and safety procedures designed to protect personnel are maintained throughout the field activities. This will be accomplished by strict adherence to the project Site Health and Safety Plan (HASP), which has been

prepared as a separate document. In conjunction with the Site Safety Officer, the Health and Safety Manager has the authority to halt fieldwork if health or safety issues arise that are not promptly resolvable in accordance with the project HASP. The Health and Safety Manager reports to the GSC Project Director.

### A.4.9 GSC Laboratory Coordinator

The GSC Laboratory Coordinator is responsible for coordination of sample shipment to the laboratory and subsequent chemical analysis and reporting performed by the analytical laboratory, in accordance with the requirements of the QAPP. This individual will be responsible for obtaining required sample containers from the laboratories for use during field sample collection; resolving questions the laboratory may have regarding QAPP requirements and deliverables; and coordination of data reduction, review, and documentation activities related to sample data package deliverables received from the laboratory. The GSC Laboratory Coordinator reports to the GSC Project Director.

### A.4.10 GSC Sample Manager

The GSC Sample Manager is responsible for coordination of received data from the analytical laboratory, in accordance with the requirements of the QAPP. This individual will be responsible for ensuring that chain-of-custody records are properly maintained and coordinating the management of the laboratory data (electronic and paper copies) for transfer into the project database maintained by Leidos. The GSC Sample Manager reports to the GSC Project Director.

### A.4.11 GSC Data Manager

The GSC Data Manager is responsible for entering the electronic laboratory data into the GSC system. This includes comparison of electronic data submittals to the chain-of-custody, converting electronic data deliverables (EDDs) into an access database, and entering location identifiers for sampling points. The GSC Data Manager reports to the GSC Project Director.

## A.4.12 Leidos Database Manager

The Leidos Database Administrator is responsible for entering the electronic laboratory data into the ARC IMS database and the coordination of the fYNOP website. The Leidos Database Administrator reports to the GSC Project Director and coordinates with the GSC Data Manager.

## A.4.13 GSC Data Validator

The GSC Data Validator is responsible for verification of laboratory data quality, as required by the project. This individual will conduct data validation procedures on selected data packages, in accordance with GSC data validation procedures. The GSC Data Validator reports to the GSC Project Director.

## A.4.14 GSC Field Manager

The GSC Field Manager is responsible for implementing field activities in accordance with project-specific work plans and the QAPP. This individual is responsible for ensuring proper technical performance of field operations and sampling activities; adherence to required sample custody and other related QA/QC field procedures; coordination of field personnel and subcontractor activities, including the coordination of the management of investigation-derived wastes (IDW); and checks of field documentation, if required. Except for QA/QC matters that are reported to the GSC QA/QC Manager, the Field Manager reports to the GSC Project Director.

## A.4.15 GSC Field Personnel

In addition to the Field Manager, other field personnel participating in the implementation of field activities are field staff and sampling technicians. These individuals, in coordination with field subcontractor personnel, will be responsible for collecting groundwater and surface water samples, and for preparing field logbooks and other required documentation. These individuals are responsible for performing field activities in accordance with the QAPP and report to the GSC Field Manager.

### A.4.16 Subcontracted Analytical Laboratory Support

The subcontracted analytical laboratory for this project is Eurofins Lancaster Laboratories Environmental (ELLE) of Lancaster, Pennsylvania. The ELLE main point of contact for the work at fYNOP is Marrissa Williams. The responsibilities of key personnel for the laboratory are described in the ELLE Environmental Quality Policy Manual (ELLE, 2019). The laboratory shall report to the GSC Laboratory Coordinator or his or her designee. The contact information for ELLE is as follows:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601
(717) 556-7246

## A.5 Problem Identification / Background

This QAPP has been prepared by GSC for activities performed to implement the remedy for environmental contamination at the fYNOP in the Site-Wide Cleanup Plan (GSC, 2019). The remedy combines engineering controls, institutional controls, and other remedial actions and obligations necessary to address requirements of the Pennsylvania Land Recycling and Environmental Remediation Standards Act (Act 2) and Federal Resource Conservation Recovery Act (RCRA), under the One Cleanup Program.

This QAPP is an update that replaces the QAPP prepared in June 2012 (GSC, 2012b) for activities conducted during the Part 2 Supplemental Remedial Investigation for Groundwater (Part 2 SRI) and QAPP Revision No. 1 – Tables and Appendices Updated August 2014 (GSC, 2014). Revisions in this QAPP include the following:

- Updating of project management and organizational contacts (Section A.4),
- Redirecting of laboratory services from TestAmerica to ELLE (Section A.4.16),
- Updating of analytical method versions (Section B.4),
- Adding an analytical method with lower detection limits for surface water samples (Section B.1), and

- Revising data validation procedures (Section D).

The fYNOP is located north of the City of York, in Springettsbury Township, York County, Pennsylvania as shown on **Figure A-2**. The 229-acre fYNOP property is divided into the East Campus and the West Campus. The 171-acre East Campus, currently owned by Harley-Davidson, is used as an active motorcycle manufacturing facility. In June 2012, Harley-Davidson sold the 58-acre West Campus to York County Industrial Development Authority which was followed by a sale in November 2015 to the Redevelopment Authority of the County of York, who in turn sold it in January 2017 to NP York 58, LLC (NP York). NP York built a 775,000 square-foot distribution center on the property called the Eden Road Logistics Center (ERLC).

As shown on Site Area Designations **Figure A-3**, the fYNOP is bordered on the south by U.S. Route 30 and industrial/commercial properties and on the west by an industrial/commercial property (Heuristic, formerly 84 Lumber), a railroad line, uninhabited wetland/wooded areas, the Codorus Creek levee, and Codorus Creek. Residential properties are located along the north, east, and southeast sides of the fYNOP. The northeastern and eastern portion of the property is undeveloped woodlands. The central and western portions of the fYNOP contain the Central Plant Area (CPA), West Parking Lot (WPL), and numerous other Site features shown on **Figure A-3**.

Soil and groundwater quality at the Site were impacted by past waste disposal practices and by spills and leaks that occurred during manufacturing operations conducted on the fYNOP starting in the 1940s and extending through the early 1970s. Environmental investigations began in the 1980s when a list of constituents of concern (COCs) was developed. The list includes chlorinated solvents from degreasing operations known as chlorinated volatile organic compounds (CVOCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), metals and cyanide from metal plating operations, and benzene from a fuel tank leak. CVOCs in groundwater migrated westward under natural flow conditions and discharge to Codorus Creek.

The conceptual site model (CSM) presented in the Part 2 SRI Groundwater Report (GSC, 2018) describes the nature and occurrence of residual dense non-aqueous phase liquid (DNAPL) in the aquifer beneath areas of DNAPL releases. The geologic setting, composed of a solution-prone limestone in the west and fractured quartzite in the east, combined with the recalcitrant nature of the

contaminants, make cleanup of groundwater to PADEP medium specific concentrations (MSCs) in two areas of the Site impracticable. These areas are defined in the Cleanup Plan as Technical Impracticability (TI) Areas 1 and 2 that are illustrated on **Figure A-4**. Evidence of the impracticability of groundwater cleanup in these areas is proven by 25 years of active interim groundwater pumping and treatment with limited improvement in groundwater quality even though considerable dissolved-phase CVOC mass has been removed by pumping. Groundwater samples from wells outside the TI Areas, designated as monitored natural attenuation (MNA) areas in the Cleanup Plan, generally show declining CVOC concentration trends. The concentrations of trichloroethene (TCE) in groundwater, the most widely distributed CVOC, have been reduced by 90% to 99% beneath much of the Site.

## A.6 Project / Task Descriptions

The scope of monitoring activities covered by this QAPP is contained in Section 10 of the Cleanup Plan (GSC, 2019). The monitoring activities are components of engineering controls and other remedial actions that are performed in accordance with the procedures in the Field Sampling Plan (FSP) (GSC, 2012a) and this QAPP, as revised. Discussion on field instrumentation, sampling methods, and sample handling are included in this QAPP and the FSP; however, the FSP contains specific instructions and additional detail for these items that are not contained in this QAPP. The Cleanup Plan monitoring consists of the following:

- Groundwater monitoring to demonstrate the WPL groundwater extraction system operates according to established parameters,

- Groundwater monitoring in the Southern Property Boundary Area (SPBA) to verify that a groundwater gradient exists from off-Site wells located along Canterbury Lane towards on-Site wells located in the SPBA,

- Groundwater sampling and analysis in MNA areas of the Site shown on **Figure A-4** to evaluate reduction of COCs,

- Sampling associated with the operation of the fYNOP groundwater treatment system (GWTS) shown on **Figure A-5** to meet discharge requirements of the National Pollutant Discharge Elimination System (NPDES) permit, and

- Surface water monitoring at the locations shown on **Figure A-6** to verify compliance with PADEP surface water quality criteria.

## A.7 Data Quality Objectives for Measurement Data

The general data quality objectives of this project are to characterize groundwater, soil, and other media, and to collect and analyze hydrogeologic data of sufficient quality, quantity, and precision to meet the requirements of the remedy in the Cleanup Plan. The QA program incorporates QC procedures for field sampling and field measurements, chain-of-custody, laboratory analyses, and reporting to promote generation of sound physical and chemical data.

### A.7.1 Quality Objectives and Quality Control Measures

The overall project objective is to implement the Cleanup Plan at the fYNOP. Procedures for sampling, chain-of-custody, laboratory analysis, reporting of data, internal quality control (QC), audits, preventive maintenance of field equipment, and corrective action are described in other sections of this QAPP and/or in the FSP (GSC, 2012a). The purpose of this section is to address the objectives for data accuracy, precision, completeness, representativeness, and comparability.

Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify the quality of data required to support decisions made for implementing the Cleanup Plan monitoring and are based on the end uses of the data being collected.

#### A.7.1.1 Project Objectives

The Cleanup Plan identifies specific task objectives related to remediation goals. General analytical objectives are as follows:

- To provide data of sufficient quality and quantity to support ongoing monitoring activities required in the Cleanup Plan.

- To provide data of sufficient quality and quantity to support area-specific remediation goals.
- To provide data of sufficient quality to meet applicable Commonwealth of Pennsylvania and Federal (USEPA, Region 3) risk-based goals, as required under the One Cleanup Program.
- To ensure that samples are collected using approved techniques and are representative of existing site conditions.
- To use QA/QC procedures for both field and laboratory methods that meet the USEPA and PADEP applicable requirements.

### A.7.1.2 Data Quality Objectives for Measurement Data

An analytical DQO summary for these activities is presented in **Table A-2**. QC parameters stated in the specific SW-846 methods (i.e., percent recoveries) will apply for each chemical listed.

### A.7.1.3 Level of Quality Control Effort

To assess whether QA objectives have been achieved, analyses of specific field and laboratory QC samples will be required. These QC samples include trip blanks, field duplicates, laboratory method blanks, laboratory control samples, laboratory duplicates, rinse blanks, and matrix spike/matrix spike duplicate (MS/MSD) samples.

Trip blanks and field equipment rinse blanks will be submitted for analysis, along with field duplicate QC samples, to provide a means to assess the quality of the data resulting from the field sampling program. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage. Rinse blanks are used to assess the effectiveness of field decontamination processes in conjunction with field blanks of the site potable water source used for decontamination. Criteria and evaluation of blank determinations are provided in Section B.5.2. Field duplicate QC samples are analyzed to determine sample heterogeneity and sampling methodology reproducibility.

Laboratory method blanks and laboratory control samples are used to determine the accuracy and precision of the analytical method implemented by the laboratory. Matrix spikes (MS) provide

information about the effect of the sample matrix on the measurement methodology. Laboratory sample duplicates and matrix spike duplicates (MSDs) assist in determining the analytical reproducibility and precision of the analysis for the samples of interest.

The level of QC effort will be at least one field duplicate sample for every 20 groundwater and surface water samples. One trip blank consisting of analyte-free water will be included along with each shipment of volatile organic compound (VOC) aqueous samples.

One MS/MSD sample will be analyzed for every 20 groundwater and surface water samples submitted to the laboratory.

The level of QC effort for testing and analysis of parameters will conform to accepted methods, such as USEPA SW-846 methods. The QC effort for in-field measurements, including temperature, conductivity, and pH, will include daily calibration of instruments using traceable standards and documented instrument manufacturer procedures. Field instruments and their method of calibration are discussed further in Section B.7 of this QAPP.

A summary of the QC measures that apply to samples collected and measurements made as part of the field activities is provided on **Table A-3**. These QC measures include both field and laboratory requirements.

Specific QA/QC analysis and objective summaries including analytical parameter listings, method references, QA/QC limits, and intended use of the data are presented in **Table A-2**.

## A.7.2 Data Quality Indicators

Performance acceptance criteria are expressed in terms of six data quality indicators (DQIs): precision, bias, representativeness, comparability, completeness, and sensitivity. An explanation of each DQI, together with the acceptance criteria for each DQI is presented in the following subsections.

### A.7.2.1 Precision

Precision is a measure of mutual agreement among individual measurements of the same property under prescribed similar conditions. Precision is independent of the error (accuracy) of the analyses and reflects only the degree to which the measurements agree with one another, not the degree to which they agree with the "true" value for the parameter being measured.

Precision of the measurement data for this project is based on control sample analyses (for repeatability) and results of field duplicate samples (for sampling replicability). A field duplicate sample is defined as a sample that is divided into two equal parts for the purpose of analysis. Discrete field duplicate samples are useful in determining sampling variability, and field duplicate samples will be used as a quality control measure to monitor precision relative to sample collection activities. Field duplicate sample frequency will be five percent of the original sample number or as specified in the applicable work plan. Field duplicate samples will be collected for groundwater and soil vapor only and will be analyzed for the same parameters as the original sample.

Precision for laboratory and field measurements will be expressed as the relative percent difference (RPD) between two duplicate sample determinations:

$$RPD = \frac{|X_1 - X_2|}{(X_1 + X_2)/2} \times 100\ \%$$

where $X_1$ and $X_2$ represent the individual values found for the target analyte in the two duplicate sample analyses. Acceptance criteria for laboratory precision will be as specified in the analytical method. RPDs will be compared to the laboratory-established RPD for the analysis. The analyst or his/her supervisor must investigate the cause of data outside stated acceptance limits. Follow-up action includes recalibration, reanalysis of QC samples, sample reanalysis, or flagging the data as suspect if problems cannot be resolved.

Precision of duplicates may depend on sample homogeneity. Acceptance criteria for field duplicate samples are stated in **Table A-2**.

### A.7.2.2 Bias

Bias is the systematic or persistent distortion of a measurement process causing errors in one direction. Depending on the analytical method, analytical bias will be evaluated by analysis of laboratory control spike / laboratory control spike duplicate (LCS/LCSD) or MS/MSD samples. The laboratory will perform an LCS/LCSD or MS/MSD for each analytical batch, as appropriate.

Acceptance criteria for LCS/LCSD and MS/MSD measurements will be expressed as a percent recovery and are specified in the analytical method and in USEPA's *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA-540-R-2017-002, January 2017). Various blank samples (such as laboratory method blanks and field equipment rinse blanks) will also be used to assess contamination of samples that may bias results high.

### A.7.2.3 Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. The extensive historical chemical concentration data available for the Site, coupled with the broad geographic and temporal distribution of these data is such that the monitoring plans being developed for the Site are believed to accurately reflect the state of the whole system.

The characteristics of representativeness are usually not quantifiable. Subjective factors to be taken into account are as follows:

1. Degree of homogeneity of a site.

2. Degree of homogeneity of a sample taken from one point in a site.

3. Available information on which a sampling plan is based.

Field duplication, as defined above under precision, is also used to assess representativeness. Two samples collected at the same location and at the same time are considered to be equally representative of this condition at a given point in space and time. To maximize representativeness of results, sampling techniques, sample size, and sample locations are carefully chosen so they provide

laboratory samples representative of the Site and the specific area. For this project, the only quantitative measure of representativeness will be the field duplicate results as discussed in Section A.7.2.1.

### A.7.2.4 Comparability

Comparability expresses the confidence with which one data set can be compared to another data set measuring the same property. Comparability is ensured through the use of established and approved sample collection techniques and analytical methods, consistency in the basis of analysis (wet weight vs. dry weight, volume vs. mass, etc.), consistency in reporting units, and analysis of standard reference materials.

Data comparability is achieved by using standard units of measure. The use of standard methods to collect and analyze samples, along with instruments calibrated against Standard Analytical Reference Materials (SARM), which are National Institute for Standards and Technology (NIST) traceable standards, also ensures comparability.

Comparability also depends on the other data quality characteristics. Only when data are judged to be representative of the environmental conditions, and when precision and accuracy are known, can data sets be compared with confidence.

### A.7.2.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under normal conditions.

Data completeness is a measure of the extent to which the database resulting from a measurement effort fulfills objectives for the amount of data required. Completeness is defined as the valid data percentage of the total tests requested:

$$Completeness(\%) = \left( \frac{number\ of\ valid\ analyses\ per\ method}{number\ of\ requested\ analyses\ per\ method} \right) \times 100$$

Valid analyses are defined as those where the sample arrived at the laboratory intact, properly preserved, in sufficient quantity to perform the requested analyses, and accompanied by a completed chain-of-custody. Furthermore, validity is based on the sample analysis being performed within the specified holding time and in such a manner that analytical QC acceptance criteria were met.

Completeness for the entire project also involves completeness of field and laboratory documentation, whether all samples and analyses specified in this plan have been processed and the procedures specified in the FSP and laboratory QAPPs and Standard Operating Procedures (SOPs) have been implemented.

For this project as a whole, a completeness value of 90 percent is considered acceptable. Failure to achieve this goal may necessitate resampling and reanalysis.

#### A.7.2.6 Sensitivity

Sensitivity is essentially the lowest detection limit of the method or instruments for each of the measurement parameters of interest. Technically, it is the capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest.

Quantitation limits are based on the extent to which the laboratory or field equipment, and/or analytical process itself can provide accurate, minimum data measurements of a reliable quality for specific constituents in actual field samples. The actual quantitation limit for a given analysis varies depending on instrument sensitivity, preparation (including serial dilution, if necessary), method efficiency, and matrix effects. The minimum project requirements are considered when establishing the quantitation limits appropriate for each project. The minimum project requirements for groundwater are the PADEP Statewide Health Standard residential and non-residential MSCs or USEPA Regional Screening Levels (RSLs) for regulated substances that do not have an MSC. The minimum project requirements for surface water are the PADEP Title 25, Chapter 93 surface water quality criteria.

**Tables A-4** and **A-5** list the target analytes, analytical methods, and project reporting levels (for samples not requiring serial dilution) for analysis of samples. For samples requiring serial dilution because of matrix interferences or elevated concentrations of target compounds, the project reporting

levels on **Tables A-4** and **A-5** are typically multiplied by the dilution factor, with a resulting reduction in sensitivity of the analysis for those specific samples.

## A.8 Training Requirements / Certification

All field personnel are trained scientists, engineers, or environmental sampling technicians. The GSC Project Director and QA/QC Manager are registered professional geologists. The GSC QA/QC Manager is also a certified organic data validator. All project personnel have received the necessary initial 40-hour OSHA HAZWOPER training, 8-hour supervisor training, and 8-hour annual refresher training required by 29 CFR 1910.120. In addition, the GSC QA/QC Manager has received RCRA hazardous waste management training. Training certificates are maintained at GSC's Harrisburg, Pennsylvania, office. No other special training or certifications are necessary to perform activities described in the Cleanup Plan.

The analytical laboratory, ELLE, is certified by the Commonwealth of Pennsylvania, Bureau of Laboratories (No. 36-0037) as an accredited laboratory under the National Environmental Laboratory Accreditation Program (NELAP).

## A.9 Documentation and Records

A document control procedure will be used to identify the most current version of the QAPP and to verify that the most current version of the QAPP is used by all project participants. Each page of this QAPP uniquely identifies the revision number and date of the plan, and the page number in relation to the total number of pages. The version number will be the designated "Revision No." shown in the upper right-hand corner of each page of the QAPP. The first version of the QAPP will be Revision No. 0. Updates to the QAPP will be assigned a new incremental revision number (e.g., the first update will be Revision No. 1). This revision number will be reflected on all pages of the QAPP, regardless of how many pages are actually affected by the revision.

GSC has established a document management system that includes the following elements:

1. Assignment of specific project and task numbers to each document generated by GSC.

2. Maintenance of both hardcopy and electronic copies of reports and work plans submitted to regulatory agencies.

3. Daily backup and off-site storage of critical electronic files.

4. Computer filing systems based on the project number and type of data for ease of tracking and retrieval. These systems are further described in Section B.10.

Documentation associated with groundwater and surface water sampling is detailed in **Appendix A** of this QAPP. Documents include field log forms and instrument calibration forms which will be maintained at GSC's office.

Other records and documents that will be produced include annual reports as specified in the Cleanup Plan.

# B DATA GENERATION AND ACQUISITION

## B.1 Sampling Process Design

Field activities at the Site will produce groundwater and surface water sample data of definitive quality and field measurements of screening quality. Additional samples will be collected to complete field duplicate QC and field blank analyses. Specific numbers of samples (including parameters and methods) are incorporated into the Cleanup Plan. These samples will require VOC and other general chemical determinations, as represented in **Tables A-4** and **A-5**. Note on **Table A-4** that surface water samples require a low-level analytical method. Sampling procedures for the various media are discussed in the FSP (GSC, 2012a), while relevant QA field sampling forms for GSC employees are included in **Appendix A**.

Groundwater field measurements may determine groundwater characteristics (pH, specific conductance, temperature, etc.) and static groundwater levels. A description of the field instruments and associated calibration requirements and performance checks to be used for field measurements is presented in Section B.7 of this QAPP.

The locations of the sampling stations and sample media to be collected, as well as the rationales for the selection of these stations, are presented in the Cleanup Plan (GSC, 2019).

### B.1.1 General Information and Definitions

The following sections provide definitions and information about QA and QC sampling.

#### B.1.1.1 Analytical Laboratory

The laboratory subcontracted to perform analysis of samples has been selected through procurement and review activities prior to initiation of sample collection.

### B.1.1.2 QA and QC Samples

These samples are analyzed for the purpose of assessing the quality of the sampling effort and of the reported analytical data. QA and QC samples to be used for this project are field duplicates, field equipment rinse blanks, trip blanks, and field blanks.

### B.1.1.3 Field Duplicate QC Samples

These samples are collected by the sampling team for analysis by the analytical laboratory. The identity of field duplicate QC samples is blind to the analysts, and the purpose of these samples is to provide site-specific, field-originated information regarding the homogeneity of the sampled matrix and the consistency of the sampling effort. These samples are collected concurrently with the primary environmental samples and equally represent the medium at a specific time and location. Field duplicate QC samples will be collected from each media addressed by a project and will be submitted to the analytical laboratory for analysis.

### B.1.1.4 Trip Blanks

These samples consist of containers of organic-free reagent water that are kept with the field sample containers from the time they leave the laboratory until the time they are returned for analysis. The purpose of trip blanks is to determine whether samples are being contaminated during transit or sample collection. For this project, one trip blank will be placed into each cooler used to store and ship samples designated for volatile organic analysis.

### B.1.1.5 Field Equipment Rinse Blanks

When applicable, these samples will be taken from the rinse water collected from equipment decontamination activities. They will comprise samples of analyte-free water which have been rinsed over decontaminated sampling equipment, collected, and submitted for analysis of the parameters of interest. They are used to assess the effectiveness of the decontamination process, the potential for cross-contamination between sampling locations, and incidental field contamination.

#### B.1.1.6 Field Blanks

When applicable, a sample from the Site water supply used for equipment decontamination and other activities will be acquired and submitted for analysis with the primary samples. In addition, samples of on-site analyte-free water sources may also be submitted for analysis.

## B.1.2 Sample Containers, Preservatives and Holding Times

Sample containers, sample preservation, and holding times for aqueous samples are described in **Table B-1**. Additional sample volumes will be collected and provided, when necessary, for the express purpose of performing associated laboratory QC (laboratory duplicates, MS/MSD).

Sample containers will be provided by the analytical laboratory, which will also provide the required types and volumes of preservatives with the containers. Temperature preservation will be maintained at ≤ 6°C promptly after collection and until the samples have been analyzed. If issues of sample integrity such as holding time exceedances or cooler temperatures are compromised, then resampling will occur as directed by the GSC Laboratory Coordinator. Affected data will be flagged and qualified in accordance with data validation guidance.

## B.1.3 Field Documentation

#### B.1.3.1 Field Logbooks

Sufficient information will be recorded in the logbooks to allow for reconstruction of field sampling activities. Information recorded on other project documents will not be repeated in the logbooks except in summary form where determined necessary. Field logbooks will be kept in the possession of field personnel responsible for completing the logbooks or in a secure place when not being used during fieldwork. Upon completion of the field activities, all logbooks will become part of the final project file.

#### B.1.3.2 Sample Numbering System

A unique sample numbering system will be used to identify each sample designated for laboratory analysis. The purpose of this numbering system is to provide a tracking system for the retrieval of

analytical and field data on each sample. Sample identification numbers will be used on all sample labels or tags, field data sheets or logbooks, chain-of-custody records, and other applicable documentation during Cleanup Plan monitoring activities. A list of sample identification numbers will be maintained in the field logbook. The project database will be populated with sample numbers and information consistent with information found here and in the Cleanup Plan and FSP (GSC, 2019 and 2012a).

The sample numbering system for field duplicate QC samples shall be such that the sample location is not readily discernible by the laboratory. A summary of the sample numbering system to be used for the project is presented in **Table B-2**.

### B.1.3.3 Documentation Procedures

Labels will be affixed to all sample containers during sampling activities. Information will be recorded on each sample container label at the time of sample collection. The information to be recorded on the labels will be as follows:

- Contractor name,
- Sample identification number,
- Sample type (discrete or composite),
- Site name and sample station number,
- Analysis to be performed,
- Type of chemical preservative present in container,
- Date and time of sample collection, and
- Sampler's name or initials.

Sample logbooks and chain-of-custody records will contain the same information as the labels affixed to the containers. These records will be maintained and will record information related to the sampling effort.

#### B.1.3.4 Field Variance System

Specific procedures cannot fully encompass all possible conditions that may be encountered during a sampling event. Variances from the operating procedures, FSP (GSC, 2012a), and/or HASP may occur. Variances that occur during the sampling event will be documented on a Field Change Request (FCR) form and will be noted in the appropriate field logbooks. In addition, an NCR will be initiated as discussed in Section C.1.3.1 (if warranted). Examples of the FCR and NCR forms are included in **Appendix B**. If a variance is anticipated (i.e., because of a change in the field instrumentation), then the applicable procedure will be modified, and the change will be noted in the field logbooks. These requested changes will be dealt with in a manner similar to FSP (GSC, 2012a). If the changes are substantial, then they will be submitted for review by the fYNOP team.

### B.1.4 Decontamination of Sampling Equipment

Non-dedicated sampling equipment that comes into contact with contaminated soil, waste, or groundwater will require decontamination. Typically, disposable sampling equipment will be used, and decontamination will not be needed for many sampling activities.

Down-hole tools used for sampling will be decontaminated between well or boring locations. The non-disposable tools used for groundwater sampling will be cleaned with a brush, water, and detergent, followed by a final deionized water rinse. Water level indicators and non-dedicated or disposable groundwater sampling equipment will be decontaminated with deionized water between measurements/sampling locations. If possible, measurements and sampling should be conducted from wells which are least contaminated first, followed by those with higher contaminant concentrations to limit potential cross-contamination. Water from these decontamination efforts will be collected into a bucket or other suitable container and taken to the on-site groundwater treatment plant for treatment.

## B.1.5 Sample Planning

Sample planning for the GSC Sample and Field Manager will use the following procedure:

- Identify the number of samples desired for the sampling event.

- Refer to Section B.1 of the QAPP for information about the blank and field duplicate QC samples that are needed. Typically, one field duplicate QC sample and one MS/MSD sample are required for every 20 groundwater and surface water samples, and one aqueous VOC trip blank is required for each daily shipment of samples.

- Refer to **Tables A-4 and A-5** to determine the acceptable laboratory methods for each analysis and the corresponding reporting limits. The QAPP provides the reporting limits for the standard analyses run at the Site. If the project objectives require different reporting limits, then the laboratory and FPL should be contacted for approval of special conditions.

- Send an email to the ELLE point of contact, currently Marrissa Williams (marrissawilliams@eurofinsus.com), to request bottles, coolers, and preservatives for the project. Copy email to GSC QA Manager and GSC Sample Manager. Identify the number of samples, matrix (aqueous), analytical methods needed (or simply refer to the QAPP list), regulatory program and special reporting levels (if applicable) when the samples are going to be collected and shipped, if there are holding time issues, or if Saturday receipt of samples is needed. The address for bottle shipment or drop-off is GSC's Harrisburg office address:

  fYNOP Field Sampling Manager
  Groundwater Sciences Corporation
  2601 Market Place Street, Suite 310
  Harrisburg, PA 17110-9340

  Alternatively, arrangements can be made with the ELLE point of contact to pick up bottle orders at the laboratory (2425 New Holland Pike, Lancaster, PA 17601) or the Harrisburg Service Center (5020 Ritter Road, Mechanicsburg, PA 17055).

### B.1.6 Database System

GSC will use the database system developed by Leidos for handling fYNOP laboratory and field data. This database is administered by the Leidos Software Systems Engineer/Database Administrator.

### B.1.7 Preparation of Chain-of-Custody and Sample Labels

The user can decide between using (1) the Access database to create an electronic chain-of-custody and pre-printed labels ahead of time or (2) the hard copy chain-of-custody (refer to forms in **Appendix A**). The electronic chain-of-custody can save time in the field and limit potential errors, because one will only need to insert sample times and depths in the field. The electronic chain-of-custody will include the correct laboratory address, contact names and telephone numbers, and correct laboratory methods. Use the sample nomenclature system and definitions identified in **Table B-2** of the QAPP when naming samples, which take the form of XX-AAAA-mm-NNN-nn-z. Pay particular attention to the correct nomenclature of QC samples (field duplicates, blanks, etc.). The method of filling out hard copies of chain-of-custody records in the field and filling out the sample bottle labels can still be used if desired. If this is done, then the hard copy of the chain-of-custody must be converted to an electronic chain-of-custody by the Data Manager.

## B.2 Sampling Methods Requirements

Sampling methods for various environmental media are presented in the FSP (GSC, 2012a) which describes sample collection procedures and the required sampling equipment. This section addresses sample collection data and procedures for coordinating with the laboratory for sampling and for data management.

### B.2.1 Sample Collection

Samples and field data will be collected using the following procedure:

- Record sampling and well purging information in the field logbook per guidance in Section B.3.1.2 of this QAPP.

- Sample locations and depths must be documented properly in the field. In the case of a grab sample not from an established station, the location coordinates can be obtained using a hand-held global positioning system (GPS) device.

- Groundwater samples will include a depth-to-water reading.

- Sample location information (GPS coordinates, hand measurements, or mapped locations) will be forwarded to the Data Manager after each sampling event in order to populate the database.

**Table B-1** specifies the container requirements for aqueous samples.

## B.2.2 Submittal of Samples to Analytical Laboratory

Sample will be submitted to the analytical laboratory

- Verify that bottles are properly preserved and labeled, and that the number of containers listed on the electronic chain-of-custody is the same as the number of bottles provided in the container.

- Verify that bottles are wrapped securely (bubble wrapping for glass jars) so that breakage does not occur during shipment.

- Verify that enough ice is used to keep the samples at ≤ 6°C during shipment. Bagged ice dispensers are available at several locations throughout the facility.

- Verify that a bag liner is used in the cooler and that the outside drain valve is taped shut.

- Verify that a copy of the chain-of-custody is placed inside a zip-lock bag and taped to the top of the inside of the cooler.

- Verify that the cooler is securely taped shut (wraps at two locations) and that signed custody seals are placed at opposite corners across the taped joints.

- Cooler shipping arrangements can be made using the ELLE sample courier or by direct delivery of coolers to the laboratory (2425 New Holland Pike, Lancaster, PA 17601) or the Harrisburg Service Center (5020 Ritter Road, Mechanicsburg, PA 17055).

### B.2.3 Submittal of Chain-of-Custody and Sample Locations

- Submit electronic chain-of-custody (eCOC) or paper copy of hand-written chain-of-custody to the GSC Data Manager, and a copy to the GSC Sample Manager.

- Submit sample location information to the GSC Data Manager. Provide real world coordinates (in PA State Plane NAD 83, South, in feet). In lieu of coordinates, provide map or measurements for location of sample points.

- After the chain-of-custody has been received from samplers, convert to eCOC and submit eCOC and coordinates to the Leidos Data Manager.

### B.2.4 Verification of Requested Analytical Testing

- The Analytical Laboratory point of contact will send an email to the GSC Sample Manager to verify that the requested analysis and samples are correct (sample confirmation).

- The GSC Sample Manager will compare the information on the sample confirmation email with the electronic chain-of-custody to verify that the laboratory is performing the correct analysis. The GSC Sample Manager may need to confirm discrepancies with the Field Manager or the Project Director before replying to the laboratory.

- The GSC Sample Manager will reply to the laboratory point of contact to confirm the requested analytical work or make corrections to sample nomenclature or analytical requirements as necessary. The GSC Sample Manager will copy the Field Manager or Project Director with this email confirmation.

### B.2.5 Receipt of Data Package from Laboratory

Upon completion of the analytical work, data packages from the laboratory should include a portable document format (PDF) of the entire data package, along with an EDD file (in .csv format). These data packages are made available online via the Eurofins TotalAccess web portal at https://secure.testamericainc.com/totalaccess/Account/Login using an account, username, and password set up through the ELLE point of contact. As the data packages are continuously available 24/7/365 via the TotalAccess port, there is no need to print out, forward or file the PDFs and EDDs. If data validation is to be performed, then the GSC Sample Manager will work with the GSC Data Validator to generate hard copies as needed for portions of the data packages to facilitate the validation process.

### B.2.6 Cross Check by GSC Data Manager

The GSC Data Manager places PDFs and EDDs of the analytical reports on GSC's server. The data on the server are sorted by sample event, submittal date, and Sample Delivery Group (SDG) number. The GSC Data Manager then reviews the EDD and checks the data for formatting errors. The GSC Data Manager forwards the EDD to the Leidos Database.

### B.2.7 Data Entry by Leidos Database Administrator

The Leidos Database Administrator places the data into the web-based database called "former York Naval Ordnance Plant" (fYNOP) for viewing or querying. To access this data, use the following web address: https://www.fynop.com.

### B.2.8 Data Package Validation by GSC Data Validator

- After the eCOC and EDD have been inserted into the database, the Leidos data manager will generate a completion and error/duplicate data report and will submit the report to the GSC data manager for error resolution.

- The GSC Sample Manager notifies the GSC Data Validator that the data package is ready for validation using USEPA's *National Functional Guidelines for Organic Superfund Methods Data Review* (USEPA, 2017) in **Appendix D** of this QAPP.

- The GSC Data Validator returns the completed validation summary and data qualifiers to the GSC Sample Manager for filing or inclusion in the report.

- The GSC Data Validator or designee accesses the fYNOP database online and adds qualifiers to the data package.

### B.2.9 Data Ready for Use

When tabulating data, use the preferred format and color scheme when comparing to existing standards (PADEP MSCs or USEPA RSLs for groundwater and PADEP water quality criteria for surface water). This color scheme is orange for MSCs, light turquoise for RSLs, and yellow for surface water quality criteria. Typically, only show detected compounds to limit table size. Show the detection limit (reporting limit) for all non-detects. Show any data validation qualifiers associated with the data.

## B.3 Sample Handling and Custody Requirements

Sample maximum holding times from sample collection to extraction are listed on **Table B-1**. Samples will be labeled according to the system shown on **Table B-2**.

It is the policy and intent of this investigation procedure to follow USEPA policy regarding sample custody and chain-of-custody protocols. The custody is in three parts: sample collection, laboratory analysis, and final evidence files. Final evidence files, including originals of laboratory reports and electronic files, are maintained under document control in a secure area. A sample or evidence file is under your custody when it is:

- In your possession;

- In your view, after being in your possession;

- In your possession and you place it in a secured location; or
- In a designated secure area, including a file server with password-protected access.
- Samples will be handled using the procedure in Section B.2.2.

## B.3.1 Sample Documentation

The sample packaging and shipment procedures summarized below will ensure that samples arrive at the laboratory with the chain-of-custody intact. The protocol for specific sample numbering using case numbers and traffic report numbers (if applicable) and other sample designations will be followed.

### B.3.1.1 Field Procedures

The field sampler is responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples. Each sample container will be labeled with a sample number, date and time of collection, sampler, and sampling location. Sample labels are to be completed for each sample. The Project Director, in conjunction with the QA/QC Manager, will review field activities to determine whether proper custody procedures are followed during the fieldwork and whether additional samples are required.

### B.3.1.2 Field Logbooks

Samples will be collected following the sampling procedures documented in the FSP (GSC, 2012a). When a sample is collected or a measurement has been made, a detailed description of the location shall be recorded. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample is collected, volume, and number of containers. A sample identification number will be assigned before sample collection. Field duplicate QC samples will receive an entirely separate sample identification number and will be noted under sample description. Equipment used to make field measurements will be identified, along with their calibration dates.

#### B.3.1.3 Transfer of Custody and Shipment Procedures

Samples are accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record will document transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage area. An example of the chain-of-custody form to be used for this project is provided in **Appendix A**.

All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment and copies will be retained by the sampler for return to project management and the project file.

Shipping arrangements can be made using the ELLE sample courier or by direct delivery of coolers to the laboratory (2425 New Holland Pike, Lancaster, PA 17601) or the Harrisburg Service Center (5020 Ritter Road, Mechanicsburg, PA 17055).

### B.3.2 Laboratory Chain-of-Custody Procedures

Laboratory custody procedures are described in the analytical laboratory's Environmental Quality Policy Manual (QA Plan, **Appendix C-1**). This document identifies the laboratory custody procedures for sample receipt and log-in, sample storage, tracking during sample preparation and analysis, and laboratory storage of data.

## B.4 Analytical Method Requirements

The analytical methods to be used in the analysis of samples collected during activities are listed in **Tables A-4 and A-5**. ELLE has been selected as the principal laboratory to analyze groundwater and surface water samples. Sample analyses will be performed in accordance with the laboratory's QA Plan and NELAP Certifications in **Appendix C**-1 and C-2, respectively of this QAPP. The laboratory will maintain appropriate certifications to perform the analyses required for the Cleanup Plan and FSP (GSC, 2019 and 2012a). The principal laboratory will not subcontract or transfer any portion of

this work to another facility unless expressly permitted to do so by email from the Project Director and Laboratory Coordinator.

If at any time such certifications are revoked in whole or in part, then the laboratory must notify the GSC Laboratory Coordinator promptly to facilitate transfer of pending analyses to an alternative laboratory approved by FPL, USACE Representative, and Trust Fund Project Coordinator.

## B.5 Quality Control Requirements

### B.5.1 Field QC

Field QC will be assessed during sample collection and field measurement through precision, accuracy, and reproducibility.

#### B.5.1.1 Sample Collection

The assessment of field sampling precision and accuracy will be made by collecting field duplicates and trip blanks in accordance with the procedures described in subsections B.1.1.3 and B.1.1.4 and in the FSP (GSC, 2012a).

Field performance and systems audits will be performed as described in Section C.1.

#### B.5.1.2 Field Measurement

QC procedures for most field measurements (pH, conductivity, temperature, headspace, etc.) are limited to checking the reproducibility of the measurement by obtaining multiple readings on a single sample or standard and by calibrating the instruments. Refer to Section B.7 of this QAPP and the FSP (GSC, 2012a) for information regarding these measurements.

### B.5.2 Laboratory Analytical QC

Analytical QC procedures are specified in the individual method descriptions. These specifications include the types of QC checks normally required: method blanks, laboratory control spike (LCS), MS, MSD, calibration standards, internal standards, surrogate standards, tracer standards, calibration check standards, and laboratory duplicate analysis. Calibration compounds and concentrations to be

used and the method of QC acceptance criteria for these parameters have been identified in the laboratory methods.

To promote the production of analytical data of known and documented quality, laboratories associated with the project will implement method QA and QC checks.

Laboratory performance and systems audits will be performed as described in Section C.1.

### B.5.2.1 QA Program

Analytical laboratories will have a written QA program that provides rules and guidelines to ensure the reliability and validity of work conducted at the laboratory (see **Appendix C-1** for QA program at ELLE). Compliance with the QA program is coordinated and monitored by the laboratory's QA department, which is independent of the operating departments. Laboratory QA plans will be referenced and implemented in their entirety.

The stated objectives of the laboratory QA program are to:

- Properly receive, preserve, and store samples;
- Maintain custody records from sample collection through reporting and archiving of results;
- Use properly trained analysts to analyze samples by approved methods within holding times;
- Produce defensible data with associated documentation to show that each system is calibrated and operating within precision and accuracy control limits;
- Accurately calculate, check, report, and archive data using the Laboratory Information Management System; and
- Document the above activities so that data can be independently validated.

Laboratory procedures are documented in writing as SOPs, which are edited and controlled by the QA department. Internal QC measures for analysis will be conducted as specified in the SOPs and the individual methods.

### B.5.2.2 QC Checks

Implementation of QC procedures during sample collection, analysis, and reporting ensures that the data obtained are consistent with their intended use. Both field QC and laboratory QC checks are performed throughout the work effort to generate data confidence. Analytical QC measures are used to determine whether the analytical process is in control and to determine the effects of the sample matrix on the data being generated.

Specifications include the types of laboratory QC required (laboratory duplicates, sample spikes, surrogate spikes, reference samples, controls, blanks, etc.), the frequency for implementation of each QC measure, compounds to be used for sample spikes and surrogate spikes, and the acceptance criteria for this QC.

The laboratory will provide documentation in each data package confirming that both the initial and ongoing instrument and analytical QC functions have been met. Nonconforming analysis will be reanalyzed by the laboratory if sufficient sample volume remains. It is expected that sufficient sample volumes will be collected to provide for reanalysis, if required.

#### B.5.2.2.1 Analytical Process

Laboratory analytical process QC will be in accordance with USEPA SW-846 and will include the use of the following criteria, where applicable to the analytical method.

##### *B.5.2.2.1.1 Method Blanks*

A method blank is a sample of a non-contaminated substance of the matrix of interest (typically distilled/deionized water) that is then subjected to the sample preparation (digestion, distillation, extraction) and analytical methodology applied to the environmental samples. The purpose of the method blank is to check for contamination from within the laboratory that might be introduced during sample preparation and analysis and that might adversely affect analytical results. A method blank must be analyzed with each analytical sample batch.

Analytical sensitivity goals are identified in **Tables A-4 and A-5** as project reporting levels. Method blank levels should be below these levels for all analytes.

*B.5.2.2.1.2 Laboratory Control Samples*

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

### B.5.2.2.2 Matrix and Sample-Specific QC

Matrix and sample-specific QC will be in accordance with USEPA SW-846 and will include the use of the following criteria, where applicable.

*B.5.2.2.2.1 Laboratory Duplicates*

Laboratory duplicates are separate aliquots of a single sample that are prepared and analyzed concurrently at the laboratory. This duplicate sample should not be a method blank, trip blank, or field blank. The primary purpose of the laboratory duplicate is to check the precision of the laboratory analyst, the sample preparation methodology, and the analytical methodology. If there are significant differences between the duplicates, then the affected analytical results will be reexamined. One in 20 groundwater and surface water samples will be a laboratory duplicate, with fractions rounded up to the next whole number.

*B.5.2.2.2.2 Surrogate Spikes*

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

*B.5.2.2.2.3 Matrix Spike and Matrix Spike Duplicates*

A MS is an aliquot of a sample spiked with known quantities of analytes and subjected to the entire analytical procedure. It is used to indicate the appropriateness of the method for the matrix by measuring recovery or accuracy. Accuracy is the nearness of a result or the mean of a set of results to the true or accepted value. An MSD is a second aliquot of the same sample with known quantities of compounds added. The purpose of the MSD, when compared to the MS, is to determine method precision. Precision is the measure of the reproducibility of a set of replicate results among themselves or the agreement among repeat observations made under the same conditions. One MS and one MSD are typically analyzed for every 20 samples of a similar matrix.

*B.5.2.2.2.4 Method-Specific QC*

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

## B.6 Instrument / Equipment Testing, Inspection, and Maintenance Requirements

Preventive maintenance and inspection of laboratory instruments are addressed in the laboratory QA Plan in **Appendix C-1**. Preventive maintenance of field measuring instruments and field sampling devices will be accomplished by daily inspection of the instruments and devices being used and in accordance with the manufacturer's recommended procedures. Problems will be noted, and repairs will be made promptly and before the integrity of subsequent field activities can be impacted.

### B.6.1 Field Instruments and Equipment

The field equipment for this project may include temperature probes, pH meters, conductivity meters, organic vapor detectors (i.e., photoionization detector [PID] and flame ionization detector [FID]), and water level transducers. Specific preventive maintenance procedures to be followed for field

equipment are recommended by the manufacturers. These procedures are included in the user's manual provided with each instrument.

Field instruments will be checked and/or calibrated before they are shipped or carried to the field. With the exception of temperature, field instruments will be checked daily against a traceable standard or reference with a known value to verify that the instrument is properly calibrated. Instruments found to be out of calibration will be recalibrated before use in the field. If the instrument cannot be calibrated, then it will be returned to the supplier or manufacturer for recalibration, and a backup instrument will be used in its place. Calibration checks and calibrations will be documented on the Field Meter/Calibration Log Sheets in the Measuring and Testing Equipment (M&TE) Logbook. Maintenance conducted on field equipment must be documented in the M&TE Logbook.

Critical spare parts such as tapes, papers, pH probes, electrodes, and batteries will be kept on-site to minimize downtime of malfunctioning instruments. Backup instruments and equipment should be available on-site or within one-day shipment to avoid delays in the field schedules.

### B.6.2 Laboratory Instruments

The analytical laboratory will conduct a routine preventive maintenance program as part of its QA/QC Program to minimize instrument failure and other system malfunctions. Laboratory instruments will be maintained in accordance with manufacturers' specifications and the requirements of the specific method being used. This maintenance will be carried out regularly and will be documented in the laboratory instrument service logbook for each instrument. Emergency repair or scheduled manufacturers' maintenance will be provided under a repair and maintenance contract with factory representatives.

## B.7 Instrument / Equipment Calibration and Frequency

### B.7.1 Field Instruments/Equipment

Instruments and equipment used to measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the

manufacturers' specifications. Field instruments for this purpose will have unique identifiers, and each instrument will be logged in the M&TE Logbook before use in the field.

Equipment to be used during the field sampling will be examined to certify that it is in operating condition. This will include checking the manufacturer's operating manual and instructions for each instrument to verify that required maintenance is being performed. Field notes from previous sampling events will be reviewed so that records of prior equipment problems will not be overlooked, and necessary repairs to equipment will be carried out. Spare parts or duplication of equipment will be available during the sampling effort.

Calibration of field instruments is governed by the specific SOP for the applicable field analysis method, and it will be performed at the intervals specified in the SOP. If an SOP is not available, then calibration will be performed at intervals specified by the manufacturer or more frequently, as conditions dictate. Calibration procedures and frequency will be recorded in a field logbook. If calibration is found to be off, then measurements taken with that equipment since the previous calibration will be marked as qualified/suspect.

If an internally calibrated field instrument fails to meet calibration/checkout procedures, then it will be returned to the manufacturer for service, and a backup instrument will be calibrated and used in its place. Field instrument uses, detection levels, and calibration are summarized in **Table B-3**.

Detailed instructions on the proper calibration and use of each field instrument follow the guidelines established by the manufacturer. The technical procedures for each instrument include the manufacturer's instructions detailing the proper use and calibration.

#### B.7.1.1 pH Meter Calibration

The pH meter will be calibrated according to the manufacturer's instructions using traceable standard buffer solutions before field work commences. Calibration will consider the following: (1) that the temperature of sample and buffer solutions is equivalent, (2) that at least two buffer solutions are used to calibrate the instrument, (3) that readings are allowed to stabilize for a consistent period of time, (4) that the electrode is properly rinsed between readings, and (5) that the pH meter is recalibrated every time it is turned off and turned back on, or if it reports erratic results.

Calibration of the pH meter will be checked against two standard buffer solutions before field use. Calibration procedures, lot numbers of buffer solutions, and other pertinent calibration or checkout information will be recorded in the M&TE Logbook. The calibrations that are performed, the standard that is used, and the sample pH values are to be recorded in the field logbook.

### B.7.1.2 Temperature Calibration

Temperature measurements are carried out using electronic digital thermometers. Mercury thermometers will not be used. Temperatures will be recorded in the field logbook.

### B.7.1.3 Conductivity Meter Calibration

The conductivity cells of the specific conductivity meter will be cleaned according to manufacturer's recommendations and specifications and calibrated against standard solutions of known conductivity before each sampling event. The instrument will be checked daily with NIST-traceable standard solutions. If the instrument is more than 10 percent out of calibration when compared to standard solutions, then the instrument will be recalibrated. If this cannot be done in the field, then the instrument will be returned to the manufacturer or supplier for recalibration, and a backup instrument will be used in its place. Daily calibration readings and other relevant information will be recorded in the M&TE Logbook.

Daily checks should be as follows:

- Fill a sample cup with the standard solution for conductivity calibration.
- Set the temperature knob for temperature of standard solution.
- Turn to appropriate scale and set the instrument to the value of the calibration standard.
- Record the reading obtained in the M&TE Logbook.
- Rinse out the sample cup with distilled water.

#### B.7.1.4 Organic Vapor Detector

Organic vapor detectors will be checked daily according to the manufacturer's instructions. PIDs and FIDs will be calibrated daily with a gas of known concentration. Daily calibration information will be recorded in the M&TE Logbook.

## B.7.2 Laboratory Instruments

Calibration of laboratory instruments will be based on approved written procedures as documented in the laboratory QA manual in **Appendix C-1**. Records of calibration, repairs, or replacement will be maintained by laboratory personnel performing QC activities at the location where the work is performed and will be subject to QA audit. Procedures and records of calibration will follow the laboratory-specific QA Plans.

In cases where analyses are conducted according to the SW-846 protocols, the calibration procedures and frequencies specified in the applicable methods will be followed. For analyses governed by SOPs, refer to the appropriate SOP for the required calibration procedures and frequencies. Analytical calibrations and method QC will be consistent with the laboratory QA Manual in **Appendix C-1**.

Records of calibration will be kept as follows:

- Each instrument will have a record of calibration with an assigned record number.
- A label will be affixed to each instrument showing identification numbers, manufacturer, model numbers, date of last calibration, signature of calibrating analyst, and due date of next calibration. Reports and compensation or correction figures will be maintained with the instrument.
- A written stepwise calibration procedure will be available for each piece of test and measurement equipment.
- Instruments that are not calibrated to the manufacturer's original specification will display a warning tag to alert the analyst that the devices should not be used.

## B.8 Inspection / Acceptance Requirements for Supplies

Supplies, including standard solutions, sample bottles, calibration gases, reagents, hoses, deionized and potable water, will be obtained from reputable distributors and manufacturers. Supplies will be inspected upon receipt by the end user (such as the field sampling technician, project scientist or engineer), and the expiration date (e.g., for calibration gases, standard solutions, reagents) will be checked when applicable. If supplies are damaged or expired, then they will not be accepted for use and will be replaced.

## B.9 Non-direct Measurements (Secondary Data)

Existing data, also known as secondary data, will be assessed to determine whether the quality of the data is sufficient for the current project objectives and intended use. This secondary data includes physical and chemical data collected prior to the implementation of this QAPP. The secondary physical data includes historical well logs, survey coordinates and elevations. The secondary chemical data includes historical reports and databases containing groundwater chemistry data and concentration contour maps from 1986 through 2019.

Secondary data will be identified in the reports where it is used and will be cited in the reference sections of these reports.

## B.10 Data Management

### B.10.1 Laboratory Data

The laboratory will prepare and submit analytical and QC data reports to the project in compliance with the requirements of this QAPP, including data forms listed in **Table B-4**. The laboratory EDD may be delivered either as an Excel® spreadsheet or as a comma- or tab- delimited file readable by Excel®. The file name must include the SDG number or equivalent. For example, if multiple files were submitted for the same SDG, then the file name could be the SDG number followed by a sequential number for each file in the SDG. A file cannot contain more than one SDG. Multiple analytical fractions may be present in the file. The first row of the file should contain the field names. The expected field names and comments about them are listed in **Table B-4**. Fields do not have to

be present in the order specified, and additional fields may be included; however, columns must be present for all fields identified below. An acceptable configuration is presented in **Table B-5** with all QA/QC sample data being provided in a companion ASCII file.

The analytical laboratory will prepare and retain full analytical and QC documentation. The analytical laboratory will make available retained analytical data as needed.

## B.10.2 Records Retention

Project records and files must be maintained in compliance with USEPA and PADEP policy and retained indefinitely.

# C ASSESSMENT AND OVERSIGHT

The elements in this section address the activities for assessing the effectiveness of project implementation and associated QA and QC activities. The purpose of assessment is to verify that the QAPP is being implemented as prescribed.

## C.1 Assessments and Response Actions

Internal and external audits will be conducted to monitor the performance of the total measurement system.

### C.1.1 Field Performance and Systems Audits

Field performance audits will be conducted continuously as field data are generated, reduced, and analyzed. Numerical analyses, including manual calculations, will be documented. Records of numerical analysis will be legible, reproducible, and sufficiently complete so that they may be logically reconstructed.

Other indicators of the level of field performance will be the analytical results of the blank and field duplicate QC samples as described in B.1.1. Each blank analysis is an indirect audit of the effectiveness of measures, such as decontamination procedures, taken in the field to ensure sample integrity. The results of the field duplicate QC analyses are an indirect audit of the ability of the field team to collect representative sample aliquots of each matrix type.

A field systems audit of sampling activities will be conducted by the GSC QA/QC Manager, as deemed appropriate by the GSC Project Director. During this audit, the auditor will compare observed field practices with standard procedures and protocols. The following elements will be evaluated during the field systems audit:

1. Overall level of organization and professionalism.

2. Performance of activities and analyses in accordance with the QAPP.

3. Level of activity and sample documentation.

4. Working order of instruments and equipment.

5. Level of QA conducted by field sampling team.

6. Contingency plans in case of equipment failure or other event which prevents the planned activity from proceeding.

7. Decontamination procedures.

8. Level of efficiency with which the field sampling team conducts planned activities at one location and proceeds to the next location.

9. Sample packaging and shipment.

Following completion of the field systems audit, deficiencies will be discussed with the field personnel, and corrective actions will be identified and implemented. The field sampling team will be informed promptly of deficiencies that could affect the integrity of the samples being collected so that corrective actions can be implemented promptly.

## C.1.2 Laboratory Performance and Systems Audits

In addition to the requirements for continued NELAP approval, laboratory performance audits will be coordinated through the FPL and Trust Fund Project Coordinator on a frequency of once every five years and will include the following:

1. Verification of written procedures.

2. Level of understanding of analysts.

3. Unannounced inspection of the sample handling group.

4. Review of a portion of the analytical data and calculations.

Corrective action will be taken for deficiencies noted during the laboratory performance audit.

Laboratory systems audits are qualitative audits of the measurement systems and verify that the systems are being properly maintained and implemented. In the event that a major defect is discovered as a result of these audits, a follow-up inspection will be conducted after sufficient time has passed for correction of the deficiency, but not more than 90 days, or when evidence of correction of the deficiency has been presented by the laboratory. Laboratory systems audits may be performed in conjunction with the performance audit and will include a review of the following:

1. Analytical and support instrumentation maintenance and calibration logs.
2. Refrigerator temperature records.
3. Distilled/deionized water supply records.
4. Sample tracking system.
5. Standards tracking system.
6. Reagent chemical log-in, tracking, and disposal.
7. Following the sample chain-of-custody from time of sample receipt through analytical steps, to data reduction, internal laboratory validation, and generation of analytical report.
8. Examination of maintenance and calibration logbooks to verify that maintenance and calibration are performed on a scheduled basis.
9. Examination of procedures and records for data calculation, transfer, and validation.
10. Spot-check of calibration, QC, and sample data from selected instruments for selected days, to ensure acceptable precision, accuracy, and completeness.
11. Inspection of storage areas, glassware preparation areas, and distilled/deionized water system records and procedures.
12. Examination of QA procedures and records, including standard and spike solution logbooks and storage areas, control charts, and QA manuals.

## C.1.3 Measures to Address Laboratory or Field Deficiencies

Measures to address deficiencies are those actions taken to rectify a laboratory or field measurement system that is out of compliance with the approved work plan, internal protocols or procedures. Measures may be initiated by any person collecting media samples at the Site. Measures will be taken in the field and laboratory so that problems that may develop will be handled efficiently, effectively, and accurately in the interest of promoting sampling continuity.

The essential steps to address deficiencies are as follows:

1. Identifying and defining the problem.
2. Notifying USEPA of the problem, if required by work plan or procedure.
3. Assigning responsibility for investigating the problem.
4. Investigating and determining the cause of the problem.
5. Determining a plan to eliminate the problem.
6. Assigning and accepting responsibility for implementing the plan.
7. Implementing the plan and evaluating its effectiveness.
8. Verifying that the plan has eliminated the problem.
9. Documenting the plan on the appropriate form.

### C.1.3.1 Sample Collection/Field Measurements

Technical staff and project personnel will be responsible for reporting suspected technical and QA non-conformances or suspected deficiencies of any activity or issued document by reporting the situation to the QA Manager or designee. The QA Manager will be responsible for assessing the suspected problems in consultation with the Field Manager to make a decision based on the potential for the situation to impact the quality of the data. When it is determined that the situation warrants a reportable nonconformance and corrective action, then an NCR will be initiated by the QA Manager.

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

- Evaluating reported nonconformances;
- Controlling additional work on nonconforming items;
- Determining disposition or action to be taken;
- Maintaining a log of nonconformances;
- Reviewing NCRs and corrective actions taken; and
- Verifying that NCRs are included in the final Site documentation project files.

If appropriate, the QA Manager will see to it that additional work dependent on the nonconforming activity is not performed until the corrective actions have been completed.

Corrective action for field measurements may include:

- Repeating the measurement to check the error;
- Checking for proper adjustments for ambient conditions such as temperature;
- Checking the batteries;
- Recalibrating equipment;
- Checking the calibration;
- Modifying the analytical method including documentation and notification (i.e., standard additions);
- Replacing the instrument or measurement devices; and
- Stopping work (if necessary).

The Field Manager or designee is responsible for Site activities and may at times be required to adjust the Site activities to accommodate Site-specific needs. When it becomes necessary to modify a program, the responsible person notifies the GSC Project Director of the anticipated change and implements the necessary changes after obtaining the approval of the GSC Project Director. Changes in the program will be documented on the FCR that will be signed by the initiators and the GSC Project Director. The FCR for each document will be numbered serially as required. The FCR shall be attached to the file copy of the affected document. The GSC Project Director must approve the change verbally or by email before field implementation. If unacceptable, then the action taken during the period of deviation will be evaluated to determine the significance of the departure from established program practices.

The GSC Field Manager is responsible for the controlling, tracking, and implementing the identified changes. Reports on changes will be distributed to affected parties. The FPL, USACE Baltimore District Representative, and Trust Fund Project Coordinator will be notified when program changes are made in the field.

### C.1.3.2 Laboratory Analyses

The laboratory QA plan provides systematic procedures to identify out-of-control situations and corrective actions. Corrective actions shall be implemented to resolve problems and restore malfunctioning analytical systems. Laboratory personnel have received QA training and are aware that corrective actions are necessary when:

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

- Inquiries concerning data quality are received.

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

Corrective actions may include:

- Reanalyzing the samples, if holding time criteria permit,
- Evaluating blank contaminant sources, elimination of these sources, and reanalysis,
- Modifying the analytical method (i.e., standard additions) with appropriate notification and documentation,
- Resampling and analyzing,
- Evaluating and amending sampling procedures, or
- Accepting data and acknowledging the level of uncertainty.

If resampling is deemed necessary due to laboratory problems, then the GSC Project Director will identify the necessary cost-recovery approach to implement the additional sampling effort.

The following corrective action procedures will be required:

- Problems noted during sample receipt will be documented in the appropriate laboratory email. The GSC Project Director will be contacted promptly to determine how to resolve the problem. Corrective actions will be thoroughly documented.

- When sample extraction/digestion or analytical holding times are not within method required specifications, the GSC Project Director will be notified promptly to determine problem resolution. Corrective actions will be thoroughly documented.

- Initial and continuing calibration sequences that do not meet method requirements will result in a review of the calibration. When appropriate, reanalysis of the standards or reanalysis of the affected samples back to the previous acceptable calibration check is warranted.

- Appropriate measures will be taken to prepare and clean up samples in an attempt to achieve the practical quantitation limits as stated. When difficulties arise in achieving these limits, the laboratory will notify the GSC Project Director and the GSC Laboratory Coordinator to resolve the problem. Corrective actions will be thoroughly documented.

- Dilutions impacting the practical quantitation limits will be documented in case narratives along with revised quantitation limits for the affected analytes. Analytes detected above the method detection limits, but below the practical quantitation limits, will be reported as estimated values.

- Failure of method-required QC to meet the requirements specified in this project QAPP shall result in review of affected data. Resulting corrective actions may encompass those identified earlier. The GSC Project Director and Laboratory Manager will be notified promptly to discuss possible corrective actions, particularly when unusual or difficult sample matrices are encountered.

When calculation and reporting errors are noted in a data package, reports will be reissued with corrections. Case narratives will clearly state the reasons for reissuance of reports.

## C.2 Reports

Internal reports may be provided to inform management of the results of field and laboratory audits, and to communicate the need for corrective actions, if corrective actions are necessary.

## C.2.1 Quality Control Reports

Quality Control Reports (QCRs) may be prepared. These reports will be signed and dated by the Field Manager. An example of the QCR format to be used is shown on **Figure C-1**. The contents of each QCR will include a summary of activities performed at the project Site, weather information, activities performed including field instrument calibrations, departures from the approved Work Plan, problems encountered during field activities, and instructions received from government personnel. Deviations that may affect the project DQOs will be promptly conveyed to the GSC Laboratory Manager.

## C.2.2 Laboratory Quality Assurance Reports

The laboratory will provide analytical QC summary statements (case narratives) with each data package. Chain-of-custody forms will be compared with samples received by the laboratory, and an email will be prepared and sent to the project describing differences, if any, in the chain-of-custody forms and the sample labels or tags. Deviations such as broken or otherwise damaged containers will be identified on the receiving report. This report will be forwarded to the Project Laboratory Coordinator within 24 hours of sample receipt and will include the following: a signed copy of the chain-of-custody form; itemized project sample numbers; laboratory sample numbers; cooler temperature upon receipt; and itemization of analyses to be performed.

Summary QC statements will accompany analytical results as they are reported by the laboratory in the form of case narratives for each SDG.

Departures from approved plans will receive prior approval from the Laboratory Coordinator and will be documented with FCRs. These FCRs will be incorporated into the project evidence file.

The Project Director will maintain custody of the project evidence file and will maintain the contents of files for this project, including relevant records, reports, logs, field logbooks, pictures, subcontractor reports, correspondence, and chain-of-custody forms until this information is requested or transferred to the FPL. These files will be stored under the custody of the GSC Project Director. The analytical laboratory will retain original analytical raw data electronically in a secure data storage system under the custody of the Laboratory Project Manager.

# D DATA VALIDATION AND USABILITY

The elements in this section address the QA activities that occur after the data collection phase of a project task has been completed. Implementation of these elements determines whether the data conform to the specified criteria, thereby satisfying the project objectives.

## D.1 Data Review, Validation, and Verification Requirements

Data will be reviewed to verify that it has been recorded, transmitted, and processed correctly. Data review will include the following activities:

- Checking for data entry, transcription/transposition, calculation, reduction, and transformation errors.
- Verifying that a complete list of sample information is available, including sample matrices, blanks, field duplicates, shipping dates, preservatives, and holding times.
- Performing completeness checks to determine whether there are deficiencies such as missing data or loss of data integrity resulting from electronic file corruption or loss of electronic files during storage or processing.

Data verification is the process for evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual specifications. The purpose of data verification is to evaluate performance against pre-determined specifications, for example, in an analytical method, or a software or hardware operations system.

Data validation is an analyte-specific and sample-specific process that extends the evaluation of data beyond method, procedure, or contractual compliance (i.e., data verification) to determine the quality of a specific data set relative to its end use. It focuses on the project's specifications or needs, designed to meet the needs of the decision makers/data users and should note potentially unacceptable departures from the QAPP.

Data usability will be determined by a data quality assessment of the validated data and may involve statistical evaluation (such as tests for outliers or trends) or scientific evaluation. A statistical analysis

will result in quantitative statements about the quality of the data, while a scientific analysis will result in qualitative statements. Severe data quality problems may require that the data not be used, whereas some data may still be used even when some validations have failed.

### D.1.1 Field Measurements

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

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

### D.1.2 Laboratory Services

Media samples will be sent to ELLE. Data review and verification for samples analyzed by the laboratory will be performed according to specifications outlined in the laboratory's QA plan (**Appendix C-1**). Laboratory reports will include documentation verifying compliance with analytical holding times.

Laboratories will perform in-house review and verification of analytical data under the direction of the Laboratory QA Officer. The Laboratory QA Officer is responsible for assessing data quality and for informing the GSC Laboratory Coordinator and Project Director of data that are considered "unacceptable" or that require caution on the part of the data user in terms of data reliability. Data will be reviewed and verified as described in the laboratory QA plan. Data review and reporting by the laboratory will be conducted as follows:

- Raw data are produced by the analyst who has primary responsibility for the correctness and completeness of the data. Data will be generated following methods defined in the QAPP and SOP protocols implemented by the laboratory.

- Level 1 technical data review is completed relative to an established set of guidelines by a peer analyst. The review shall assess the completeness and correctness of the data while verifying that method QC measures have been implemented and are within appropriate criteria.

- Level 2 technical review is completed by the Area Supervisor or Data Review Specialist. This review includes the data for attainment of QC criteria as outlined in the established methods and for overall reasonableness. The Level 2 review verifies that calibration and QC data are in compliance by checking at least 10 percent of the data calculations. This review shall document that the data package is complete and ready for reporting and archiving.

- Upon acceptance of the raw data by the Area Supervisor, the report is generated and sent to the Laboratory Project Manager for Level 3 administrative data review. This review will verify consistency and compliance with laboratory instructions, the laboratory QA plan, and the project QAPP.

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

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

- Data will then be delivered to the project for data assessment or validation.

The data review process will include identification of out-of-control data points and data omissions, as well as interactions with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analyses may be made by the GSC Project Director or designee based on the extent of the deficiencies and their importance in the overall goals of the project. The laboratory will provide flagged data to include items such as: 1) concentration below required detection limit; 2) estimated concentration due to poor spike recovery; and 3) concentration of chemical also found in laboratory blank.

The laboratory will prepare and retain full analytical and QC documentation for the project. The laboratory will supply email or cloud reports of the retained information.

The laboratory will provide the following information to the project in each analytical data package:

- Cover sheets listing the samples included in the report and narrative comments describing problems encountered in analysis;
- Tabulated results of organic and miscellaneous parameters identified and quantified;
- Analytical results for QC sample spikes, laboratory duplicates, initial and continuous calibration verifications of standards and blanks, standard procedural blanks, LCSs, and other deliverables as identified in Section D.3; and
- Tabulation of instrument detection limits.

## D.2 Validation and Verification Methods

A systematic process for data verification and validation will be performed to verify that the precision and accuracy of the analytical data are adequate for their intended use. The greatest uncertainty in a measurement is often a result of the sampling process and inherent variability in the environmental media rather than in the analytical measurement. Therefore, analytical data validation will be performed only to the level necessary to minimize the potential of using false-positive or false-negative results in the decision-making process (i.e., to ensure accurate identification of detected versus non-detected compounds). This approach is consistent with the project DQOs, analytical methods, verifying chains-of-custody, and calculating risk.

Samples will be analyzed through implementation of "definitive" analytical methods. "Definitive data" will be reported consistent with the deliverables identified in Section D.3, **Tables B-4** and **B-5**. This report content is consistent with what is understood to be a comprehensive data deliverable (data forms including laboratory QC, calibration information, and raw data). This "definitive data" will then be evaluated through the review process presented in Subsections D.2.1 through D.2.10. DQOs identified in Section A.7 and method-specified criteria will be reviewed. Complete analytical documentation will be retained by the laboratory.

Data validation will be accomplished by comparing the contents of the data packages and QA/QC results to requirements of the requested analytical methods. The validation support staff will be responsible for these activities. It will be the practice of GSC to conduct data validation on all of the data packages received from the laboratory using knowledgeable validation support staff.

Validation support staff will conduct a systematic review of the data for compliance with the established QC criteria in accordance with pages 11 through 55 of USEPA's *National Functional Guidelines for Organic Superfund Methods Data Review* (refer to **Appendix D**) and based on the following categories:

- Preservation and holding times,
- Laboratory and field blanks,
- Laboratory control samples (LCS),
- System monitoring compound (surrogate) recoveries (for organic methods),
- Performance of internal standards (primarily for organic methods),
- Acceptability of initial and continuing calibrations,
- Sample reanalysis,
- Secondary dilutions,
- RPD between field duplicate sample results, and
- Laboratory case narrative.

Laboratory analytical results will also be assessed by the data validator for compliance with the applicable DQIs listed in Section A.7.2. Upon completion of validation, a data validation report will be prepared for the data deliverables packages that are reviewed. Limitations on the use of laboratory data will be reported by means of qualification codes as summarized in the data validation reports.

The most common qualification code is a "J" which indicates that the reported concentration is estimated.

Consistent with the data quality requirements as defined in the DQOs, project data and associated QC will be evaluated on these categories and qualified according to the outcome of the review.

## D.2.1 Holding Times

Evaluation of holding times ascertains the validity of results based on the length of time from sample collection to sample preparation or sample analysis. Verification of sample preservation must be confirmed and accounted for in the evaluation of sample holding times. The evaluation of holding times is essential to establishing sample integrity and representativeness. Concerns regarding physical, chemical, or biochemical alteration of analyte concentrations can be eliminated or qualified through this evaluation.

## D.2.2 Blanks

The assessment of blank analyses is performed to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks applies to any blank associated with the samples, including field, trip, equipment, and method blanks. Contamination during sampling or analysis, if not discovered, results in false-positive data.

Blanks will be evaluated against reporting levels as specified in **Table A-4**. Field, trip, and equipment rinse blanks will be evaluated against 5X these levels for most analytes and against 10X levels for common laboratory solvent analytes such as acetone and methylene chloride.

## D.2.3 Laboratory Control Samples

The LCS serves as a monitor of the overall performance of the analytical process, including sample preparation, for a given set of samples. Evaluation of this standard provides confidence in or allows qualification of results based on a measurement of process control during each sample analysis.

### D.2.4 Surrogate Recovery

System monitoring compounds, also known as surrogates, are added to every sample, blank, MS, MSD, and standard. They are used to evaluate extraction, cleanup, and analytical efficiency by measuring sample-specific recovery. Poor system performance as indicated by low surrogate recoveries is a common reason for data qualification. Evaluation of surrogate recovery is critical to the provision of reliable sample-specific analytical results.

### D.2.5 Internal Standards

Internal standards are used to evaluate and compensate for sample-specific influences on the analyte quantification. They are evaluated to determine whether data require qualification due to excessive variation in quantitative or qualitative performance measures of internal standards. For example, a decrease or increase in internal standard area counts for organics may reflect a change in sensitivity that can be attributed to the sample matrix. Because quantitative determination of analytes is based on the use of internal standards, evaluation is critical to generating reliable analytical results.

### D.2.6 Initial and Continuing Calibration

The purpose of initial and continuing calibration verification analyses is to verify the linear dynamic range and stability of instrument response. Relative instrument response is used to quantify the analyte results. If the relative response factor is outside acceptable limits, then the data quantification is uncertain and requires appropriate qualification.

### D.2.7 Sample Reanalysis

If instrument performance-monitoring standards indicate that an analysis is out of control, then the laboratory is required to reanalyze the sample. If the reanalysis does not solve the problem (i.e., surrogate compound recoveries are outside the limits for both analyses), then the laboratory is required to submit data from both analyses. An independent review is necessary to determine which analysis produced the best sample result.

### D.2.8 Secondary Dilutions

When the concentration of an analyte in a sample exceeds the initial calibration range, a new aliquot of that sample must be diluted and reanalyzed. The laboratory is required to report data from both analyses. When this occurs, an independent review of the data is required to determine the appropriate results to be used for that sample. An evaluation of each analyte exceeding the calibration range must be made, including a review of the dilution analysis that is performed. Results chosen in this situation may be a combination of both the original results (i.e., analytes within initial calibration range) and the secondary dilution results.

### D.2.9 Laboratory Case Narratives

Analytical case narratives are reviewed for specific information concerning the analytical process. This information is used to direct the data validator to potential problems with the data.

## D.3 Reconciliation with Data Quality Objectives

Analytical data for this project will be screened electronically and reviewed by qualified chemists. Flags signifying the usability of data will be noted and entered into an analytical database. Deficiencies in data deliverables will be corrected through direct communication with the field or laboratory, generating immediate response and resolution. Significant data discrepancies noted during the validation process will be documented through NCRs, which are sent to the laboratory for clarification and correction. Decisions to repeat sample collection and analysis may be made by the GSC Project Director based on the extent of the deficiencies and their importance to the project goals.

Data will be generated in a format which facilitates its review and evaluation. The data set will include data flags in accordance with the above-referenced protocols, as well as additional comments of the Data Review Team. The associated data flags will include: U = not detected at the associated level, J = associated value estimated, UJ = not detected and associated value estimated, and R = associated value unusable or analyte identity indeterminate.

Data validation will be accomplished by the joint efforts of the data validator and the QA Manager. Data validation by data management will be based on the criteria that the sample is properly collected

and handled according to the FSP (GSC, 2012a). An evaluation of data accuracy, precision, sensitivity, and completeness, based on criteria in Section A.7 of this QAPP, will be performed by a data validator. This data validation will indicate that data are: 1) usable as a quantitative concentration; 2) usable with caution as an estimated concentration; or 3) unusable due to out-of-control QC results. Data sets will be available for controlled access by the GSC Project Director and authorized personnel.

Following validation, the analytical chemistry data will be reviewed for anomalies or departures from assumptions made during the planning phases of data collection. This data inspection will consist of the following steps:

- Have parameters been detected for the first time at this sampling location?
- Are parameters now absent that previously have been consistently detected at this sampling location?
- Have parameters been reported at concentrations significantly outside the previously reported ranges?

If the data do not meet the inspection criteria listed above, then the following actions will be taken:

- The database value will be checked against the value reported on the laboratory report.
- Laboratory validation, field conditions, and field data will be reviewed to determine whether a cause can be identified.
- Professional judgment will ultimately determine whether data is acceptable, and the reasons for discarding unacceptable data will be documented.

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# Tables

**TABLE A-2**
**SUMMARY OF DATA QUALITY OBJECTIVES**
**Former York Naval Ordnance Plant - York, PA**

| Data Use | Sample Type | Analytical Method | Precision (Relative Percent Difference) | | Accuracy | | Completeness |
|---|---|---|---|---|---|---|---|
| | | | Field Dups | Lab Dups | Lab LCS | Lab MS | |
| Contaminant Measurement | Discrete (groundwater) | SW-846 Method 8260D | <50 RPD | <40 RPD | 75%-125% Recovery | 60%-140% Recovery | 90% |
| | | EPA Method 9014 Total Cyanide | <50 RPD | <35 RPD | 90%-110% Recovery | 75%-125% Recovery | 90% |
| | | OIA 1677 Available Cyanide | <50 RPD | <35 RPD | 90%-110% Recovery | 75%-125% Recovery | 90% |
| | Discrete (surface water) | SW-846 Method 8260D LL | <50 RPD | <40 RPD | 75%-125% Recovery | 60%-140% Recovery | 90% |
| | Discrete (NPDES Permit) | EPA Method 624.1 | <50 RPD | <40 RPD | 75%-125% Recovery | 60%-140% Recovery | 90% |

**TABLE A-3**
**SUMMARY OF QUALITY CONTROL MEASURES**
Former York Naval Ordnance Plant – York, PA

| | |
|---|---|
| 1. | Field sampling documentation will be in the form of field logbooks, sampling field data sheets and chain of custody records. |
| 2. | Monitoring and/or field-portable analytical equipment will be calibrated prior to collection and analyses of samples with results and/or performance check procedures/methods summarized and documented in a field, personal, and/or instrument log notebook. |
| 3. | Both the analytical sample results and the laboratory-determined method detection limits (MDLs) will be presented in the final laboratory data deliverable reports. |
| 4. | Analytical holding times will be determined from date and time of sample collection to date and time of sample analysis. Date and time of sample collection will be documented on the sampling field data sheet as well as the Chain of Custody Record. The date and time of sample analysis will be provided by the laboratory in the final data deliverables packages. |
| 5. | Initial and continuous instrument calibration data will be presented. |
| 6. | QC blank results (non-dedicated equipment rinse, trip, method, preparation, instrument, etc.), will be provided as applicable. |
| 7. | For gas chromatography (GC) methods, matrix spike / matrix spike duplicate (MS/MSD) QC samples will be collected and analyzed to provide a quantitative measure of analytical precision and accuracy. For gas chromatography / mass spectrometer (GC/MS) methods, laboratory control samples (LCSs) will be analyzed to provide a quantitative measure of the analytical precision and accuracy. Duplicate samples will not be collected for soils and sediments due to the difficulty in obtaining representative aliquots for these media. |
| 8. | Laboratory analysis will use EPA-approved methods. In addition, appropriate documentation such as gas chromatograms, mass spectra, etc. will be included in the final deliverable reports such that compound identification may be confirmed. All sample analysis runs (e.g. undiluted, diluted, re-runs) will be included in the final data deliverables packages. |
| 9. | Sampling locations (wells and borings) will be surveyed to the nearest 0.1 feet for planar coordinates and ground surface elevation, and to the nearest 0.01 feet for top-of-casing (measurement point) elevation. Groundwater elevations will be measured to the nearest 0.01 feet. |

**TABLE A-4**
**PROJECT ANALYTE LIST, REPORTING LIMITS, AND METHOD DETECTION LIMITS FOR VOLATILE ORGANIC COMPOUNDS**
**Former York Naval Ordnance Plant - York, PA**

| | | Aqueous (Groundwater) | | Aqueous (Surface Water) | | Aqueous (NPDES) | |
|---|---|---|---|---|---|---|---|
| | | SW-846 Method 8260D | | SW-846 Method 8260D LL | | EPA Method 624.1 | |
| | | RLs | MDLs | RLs | MDLs | RLs | MDLs |
| Analyte | CAS No. | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| 1,1,1,2-Tetrachloroethane | 630-20-6 | 1 | 0.2 | 0.5 | 0.07 | -- | -- |
| 1,1,1-Trichloroethane | 71-55-6 | 1 | 0.3 | 0.5 | 0.06 | -- | -- |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 1 | 0.2 | 0.5 | 0.07 | -- | -- |
| 1,1,2-Trichloroethane | 79-00-5 | 1 | 0.2 | 0.5 | 0.06 | -- | -- |
| 1,1-Dichloroethane | 75-34-3 | 1 | 0.2 | 0.5 | 0.07 | -- | -- |
| 1,1-Dichloroethene | 75-35-4 | 1 | 0.2 | 0.5 | 0.06 | 1 | 0.2 |
| 1,2-Dibromoethane (EDB) | 106-93-4 | 1 | 0.2 | 0.5 | 0.06 | -- | -- |
| 1,2-Dichloroethane | 107-06-2 | 1 | 0.3 | 0.5 | 0.05 | -- | -- |
| 1,2-Dichloropropane | 78-87-5 | 1 | 0.2 | 0.5 | 0.06 | -- | -- |
| 2-Butanone (MEK) | 78-93-3 | 10 | 0.3 | 5 | 0.6 | -- | -- |
| 2-Hexanone | 591-78-6 | 10 | 0.3 | 5 | 0.6 | -- | -- |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | 10 | 0.5 | 5 | 0.7 | -- | -- |
| Acetone | 67-64-1 | 20 | 0.7 | 5 | 0.9 | -- | -- |
| Acrylonitrile | 107-13-1 | 20 | 0.3 | N/A | N/A | -- | -- |
| Benzene | 71-43-2 | 1 | 0.2 | 0.5 | 0.05 | -- | -- |
| Bromochloromethane | 74-97-5 | 5 | 0.2 | 0.5 | 0.05 | -- | -- |
| Bromodichloromethane | 75-27-4 | 1 | 0.2 | 0.5 | 0.05 | -- | -- |
| Bromoform | 75-25-2 | 4 | 1 | 1 | 0.3 | -- | -- |
| Bromomethane | 74-83-9 | 1 | 0.3 | 0.5 | 0.07 | -- | -- |
| Carbon disulfide | 75-15-0 | 5 | 0.2 | 1 | 0.06 | -- | -- |
| Carbon tetrachloride | 56-23-5 | 1 | 0.2 | 0.5 | 0.07 | -- | -- |
| Chlorobenzene | 108-90-7 | 1 | 0.2 | 0.5 | 0.06 | -- | -- |
| Chloroethane | 75-00-3 | 1 | 0.2 | 0.5 | 0.07 | -- | -- |
| Chloroform | 67-66-3 | 1 | 0.2 | 0.5 | 0.09 | -- | -- |
| Chloromethane | 74-87-3 | 1 | 0.2 | 0.5 | 0.06 | -- | -- |
| cis-1,2-Dichloroethene | 156-59-2 | 1 | 0.2 | 0.5 | 0.05 | 1 | 0.1 |
| cis-1,3-Dichloropropene | 10061-01-5 | 1 | 0.2 | 0.5 | 0.05 | -- | -- |
| Dibromochloromethane | 124-48-1 | 1 | 0.2 | 0.5 | 0.07 | -- | -- |
| Ethylbenzene | 100-41-4 | 1 | 0.4 | 0.5 | 0.06 | -- | -- |
| Methyl tert-butyl ether | 1634-04-4 | 1 | 0.2 | 0.5 | 0.05 | -- | -- |
| Methylene Chloride | 75-09-2 | 1 | 0.3 | 0.5 | 0.07 | -- | -- |
| Styrene | 100-42-5 | 5 | 0.2 | 0.5 | 0.05 | -- | -- |
| Tetrachloroethene | 127-18-4 | 1 | 0.2 | 0.5 | 0.06 | 1 | 0.2 |
| Toluene | 108-88-3 | 1 | 0.2 | 0.5 | 0.07 | -- | -- |
| trans-1,2-Dichloroethene | 156-60-5 | 5 | 0.2 | 0.5 | 0.06 | -- | -- |
| trans-1,3-Dichloropropene | 10061-02-6 | 1 | 0.2 | 0.5 | 0.06 | -- | -- |
| Trichloroethene | 79-01-6 | 1 | 0.2 | 0.5 | 0.06 | 1 | 0.2 |
| Vinyl chloride | 75-01-4 | 1 | 0.2 | 0.5 | 0.1 | 1 | 0.3 |
| Xylenes, Total | 1330-20-7 | 6 | 1.4 | 1 | 0.15 | -- | -- |

Notes:
Analysis for acrylonitrile is only required on samples from well MW-136A (495.5'-460').
-- The analyte is not a reportable analyte for NPDES permit samples.
RLs - Reporting Limits.
MDLs - Method Detection Limits (MDLs are subject to change from the laboratory and are current as of October 2020).

**TABLE A-5**
**PROJECT ANALYTE LIST, REPORTING LIMITS, AND METHOD DETECTION LIMITS FOR MISCELLANEOUS PARAMETERS**
**Former York Naval Ordnance Plant - York, PA**

| Matrix | Analyte Description | Method | CAS No. | RLs | MDLs | Units |
|---|---|---|---|---|---|---|
| Aqueous | Cyanide, Total | EPA 9014 | 57-12-5 | 0.01 | 0.0044 | mg/L |
| Aqueous | Available cyanide | OIA 1677 | STL00015 | 0.006 | 0.002 | mg/L |
| Aqueous | pH | 9040B | STL00204 | 0.01 | 0.01 | SU |

# TABLE B-1
# CONTAINER REQUIREMENTS FOR AQUEOUS SAMPLES
# Former York Naval Ordnance Plant - York, PA

| Analyte Group | Container | Minimum Sample Size | Preservative | Holding Time |
|---|---|---|---|---|
| Volatile Organic Compounds | 3 - 40 mL glass vials with Teflon®- lined septum (no headspace) | 40 mL | 1:1 HCL to pH <2<br>Cool, ≤6°C | 14 days |
| Volatile Organic Compounds (Acrylonitrile only) | 3 - 40 mL glass vials with Teflon®- lined septum (no headspace) | 40 mL | 1:1 HCL to pH 4 - 5<br>Cool, ≤6°C<br>**OR**<br>Unpreserved<br>Cool, ≤6°C | 14 days (preserved)<br><br>3 days (unpreserved) |
| Cyanide (total or available) | 1 – 250 glass | 125 mL | NaOH to pH >12,<br>0.6 g ascorbic acid,<br>Cool, ≤6°C | 14 days |
| pH | Flow through cell | 50 mL | None | Immediately in the field |

**TABLE B-2**
**SAMPLE NUMBERING SYSTEM**
**Former York Naval Ordnance Plant – York, PA**

Sample Identification: XX-AAAA-mm-NNN-nn-z

| | |
|---|---|
| XX = Site Designator | Site designators used for the project will be as follows:<br>Harley-Davidson Site =HD |
| AAAA= Area/Project Designator | An Area Designator will be used for a specific area investigation. Example project or area designators are as follows:<br>Cyanide Spill (MW-2) Area = CSA<br>Reforested Area = RA<br>Site Perimeter Area = SPA<br>Northeast Property Boundary Area = NPBA<br>Former Lagoon Area = FLA<br>Bunkers and Shell Ranges = B&SR<br>North End Test Track = NETT<br>Magnesium Burn Area = MGBA<br>North Plant Area = NPA<br>Old Waste Containment Area = OWCA<br>Metal Chip Bin Area = MCBA<br>Southern Property Boundary Area = SPBA<br>West Parking Lot = WPL<br>Burn Pile Area = BPA<br>Eastern Landfill area = ELF<br>Drum Storage Area = DSA<br>Building 66 Chrome/Nickel/Zinc Plater = B66P<br>North End of Building 4 – Former Northern Degreaser = B4ND<br>North End of Building 4 – Former Southern Degreaser = B4SD<br>North End of Building 4 – Former Methylene Chloride Area = B4MC<br>North End of Building 4 – Wastewater Tanks = NB4W<br>North End of Building 4 – Zinc Plater area = B4ZP<br>Fire Water Pond area = FWP<br>Building 2 Wastewater Sump Area = B2WW<br>Building 2 Former Cutting Oil Tank Area = B2CO<br>Building 2 Former Bomb Line Area Settling Tanks = B2BL<br>Building 2 TCA Area = TCA<br>Building 41 North Access Road = B41N<br>Former Coal Storage Area (NW Bldg 10) = FCSA<br>Building 67 Container Storage Area = B67C<br>Building 41, IWTP = IWTP<br>Building 40, Hazardous Waste Storage Area (Tank Farm) = B40T<br>Building 16, Former Degreaser Area = B16D<br>Building 57, Former Metals Fabrication = B57C<br>Building 51, Former <90 day hazardous waste storage area = B51H |

**TABLE B-2**
**SAMPLE NUMBERING SYSTEM**
**Former York Naval Ordnance Plant – York, PA**

| | |
|---|---|
| mm = Sample Station/Media Type | Examples<br>Soil Boring = SB<br>Surface Soil Sample = SS<br>Sediment Sample = SD<br>Test Pit = TP<br>Monitoring Well = MW (or CW)<br>Residential Well = RW<br>Surface Water Sample = SW<br>Spring = SP<br>Soil Gas = SG<br>Roll-off = RO<br>Waste Characterization = WC<br>Quality Control sample = QC |
| NNN = Sample Number | The Field Manager will maintain a listing of three digit station identifiers and correlate them to specific sampling/station locations. |
| nn/nn = Sample Interval in Feet Below Ground Surface (for soils), or Feet below measuring point (for water) | Examples<br>Soil Sampling:<br>12/15= Top of interval is 12 feet and bottom of interval is 15 feet below ground surface.<br><br>Water Sampling:<br>12/12= Pump depth/intake depth set at 12 feet below measuring point.<br>0/0= indicates that intake depth is unknown.<br>Roll Off or Soil Pile Sampling:<br>0/0.5 = surface soil sample taken from top 6 inches.<br>X/X = depth for composite sampling. |
| z = Sample Type | Examples<br>0 = Primary Investigative Sample<br>1 = Field Duplicate Sample<br>2 = Trip Blank<br>3 = Equipment Rinsate<br>4 = Site Source Water Blank<br>5 = Investigation Derived Waste (IDW) (total analysis)<br>5T = Investigation Derived Waste (IDW) (TCLP analysis) |

**TABLE B-3**
**FIELD INSTRUMENT USES, DETECTION LIMITS, AND CALIBRATION**
**Former York Naval Ordnance Plant - York, PA**

| Instrument | Uses | Detection Limits | Calibration | Comments |
|---|---|---|---|---|
| Total Organic Vapor Meters | Sample screening for VOCs | PID - 0.2 ppm isobutylene | 1 point – PID isobutylene daily | Action level must be stated in Health and Safety Plan |
| | Health and safety screening | FID - 1.0 ppm methane | 1 point – FID methane daily | Instrument cannot differentiate naturally occurring compounds from contaminants |
| | | | Verification check every 20 samples | PID cannot detect compounds with ionization potentials > 11 eV |
| Horiba U22 or Specific pH Meters | Field screening of waters | NA | 2 point with standards at pH 7.0 and 4.0 or pH 7.0 and 10.0 daily | Accuracy is to +/- 0.5 pH units |
| Horiba U22 or Temperature Meter | Determining water temperature | NA | To manufacturer instructions | None |
| Horiba U22 or Conductivity Meter | Determining conductivity of water | NA | 1 point in KCL solution | Calculations and acceptance criteria must be available in the field |

PID = photoionization detector
FID = flame ionization detector
NA = not applicable

# TABLE B-4
# LABORATORY STANDARD DATA DELIVERABLES FORMS LIST
# Former York Naval Ordnance Plant – York, PA

| Method Requirements | Deliverables |
|---|---|
| **Requirements for all methods:** | |
| - Holding time information and methods requested | Signed chain-of-custody forms |
| - Discussion of laboratory analysis, including any laboratory problems | Case narratives |
| - LCS (run with each batch of samples processed) | Results |
| **Organics: GC/MS Analysis** | |
| - Sample results, including TICs | EPA Form I or equivalent |
| - Surrogate recoveries | EPA Form II or equivalent |
| - Matrix spike/spike duplicate data | EPA Form III or equivalent |
| - Method blank data | EPA Form IV or equivalent |
| - GC/MS tune | EPA Form V or equivalent |
| - GC/MS initial calibration data | EPA Form VI or equivalent |
| - GC/MS continuing calibration data | EPA Form VII or equivalent |
| - GC/MS internal standard area data | EPA Form VIII or equivalent |
| **Metals** | |
| - Sample results | EPA Form I or equivalent |
| - Initial and continuing calibration | EPA Form II or equivalent, dates of analyses and calibration curve, and the correlation coefficient factor |
| - Method blank | EPA Form III or equivalent and dates of analyses |
| - ICP interference check sample | EPA Form IV or equivalent and dates of analyses |
| - Spike sample recovery | EPA Form VA or equivalent |
| - Postdigestion spike sample recovery for ICP metals | EPA Form VB or equivalent |
| - Duplicates | EPA Form VI or equivalent |
| - LCS | EPA Form VII or equivalent |
| - Standard additions (when implemented) | EPA Form VIII or equivalent |

GC = gas chromatography
ICP = inductively coupled plasma
MS = mass spectrometry
TIC = tentatively identified compound
LCS = laboratory control standard

# TABLE B-5
# LABORATORY STANDARD ELECTRONIC DATA DELIVERABLES (EDD)
# Former York Naval Ordnance Plant – York, PA

| EDD Fields (Max Length) | Description |
|---|---|
| SMP_ID (15 ) | The original client sample identification number. For Lab QC samples this field may be left empty or filled with a place holder like 'QC' or 'NA' for LCS and blanks. The original client sample ID should be used for MS, MSD, and SUR samples. |
| LAB_ID (15) | The laboratory's sample identification number. |
| DATE_SMP (10) | The date the sample was collected in the field (MM/DD/YYYY). |
| TIME_SMP (10) | The time the sample was collected in the field (MM/DD/YYYY). |
| DATE_REC (10) | The date the sample was received by the laboratory (MM/DD/YYYY). |
| DATE_EXT (10) | The date the sample was extracted (MM/DD/YYYY). The extraction refers to any preparatory techniques such as extraction, digestion, and separation. |
| DATE_ANA(10) | The date the sample was analyzed (MM/DD/YYYY). |
| TIME_ANA(5) | The time the sample was analyzed (HH:MM). |
| MATRIX (10) | The sample matrix. Valid values are Water, Solid, or Air. |
| METHOD (21) | The method requested by the client (i.e., SW846 8080). This should not be the lab method number. |
| RES_TYPE (4) | The laboratory result type. Currently the loading routine only handles the following values: |
| | REG-results of a primary analysis of a client sample |
| | REA- results of a reanalysis of a client sample |
| | DIL- results of an analysis of a diluted client sample |
| | LCS-results of a laboratory control sample as %recovery |
| | LCST-expected (true) result of a laboratory control sample as a concentration |
| | LCSF-actual (final) result of a laboratory control sample as a concentration |
| | SUR-surrogate recovery as % recovery |
| | MS-matrix spike recovery as a % recovery |
| | MST- expected (true) result of a matrix spike sample as a concentration |
| | MSF- actual (final) result of a matrix spike sample as a concentration |
| | MSD-matrix spike duplicate recovery as relative percent difference |
| | MSDT- expected (true) result of a matrix spike duplicate sample as a concentration |
| | MSDF- actual (final) result of a matrix spike duplicate sample as a concentration |
| | BLK-result of a laboratory blank sample. |
| CAS_NUM (15) | The CAS number or blank if no CAS number is available. |
| PARAMTR (50) | Chemical name for the analytic parameter. |
| RESULTS (N) | The analytic result |
| UNITS (15) | The units for the result. |
| LABQUAL (6) | The qualifiers assigned by the laboratory. |
| DET_LIMIT (N) | The Contract-Required Detection Limit for the analyte being measured. It should be reported in the same units as the result. |
| REP_LIMIT (N) | The Contract-Required Reporting Limit for the analyte being measured. It should be reported in the same units as the result. |
| UNC (N) | The 2 sigma error in the net count rate for radiological analyses. Should be expressed in the same units as the analytic result. |
| DILUTION (N) | The overall dilution of the sample aliquot. A value of one should correspond to nominal conditions for the method. Values less than one correspond to concentrations. |
| SMP_WT (N) | The weight or volume of the sample used for the analysis. |
| WT_UNITS (2) | The units for the sample weight or volume. |
| FILTERED (1) | Must have 'F' if the sample was filtered either by the lab or in the field. |
| PCT_SOL (N) | Percent solids |
| TIC (10) | Enter 'TIC' or retention time for tentatively identified compound. Blank if not a TIC. |

The laboratory EDD may be delivered either as an Excel spreadsheet or as a comma or tab delimited file readable by Excel. The file name must include the SDG number or equivalent. For example, if multiple files were submitted for the same SDG, the filename could be the SDG number followed by a sequential number for each file in the SDG. A file cannot contain more than one SDG. Multiple analytic fractions may be present in the file. The first row of the file should contain the field names. The expected field names and comments about them are listed below. Fields do not have to be present in the order specified and additional fields may be included; however, columns must be present for all fields identified below. N-Indicates that the field requires a numeric entry.

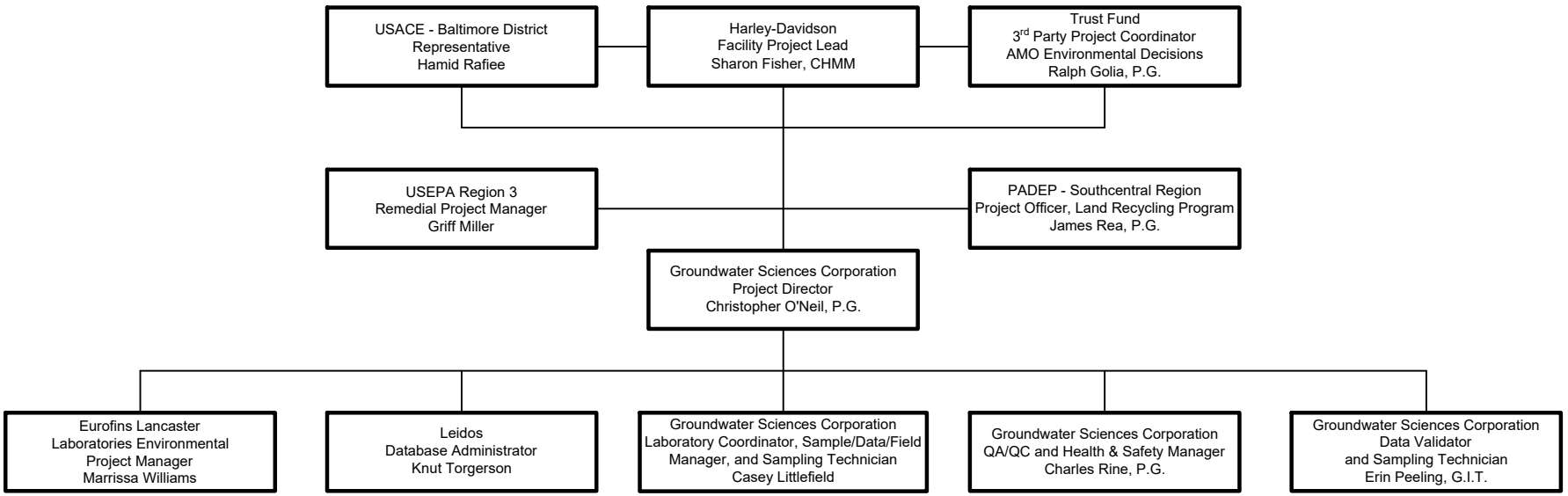
# Figures

Figure A-1

# Project Organization Chart

Quality Assurance Project Plan (QAPP)

Former York Naval Ordnance Plant - York, PA

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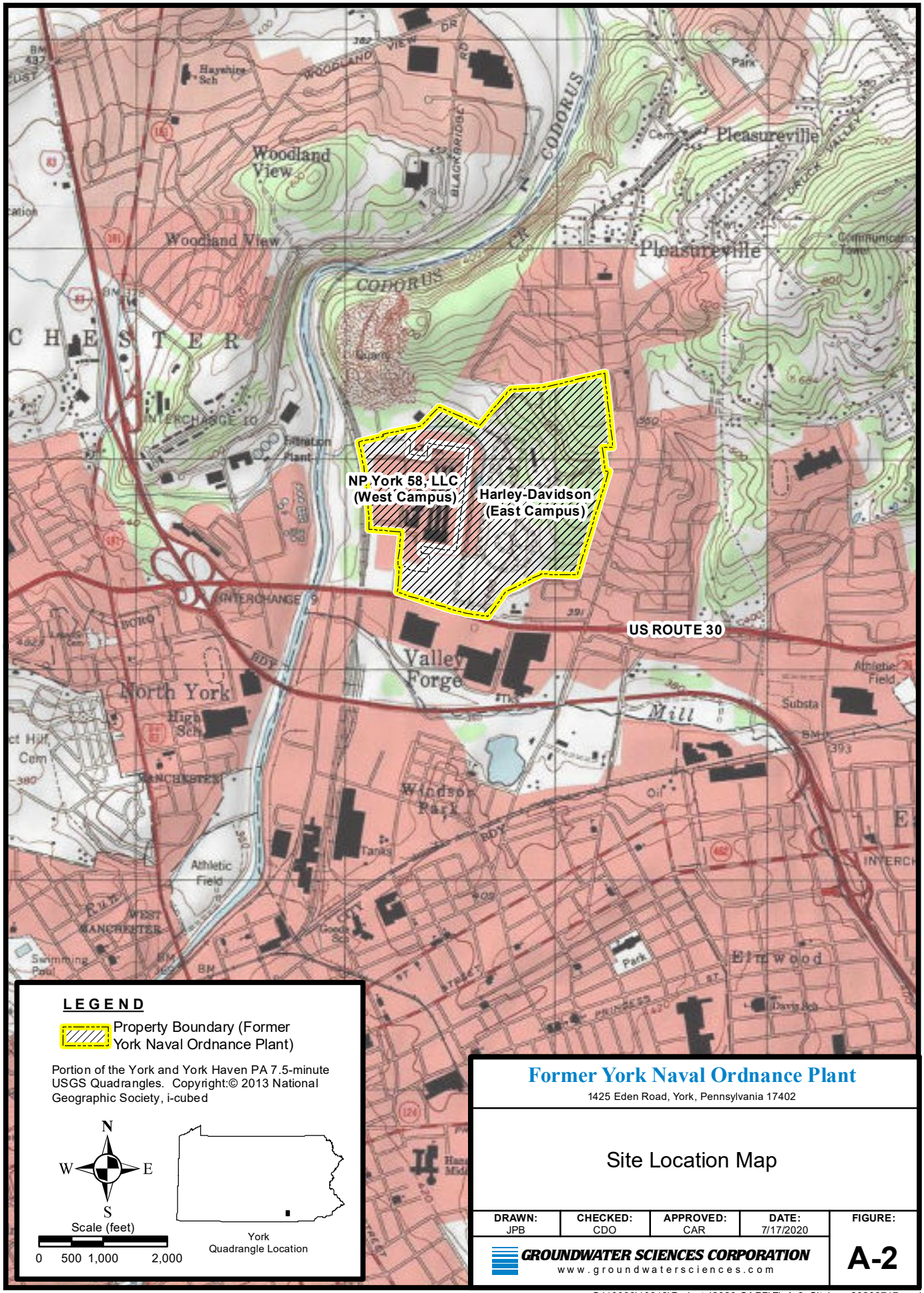


# Former York Naval Ordnance Plant

1425 Eden Road, York, Pennsylvania 17402

## Site Location Map

| DRAWN: | CHECKED: | APPROVED: | DATE: | FIGURE: |
|---|---|---|---|---|
| JPB | CDO | CAR | 7/17/2020 | A-2 |

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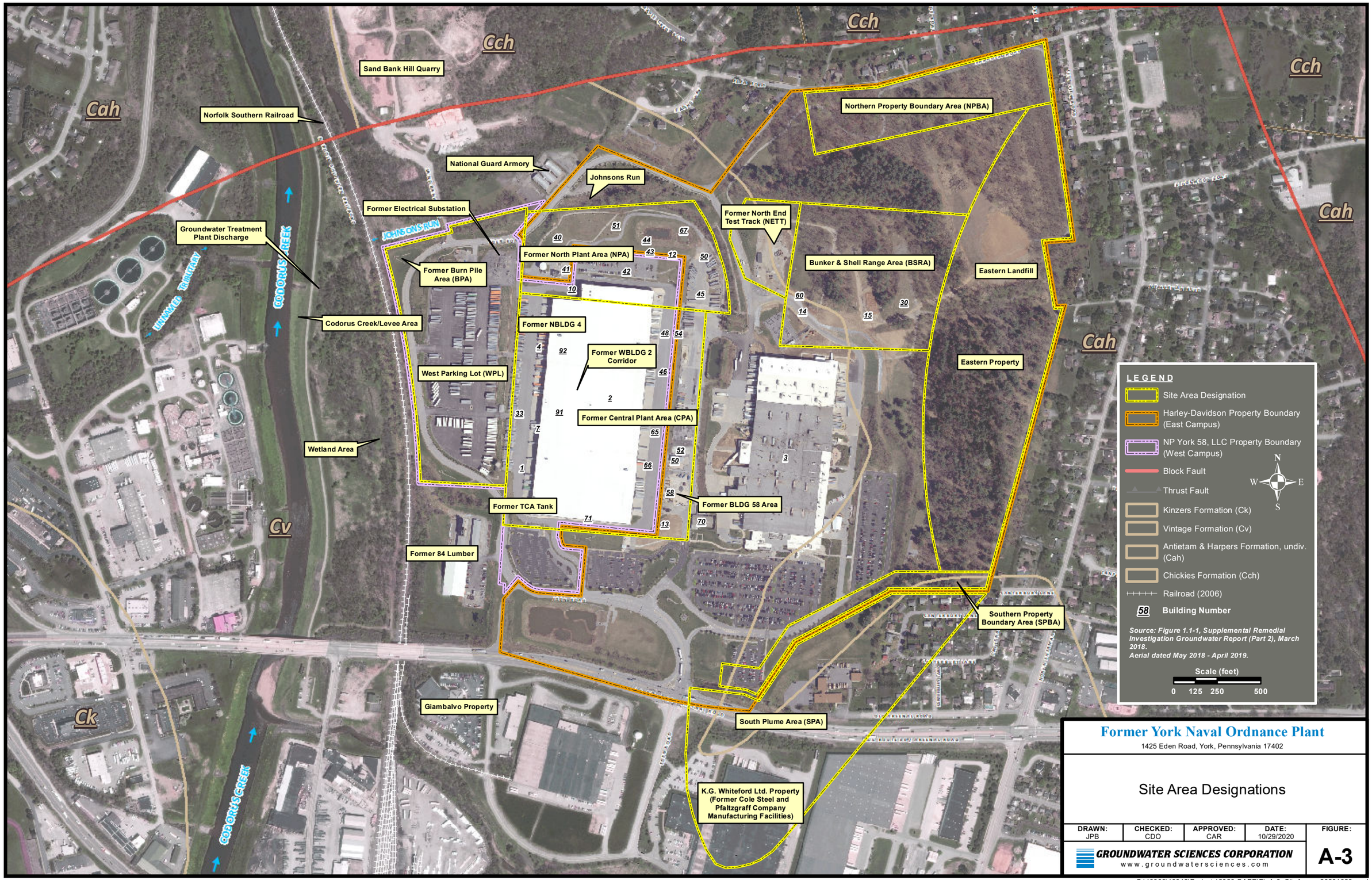


# Former York Naval Ordnance Plant

1425 Eden Road, York, Pennsylvania 17402

## Site Area Designations

| DRAWN: | CHECKED: | APPROVED: | DATE: | FIGURE: |
|---|---|---|---|---|
| JPB | CDO | CAR | 10/29/2020 | A-3 |

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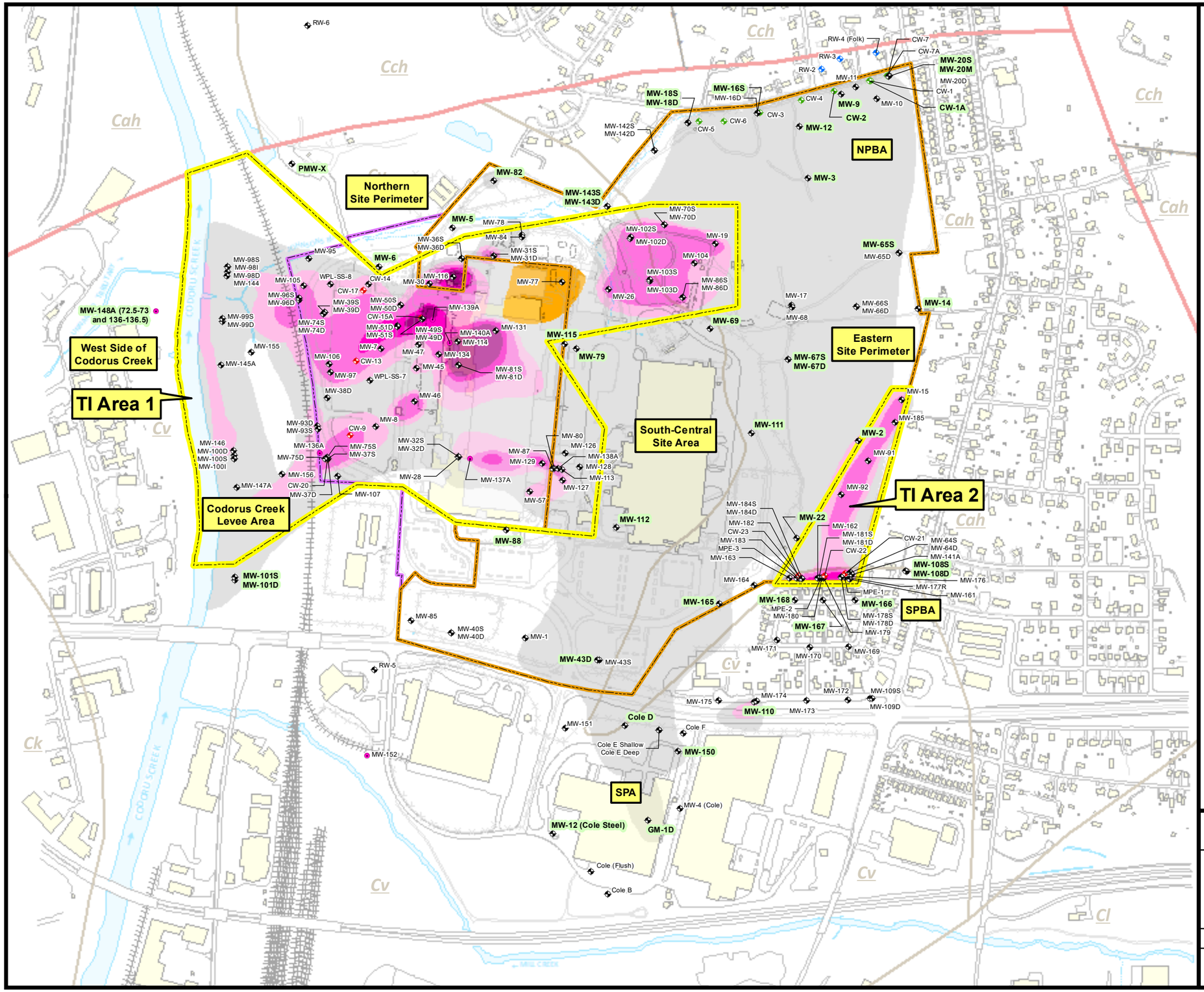


**LEGEND**

- Active Extraction Well
- Inactive Extraction Well
- Monitoring Well
- Residential Well
- Waterloo™ Monitoring Well
- Technical Impracticability (TI) Boundary
- Harley-Davidson Property Boundary (East Campus)
- NP York 58, LLC Property Boundary (West Campus)
- Block Fault
- Thrust Fault
- Ledger Formation (Cl)
- Kinzers Formation (Ck)
- Vintage Formation (Cv)
- Antietam & Harpers Formation, undiv. (Cah)
- Chickies Formation (Cch)
- Existing Building
- Demolished/Slab Remains
- Demolished/Slab Removed
- Paved Road
- Railroad
- Curb or Walkway
- Fenceline
- Existing Stream
- Existing Water Feature
- TCE/PCE Concentration >5 <50 µg/L
- TCE/PCE Concentration >50 <100 µg/L
- TCE/PCE Concentration >100 <500 µg/L
- TCE/PCE Concentration >500 <1,000 µg/L
- TCE/PCE Concentration >1,000 <10,000 µg/L
- TCE/PCE Concentration >10,000 µg/L
- Petroleum Plume
- MW-112 Post-Remediation Care Plan (PRCP) Groundwater Monitoring Location

N W E S

NOTES:
1) TCE/PCE plumes are from the Part 2 SRI for groundwater (GSC, 2018). Concentrations are for the shallow portion of the aquifer (defined as any well monitoring groundwater within approximately 75 feet of the ground surface).
2) Proposed monitoring well (PMW-X) is to be installed and the location is approximate (to be determined based on site access and other considerations).
3) Open intervals for Waterloo™ monitoring well MW-148A sample ports are shown in feet below ground surface.
4) Monitored natural attenuation (MNA) will be used for resource restoration outside of TI boundaries at the site.

Scale (feet)
0 150 300 600

**Former York Naval Ordnance Plant**
1425 Eden Road, York, Pennsylvania 17402

# MNA Area Monitoring Locations

| DRAWN: | CHECKED: | APPROVED: | DATE: | FIGURE: |
|---|---|---|---|---|
| JPB | CDO | CAR | 7/17/2020 | A-4 |

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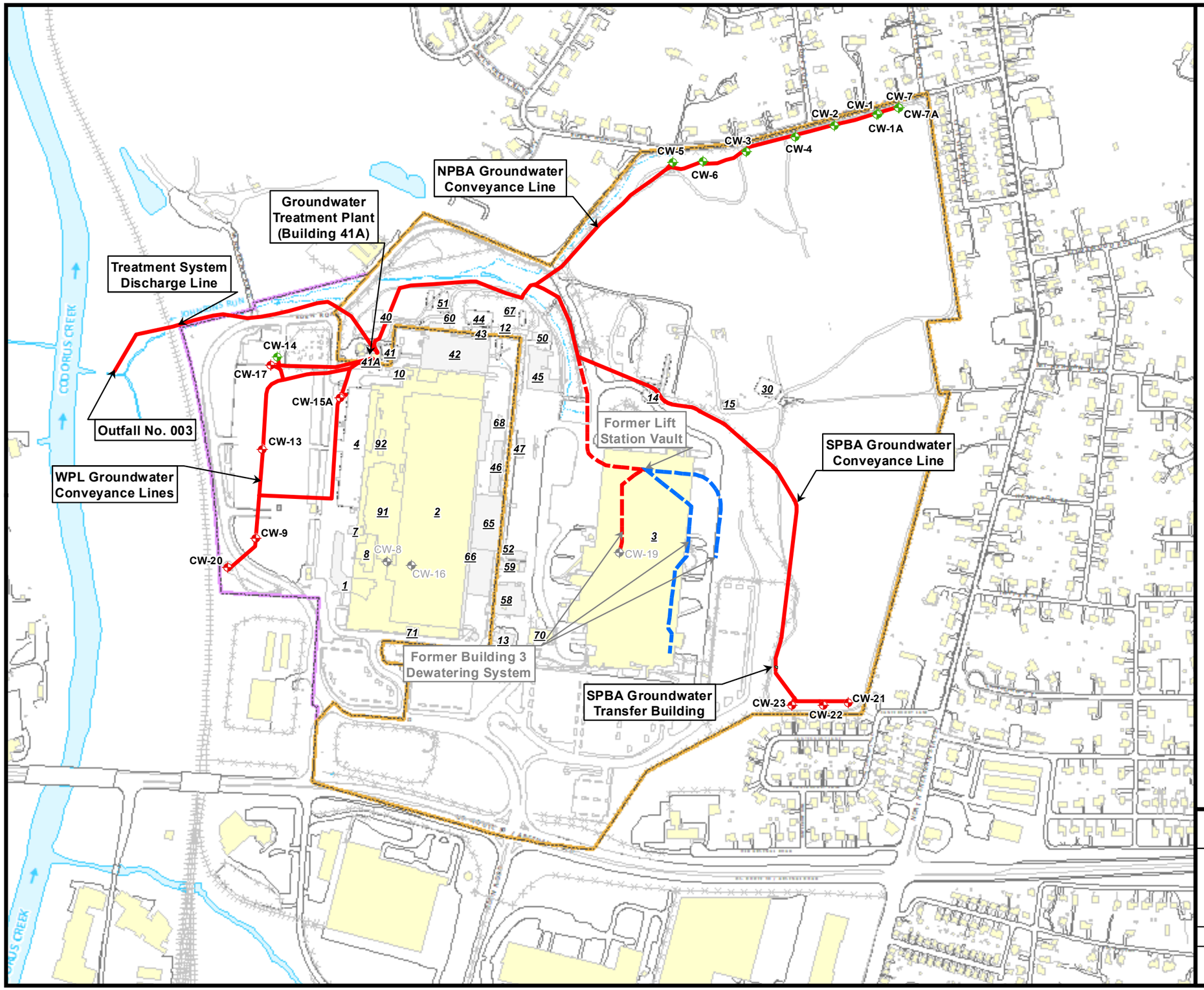


N
W E
S

**LEGEND**

- Active Extraction Well
- Inactive Extraction Well
- Abandoned Extraction Well
- Groundwater Treatment System Conveyance Line
- Former Groundwater Treatment System Conveyance Line
- Former Building 3 Groundwater Dewatering System Interceptor Trench
- Harley-Davidson Property Boundary (East Campus)
- NP York 58, LLC Property Boundary (West Campus)
- Buildings_20190808
- Existing Building
- Demolished/Slab Remains
- Demolished/Slab Removed
- Existing Stream
- Existing Water Feature
- Paved Road
- Railroad
- Curb or Walkway
- Fenceline

NOTE:
The Building 3 lift station vault and the dashed portions of the Building 3 dewatering system lines have been abandoned.

Map Sources:
Harley-Davidson Motor Company Operations, Inc. (York, PA; "New Factory York Site Utility Plan", dated Oct. 5, 2011).
Hydro-Terra Group (Westminster, MD; HD-SPBA-GW SITE PLAN - GSC.dwg, undated).
Leidos (Reston, VA; "Groundwater Treatment System Location", dated Feb. 13, 2011, updated Jan. 5, 2017).

Scale (feet)
0 125 250 500

**Former York Naval Ordnance Plant**
1425 Eden Road, York, Pennsylvania 17402

# fYNOP Groundwater Extraction and Treatment System Map

| DRAWN: | CHECKED: | APPROVED: | DATE: | FIGURE: |
|---|---|---|---|---|
| JPB | CDO | CAR | 7/17/2020 | A-5 |

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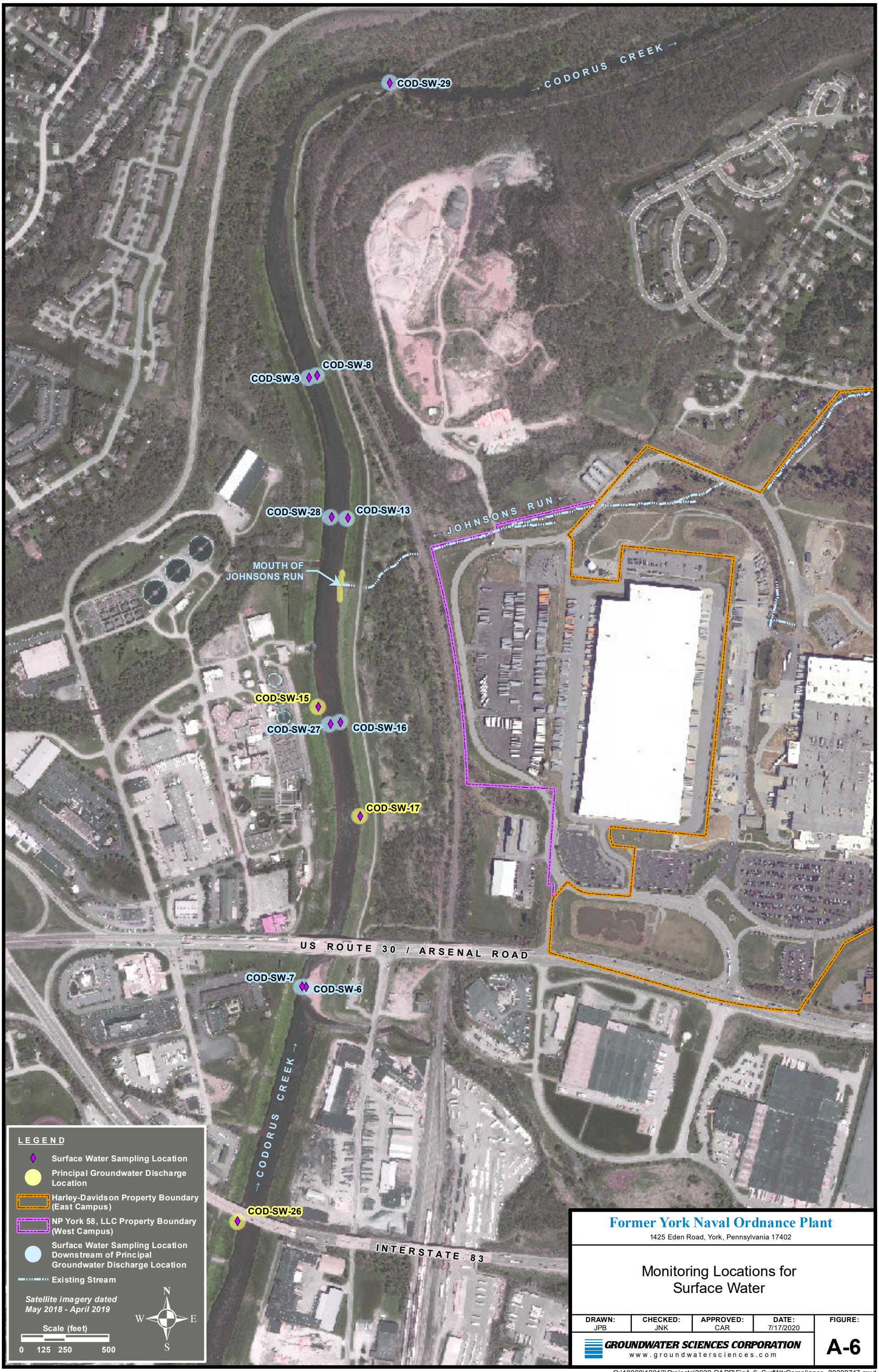
www.groundwatersciences.com

Q:\10000\10012\Projects\2020 QAPP\FigA-5_GWsystemSite_20200717.mxd




**Former York Naval Ordnance Plant**

1425 Eden Road, York, Pennsylvania 17402

# Monitoring Locations for Surface Water

| DRAWN: | CHECKED: | APPROVED: | DATE: | FIGURE: |
|---|---|---|---|---|
| JPB | JNK | CAR | 7/17/2020 | A-6 |

GROUNDWATER SCIENCES CORPORATION
www.groundwatersciences.com

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**Figure C-1**
**QUALITY CONTROL/INSPECTION REPORT**
**Environmental Inspection Activities**
**Former York Naval Ordnance Plant**
**York, Pennsylvania**
**Page 1 of ___**

---

Project No. _____ Day: _____ Date: _____

| | **Weather** | **Temperature** | **Precipitation** | **Wind** |
|---|---|---|---|---|
| **AM** | | | | |
| **Noon** | | | | |
| **PM** | | | | |

1. Key Personnel On-Site
   Harley-Davidson: _____
   _____
   GSC: _____
   _____
   Contractor(s): _____
   _____
   Visitor(s) (include time and purpose of visit): _____
   _____

2. Work Performed Today by Contractors:
   _____
   _____
   _____
   _____
   _____
   _____
   Primary Equipment On-Site: _____
   _____
   _____

3. Health and Safety Meetings, Levels and Activities: _____
   _____
   _____
   _____
   _____
   _____
   _____

**Figure C-1**
**QUALITY CONTROL/INSPECTION REPORT**
**Environmental Inspection Activities**
**Former York Naval Ordnance Plant**
**York, Pennsylvania**
**Page 2 of ___**

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4. Environmental Observations (attach and reference additional information/maps as needed):
   _____
   _____

   List Inspection Type (indicate whether: I-Initial, F-Follow-up or S-Sampling), Location, Observation and Action(s) to be Taken:

| Type | Location | Observation | Action |
|---|---|---|---|
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   List Sample Reference (Chain-of-Custody [COC] No.), Sample ID, Type (S-Soil, GW-Groundwater, SW-Surface Water, W-Waste), Location/Depth Where Collected, Analyses Requested or General Results of Previous Tests:

| COC No. | Sample ID | Type | Location/Depth | Analyses/Results |
|---|---|---|---|---|
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5. Problem(s) Encountered/Corrective Action(s) Taken: _____
   _____
   _____
6. Special Notes/Remarks: _____
   _____
   _____
7. Tomorrow's Expectations: _____
   _____
   _____

   GSC On-Site Inspector: _____ Checked By: _____

# Appendix A

# GSC Field Documentation Forms

## Groundwater Sciences Corporation
## Field Data Table

Site: _____ Project: _____ Method: _____ Sampler: _____

| Well | Sampling Date | Sampling Time | pH | Specific Conductivity | Temperature | Interval |
|---|---|---|---|---|---|---|
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**Calibration Record**

**Instrument: _____**

Serial #: _____

| | | | pH | | Conductivity | | Calibrated By |
|---|---|---|---|---|---|---|---|
| Date | Time | Temp. | Initial | Corrected | Initial | Corrected | |
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Groundwater Sciences Corporation
2601 Market Place Street, Suite 310
Harrisburg, Pennsylvania 17110-9307

GROUNDWATER SCIENCES CORPORATION

# Groundwater Field Data Sheet

## Low-Flow Groundwater Purging and Sampling

### General Information

Site/Location: _____
Project Number: _____
Sample Location/Well ID: _____
Surface Completion: _____
Physical Condition: _____

### Purging Information

Date: _____
Personnel: _____
Total Depth: _____
SWL: _____
Well Diameter: _____
Well Volume: _____
Pump Type: _____
Pump Depth: _____
Start Time: _____
Stop Time: _____
Purge Rate: _____

### Sampling Information

Date: _____
Personnel: _____
Sample Time: _____
Sample Rate: _____
Laboratory: _____
Analyses: _____

| Time | pH (S.U.) | SC (mS/cm) | Turb (NTU) | Salinity | DO (mg/L) | Temp (deg C) | ORP (mV) | Depth to $H_2O$ (ft) | NOTES |
|---|---|---|---|---|---|---|---|---|---|
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| | | | | | | | | | |
| NA | +/- 0.1 Unit | +/- 3% | +/- 10% or <10 NTU | | +/- 10% | +/- 1 deg C | +/- 10 mV | < 0.3 ft -- Adj Purge Rate As Necessary | NA |

**GROUNDWATER SCIENCES CORPORATION** *Sampling Field Data Sheet*

## GENERAL INFORMATION

Sample Location/Well ID: _____ Site: _____

Manhole/Standpipe/Other (circle one) If Other Explain: _____

Physical Well/Location Condition: _____

## PURGING

Date: _____ Personnel: _____ Air Temp: _____ Skies: _____ Wnd Spd/Drctn: _____

TD: _____ SWL: _____ TD – SWL _____ Required Purge Vol: (TD – SWL x C F (below)) _____ (gal)

Method: _____ Start Time: _____ Stop Time: _____ Volume Purged: _____ (gal)

Water Level at End of Purge (WLEP): _____ Total Purge Time: _____ (minutes)

***Conversion Factors (well diameter – gallons per foot of water):*** *( ¼ $d^2$ π) x 7.4805 = gal/ft (d = well diameter in feet)*

***1 Vol:*** ½" – 0.01; ¾" – 0.023; 1" – 0.041; 1 ¼" – 0.063; 1 ½" – 0.092; 2" – 0.163; 3" – 0.367; 4" – 0.653; 6" – 1.47; 8" – 2.61; 10" – 4.08; 12" – 5.88

***3 Vol:*** ½" – 0.03; ¾" – 0.069; 1" – 0.123; 1 ¼" – 0.189; 1 ½" – 0.276; 2" – 0.489; 3" – 1.101; 4" – 1.959; 6" – 4.41; 8" – 7.83; 10" – 12.24; 12" – 17.64

## SAMPLING

**Sample ID:** | | | | | | | | | | | | |

Sample Type: (circle one) Groundwater Surface water Other _____

Date: _____ Personnel: _____ Air Temp: _____ Skies: _____ Wnd Spd/Drctn: _____

WL Recovery (WL/time): _____/_____; _____/_____; _____/_____; _____/_____; _____/_____

Sampled Depth Interval: _____ to _____ feet (gs or toc) Sampling Method: _____

Field Data (in well or in line): SAMPLE TIME: _____

| *Depth* | *pH* | *Sp. Cond.* | *Temp* | *DO* | *Eh* | *Clarity* |
|---|---|---|---|---|---|---|
| | | | | | | |

***Sampler's Signature:*** _____ Was Sample collected w/in 2 hrs of End of Purge? YES NO

## LABORATORY INFORMATION

Laboratory: _____ Turnaround Time (TAT): _____ Number of Containers: _____

Date Shipped or Delivered: _____ Method of Delivery to Laboratory: _____

Analyses Requested:

- ☐ PA DEP Unleaded Gasoline
- ☐ PA DEP Leaded Gasoline
- ☐ PA DEP Diesel/Heating Oil
- ☐ PA DEP Used Motor Oil
- ☐ AACM Pesticides
- ☐ Nitrate
- ☐ Nitrite
- ☐ Ammonia
- ☐ PP VOCs
- ☐ PP SVOCs
- ☐ PP Metals
- ☐ PP Pest/PCBs
- ☐ TCL VOCs
- ☐ RCRA Metals
- ☐ TCLP Metals
- ☐ TCLP VOCs
- ☐ Attached Sheet
- ☐ 124&135 TMB
- ☐ N&Sec Butbz
- ☐

OTHER: _____

## ADDITIONAL NOTES

# Well Development Field Data Sheet

Well _____ Site _____

Development Personnel _____ Pump Type _____

Casing Diameter _____ DTW _____ DTB _____

Well Volume = _____ gal/ft* x (DTB - DTW) _____ = _____ gal

x3 = _____ gal

x10 = _____ gal

| Date | Time | WL (ft) | Flow Rate | Temp | pH | ΔpH (units) | Cond. | ΔCond. (%) | Total Volume | Remarks & Clarity |
|---|---|---|---|---|---|---|---|---|---|---|
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*gal/ft: 1" = 0.041; 1.5" = 0.092; 2" = 0.163; 3" = 0.367; 4" = 0.65; 6" = 1.47; 8" = 2.61

or

gal/ft calculation: $(1/4d^2\pi h) \times 7.4805 =$ _____ gal/ft (h = 1; d = diameter in feet)

*Revised 8/25/95*

**SOIL GEOLOGIC WELL LOG**

Project No. _____

Total Depth _____

Depth to S.S. Refusal _____

Depth to Competent Bedrock _____

Hole Diameter _____

Notes _____

Boring No. _____

Location _____

_____

_____

Driller _____

Logged By _____

Drilling Began _____

Drilling Completed _____

Well Construction Completed _____

| Depth | Blow Counts | RQD ft/ft | Recv | Sample # / Run # | SAMPLE DESCRIPTION Name: GRADE, DENSITY, MOISTURE, COLOR, STRUCTURE (USCS), ETC. | Volatile Scan | Graphic: Lith. | Graphic: Well Construction | Depth |
|---|---|---|---|---|---|---|---|---|---|

Groundwater Sciences Corporation

# Rock Classification Sheet

Project _____ Job. No. _____ Sheet _____ of _____

Site Area _____ Drill Hole No. _____

Contractor _____ Driller _____ Classified By _____ Date _____ Coordinates N/S_____

E/W_____

| | Drilling History | | | | | Geologic Characteristics | Engineering Characteristics | | Groundwater |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Run No. | Core Rec. | Remarks | Well Constr. | Graphic Log | Description | Description | Discont. | Static Water Level Time & Date |
| | | | | | | | | | |

USE PRINTED 2-PART FORM

Groundwater Sciences Corporation

**Daily Drilling and Monitoring Well Construction Report**

**Date** _____ **Page** _____ **of** _____

**Project Number** _____

**Project Name** _____

**Supervising Geologist(s)** _____

**Drilling Company** _____

**Rig Type/Number** _____

**Driller** _____

**Driller's Helper(s)** _____

**Daily Drilling Log**

| Well/Boring Number | Location | Type (HSA/Air) | Drilling (Ft/Dia.) | Core (Ft/Dia.) | Samples (No./Dia.) | Comments |
|---|---|---|---|---|---|---|
| | | | | | | |
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**Daily Activities Log**

| Time | Description | Hours | Time | Description | Hours |
|---|---|---|---|---|---|
| 0630 | | | 1345 | | |
| 0645 | | | 1400 | | |
| 0700 | | | 1415 | | |
| 0715 | | | 1430 | | |
| 0730 | | | 1445 | | |
| 0745 | | | 1500 | | |
| 0800 | | | 1515 | | |
| 0815 | | | 1530 | | |
| 0830 | | | 1545 | | |
| 0845 | | | 1600 | | |
| 0900 | | | 1615 | | |
| 0915 | | | 1630 | | |
| 0930 | | | 1645 | | |
| 0945 | | | 1700 | | |
| 1000 | | | 1715 | | |
| 1015 | | | 1730 | | |
| 1030 | | | 1745 | | |
| 1045 | | | 1800 | | |
| 1100 | | | 1815 | | |
| 1115 | | | 1830 | | |
| 1130 | | | 1845 | | |
| 1145 | | | 1900 | | |
| 1200 | | | 1915 | | |
| 1215 | | | 1930 | | |
| 1230 | | | 1945 | | |
| 1245 | | | 2000 | | |
| 1300 | | | | | |
| 1315 | | | | | |
| 1330 | | | | | |

**Materials Used**

| Well/Boring | Screen (ft./dia.) | Riser (ft./dia.) | Sand | Bentonite | Steel Casing | Other Materials |
|---|---|---|---|---|---|---|
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_____ _____

**Signature - GSC** **Signature - Contractor**

# Appendix B

# Field Change Request and Nonconformance Report Forms

**FIELD CHANGE REQUEST (FCR)**

FCR NO. _____ DATE INITITATED _____

PROJECT _____

CONTRACT NO. _____

**REQUESTOR IDENTIFICATION**

NAME _____ ORGANIZATION _____ PHONE _____

TITLE _____ SIGNATURE _____

**BASELINE IDENTIFICATION**

BASELINE(S) AFFECTED ☐COST ☐SCOPE ☐MILESTONE ☐METHOD OF ACCOMPLISHMENT

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) _____

DESCRIPTION OF CHANGE:

**JUSTIFICATION:**

**IMPACT OF NOT IMPLEMENTING REQUEST:**

**PARTICIPANTS AFFECTED BY IMPLEMENTING PLAN:**

**COST ESTIMATE** $_____ ESTIMATOR SIGNATURE _____

DATE _____ PHONE _____

PREVIOUS FCR AFFECTED ☐YES ☐NO IF YES, FCR NO. _____

PROJECT MANAGER _____ DATE _____

QA SPECIALIST _____ DATE _____

H&S MANAGER SIGNATURE (IF APPLICABLE) _____ DATE _____

**NONCONFORMANCE REPORT (NCR)**

**Page ___ of ___**

| DATE OF NCR | NCR NUMBER |
|---|---|
| LOCATION OF NONCONFORMANCE | |
| INITIATOR (NAME/ORGANIZATION/PHONE) | FOUND BY |
| | DATE FOUND |
| RESPONSIBLE ORGANIZATION/INDIVIDUAL | PROGRAM |
| | PROJECT |

**DESCRIPTION OF NONCONFORMANCE:** CATEGORY _____

_____ _____ ☐ ☐

INITIATOR SIGNATURE DATE QA/QC OFFICER DATE CAR REQ'D YES NO

**DISPOSITION:**

PROBABLE CAUSE:

ACTIONS TAKEN TO PREVENT RECURRENCE:

PROPOSED BY: _____

NAME DATE

**JUSTIFICATION FOR ACCEPTANCE:**

INITIATOR: _____

NAME DATE

# Appendix C

# Appendix C-1 - Eurofins Lancaster Laboratories Environmental, Environmental Quality Policy Manual v. 17, July 17, 2019*

# Appendix C-2 – Eurofins Lancaster Laboratories Environmental, National Environmental Laboratory Accreditation Program (NELAP) Certifications*

** - in portable document format (PDF) on the USB Drive attached to the hard copy of this report.*

| | | |
|---|---|---|
| eurofins | Always check on-line for validity.<br>**Environmental Quality Policy Manual** | Level:<br>**Quality Manual** |
| Document number:<br>**QA-QM11872** | | |
| Old Reference:<br>**1-P-QM-GDL-9015377; DOD - EQPM** | | |
| Version:<br>**17** | | Organisation level:<br>**5-Sub-BU** |
| Approved by: **UDM6**<br>Effective Date **17-JUL-2019** | Document users:<br>**4_EUUSLA_ELLE_All_Support, 4_EUUSLA_ELLE_All_Technical** | Responsible:<br>**5_EUUSLA_Env Quality Assurance_All** |

**Title Page**

# Environmental Quality Policy Manual

**Eurofins Lancaster Laboratories Environmental, LLC (ELLE)**


2425 New Holland Pike
Lancaster, PA 17601
Phone: 717-656-2300
Fax: 717-656-2681


Reviewed and Approved by:
Vice-President/Technical Director
Quality Assurance Director
(as recorded in the electronic document control system)

## Revision Log

| | **Revision:** 17 | **Effective Date**: This Version |
|---|---|---|
| **Section** | **Justification** | **Changes** |
| Revision Log | Formatting requirement | Removed revision logs up to the previous version |
| Section 2.2 | Correction | Changed timeline for deputies and notification to agencies |
| Section 2.5 | Correction | Notification timelines are dictated by regulatory authority. |
| | | |

| | | |
|---|---|---|
| Section 6.3.4 | Clarification | Calibration/verification is at least annual |

| | **Revision:** 16 | **Effective Date**: 3/19/2019 |
|---|---|---|
| **Section** | **Justification** | **Changes** |
| Revision Log | Formatting requirement | Removed revision logs up to the previous version |
| Throughout Document | No longer applicable | Removed reference to microbiological analyses at ELLE |
| Section 1, 1.2, 2.4, 11.1, 13.2, 13.4 | Compliance to PALA | Added reference to PALA compliance |
| Section 6 | No longer applicable | Removed section 6.4 regarding Micro, renumbered following sections |
| Section 8.4 | Clarification | Added Note: when procedural deviations are not permitted |
| Section 10.1, 13.2 | Enhancement | Added reference to Project Notes |
| Section 10.7 | Enhancement | Accreditation by parameter may be reported via the certification status in LIMS |
| Section 11.1 | Compliance to PALA | Updated from 3 to 5 year retention of internal audit records |

## 1.0 INTRODUCTION

This *Quality Policy Manual* is based upon Eurofins Lancaster Laboratories Environmental LLC's (herein referred to as the laboratory) overall business and management philosophies, mission, and goals. This manual is written to present the policies employed by the laboratory as well as the support departments that serve the environmental laboratories and to comply with the requirements of the National Environmental Laboratory Accreditation Program (also referred to as NELAP or TNI), ISO 17025, the Department of Defense (DoD), Quebec Accreditation Program for Analytical Laboratories (PALA) as well as individual state agency requirements. These policies define the "what" we do with emphasis on management's responsibilities and commitment to quality.

Governing SOPs are in place within the organization, to ensure the proper execution of this policy document (refer to Appendix A). This manual is required reading for laboratory personnel. The most recent and up-to-date *Quality Policy Manual* and all referenced documents are available to all laboratory personnel who work in or support the laboratory. As described within this document, the laboratory actively strives for continuous improvement of its quality systems to better serve our clients.

### 1.1 Mission Statement

The laboratory offers analytical and consulting services in the chemical and biological sciences with comprehensive expertise in environmental laboratory applications. The company mission statement describes the corporate philosophy:

At Eurofins Lancaster Laboratories Environmental LLC we are people working together to serve the health and environmental needs of society through science and technology. We strive to be the recognized leader in all that we do.

Our mission is to provide independent laboratory services in the chemical and biological sciences with excellent quality and service. As a corporate community, we:

- Deliver quality by fully understanding and always meeting the requirements of those we serve.
- Live our values by relating to our clients, coworkers, shareholders, suppliers, and community in a fair and ethical manner.
- Manage our growth and financial resources so we can serve our clients well, provide a satisfactory return to shareholders, and maintain our meaningful and enriching workplace.

## 1.2 Quality Policy

The Executive Management Group recognizes quality as a key element of the laboratory's standard of service. The group supports the laboratory's commitment to quality as defined by NELAP, ISO 17025, DoD, PALA and other regulatory agencies (i.e. states) through the strict adherence to the Quality Policy Statement. The Quality Assurance Director wrote the Quality Policy Statement, with final approval from the laboratory Vice-President. The policy cannot be revised without their approval.

The Quality Policy Statement gives employees clear requirements for the production of analytical data. Employees are trained on the components of the Quality Policy Statement during their first day of orientation. Each employee signs the statement upon hire as agreement to implement the policy in all aspects of their work. Employee agreement to any subsequent revisions of the statement is obtained by documented reading and understanding of an agreement to follow the Quality Manual, which contains the current version of the statement. The statement is as follows:

As an organization, all personnel are committed to high quality professional practice, testing and data, and service to our clients.

We strive to provide the highest quality data achievable by:

- Following all documentation requirements; describing clearly and accurately all activities performed; documenting "real time" as the task is carried out; understanding that it is never acceptable to "back date" entries and should additional information be required at a later date, the actual date and by whom the notation is made must be documented.
- Providing accountability and traceability for each sample analyzed through proper sample handling, labeling, preparation, instrument calibration/qualification, analysis, and reporting; establishing an audit trail that identifies date, time, analyst, instrument used, instrument conditions, quality control samples (where appropriate and/or required by the method), and associated standard material.

- Emphasizing a total quality management process and commitment to continuous improvement which provides accuracy, and strict compliance with agency regulations and client requirements, giving the highest degree of confidence; understanding that meeting the requirements of the next employee in the work flow process is just as important as meeting the needs of the external client.

- Providing thorough documentation and explanation to qualify reported data that may not meet all requirements and specifications, but is still of use to the client; understanding this occurs only after discussion with the client on the data limitations and acceptability of this approach.

- Responding immediately to indications of questionable data, out-of-specification occurrences, equipment malfunctions, and other types of laboratory problems, with investigation and applicable corrective action; documenting these activities completely, including the reasons for the decisions made.

- Providing a work environment that ensures accessibility to all levels of management and encourages questions and expression of concern on quality issues to management.

We each take personal responsibility to provide this quality product while meeting the company's high standards of integrity and ethics, understanding that improprieties, such as failure to conduct the required test, manipulation of test procedures or data, or inaccurate documentation will not be tolerated. Intentional misrepresentation of the activities performed is considered fraud and is grounds for termination.

I understand the expectations and commit to implementation of all applicable policies and procedures and to providing quality data.

## 1.3 Statement of Values

Eurofins Lancaster Laboratories Environmental is a team of people who work together to serve the health and environmental needs of society through science and technology.

At Eurofins Lancaster Laboratories Environmental, our mission is to provide independent laboratory services in the chemical and biological sciences with excellent quality and service. We fulfill our mission by incorporating our values into our work every day.

As a corporate community, we embrace our heritage of integrity and strive to live by the following principles:

- Fairness and honesty in all our relationships

- Mutual trust

- A respect for ourselves and others

- A sense of caring that leads us to act responsibly toward each other and society, now and in the future

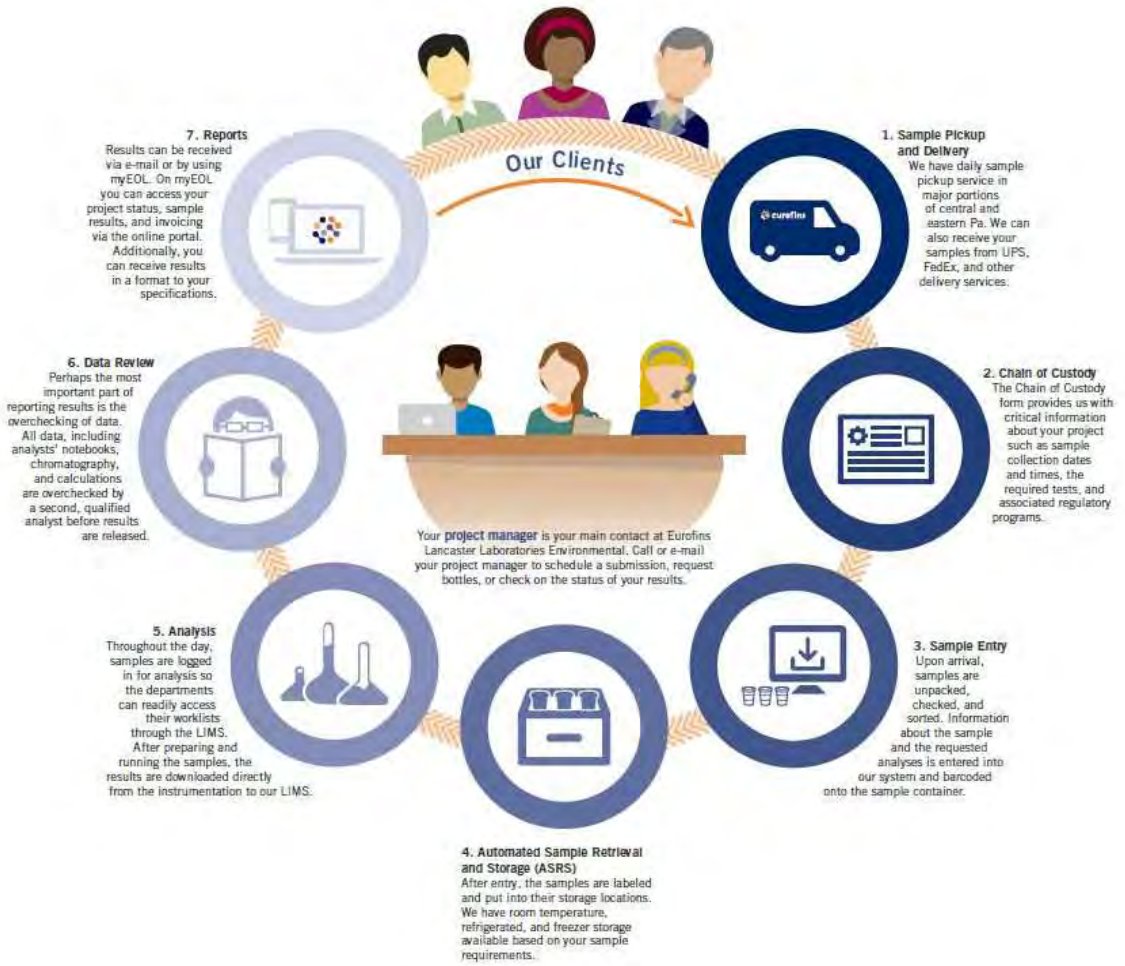
- Loyalty to our clients and one another
- A spirit of open-mindedness as we deal with all
- Dedication to service
- Good stewardship of our resources
- A commitment to flexibility and continuous improvement

We are committed to:

- Delivering quality by fully understanding and always meeting the requirements of those we serve.
- Living our values by relating to our clients, coworkers, shareholders, suppliers and community in a fair and ethical manner.
- Managing our growth and financial resources so we can serve our clients well, provide a satisfactory return to shareholders and maintain our meaningful and enriching workplace.

At Eurofins Lancaster Laboratories Environmental, we each take personal responsibility to live these values in all of our dealings, knowing full well that our pledge may involve difficult choices, hard work and courage.

## 1.4 Sample Flow-Through Diagram




## 1.5 Certifications, Accreditations, and Registrations

Accreditation/Certification is the process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications and/or standards. It is the one generally accepted method by which a laboratory such as ours can demonstrate its capability of generating acceptable, professional, quality test results in those areas in which it claims competence. To this end, we have actively sought accreditation by organizations offering it in those areas relevant to our technical expertise. We strive to ensure that the facilities, equipment, procedures, records, and methods used by the laboratory in the testing of environmental samples are in compliance with the requirements of these standards.

Although organizations offering accreditation differ somewhat in the details of their programs, they generally evaluate laboratories in four basic areas: personnel (adequate staffing, education, training, and experience), physical facilities, instrumentation/equipment, and quality assurance program. This evaluation is performed by one or more of the following procedures: periodic on-site inspections of the laboratory by assessors experienced in technical operations, quality systems, and management; periodic analysis of proficiency test samples; and periodic updating of the laboratory's file to reflect changes in personnel, equipment, or services offered. Some agencies offer reciprocity with other agency programs.

Appendix B lists accreditations and registrations held by the laboratory in support of environmental work. Current copies of all scopes of accreditation are available on the laboratory website https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ and are kept on file in the Quality Assurance Department.

# 2.0 ORGANIZATION AND PERSONNEL

## 2.1 Company Overview and History

The laboratory was founded in 1961 by Dr. Earl Hess in response to a need for high quality technical services by the agricultural and industrial communities in southeastern Pennsylvania. Nourished in a culture of quality and caring about all those associated with the business, the corporation became an industry leader known for innovative business practices and people-friendly policies. The company was independently owned until the retirement of Dr. Hess in 1995. At that time, the laboratory was acquired by a publicly held company, Thermo TerraTech, Inc., a Thermo Electron company. Ownership changed in September 2000, when the laboratory was acquired by Goldner, Hawn, Johnson, and Morrison, Inc. (GHJ&M), a private equity investment firm. In August 2005, the laboratory was acquired by Fisher Scientific under their BioPharma Division. On November 9, 2006, Thermo Electron and Fisher Scientific merged to form Thermo Fisher Scientific. In April 2011, Thermo Fisher Scientific sold the laboratory to Eurofins Scientific. Effective July 1, 2013, the Pharmaceutical and Environmental Divisions were split into separate business entities and the company name became Eurofins Lancaster Laboratories Environmental, LLC. The laboratory continues to operate as an independent laboratory and is incorporated by the State of Delaware.

The laboratory provides a wide array of laboratory services to clients working in environmental industries. We strive to offer high quality technical services in the chemical and biological sciences with personal attention to client needs. These services include chemical analyses and analytical method development. We are, therefore, a technical service company and do not manufacturer or distribute goods. Our "product" is accurate and timely technical information and our continued existence depends on the quality of the services we offer and efficiency with which we deliver them.

### 2.1.1 Business Continuity and Contigency Plans

Various policies and practices are in place to address continuity of business and contingency plans to ensure continued operations or minimal disruption in operations should unplanned events (natural disasters, unexpected management changes, etc.) occur.

Section 2.2 of this document explains the identification of deputies for key management positions. Section 3.3 discusses the disaster recovery plan. Section 6.4 addresses the security and backup of our computer systems. Section 10.8 addresses handling of client records should the company have a change in ownership or go out of business.

## 2.2 Organizational Structure

The laboratory President, in conjunction with the Vice-President and Director of Operations, is responsible for the daily operations of the laboratory. The Vice-President, Duane Luckenbill, is designated as the laboratory's Technical Director relative to accreditations.

The Executive Management Group is defined as the Eurofins Environment Testing US Chairman of the Board and President and Eurofins Lancaster Laboratories Environmental, LLC Vice-President.

The management staff includes directors, managers and group leaders. Organizational charts of the management staff are presented in Appendix C. Individual departmental staff lists are maintained in the company's internal intranet. The Vice-President and Quality Assurance (QA) Director have identified deputies for all key management personnel. Deputies would temporarily fill a role if the primary is absent for more than 15 consecutive calendar days. The deputies must meet the same qualifications as the primary person should they be required to take on the responsibilities. Notification to agencies is performed as noted in section 2.5.

### 2.2.1 Technical Director

The Technical Director ensures that the laboratory's policies and objectives for quality of testing services are documented in this quality manual. The Technical Director must assure that the manual is communicated to, understood, and implemented by all personnel concerned.

### 2.2.2 Quality Assurance Director

The Quality Assurance Director ensures that the quality system is followed at all times. The QA Director reports directly to the President thus ensuring corrective actions to quality issues are taken promptly and are separate from business decisions. The QA Director has no direct supervisory responsibility for the generation of technical data to avoid any conflict of interest in administrating the QA program. The QA Director has the final authority to stop work that compromises our integrity or data quality. The situation must be investigated and appropriate corrective action must be put in place before the QA Director will authorize the resumption of work. The specific duties of the QA Director are communicated in the position qualification description (PQD).

## 2.3 Management Responsibilities

Laboratory management duties are outlined for supervisory personnel using a job plan format, which details each individual's responsibilities along with expected results. Typically, management duties include, but are not limited to:

- Personnel hiring and training
- Supervision of personnel
- Providing resources to ensure a work environment free from commercial, financial, and other undue pressures that may adversely affect the quality of their work
- Providing resources to ensure a safe work environment
- Directing daily work operations, including scheduling of work

- Ensuring compliance with the TNI Standards, ISO 17025, Department of Defense Quality Systems Manual, regulatory programs, analytical methods, and client requirements.

- Assessing laboratory capacity and workload

- Resource allocation

- Ensuring quality of data produced

- Contributing to the continuous improvement of the laboratory operation

- Ensuring that corrective actions are carried out in an appropriate and agreed upon time-frame.

- Communicating problems and concerns to Senior and Executive Management to enlist a higher level of support for corrections and continuous improvements.

- Maintaining awareness of technical developments and regulatory requirements

## 2.4 Overview of the Quality Assurance Program

Quality Assurance (QA) is responsible for developing planned activities whose purpose is to provide assurance to all levels of management that a quality program is in place within the laboratory, and that it is functioning in an effective manner that is consistent with the requirements of NELAP, ISO 17025, DoD, PALA, and any other regulatory agencies (i.e. states) in which we hold accreditation. Although the laboratory is a wholly owned subsidiary of Eurofins Scientific, the Quality Assurance and Quality Systems operations described in this manual are specific to the Lancaster site and associated service centers.

The administration of the QA program is the responsibility of the QA Director in cooperation with all levels of management.

The QA program, as directed by executive management, was established to:

- Ensure accountability, accuracy, and traceability of all analytical data generated.

- Ensure that current regulatory, agency, and client requirements are being met.

- Ensure that operating procedures are in place to minimize the possible loss, damage, and tampering with data, in addition to ensuring that raw data is stored in a secured area and is maintained by designated archivists and/or system administrators.

- Ensure that curriculum vitae (CVs) and training records are maintained to document that staff members have the necessary education, training, and experience to perform their job responsibilities and functions.

- Ensure that regulatory training is provided to applicable employees on a routine and ongoing basis.

- Ensure that all procedures are available, controlled, and current.

- Ensure that documentation demonstrates that procedures are carried out in a compliant and effective manner.

- Ensure that all equipment and instrumentation is qualified, maintained, and calibrated, as appropriate, in accordance with written standard operating procedures.

- Ensure that all significant laboratory problems are investigated, evaluated for root cause and corrective action is put in place as documented

- Ensure that an internal audit program is in place to provide on-going monitoring and confirm that laboratory personnel are adhering to standard operating procedures and applicable regulations.

- Ensure that quality issues are brought to the attention of management in a timely manner.

## 2.5 Quality Assurance Responsibilities

The QA Director assigns tasks with input from the company President. The primary responsibilities of QA include, but are not limited to the following:

- Oversee the laboratories' internal audit program which consists of various audit types and applies to all laboratory activities (technical and administrative).

- Review and approve standard operating procedures and analytical methods.

- Review and approve validation documentation.

- Review non-conforming quality control data

- Perform tracking and trending of quality measurements and report the status and effectiveness of the quality system to management.

- Approve investigation and corrective action reports (ICARs) and audit responses to ensure that they are completed in a timely manner, evaluated for root cause, that corrective actions are implemented as needed and to monitor corrective action for effectiveness.

- Host client and regulatory agencies during facility audits and follow-up to any cited deficiencies.

- Provide regulatory guidance to the laboratory and support areas.

- Monitor Good Laboratory Practice (GLP) regulatory activities.

- Communicate quality issues to management in a timely manner

- Provide and/or coordinate on-going regulatory training (e.g., Ethics, GLP).

- Participate in the vendor and supplier approval process, including subcontractors.
- Review analytical data for compliance with our procedures.
- Prepare and review QA project plans (QAPPs) as required by EPA and client projects.
- Maintain and update this *Quality Policy Manual*.
- Maintenance of the Laboratory's accreditations, including but not limited to, administration of the proficiency test sample programs, both single and double blinds.
- Communication to the relevant regulatory authorities is required when there are management or facility changes that impact the laboratory. Changes in the technical director must be communicated within a period of time and in the manner dictated by each regulatory authority.

## 2.6 Communication of Quality Issues to Management

The QA Department is responsible for preparing reports to Management to keep them apprised of outstanding quality issues. Reports to management foster communication, review, and refinement of QA activities to ensure that the QA program is adequate to meet regulatory and the laboratory's quality objectives. The following reports are used to communicate quality issues and include, but are not limited to:

- Internal, client, and agency audit reports and corrective action plans
- Proficiency test reports
- Investigation and corrective action reports
- Monthly quality status reports
- Plans for corrective action

Upon review of quality issues, management and/or QA may issue a stop work notice if an issue indicates the potential for a problem on a broader scale with an analysis. The investigation would need to be completed and the issue resolved before work could continue. The information is tracked through our Investigation and Corrective Action Report (ICAR) process.

## 2.7 Personnel Qualifications and Responsibilities

The position qualification descriptions (PQDs) for senior staff (Vice-President/Technical Director, QA Director, Laboratory Operations Director, Science Officer, Technical Manager and Support Manager) are provided in Appendix D.

PQDs for all positions are maintained in the laboratory's document control system. Resumes (curricula vitae or CVs) are maintained on file for all staff in the training record system. Responsibilities are outlined in the PQD at the position

level. Individual responsibilities and expectations are documented in each employee's job plan. The job plan is evaluated and discussed with each employee on an annual basis. The job plan is a confidential personnel record.

## 2.8 Relationship of Functional Groups and Quality Assurance Program

In addition to this *Quality Policy Manual*, aspects of the QA program are documented in a series of standard operating procedures that support the proper execution of this document. Technical operation procedures with required quality components are also in place. A list of the titles of relevant SOPs is provided in Appendix E. There are a variety of mechanisms used to communicate requirements and verify compliance with the QA program, including:

- Management requires that all employees read and be trained in the policies and SOPs that are pertinent to their jobs.

- Employee job plans define individual responsibilities. All job plans include QA aspects, and performance is reviewed annually.

- Laboratory audit findings are circulated to management and require a response and follow-up to items needing corrective action.

- Cross-functional meetings, including representatives from QA, Client Services, Marketing, management, and technical operations are held regularly to review specific projects and quality issues.

## 2.9 Balancing Laboratory Capacity and Workload

Evaluating laboratory capacity to perform specific projects is the responsibility of the Vice-President, laboratory directors and managers, and the Client Services director and manager. These responsibilities are documented in the individual job plans for these positions.

The laboratory facilities and staff size are very large compared to other laboratories serving the environmental industry. Many analysts are cross-trained to perform a variety of tests, and there is redundant equipment available in case of malfunctions. This minimizes the need to evaluate small and medium size projects against capacity available to complete them. Large projects are reviewed against capacity estimates before bids are submitted to ensure that the client's analysis schedule is met.

Regularly scheduled meetings are held with upper management, laboratory middle management, Client Services and QA personnel to review progress with current projects, as well as special requirements of new work scheduled for the laboratory.

Laboratory capacity and backlog is tracked on a continuous basis using information from the Laboratory Sample Information System (LIMS) including turnaround time, and work in-house.

## 2.10 Identification of Approved Signatories

All data is reviewed and verified by a second level reviewer at the department level prior to release to the client. Based on complexity or regulatory needs, some projects are designated for secondary (technical and/or QA) review of the Analysis Reports and/or data deliverables. Approved signatories for these secondary reviews are defined in the SOP

on Data Entry, Verification, and Reporting. Directors, managers, group leaders, and other employees (such as QA, project managers, and senior technical staff) are designated, through specific LIMS roles/permissions, to approve/release Analysis Reports. Request for approval of an employee to approve/release reports must be made through the QA and IT Departments. These authorized personnel are designated in the LIMS with the "approve reports" role. A list of the employees with this LIMS permission can be obtained from IT.

## 2.11 Personnel Training

The experience and training received by personnel is of great importance to our clients and regulatory agencies. Curricula Vitae (CVs) and on-going training documentation are available to demonstrate how personnel have been prepared for the tasks they routinely perform. To ensure the highest quality of services at the laboratory, training programs and plans are developed to match skills with job functions. Accurate training documentation is the responsibility of both the employee and their supervisor. On a routine basis, the supervisor reviews and approves training documentation to verify that it is complete and current.

Training requirements can be met through education, prior job experience, internal and external training classes, on-the-job training, training modules, procedure reading, or any combination thereof, to enable the person to perform assigned job functions and meet regulatory compliance.

Each analyst training to perform a new analysis is required to perform an initial demonstration of capability and meet the requirements for accuracy and precision before working independently on the test method. Typically, this is accomplished by the successful analysis of four known samples (i.e. a quad study). However, there are certain tests performed that are not required by the mandated test method or regulation to perform the above procedure since they are not conducive to spiking . In this case, the analyst's documentation of proficiency is achieved by documentation of having read, understood, and agreed to follow the SOP as written, on-the-job training and observation by a senior analyst.

Management personnel are responsible for planning ongoing professional growth and development activities for an employee through on-the–job training and/or internal and external training courses so an employee can maintain a current skill set to match job responsibilities.

An annual performance review based on job responsibilities, accountabilities, objective measures, and pre-defined standards is completed by management personnel for each employee. This assessment is documented and maintained. Input is obtained from other managerial personnel as needed. Performance reviews are maintained in the employee's personnel file and are confidential.

### 2.11.1 New Hire Training

New employees are oriented as part of a year-long process that is designed to make the employee feel welcome and comfortable by defining our culture, traditions, philosophies, and work practices. During the orientation process an employee learns about personnel and safety policies and business strategies in addition to quality, ethics, and customer satisfaction expectations through a formal process administered by collaboration of our Human Resources staff, QA, and the management of the employee's assigned department.

New employees are required to attend "core" technical orientation, as applicable, which can entail the participation in training module exercises, short session attendance, and/or other skill training specific to their assigned department or job function. Additional job-specific training required for an employee is based upon their assigned duties and is identified by their supervisor. Technical orientation occurs during the first few weeks of employment.

Note: Seasonal and temporary employees have reduced “core” training requirements based on the assigned tasks and as defined by QA, Safety, and the assigned department management.

The orientation process is designed to enable employees to initiate and take responsibility for their personal and professional career growth at the laboratory. The orientation process is conducted without regard to employee race, color, creed, national origin, sex, age, or disability in accordance with the laboratory’s Employee Equal Opportunity (EEO) policy.

### 2.11.2 Ongoing Training

Refresher and ongoing training occurs through various means, which include but are not limited to, training in or independent review of new/updated standard operating procedures and work instructions; on-going regulatory training; in-house or off-site classes or seminars. The goal of this training is to ensure that employees remain current with changes to laboratory systems and practices, as applicable to their job function. Retraining and re-qualification activities occur as directed by procedures or regulations. Employees are retrained if an issue or investigation warrants that retraining is a necessary corrective action. Management directs when employee re-training is required, and the extent of the re-training.

## 2.12 Regulatory Training

The QA Department is responsible for coordinating and conducting initial and ongoing regulatory training (i.e., Ethics, GLP) for all applicable laboratory and support personnel. It is the responsibility of management within each department to ensure that personnel attend the required training sessions.

The choice of training format and topics covered for ongoing regulatory training is left to the discretion of QA and the trainer. All training sessions reinforce the concepts in the regulations as they are relevant to the laboratory.

Whenever possible, after training is completed, a demonstration of proficiency of the training topic is given. The demonstration of proficiency is generally in the form of a quiz although other demonstrations of proficiency are acceptable depending on the scope and content of the training. If necessary, training is presented and/or repeated one -on-one with individuals who do not demonstrate proficiency in the training topic. This is performed by QA in conjunction with applicable laboratory management personnel.

## 2.13 Employee Safety

The laboratory, being mindful of its responsibilities as an employer and active corporate citizen, has established the following objectives of its safety program:

- Provide a safe environment for its employees, visitors, and the community surrounding its place of business.
- Provide ongoing safety training for employees.
- Provide all necessary facilities and equipment to ensure the safety of its employees and to minimize all chemical exposure during the normal performance of their required tasks, and to take all necessary precautions to safeguard the surrounding environment.
- Provide periodic health physicals for employees.

- Foster and encourage safe operations and a proper safety attitude on the part of our employees through general operations and systems, training, and the *Chemical Hygiene Plan* (CHP).

The CHP addresses various aspects of our safety program in greater detail.

A Safety Committee works to enhance our overall safety program. The committee meets on a routine and ongoing basis and its specific responsibilities are detailed below:

- Review accident and incident reports. Make recommendations for methods of prevention to eliminate further accidents.

- Promote safety awareness and distribute safety information by various means (e.g., posters, videotapes, pamphlets, and books). Use internal communication channels to promote safety awareness.

- Enhance and recommend safety-training programs for all employees, as necessary.

- Maintain up-to-date information on employee concerns that are safety related. Offer input and information to the Chemical Hygiene Officer and/or Safety Officer, as needed.

## 2.14 Client Services/Project Management Responsibilities

Members of the laboratory Client Services/Project Management Group are responsible for organizing and managing client projects. Clients are assigned a project manager (a.k.a. “CSR”) who serves as their primary contact at the laboratory. It is the project manager’s responsibility to act as the client advocate by communicating client requirements to laboratory personnel and ensuring that clients provide complete information needed by the laboratory to meet those requirements. All client verbal communications are documented by the project manager in a controlled notebook. In addition to information management, Project Management responsibilities include:

- Coordinating and preparing proposals in conjunction with technical staff.

- Confirming certification status.

- Assisting QA with hosting client visits and audits.

- Coordinating and communicating turnaround time (TAT) requirements for high priority samples/projects.

- Answering common technical questions, facilitating problem resolution.

- Providing clients with sample status report or results (partial reports) prior to receipt of the final Analysis Reports.

- Scheduling sample submissions, sample containers orders, and sample pick-up via the laboratory courier service.

- Informing the client of deviation from their contract.

## 2.15 Confidentiality

Strict confidentiality is maintained in all of our dealings with clients. Confidentiality agreements, therefore, are willingly provided.

All employees are required to protect company data, including client names and test results from disclosure to any third party. This policy, as described in the *Eurofins Lancaster Laboratories Employee Handbook*, is provided and presented to employees during their orientation period and whenever revisions are made.

Intellectual property associated with the testing that we perform under contract for a client is the property of the client.

In an attempt to ensure the confidentiality of our systems and procedures within our laboratory, it is our policy to restrict the distribution of our internal procedures to clients. Clients are permitted to review our procedures while on-site as part of an audit or visit. Based on this policy, we would request that any documents viewed would not be shared or made available to any third parties without the permission of the laboratory.

## 2.16 Business Conduct

Our business conduct policy applies to all operations of the company. All employees must avoid involvement in any activities that would diminish confidence in their competence, impartiality, judgment, or operational integrity. All employees must further avoid any relationship with other individuals or organizations that might impair, or even appear to impair, the proper performance of their company-related responsibilities. Employees must avoid any situation that might affect their independence of judgment with respect to any business dealings between the company and any other organization or individual. Any employee who believes that they have such a conflict, whether actual or potential, or who is aware of any conflict involving any other employee must report all pertinent details to the Vice-President or President of the company.
The company's management vigorously enforces this policy and takes prompt and appropriate action, including termination, against any employee found to be in violation.

## 2.17 Operational Integrity

All employees review and sign the Employee Ethics Statement on their first day of employment and annually thereafter. All employees are instructed in regard to how ethics and data integrity are relevant to every position in the company. Employees responsible for generating, handling, or reviewing laboratory data understand that the laboratory mission is to perform all sample processing and testing with the highest level of integrity. Under no circumstances are shortcuts or generating results to suit a client's purpose rather than good scientific practice considered acceptable. Any violation of the laboratory ethics policy results in a detailed investigation that could lead to termination.

All levels of management consider the following activities unacceptable:

- Knowingly recording inaccurate data.

- Fabrication of data without performing the work needed to generate the information. This includes creating any type of fictitious data or documentation.

- Time travel or adjusting clocks on computerized systems to make it appear that data was acquired at some time other than the actual time.

- Manipulation of data for the express purpose of passing system suitability or quality control criteria.

- Selective use of data generated, or not using data that was legitimately generated and has an impact on the outcome of the test.

- Executing significant deviations from approved test methods and procedures without prior approval from the laboratory management, QA, and/or the client.

If an issue does arise which could compromise data integrity, personnel are instructed to perform the following activities:

- Clearly document the situation and maintain all data generated. There is a big difference between poor judgment and fraud. Fraud usually involves intent to conceal an action taken. Therefore, the more documentation that is maintained, the less likely an action is considered fraudulent if further scrutinized.

- When out-of-specification results or quality type issues are detected, all supporting data and relative background information must be documented and presented for management review. Problem resolution and client contact, as applicable, must also be documented.

- Review any questionable situations and decisions with a supervisor.

- Bring a questionable or uncomfortable issue directly to the QA Director or a member of the QA Department as part of our QA open door policy.

- Utilize the company's anonymous Ethics hotline service. See Section 12.4 of this manual.

## 3.0 BUILDING AND FACILITIES

### 3.1 Facility

The laboratory is located at 2425 New Holland Pike, Lancaster PA. The facility consists of two campuses with multiple buildings located on the North and South sides of Route 23. The two campuses are connected by a pedestrian bridge that spans Route 23.

Building A resides on a commercial plot measuring 13.6 acres on the north side of Route 23. Building A is a three-story building of concrete and steel construction which houses both laboratory space and administrative offices. It is approximately 108,000 square feet and consists of approximately 47,000 square feet of laboratory space; 29,000 square feet of office space; and 32,000 square feet of storage, mechanical, and common areas. On this parcel, adjacent to Building A, sit two chemical storage buildings (Buildings I and L) with a total space of 2500 square feet. In addition, a 10,500 square foot storage building houses stability chambers (Building J). The bottles packing area, which includes preservation of bottles being sent to clients for sampling, is located in a separate 3100 square foot building (Building K). In addition, there are two other buildings (Buildings G and H) with a total square footage of 20,000 square feet that host recycling, storage, workshop and facilities maintenance areas.

The remaining buildings reside on a commercial plot measuring 35.7 acres on the south side of Route 23. These building are connected to the north campus buildings via a pedestrian walkway over the highway.

Building B is a three-story building of steel and concrete construction. It is approximately 56,000 square feet and consists of approximately 17,000 square feet of laboratory space; 14,000 square feet of office space; and 25,000 square feet of storage, mechanical, and common areas.

Building C resides between buildings B and D and consists of a three-story building of steel and concrete construction. It is approximately 47,000 square feet and consists of approximately 25,000 square feet of laboratory space; 6,900 square feet of office space; and 15,100 square feet of storage, mechanical, and common areas. The first floor houses the main lobby and visitor's entrance.

Building D is connected to building C. It is a 78,000 square foot, four-story building of steel and concrete construction and provides approximately 35,000 square feet of laboratory space, 19,000 square feet of office space, and 24,000 square feet of storage, mechanical, common area.

Two small support buildings (Buildings E and F) with a combined space of approximately 800 square feet are used for chemical and waste storage on the south campus.

Building U is a 17,000 square foot stability storage building.

The Lancaster campus also utilized an adjacent parcel for a technical training center. This space is approximately 6,500 square feet.

There is an automatic fire alarm and security system hooked up at the facility. This system is monitored offsite by Choice Security. The entire campus and all exterior doors are monitored by video surveillance.

This facility is serviced by public sewer. Drinking water and the facility sprinkler system is fed by the public water supply. Laboratory process water is supplied via on-site wells. The closest surface water is the Conestoga Creek.

## 3.2 Security

The laboratory is considered a secure facility. All outside doors except the main lobby entrance are locked during normal business hours to prevent unauthorized entry. An attendant monitors this entrance at all times.

During evenings, weekends, and holidays, all doors are locked and Security personnel are on site to prevent unauthorized entry into the building. Video cameras are utilized by Security personnel to monitor the facility grounds.

Every employee is issued a photo ID badge which also serves as a building access card. This badge must be worn at all times while on laboratory property so that employees are easily identified. Access to secured/designated areas within the building is limited to only applicable employees through the building security system. This system is administered by Security staff.

All visitors must register with the lobby attendant and are issued a visitor badge. A staff person must accompany visitors while in the facility. Additional visitor rules are outlined in the *Visitor Security and Safety Rules* pamphlet which is provided to all guests.

Building access cards are issued on a temporary basis to contractors or service technicians (e.g., electricians and plumbers) who need access to the building to work on a project. These cards provide the contractor with limited access during the normal workday and must be returned when the work is complete.

## 3.3 Disaster Recovery

A disaster recovery plan is in place to provide direction for situations where normal operations of the laboratory are not possible. In the event that the building or information technology (IT) systems would be severely challenged, a designated disaster recovery team, which includes Physical Services, Maintenance, Safety, Corporate Management, Public Relations, IT, QA and other applicable personnel depending on the scope of the disaster, would assemble at a designated area to assess the situation and formulate a plan.

The plan addresses, in general terms, how to approach the following issues: electrical failures, heating/air conditioning failures, fire/building evacuation, computer failures, hazardous material spills, injury to employees, pandemic flu, disruption of phone service, and stability chamber failures.

## 3.4 Environmental Monitoring

The air handling system for the main laboratory is specially designed to protect sensitive instruments from harmful vapors to ensure that samples are not contaminated. The Physical Services/Maintenance Group is responsible for maintaining the HVAC and exhaust hood systems. This is particularly important in our instrumentation rooms and computer center where a controlled environment, positive pressure system is maintained.

Most refrigerators, freezers, incubators, and ovens used for analysis are monitored by a computerized system equipped with stationary thermometer temperature probes linked to a master panel that is accessed through a computer. If a unit is outside of a predefined temperature range for a specified period of time, the system alarms. Units not on the computerized system must be monitored manually by recording thermometer temperature readings twice daily.

The laboratory is set up so that there is effective separation between neighboring areas in which there is potential for contamination. Laboratory storage blanks are also used to evaluate conditions under which samples for volatile analysis are stored to monitor for cross-contamination potential. QA provides oversight of the environmental monitoring system.

QA and technical management, in consultation with facilities management as needed, evaluate any issues with environmental conditions that could have adverse effects on data to determine if alternative operational plans (moving testing to alternate laboratories, temporary shutdowns, etc.) need to be employed.

## 3.5 Water Systems

Well water and the public sewer system service the facility. The water system is monitored to meet the permit requirements of the Pennsylvania Department of Environmental Protection.

Reagent water is available to analysts for sample preparation (including dilution) and glassware cleaning. Two reverse-osmosis deionized water systems deliver highly purified water to a sealed fiberglass storage tank. From the storage tank the water is delivered to an ion-exchange-carbon filter system for further polishing. The water is also exposed to an in-line ultraviolet sterilization lamp before being circulated to taps throughout the laboratory.

Daily monitoring and preventive maintenance for the system is the responsibility of the Physical Services Department. Monthly and annual testing is performed as required by regulatory guidance. QA provides oversight of the water system monitoring. In addition, method blanks are tested with each batch (=20) of samples.

## 3.6 Housekeeping/Cleaning

The laboratory is dedicated to providing a clean workplace. A third party professional cleaning service provides routine cleaning of "common areas" that include lavatories, drinking fountains, floors, and windows. Technical staff are responsible for the cleaning (or the contract of cleaning) of specific laboratory work areas.

Detergents used for cleaning contain no to very low levels of metals, pesticides/herbicides/ fungicides, or volatile solvents.

## 3.7 Insect & Rodent Control

Steps are taken to prevent, monitor, and control insect and rodent infestation. The coordination of this program is the responsibility of the Physical Services Department under the direction of QA. An outside service firm is contracted to perform routine and ongoing monitoring of the facility to ensure that preventive measures which are in place are effective and are working as intended.

No insect or rodent control chemical agents in a liquid or vapor form are applied or sprayed in any laboratory building, unless there is no other option, in which case department management must be contacted for approval.

## 3.8 Emergency Power Supply

The laboratory is located at the junction of two power grids that supply electrical service to the facility. If one of the power grids fails, we have the ability to work with the power company to have service switched to the other grid. Various types of diesel and natural gas generators are also available on a standby basis to supply power to selected areas of the laboratory in case of a power outage.

To reduce spikes and spurious line voltage changes to laboratory instruments that can affect results or damage electronic equipment, "conditional power" is fed to these sensitive instruments. All essential computer systems are on uninterrupted power supply (UPS) which is a battery system that provides continuous conditional power for a limited time period in the event of a short power outage.

## 3.9 Facility Changes

Procedures are in place to manage change, ensure communication, and to minimize negative consequences through active participation of personnel involved in a facility change. The goal is to ensure that physical and environmental condition changes are adequately evaluated for impact and reduction of risk to quality, safety, health, employee, environment, property, analytical services, and business operations before and after the change is implemented.

# 4.0 DOCUMENT CONTROL

The administration of the document control system including tracking, filing, updating, and archiving of inactive copies is managed by the laboratory and QA staff using an electronic record keeping system. All documents are maintained and accessed through the electronic system. If an employee or department uses hardcopy versions of the documents, they are responsible to ensure that they are using the active version of the document.

It is our policy to restrict the distribution of our internal procedures to clients and we discourage the distribution of company confidential documents outside of the facility. Clients are permitted to review

our procedures while on-site as part of an audit or visit. Any documents that are distributed are only sent with the approval of QA and are considered "Uncontrolled".

The goals of the document control process are:

- Format documents according to consistent and defined standards
- Review and approve new documents
- Schedule review of existing documents
- Control of document versions and effective dates
- Review and approval of document changes
- Communicate and track employee training on SOPs
- Control document distribution and removal of obsolete documents
- Archive obsolete documents

## 4.1 Hierarchy of Internal Operating Procedures

The hierarchy of controlled procedures at the laboratory is defined. The levels (e.g. Policy, SOPs, work instructions, forms) are identified for each document in the document control system. These procedures and documentation are made available to promote consistency throughout the organization and to meet regulatory requirements. A list of relevant methods and procedures is located in Appendix E. The development of new procedures and the review and updating of current procedures is ongoing based on laboratory changes, new method development and regular review cycles.

### 4.1.1 Level 1 - Quality Policy Manual and Company Policies

The intent of these documents is to define "what" we do with emphasis on Executive and Management's responsibility for quality.

The purpose of the Quality Policy Manual is to provide a framework to outline the quality systems at the laboratory. Information on key quality system processes is described within the manual. Organizational charts, list of SOPs, a list of equipment, instrumentation, and PQDs for senior personnel are included as attachments to this manual.

- Executive Management is responsible for ensuring that adequate personnel, resources, and support are available to carry out the requirements of this Quality Policy Manual.

- Management is responsible for ensuring that SOPs, Work Instructions, or other appropriate documents are written and available to personnel to define the practices and systems which support these policies.

- All employees are responsible for conducting business in a manner which is compliant with quality and company policies and associated SOPs, Work Instructions, or other appropriate documents. Review of these policies and procedures must be documented.

Additional company policies are written to support and expand upon this Quality Policy Manual. These policies contain more detailed information about a subject with approval signatures executed at the Executive and/or Management level.

### 4.1.2 Level 2 - Standard Operating Procedures

The intent of these standard operating procedures is to define "who, what, where, and when." These procedures provide specific information for a process or topic so that the requirements outlined in this *Quality Policy Manual* and company policies can be achieved. The review and approval of these SOPs is performed at the director/manager/group leader level, including QA review and signoff, and the responsibility of these SOPs lies with the area or person directing the operation.

SOPs can apply to site-wide operations, the entire company, across multiple departments, or a specific operating area.

### 4.1.3 Level 3 - Work Instructions (at a department level)

The intent of these procedures or documents is to define in greater detail the specific "how to". The level of detail in these documents must be sufficient so any appropriately trained person can perform the task accurately. Examples include, but are not limited to departmental standard operating procedures (SOPs); maintenance and calibration procedures; and the laboratory analytical methods. Departmental level procedures/documents are reviewed and approved at the manager or group leader level including QA review and signoff.

### 4.1.4 Level 4 - Quality Records

The intent of these
documents is to provide documented evidence to support our quality systems and operations. Examples include but are not
limited to, data notebooks/logbooks, and preformatted data recording forms.

## 4.2 Document Approval, Issue, Control, and Maintenance

The document control process ensures that documents are approved and adequate for use. It ensures that documents are readily available to personnel and at locations where essential operations are performed.

Procedures are available to all employees in electronic form through our document management system. The laboratory management and QA staff is responsible for ensuring the documents in this system are in a current and accurate state. These procedures can be printed from this system for reference by employees as the corresponding task is being performed. Prior to using a printed document, the employee **must** ensure that it is the current version.

Each procedure is uniquely identified and includes effective date, version identification, designated user groups and the "approved by" employee. Document editors and reviewers are recorded in the electronic system for each version of a document. All documents are searchable and uniquely identified in the document management system.

Controlled policies, procedures, and work instructions are reviewed and approved by appropriate individuals and are formally issued and administered through the electronic document management system. The editor, reviewer and approval personnel are recorded within the document as through the document control interface. The recording of these steps is through the employee's secure network log -in and password. Designated personnel are assigned the editor, reviewer, and approval roles. Administration of the role assignments is managed by QA.

Procedures undergo scheduled annual review to ensure that they are accurate, current, and compliant. QA is the final approver and publisher on procedures which gives QA the authority to implement the procedure. Forms may be approved and published by department management. Upon the effective date of new or updated documents, all copies of obsolete documents are removed from service.

Interim amendments to procedures are not allowed. Any needed changes require a revision to the document. The document management system has a feedback function which enables information to be given to the assigned document editors. If minor edits (e.g. typos) are identified that can wait until the next review cycle, these can be communicated through the feedback function.

Forms are frequently used in logbooks. The logbooks are created by the Office Services group. The appropriate form is provided to Office Services to be made into a logbook. The logbook is given a unique identification number and is tracked by Office Services in regard to issuance to the associated department and through to subsequent archival.

## 4.3 Client-Supplied Methods and Documentation

Client documentation to support environmental testing at the laboratory is maintained in a centralized area. This information is organized by client/project in the Client Services/Project Management Group. Client documentation includes the following information depending on project size and scope:

- Client supplied analyte lists
- Client supplied project plans
- Client contract quality manuals with specified limits, QC criteria, etc.

- Communication/correspondence records which relate to testing requirements, interpretation of results, or reporting formats

## 4.4 Laboratory Notebooks, Logbooks, and Forms

Procedures are in place to ensure that all data is traceable, authentic, complete, and retrievable. The following general requirements outline our system for the issuing, control, and archival of laboratory notebook and logbooks.

- The administration of notebooks and logbooks is controlled by the Office Services Group. They maintain a master index to uniquely number and identify each book distributed.
- Notebooks and logbooks can contain blank or preformatted pages.
- Notebooks and logbooks are bound, uniquely identified and have sequentially pre-numbered pages.
- If notebooks or logbooks contain preprinted laboratory form pages:
    - A unique identification number is assigned to each form
    - Forms are approved through the electronic document management system by appropriate management personnel before they are put into use
    - Forms are reviewed on a routine basis to ensure they are still accurate and current
- Completed notebooks are returned to an archivist. Incomplete books are returned to the Office Services group:
    - Two years from the issue date
    - For employee specific notebooks – when the employee leaves the company
    - For project specific notebooks – when the project for which it was used is complete
- In specific situations, records may be bound to create books at the time of archival (e.g., temperature charts).
- At the time of archival any page(s) in the notebook or logbook that does not contain data documentation is crossed-out or a statement is written on the last page used to note that the book is complete to prevent data from being entered at a later date.
- Notebooks and logbooks identified as requiring permanent archival are assigned a designated qualifier.

## 4.5 Control of External Documents

Hard copy versions of external documents are controlled using an inventory form in the document management system. Any external document that is maintained in the laboratory are inventoried and listed on a department specific controlled form.

External documents such as copies of the 40 CFR and ASTM methods are stored exclusively in the QA Department. QA also keeps applicable agency documents on file, these include, but are not limited to, the TNI (The NELAC Institute) and ISO 17025 standards.

Environmental methods from the EPA or Standard Methods are available in the QA Department, but the technical areas also have copies that pertain to the tests that they perform. Some methods are available on-line and are accessed through the Internet.

It is the laboratory's understanding that the need to control external documents is to ensure that the most current version of a method is referenced or appropriate manual is being used. Regulatory methods are used as references by the laboratory and testing is performed as per written SOPs that fall under our existing document control system and have scheduled reviews. The scheduled review of SOPs is used to ensure that the proper version of a method is referenced. While using the most current version of an analytical method is our typical practice, there are specific client needs and accreditation rules that require previous versions of a method to be used.

The technical areas are responsible for ensuring that all manufacturers' manuals are current and available to analysts. The vendor provides instrument manuals when new equipment is purchased or existing instruments are updated. These manuals are kept with the instruments to which they are associated.

# 5.0 SAMPLE HANDLING

## 5.1 Sample Collection

It is the responsibility of the client to send us representative and/or homogeneous and properly preserved samples of the system from which they are drawn. The laboratory assumes that all multiple sample containers with the same designator/description and bottle type contain a homogeneous, representative sample. We also assume that it is acceptable to deplete one container and move to the next, without implications unless otherwise indicated by the client.

The laboratory provides the appropriate sample containers, required preservative, chain-of-custody (COC) forms, shipping containers, labels, and custody seals. The laboratory also provides trip blanks and analyte-free water for field blanks. Preparation of methanol containers for field preservation of volatile soil samples is available.

Sample containers are purchased pre-cleaned by the supplier. For pre-preserved bottles, each lot of preservative is checked for contaminants before use. This also serves as a check on the associated containers. An annual bottle lot check is performed to evaluate the cleanliness of any containers not already covered by the preservative checks. The evaluation is to assess cleanliness to the laboratories'

detection limits. These checks are processed through the LIMS as samples. Results are documented through the LIMS Analysis Report.

The laboratory provides instructions with all bottle orders that define how to sample, preserve, store, and ship the samples prior to their delivery at the laboratory. These instructions inform the client of the importance of proper sampling and advise them that non-compliant samples are rejected or reported with a qualifier.

As samples are analyzed at the laboratory, there are times when additional sample volume is necessary to complete testing or perform retesting. If this situation arises, "additional sample" is requested by the laboratory and/or submitted by a client to supplement current work being performed within our facility. Additional sample received is either assigned a new laboratory sample ID number and/or a comment noted on the final report to state that additional sample was received, depending on the situation. It is our goal to provide accurate traceability between sample submission and when testing is performed.

## 5.2 Sample Receipt and Entry

### 5.2.1 Sample Entry

Samples can be received at the laboratory 24 hours a day, 7 days a week, 365 days of the year. Receipt can occur in one of three ways:

- The laboratory courier services (i.e., Transportation Department
- Personal delivery
- Commercial courier

All samples received for testing are delivered to the Sample Registration group immediately upon arrival. This group is responsible for the unpacking and organizing of the samples. This process includes checking custody seals if present, paperwork agreement, signing the chain of custody, recording cooler temperatures, documenting the condition of containers, accounting for all sample bottles, and observing any safety hazards, and reporting any problems to Client Services for communication to the client. This receipt process is documented in the LIMS.

### 5.2.2 Sample Entry

As soon as practical after sample receipt, all samples are entered into our LIMS. Samples awaiting log-in are stored in temporary holding areas, at appropriate storage conditions to maintain sample integrity. Samples scheduled for Volatile analysis are stored separately. If there is doubt about the suitability of items received or if items do not conform to the description provided or the testing required is not clear or specified, the client is contacted and the conversation documented.

At the time of entry, the LIMS assigns a unique laboratory sample number to each sample. This number is sequentially assigned and a label is generated and is attached to the sample container. Each sample container is uniquely identified with a bottle code. the sample number and bottle code are

subsequently recorded on laboratory data records to ensure traceability from the test data to the sample container.

Samples are tracked to the minute upon arrival. This allows the client to see exactly how long it took the samples to pass through receipt, unpacking, and entry.

A sample acknowledgement is generated from the LIMS per sample entry group. Upon request, a copy of the Acknowledgement may be sent to the client on the day following sample log-in to confirm sample receipt and entry. Internally, appropriate personnel audit all applicable sample entry and client paperwork.

### 5.2.3 Sample Preservation Check

Sample Registration personnel check and document preservation of non-volatile liquid samples after the samples have been entered into the LIMS and before they are released to the laboratory for testing or placed into storage. Any checks of volatile samples are performed and documented at the time of analysis.

### 5.2.4 Sample Rejection Policy

Regulated (e.g. drinking water, NPDES) samples are rejected if receipt requirements are not met. The laboratory's Sample Acceptance Policy is communicated to clients with each bottle order. Any time a sample is received in a condition that does not meet the method, regulatory, or client requirements, the condition of the sample is clearly documented through the LIMS on a sample registration documentation log or sample problem form. This information is forwarded to the CSR and the client is contacted to discuss the best course of action. The client is given the option to resample or have the sample analyzed and reported with a qualifying comment.

## 5.3 Sample Identification and Tracking

A sample label is generated for each sample and, in addition to the assigned unique sample number, the following information is displayed on the label: client name, sample identification assigned by the client, sample collection information, bottle code ID, analyses requested, and any applicable notes to laboratory personnel. The label includes a barcode that is used to track this information about the sample/container and to trace each container's storage location.

To ensure accountability of results, the unique sample number assigned is used to identify the sample in all laboratory data documentation, including notebooks, instrument printouts, and final reports. The sample number is also used to identify additional containers of the sample that are created during sample preparation and analysis (e.g., subsamples, extracts, digests). Each container for a sample is tracked through the bottle code and an A.B.C… designator when there are multiple containers of the same type received. The link of the bottle code and sample number is used to identify which specific container was used for testing.

Routine sample tracking is documented using the Laboratory Sample Analysis Record (LSAR) which captures the date, time and analyst for each sample preparation and analysis. The information is

compiled in the LIMS using electronic record tracking from the data upload and entry functions. This displays, per sample, on each Analysis Report.

## 5.4 Sample Storage

After sample registration is complete, samples are placed in an assigned and identified storage location until needed for analysis. Room temperature, refrigerated, and frozen storage are available and samples are stored in accordance with regulatory, method, or client direction. The LIMS is used to assign storage locations, which assists in the orderly storage of samples. Sample storage locations are secured and monitored for accurate temperature control. Samples are stored separately from standards and reagents.

The central locked storage facility contains 3430 square feet of refrigerated space, including 2740 square feet equipped for automated sample retrieval. Samples are stored in the laboratory's automated storage and retrieval system (ASRS) or other assigned storage locations (separate volatiles areas) within the laboratory until completion of all analytical work.

When a sample is scheduled for analysis, the analyst requisitions it through the LIMS from the storage area. Barcode readers are used for LIMS documentation of the movement of the samples between storage and the laboratories. To maintain the integrity and security of the sample(s), the aliquot needed for analysis is removed and the sample(s) returned to storage as soon as possible.

## 5.5 Sample Return/Disposal

Samples remain in the storage area following analysis until the testing results have been verified and the analysis report has been generated. On a regular basis, a list is generated from the LIMS that summarizes samples that can be removed from the storage area. At a minimum, water samples are held for 1 week and soil samples for 2 weeks after reporting before they would be eligible for disposal. Samples are either returned to the client or disposed of in accordance with local, state, and federal regulations. Removal of the containers from storage for permanent discard is also documented in the LIMS using the barcode reader.

Due to the variety of waste generated at the laboratory, several general categories of wastes and waste streams have been identified. Identification of waste occurs through information provided by the client, historical information, and/or analytical testing. The laboratory uses a sophisticated, computerized LIMS, which includes programming to assist in the identification of hazardous wastes at time of discard.

For reasons of environmental liability, client confidentiality, proprietary product formulation protection, etc., wastes generated by the laboratory are disposed of via incineration at EPA licensed facilities. The three exceptions include bulk neutralized acid waste, COD analysis waste, and lab pack waste containing mercury. None of these exceptions involve containers with client information.

## 5.6 Legal Chain of Custody

Samples being tested for litigation require locked storage and documentation of the time and personnel

responsible when the sample was not in storage. This level of documentation is available upon client request and procedures to define these activities are in place and include the following:

- A chain-of-custody document is initiated for each bottle type submitted by the client.
- The chain of custody is signed each time the sample is stored, removed from storage, or changes hands.
- Clients requesting legal internal chain-of-custody documentation receive the completed forms after the analysis is complete.

### 5.7 Representativeness of Samples

Each analytical method provides specific procedures for
ensuring that a representative aliquot of the sample is used for testing. These procedures include shaking water
samples and mixing solid samples prior to removing an aliquot for testing. Analysts are also instructed in sampling
techniques that prevent contamination of samples.

## 6.0 TECHNICAL REQUIREMENTS - TRACEABILITY OF MEASUREMENTS

### 6.1 Reagents and Solvents

The reliability of our analytical results can be directly affected by the quality of reagents used in the laboratory. Procedures are in place to address labeling, storage, and evaluation of these materials. Reagents and solvents include acids, bases, indicators, buffer solutions, colorimetric solutions (CS), test solutions (TS), and volumetric solutions (VS). The *Chemical Hygiene Plan* provides safety information in regard to the storage and handling of laboratory chemicals. All reagents are stored separately from samples.

Each analytical method includes a list of reagents needed to perform the test. Reagents/solvents are fully described, including chemical name, purity, and description of preparation. Where applicable, shelf life and storage conditions are also listed. The laboratory is responsible for checking that new supplies meet the method requirements. These checks are documented and maintained.

Departmental management ensures that an adequate inventory of reagents needed to perform testing is maintained. Reagents received at the laboratory funnel through the Shipping and Receiving Department and deliveries are verified and labeled with the date of receipt. Large volume reagents (e.g., solvents, acids) are stored in a building outside of the laboratory until needed for use.

In addition to the name and concentration of the reagent, all reagents are labeled with the manufacturer/vendor, storage conditions, the date opened, and an expiration or re-evaluation date. Before using any reagent, the analyst must ensure that the material was properly stored and labeled.

If a reagent has passed its expiration date or shows signs of deterioration, the material is not to be used in the laboratory and must be discarded or segregated as expired. In some method development or research work, expired reagents may be used. These must be labeled as such or stored in a designated location.

If a re-evaluation date is reached before a reagent is completely consumed, the reagent will be inspected by physical observation for signs of degradation. Physical signs include, but are not limited to, color changes, clumping or other texture changes for solids and formation of precipitate in solutions. This evaluation is performed by an experienced chemist.

Subsequent reagent solutions or mixtures prepared at the laboratory are fully documented in a log and labeled to include: unique name, concentration, date prepared, name of analyst who prepared the reagent, storage conditions or reference to the log containing these details, and expiration/re-evaluation date. The information recorded allows these solutions to be traced to the original stock solution. The reference to the log is intended for use on containers that are too small to clearly document all of the information.

All reagent certificates and MSDSs are retained by the laboratory.

## 6.2 Calibration Standards

Written calibration procedures are required, where applicable, for all instruments and equipment used in the laboratory. The source and accuracy of standards used for calibration purposes are integral to obtaining quality data. Requirements for calibration are provided in each analytical method including specifications for the standards used. Where available and practicable, calibration measurements made by the laboratory must be traceable to national standards of measurement (e.g., NIST). Certificates of Analysis (C of As) are maintained for each material, as applicable.

The laboratory's ISO 17025 and DoD accreditations require calibration materials to be certified and purchased from a reference material producer accredited to ISO Guide 34 and ISO 17025, when available. A list of accredited suppliers is maintained by QA. This is applicable to the tests under these scopes of accreditation and can be met through the stock standards used for calibration; a standard processed under the calibration such as an ICV or LCS; or comparison to a separate reference material at a frequency defined by at the test level (i.e. annually).

Standards are usually purchased from commercial supply houses either as neat compounds or as solutions with certified concentrations. Upon receipt at the laboratory, the material must be labeled with the date of receipt. The accuracy and quality of these purchased standards is documented on a C of A and these certificates are maintained on file in the laboratory.

Most solutions and all neat materials require subsequent dilution to an appropriate working range. Records of all standard preparations include the dilution(s) made and a reference to the original and any intermediate mixtures. Solutions are labeled according to laboratory procedures and assigned unique names or code numbers that provide traceability to the original components.

All standards are stored separately from samples and in conditions as stipulated by the method or vendor (refrigerator, freezer, room temperature, etc.).

Each new preparation of standard is tested for integrity by comparison to standards from another source or previously prepared solutions. Standards are not used for sample analyses in the laboratory past their expiration date. In some method development or research work, expired standards may be used. These must be labeled as such or stored in a designated location.

## 6.3 Equipment and Instrumentation

The laboratory is equipped with all equipment and instrumentation required for testing the scope of work which it supports. All equipment and instrumentation is maintained in proper working order. A master list of our equipment and instruments is maintained by our accounting department and includes the date received and the condition at receipt (new v. used). Our major equipment and instrumentation capabilities are summarized in Appendix F. In addition, we have numerous other instruments including pH meters along with support equipment such as ovens, incubators, centrifuges, balances, etc.

### 6.3.1 General Requirements

Equipment/instrumentation is assigned a unique designation. This unique number or system identification is used to track the equipment or instrument within data documentation.

A maintenance logbook is established in conjunction with installation and is readily available to document all incidents and/or routine maintenance processes that pertain to the equipment or instrument as they occur. The corrective action taken, the date that the equipment/instrument is returned to service, and performance checks performed is documented.

All test, measuring, and inspection of laboratory systems, equipment, and instrumentation used at the laboratory is routinely calibrated and maintained in accordance with applicable standard operating procedures.

A member of the technical group, or designated individual, performs routinely scheduled maintenance and calibration of laboratory equipment and instruments as required by laboratory procedures. These activities are documented.

If appropriate standards or expertise for calibration or maintenance are not available in-house, the operation is conducted by an outside service firm, with appropriate accreditation. Certificates or other data generated by the service firm are reviewed by applicable the laboratory personnel to verify acceptability. This information is maintained on file.

All equipment or instruments taken out of service are tagged "DO NOT USE". The following minimum information is documented on the tag:

- Date taken out of service
- Employee who took the equipment/instrument out of service
- Reason for tag-out

### 6.3.2 Standard Operating Procedures

Information regarding operation, maintenance, and calibration of equipment and instrumentation is found in the respective SOPs. The procedures include, where applicable, a routine schedule for preventive maintenance and calibration along with acceptance criteria and remedial action to be taken in the event of failure. These procedures are maintained in the document control system and reviewed on a regular basis to verify they remain current and accurate. Vendor supplied manuals are also available to provide additional information in regard to operation and maintenance.

### 6.3.3 Maintenance

Instrument and equipment maintenance is performed as either a preventive or corrective operation. These processes and schedules are defined in the corresponding SOPs and Work Instruction documents.

Preventive maintenance procedures and schedules are developed for each instrument or piece of equipment, where applicable. Preventive maintenance operations are performed by an analyst, equipment maintenance specialist, or contracted (manufacturer's representative or service firm personnel). Documentation is maintained in the associated maintenance log for the procedure(s) performed as part of the preventive maintenance operation. It is the responsibility of departmental management to ensure that a preventive maintenance schedule is addressed by a procedure where appropriate and is followed.

Corrective maintenance is performed by an analyst, equipment maintenance specialist, or contracted (manufacturer's representative or service firm personnel) in response to indications of equipment or instrument malfunctions. The unit must be clearly tagged as out of service. All corrective actions taken to bring the unit back into service are documented in the associated maintenance log. After repair, further notation is made in the log regarding the functional status. Calibration activities are performed, as applicable, and documented in the log before the unit is placed back into service.

A supply of commonly needed replacement parts is maintained by the laboratory.

### 6.3.4 Calibration

Calibration is the establishment of, under specified conditions, the relationship between the values/response indicated by a measuring instrument or system and the corresponding known/certified values associated with the standards used. Some types of calibrations are performed with a set frequency (e.g. daily) while others provide intermediate checks to ensure that the instrument response has not changed significantly.

All measuring and testing instruments and equipment having an effect on the accuracy, precision, or validity of calibrations and tests are calibrated and/or verified at least annually. Methods for calibration of instruments and equipment vary widely with the nature of the device and the direction given by analytical procedures, departmental procedures, manufacturer recommendations, or regulatory requirements. Frequency of calibration can also depend on additional factors including ruggedness of the instrument or equipment and the frequency of use. The calibration procedures, schedules, and acceptance criteria are defined in the corresponding SOPs and Work Instruction documents.

Departmental management is responsible for developing or acquiring written calibration procedures for the types of instruments and equipment employed within their area, as applicable. Procedures address the following aspects: description of the calibration method, frequency/schedule for calibration, acceptance criteria, and corrective actions if failure occurs.

Calibration information is recorded in a logbook that is associated with the instrument/equipment and/or a calibration certificate is maintained and/or data is generated and filed to document the activity.

Calibration measurements are traceable to national standards of measurement (e.g., NIST) where available. Physical standards, such as NIST certified weights or thermometers are re-certified on a routine basis. Calibration certificates are maintained on file, where applicable, to indicate the traceability to national standards of measurement. These physical standards are used for no other purpose than calibration.

Calibration failures are documented in the associated logbook and/or within the data generated from the instruments or equipment. Management personnel perform an evaluation and review of failures and assess any potential impact the failure might have on previously generated data. The laboratory utilizes "real-time" controls to ensure the accuracy of the data. These controls are used to assist in assessing the impact of the situation.

After repair, adjustments, or relocation that could affect instrument response, calibration/verification activities are performed, as applicable, before the unit is returned to service.

Analytical data is not reported from instrumentation or equipment with noncompliant calibration unless the client has agreed to receipt of the data and appropriate qualifiers or comments are applied to the final Analysis Report.

## 6.4 Computerized Systems and Computer Software

### 6.4.1 Computer Usage

The laboratory provides computer equipment for employees to use as a tool in performing their work. Computer equipment is the property of the laboratory and used in accordance with defined terms and conditions. Our goal is to provide standard hardware and software that meets the needs of the user. The majority of desktop PCs and laptops in use are standardized using cloning software.

#### 6.4.1.1 Physical Security of Computer Systems

It is company policy to protect computer hardware, software and data documentation from misuse, theft, unauthorized access and environmental hazards. The corporate computer area and computer "Hot-Site" is locked and requires identification/building card access. All vendors, contractors, or other visitors must be escorted into this area. Controlled access of the laboratory buildings is outlined in Section 3.2.

#### 6.4.1.2 Passwords

Passwords are important for the security of company data and resources. The laboratory's primary network operating system is Windows and each employee must have a user ID and password combination to access the system. Other computer systems also require a user ID password combination for access. The following procedures apply regardless of which system(s) is being utilized:

- Passwords must be created as strong passwords in accordance with Eurofins Password Policy and must be kept confidential.
- Users must log-out of a system when not in use to prevent unauthorized access. In addition, the network access will automatically timeout after a set period of inactivity, requiring a user to log-in to access the system.
- Forgotten passwords can only be reset by the IT Department or by an appropriate System Administrator.
- Network and LIMS passwords automatically expire at designated intervals. The computer prompts a user to change the password when the expiration date nears. If the password is not changed, the user will be locked out of the system.

#### 6.4.1.3 Viruses

The laboratory centrally and continuously monitors the computer network for computer viruses. Employees are prohibited from using the company's computer equipment to propagate any virus. Anti-virus software is employed to detect viruses on the Windows network. A notification is sent when there is a particularly dangerous or virulent data destructive program that employees need to be aware of. However, employees are instructed to always be cautious and observant even if there are no current warnings. Employees must report any virus concerns to the anti-virus administrator or IT Management as soon as possible. Employees who share files between their home computer and the laboratory should install anti-virus software on their home computer. If an employee does not have such software, the laboratory can suggest various no-cost anti-virus software products.

### 6.4.1.4 Internet and E-mail Systems

The e-mail system is used primarily for the laboratory's business purposes. The *Eurofins Lancaster Laboratories' Employee Handbook* provides additional information in regard to system usage. Employee access to the internet is restricted to those employees who have a business need for it. All employees have access to e-mail. Access to the internet is configured through a user's Windows network account. All internet and e-mail activity is subject to monitoring. All messages created, sent or received over the internet are company property and can be regarded as public information. E-mail and website filtering software is utilized.

### 6.4.1.5 The Laboratory's Intranet (LabLinks)

The Intranet is designed to be a useful tool for employees to acquire company information and to provide a company communication system. The *Eurofins Lancaster Laboratories' Employee Handbook* provides additional information in regard to usage.

### 6.4.1.6 Software Policy

Copyright laws protect software, and the laboratory's intent is to abide by all software agreements.

Software purchases must be formally requested and approved by management and/or validation personnel, as necessary.

All software is used in accordance with applicable license agreements.

Employees are not to install any software on computer(s) unless authorized by the IT Department.

Software upgrades must occur in accordance with applicable change control procedures.

Employees must not give software to outsiders (e.g., clients, contractors), unless approval is granted by management.

Users must not make copies of any licensed software or related documentation without permission. Any user that illegally reproduces software is subject to civil and criminal penalties including fines and imprisonment.

### 6.4.1.7 Computer System Backup, Data Restoration, and Data Archival

Mission critical data is stored on several computers throughout the laboratory. These computers are connected through the local area network. Selected files on these computers are backed up using an enterprise-level backup software program. The objective of this backup is to have the ability to restore data after a total loss (e.g., theft, fire, natural disaster). Procedures are in place to perform data backups and restores.

### 6.4.1.8 Remote Access to Computer Systems

Designated employees are able to remotely connect to the laboratory computer systems through an encrypted (SSL) login. When logging in, users are authenticated with their Windows Active Directory account and password.

### 6.4.1.9 Electronic Data

Instrument software used for processing data
must, when available, have password access and audit trails enabled. All data processed through the LIMS includes
tracking features to document who and when data was entered and/or
changed.

### 6.4.2 System and Software Verification

The laboratory LIMS is an in-house developed program. The design and updates to the system are written following typical Software Development Life Cycle (SDLC) processes for initial planning through testing and implementation. Before a new computer system/program or significant modification of an existing system/program is implemented in our laboratory, it is necessary to generate a plan to specify the level of documentation required for the new or updated application. Developers, affected area management, and QA personnel review and approve the documentation.

The following are the typical documents that are compiled for these updates:

- System Change Request document – used for documenting/tracking changes in the programming
- Requirements documents – Describe the required system functionality and specifications
- Design documents – System overview, screen design, report layout, data description, system configuration, file structure and module design
- Testing documentation for system development/verification – Structural testing of the internal mechanisms and user testing of the installation and system qualification
- Periodic Review documents – periodic retesting of the programs is performed to ensure that the systems remain in a validated state.
- Retirement documents – used for documenting when a program is taken out of service
- Standard operating procedures and/or manuals

## 6.5 Change Control

Procedures are in place to define how to maintain facilities, processes, instrumentation, equipment, computerized systems, and computer software in a validated or controlled state through a plan of change control. Successful changes require a thorough evaluation and testing for potential consequences prior to implementation. Planning, authorizing, testing, and reviewing of proposed changes are documented throughout the change process. Changes are planned or could be made in

response to an emergency situation. The following "general" elements apply to changes, as appropriate:

- Request to perform a change
- Evaluation of a change
- Authorization of a change request
- Preparation for an authorized change
- Execution and testing of the change
- Documentation of the change
- Approval of the change
- Change implementation and follow-up (Formal approval of the change is performed by designated responsible individuals and QA.)

**Note**: The DoD will be notified in advance of the migration to a new LIMS platform and/or relocation of the data center from the Lancaster site.

### 6.6 Labware Cleaning

Dedicated washroom personnel support the laboratory operations in regard to labware preparation, washing, rinsing, and drying. Labware can include, but is not limited to glassware, plastic ware, utensils, and pipettes. Procedures are in place to outline the washing process for each type of labware. Most labware is cleaned using a Miele glass washing machine. Some labware is still washed by hand and either air-dried or dried in specifically designed ovens.

Most of the labware used in the laboratory is "common or non-dedicated" labware (common to a department), but some of the labware used in the laboratory may be identified as "dedicated" labware and exclusively used for certain analyses. This labware is isolated and cleaned only with "like" labware.

All glassware is class A and 100% visually inspected for breakage (e.g., cracks, chips), cleanliness, and dryness before being returned to the laboratory for use.

Generally, each test has controls in place to ensure that results are not adversely affected by unclean labware. These controls include blanks to detect positive interferences and recovery controls to detect negative interferences.

## 7 PURCHASING EQUIPMENT AND SUPPLIES

### 7.1 Procurement

It is the responsibility of management personnel within each department to ensure that the appropriate supplies are available and/or ordered with sufficient lead-time to perform analytical testing or to provide support to the testing areas. The individual technical departments have trained personnel who enter the supply order into the company's purchasing system. The selection of these products is based on technical input at the analyst level and authorized by technical departmental management. The Purchasing Department maintains an ordering system in which purchase requisitions are managed. Common laboratory items (e.g., beakers, flasks, reagents) are ordered directly through the purchasing system. Purchase orders over a specified dollar amount require approval from the appropriate member (s) of the Executive Management Group before an order can be placed.

Upon receipt of an order, the Shipping and Receiving Department checks the order to ensure that all items were received as specified. Products that have specific storage requirements are taken to the technical area upon receipt. It is the technical area's responsibility to ensure that the product is stored in the appropriate manner. Any checks on the quality of the materials received for use in a specific test are the responsibility of the laboratory using them. This is based upon the experience of the laboratory with the usability of the product. Generally, each test has controls in place to ensure that test results are not adversely affected by the materials.

Any problems encountered when using a material in the laboratory must be brought to the attention of the Purchasing Department and/or Quality Assurance, as applicable, to ensure that follow-up and corrective action occur.

## 7.2 Supplier Evaluation

Procedures are in place to evaluate vendors who supply us with: new equipment, instrumentation, computerized systems and computer software; commercially purchased glassware, including sample bottleware, reagents, chemicals, solvents, gases, media, and standards; and contracted and subcontracted services.

The laboratory strives to ensure that our suppliers continually improve their quality systems and we reserve the right to purchase from suppliers of our choice in order to best fulfill the needs of our clients and our business. When directed by a client to purchase from a specific supplier, we will do so. In this instance it is the client's responsibility to "qualify" the specified supplier. We attempt to purchase from businesses that we have an established purchase history or have previously acquired information regarding the supplier's quality programs.

The laboratory does not evaluate every supplier. Risk assessment is taken into consideration when making this decision. The risk assessment analysis includes system, material, services, and number of samples or operations the purchase may affect or support. Evaluations are not required for computer operating systems, utilities, toolsets, or systems software. They also are not required for any off-the-shelf configurable software package that has an extensive market performance history (e.g., Microsoft Word, Excel, Access).

Additional quality systems are also in place within the laboratory to further verify and support the materials used:

- C of A for every lot of purchased chemicals, where available, are reviewed and maintained on file.
- For most chemical analyses a blank and a recovery check are routinely analyzed and serve as real time suitability testing of the reagent being used.

# 8 ANALYTICAL METHODS

## 8.1 Scope of Testing

Samples are analyzed in accordance with official published methods, standard methods, client-supplied methodology, or validated in-house methods. We recognize the importance of providing verifiable results and, therefore, use methods accepted and approved by a broad range of federal and state regulatory agencies. The laboratory can also assist in developing and validating analytical methods for specific products and matrices. All methods submitted for our review, as well as all analytical results, are considered confidential.

The laboratory performs a wide variety of environmental testing in support of the Safe Drinking Water Act (SDWA); Clean Water Act (CWA); Resource Conservation and Recovery Act (RCRA); Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA/Superfund); and the Clean Air Act (CAA). Methods approved by ASTM are also used in testing. Potable water, wastewater, soil, sediment, sludge, oils, biota, tissue, soil gas, and air are among the matrices typically analyzed.

Our areas of expertise include:

| **Standard Services** | **Specialty Services** |
|---|---|
| • Volatiles<br>• Semivolatiles<br>• Metals<br>• Pesticides/PCBs/Herbicides<br>• Petroleum Analysis<br>• Waste Characterization<br>• Non-potable Water Testing<br>• Drinking Water<br>• Soil and Surface Water Testing<br>• Vapor and Air Analysis<br>• Sediment and Tissue Testing<br>• Method Development<br>• Shale Oil & Gas Analysis | • Dioxins & Furans<br>• Hydrazines and NDMAs<br>• Perchlorate<br>• 1,4-Dioxane<br>• Pharmaceutical Manufacturing Industry (PMI) Wastewater<br>• EPA Method 25D<br>• PCB Congeners<br>• Explosives<br>• Alkyl PAHs, Alkanes, Biomarkers<br>• PFAS<br>• Organic Acids<br>• Aldehydes |

All current certificates and scopes of accreditation are available on the laboratory's website at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/. A complete list of the tests routinely performed by the laboratory can be found in the *Schedule of Services*.

## 8.2 Analytical Test Methods

Each laboratory is required to establish and maintain analytical procedures for all the methods referenced in standard testing. The sources for these methods include the most recent versions of these compendia:

- Test Methods for Evaluating Solid Waste, SW-846
- Standard Methods for the Examination of Water and Waste
- Code of Federal Regulations, Chapter 40
- EPA 100 through 600 and 1600 series methods
- ASTM

The test methods used are re-written into a laboratory standard format, which provides consistency in content and allows the analysts to locate the information they need quickly. Procedures are in place to define the format, required approvals, and the control system for these method documents. Elements to address in SOPs are based on TNI and DoD required sections. The format requirements include, but are not limited to, the following:

- Uniquely assigned method number, which is used extensively for scheduling and documentation purposes.
- Reference to the original source of the method (e.g. SW-846)
- Scope
- Basic Principles
- Apparatus and Reagents
- Personnel Training and Qualifications
- Safety and Waste Disposal
- Detailed procedure (including any method modifications)
- Calculations
- QA/Quality Control
- Revision Log

- Review and approval by technical management and QA personnel

Analytical methods are maintained as controlled documents to ensure that analysts are always working with the most current version and are reviewed periodically for accuracy.

## 8.3 Client Supplied Methods

Most of the client-supplied method requirements presented to us involve achieving specific quality control criteria, limits of quantitation (LOQ), and/or method detection limits (MDL) using standard EPA methods. These requirements are communicated to the appropriate technical groups prior to the project start up. Each technical group evaluates the scope of work and the requirements to ensure the criteria can be met using the standard EPA method. The data is monitored to ensure the criteria are met throughout the project. The CSR notifies the client if there is a more appropriate method available or if the client's criteria cannot be achieved on a certain sample matrix (i.e., due to matrix or dilutions).

Occasionally, we are asked to transfer a non-standardized method from a client into our lab or to develop a new method, when one is not available. In the case of a method transfer, we set up the client's method and perform some initial evaluation. After the initial evaluation, we may make recommendations on how to improve method performance. If the method appears to be adequate, we determine linearity, specificity, precision, accuracy, MDL, and LOQ by performing calibrations, analyzing method blanks, and carrying out method detection limit and quad studies.

In the case of method development, we work with the client and/or data user to determine the level of validation required ensuring that the method meets its intended purpose. In addition to the elements above, we also determine standard and sample stability and robustness depending on the scope of the project. Typically, a standard operating procedure is written and submitted to the client with the results of the validation. These steps are completed prior to analysis of field samples. Data related to the setup of the method are archived.

## 8.4 Method Validation

Before new or revised analytical methods are authorized for routine use in the laboratory, validation data is required to demonstrate that the method as performed in our laboratory and analysts performing it are capable of meeting data quality objectives for precision and accuracy. A procedure is in place to outline this process.

Many methods published by USEPA include instructions for performing an initial demonstration of capability, which typically consist of determining the method detection limit and analyzing fortified samples in quadruplicate (i.e. a quad study). This demonstration is performed and compared to acceptance limits for precision, accuracy, and detection limits, when available.

Methods that do not include specific validation requirements are validated by analyzing fortified samples or standard reference materials in replicate. The results of these analyses are used to assess accuracy

and precision. Results of validation studies are documented and subject to review and approval by technical and QA management.

### 8.5 Procedural Deviation

Analysts are required to follow a documented method for all tests performed. Procedures are in place to ensure that deviations from analytical methods are documented, approved, and justified in an appropriate and consistent manner. We classify method deviations as either being a planned deviation or an unplanned deviation. In general, the following information is captured to document both types of situations:

- Description of the deviation
- Reason or justification for the deviation
- Impact the deviation had on the testing
- Signature/date of analyst performing the test
- Signature/date of Quality Assurance and Laboratory Management approving the deviation
- Signature/date of client approval, if necessary

Deviations to written procedures are documented in raw data records or through the ICAR (Investigation and Corrective Action Report) system. Both types of documentation require management and QA review and approval.

**NOTE**: Deviations to analytical methods are not permitted by PALA . If samples are analyzed for compliance to a regulatory program, deviations may be allowed with approval from the appropriate compliance officer and/or program.

## 9 INTERNAL QUALITY CONTROL CHECKS

### 9.1 Laboratory Quality Control Samples and Acceptance Criteria

Quality control (QC) samples are analyzed with each batch of samples to demonstrate that all aspects of the analysis are in control within established limits of precision and accuracy. Management is responsible for ensuring that QC is analyzed as required by the referenced method. Each analytical SOP specifies (or cross-references another procedure) the type of QC sample, frequency of analysis, acceptance criteria for QC sample results, and corrective action to be taken if QC sample results fall outside of the acceptable range.

The laboratory provides additional bottleware to the client for matrix QC sampling as determined by the method or regulatory requirements.

QA staff, at the direction of the technical department, must program the LIMS with the acceptance criteria for each QC type (other than blanks). The acceptance criteria are based on statistically generated limits from historical laboratory data, on method defined limits, government agency recommendations, or on client/project specific limits.

These limits are used to flag samples that are out of specification.

The types of QC samples and the information each provides are discussed in the following paragraphs.

### 9.1.1 Blanks

A blank is a designated sample designed to monitor for sample contamination during the analysis process. The blank consists of a clean matrix (i.e. reagent water, Ottawa sand, glass beads, Teflon chips) taken through the entire sample preparation and analysis process. The blank and field samples are treated with the same reagents, internal standards, and surrogate standards. Ideally, blanks demonstrate that no artifacts were introduced during the analysis process. The specific acceptance criteria for each test are usually based on the required reporting limit (MDL or LOQ).

### 9.1.2 Surrogates

Surrogates are organic compounds, which are chemically similar to the analytes of interest but are not naturally occurring in environmental samples. When required by the analytical method, surrogates are spiked into all the field and QC samples to monitor analytical efficiency by measuring recovery on an individual sample basis. The percent recovery is determined and compared to the acceptance criteria.

### 9.1.3 Matrix Spikes

A matrix spike sample is created by fortifying a second aliquot of a water or soil sample with some or all of the analytes of interest. Blanks are not used for matrix spike QC. The concentration added is known and compared to the amount recovered to determine percent recovery. Matrix spike recoveries provide information about the potential matrix effects on the data. Matrix effects can cause results to be outside of the acceptance criteria.

### 9.1.4 Laboratory Control Samples

Laboratory control samples (LCS) are samples of known composition that are analyzed with each batch of samples to demonstrate laboratory accuracy. Laboratory fortified blank (LFB) is another term used to describe a LCS. The samples are clean samples fortified with known concentrations. Percent recovery is calculated and compared to acceptance limits.

### 9.1.5 Duplicates and Matrix Spike Duplicates and Laboratory Control Sample Duplicates

A duplicate is a second aliquot of a sample that is treated identically to the original to determine precision of the test. To compare the values for each analyte, the relative percent difference (RPD) is calculated by dividing the difference between the numbers by their average. Precision for analytes that are not typically found in environmental samples (i.e., organic contaminants) is determined by analyzing a pair of matrix spike duplicates, defined as two spiked samples and comparing the RPD for the spiked compounds. The acceptance criteria are described as a maximum for the RPD value.

### 9.1.6 Internal Standards

Internal standards are organic compounds, which are chemically similar to the analytes of interest but are not naturally occurring in environmental samples. When required by the method, internal standards are added to every field and QC sample after extraction but prior to analysis. Comparison of the peak areas of the internal standards is used for quantitation of target analytes. Internal standard peak area and retention time also provide a check for changes in the instrument response. The acceptance criteria are stipulated in the analytical method.

### 9.1.7 Serial Dilutions

A serial dilution is the dilution of a sample with sufficiently high concentration by a factor of five to check for the influence of interferents. This QC check is performed for inorganics analyzed by ICP or ICP -MS. When corrected by the dilution factor, the diluted sample result must agree with the original sample within method specified limits.

### 9.1.8 Interelement Correction Standard

This QC check is performed for inorganics analyzed by ICP to verify interelement and background correction factors. A solution containing both interfering and analyte elements of known concentration is analyzed at the beginning and end of each analytical run or a minimum of twice per 8 hours.

### 9.1.9 Second Source Check

A second source check is analyzed using either the LCS and/or an Initial Calibration Verification (ICV). The second source is a standard that is made from a solution or neat purchased from a different vendor than that used for the calibration standards. For some custom mixes, the same vendor but a different lot and preparation is used. This ensures that potential problems with a vendor supply would be evident in the analysis. Some tests use the continuing calibration verification standards as a second source from the initial calibration.

## 9.2 Quality Control Sample Frequency and Corrective Action

Each analytical method defines the frequency for the required QC samples and the corrective action required when a QC result fails to meet the acceptance criteria.

The QC acceptance criteria are available to analysts in the laboratory through their SOPs or Work Instructions and the LIMS. If the method reference requires the use of specific limits then the laboratory uses the published limits that are documented as part of the analytical method. Many methods require that each laboratory determine their own acceptance criteria based on statistical data obtained from performance of the method. In these cases, the limits are available to the analysts and are entered into the LIMS described below. Statistically determined acceptance criteria are subject to change as the laboratory recalculates its control limits. Due to their dynamic nature, acceptance criteria are not included in this manual.

The results of all quality control samples are entered into the LIMS in the same way as the results of client samples. The LIMS compares the individual values with the acceptance limits and identifies quality control sample results that are out of specification. If the results are not within the acceptance criteria, corrective action suitable to the situation must be taken. This includes, but is not limited to, checking calculations, examining other quality control analyzed with the same batch of samples, qualifying results with a flag and/or comment stating the observed deviation, and reanalysis of the samples in the batch.

Each month, a summary of all QC entries (except blanks and surrogates) is generated from the LIMS. This summary is reviewed by QA staff and evaluated for changes in data that may indicate that an analysis is trending towards an out-of-control situation. The technical department is notified if a trend is observed. A weekly trend analysis is performed by the LIMS and any trends identified based on defined statistical parameters are communicated via email to the associated department manager.

The laboratory allows for marginal exceedances based on the number of analytes in the LCS. The exceedances are carefully monitored so that any systemic problems would be identified and corrective action taken. If the LCS is being reported based on the marginal exceedance allowance,a comment is added to the analytical report.

## 9.3 Quality Control Charts

The LIMS quality control system is used to report QC data to clients, to collect data for assessment of precision and accuracy statistical limits, and to generate control charts. Control charts are accessible to all employees through the LIMS interface. The system charts results from blanks, surrogates, matrix spike/matrix spike duplicates, duplicates, and laboratory control samples/laboratory control sample duplicates. These charts provide a graphical method for monitoring precision and bias over time. They can be used to detect quality problems by observation of patterns. The QA staff uses the charts in conjunction with a LIMS generated monthly QC trend report to evaluate potential data trends.

## 9.4 Measurement Uncertainty

Per ISO 17025-2017 section 7.6.1 "Laboratories shall identify the contributions to measurement uncertainty. When evaluating measurement uncertainty, all contributions that are of significance, including those arising from sampling, shall be taken into account using appropriate methods of analysis." This means the laboratory must determine the uncertainty contribution of all steps in the testing process such as equipment, calibration, standards, reagents, preparation, cleanups, etc. Since, in most methods, the laboratory control sample (LCS) goes through the entire process of preparation to analysis; all factors that would contribute to uncertainty is evident through the LCS results. LCSs are performed with every batch of samples where appropriate for the method. Tests that do not have LCSs (i.e. TCLP; paint filter test), are evaluated on a case-by-case basis by taking into account the uncertainty of each of the steps taken to perform the test. Our laboratory does not perform field sampling so our ability to assess uncertainty is limited to the processes that we perform. Thoroughly mixing samples prior to taking the testing aliquot minimizes the uncertainty risk with our aliquot.

Measurement Uncertainty reports are generated by each technical department on an annual basis using a LIMS program and submitted to QA. Measurement Uncertainty is calculated as two times the standard deviation of the LCS recoveries for the group and date range of data points selected for all applicable methods. This is reported as a percentage. It is not necessary to apply or report the uncertainty value with sample results. When a client requests the measurement uncertainty it is applied by multiplying the determined analyte concentration by the uncertainty percentage.

# 10 ASSURING QUALITY OF TEST RESULTS

## 10.1 Data Management

At a minimum, data management is initiated when the laboratory receives the samples from the client. More often the process begins with client communication of their needs and requirements for a specific project and/or testing. When requested, bottle orders for the client's sampling efforts are generated through the LIMS by the CSR. The CSRs are responsible for entering the information in the sample set up function of the LIMS. Upon receipt of the samples a unique tracking number for the sample group and the samples within the group is generated based on this information. At this point, the LIMS becomes an integral part of tracking the samples through laboratory operations. The flow of data from the time samples enter the laboratory until the data is reported is summarized in the following table:

**Sample and Data Flow**

| Action | Personnel Involved |
|---|---|
| Bottle orders generated upon request<br>· Bottles packed and shipped to the client under chain of custody documentation | Client Service Representative<br>Bottles Preparation |
| Sample received at Lancaster Labs<br>· Unpacked and reconciled against the client paper work or COC<br>· Sample Entry Documentation log completed | Sample Registration |
| Sample is entered into the LIMS<br>· Lab ID number assigned<br>· Analyses entered<br>· Storage location assigned<br>· Electronic record of sample number<br>· Labels generated<br>· Acknowledgement printed (record of samples received and analyses entered) | Sample Registration |
| Preservation checks performed<br>Sample stored in assigned location (refrigerator, freezer, etc.)<br>· Electronic record of sample #, bottle code, and location | Sample Registration |
| Acknowledgment sent to client (when requested) | Sample Registration |
| Samples requisitioned and removed from storage for analysis<br>· Electronic requisition of sample number by bottle code<br>· Necessary aliquot taken | Sample Registration<br>Technical Personnel |

| Action | Personnel Involved |
|---|---|
| · Remaining sample returned to storage | |
| Analysis is performed according to selected analytical method and applicable Project Notes*<br>· Raw data recorded<br>· Data Reviewed<br>· Data uploaded to the LIMS from the instrument or manually entered by the analyst* (This is tracked by the unique sample number and batch number.) | Technical Personnel |
| LIMS performs calculations as programmed according to methods | Data Processing |
| Designated analyst or supervisor verifies raw data | Technical Personnel |
| Generation/release of reports (automated through LIMS) | Billing and Reporting Group |
| Data package deliverables are assembled, reviewed and released to client<br>Electronic copy saved in the LIMS | Data Package Group |
| Electronic Data Deliverables (EDDs) are generated | EDD Group |
| Designated Data packages are overchecked by QA prior to release | QA |
| Hard copy of batch raw data is archived<br>Electronic files are backed up and archived | Technical Personnel, Data Package Personnel, Office Services, IT |

*Project Notes contain client- and agency-specific requirements (i.e. DoD, PALA, NJ DKQP, CT RCP, MA MCP)
**Analyses requiring the analyst's interpretation may involve manual data reduction before entry into the LIMS.

## 10.2 Data Documentation

Analytical data generated in the laboratory are collected from the instruments or associated data system or are manually documented in bound notebooks. Analysts review data as it is generated to determine that the instruments/systems are performing within specifications. If any problems are observed during an analytical run or the testing process, corrective action is taken and documented.

Procedures are in place to ensure that all data is traceable, authentic, and complete. Electronic data records are maintained and tracked through the LIMS, requiring authorized, password protected user access. The following general requirements outline our system for notebook, logbook, and documentation recording:

- Observations, data, and calculations are recorded at the time they are made and are identifiable to the specific task.
- Entries must be legible, signed, and dated. The signature may be a wet or electronic signature.

- Errors are corrected in a manner that does not obliterate the original entry, initialed and dated, and coded with an explanatory identifier. Changes to electronic data are tracked through audit trail functions.
- Blank pages or substantial portions of pages which are left blank are crossed-out to eliminate the possibility of data entry at a later date.
- Notebook pages and instrument printouts are signed/dated to indicate second party data review; this may be a wet or electronic signature.
- At periodic intervals a supervisor or data reviewer checks equipment/instrument logbook entries and temperature recordings for completeness, legibility, and conformance to procedures.
- At a minimum, the following information is recorded as part of data documentation:
  - Date of analysis/operation
  - Signature/date of analyst performing test/operation
  - Identification of client sample(s) and material(s) analyzed
  - Materials, reagents, standards used to perform the testing/operation
  - Method used to perform testing/operation (including version number and/or effective date)
  - Equipment/instrumentation used to perform testing/operation
  - Calculations and how they were derived
  - Departures, planned or unplanned, from the analytical method
  - Signature/date of person reviewing data documentation
- For computer generated data, the following information is recorded:
  - Sample(s) analyzed/operations performed
  - Date of analysis/operation
  - Unique instrument identification
  - Name/date of person operating the instrument
  - Name/date of person reviewing data

- Any manual notations made on instrument printouts are signed, dated, and reviewed

## 10.3 Data Calculations

Most instruments either include or are connected to a data system programmed to perform calculations to reduce the raw data to a reportable form. All calculations are maintained in the instrument manuals and/or as part of the analytical method.

In many cases, the data from the local instrument system are uploaded directly to the LIMS for review and reporting. This direct upload eliminates the need to retype data and an associated source of transcription errors from the analytical scheme.

Some instruments report data that require application of additional factors before the data is in final form. For example, an extract concentration may be reported by the instrumental data system, but additional dilution and preparation factors may be needed before the result represents the concentration of analyte in the sample. Analysts input these additional factors into the LIMS, where final calculations are performed.

Analysts manually enter collected data, such as titration data, into the LIMS, which is programmed to perform calculations for final reporting. Documentation of the programming for each calculation performed by the LIMS is maintained.

## 10.4 Reporting Limits

It is important to ascertain the limit of quantitation (LOQ) that can be achieved by a given method, particularly when the method is commonly used to determine trace levels of an analyte. The Environmental Protection Agency has set forth one method for determining method detection limits (MDLs) from which LOQs can be extrapolated. This process is summarized in a laboratory procedure.

MDLs are determined annually using quarterly MDL analyses performed for each method across all instruments used for that method. The MDL is the basis for the LOQ used in the default reporting format. Because MDLs change each time they are re-evaluated, they are not included in this manual, but are maintained in the LIMS and available to clients upon request.

The reporting limit used to determine whether a result is significant and reported as detectable is dependent upon agency and client requirements. A variety of formats are available and include use of the MDL, LOQ, method specified limits, and project specific limits. The MDL and LOQ for each analyte are programmed into the LIMS for reporting purposes.

Under the DoD program, the laboratory must establish a Detection Limit (DL) and Limit of Detection (LOD). As defined by the DoD program, the DL is the smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration with 99% confidence. The laboratory determines the DL using the calculated value from the MDL Study. The DL can be derived from pooled MDL values obtained across instruments. The LOD is the smallest amount of a substance that must be present in a sample in order to be detected at the DL with 99% confidence. It is established by spiking

a quality system matrix at a concentration of 2-4 times the DL and must be less than the LOQ. The LOD must be verified on a quarterly basis or with each batch of samples.

## 10.5 Data Review

Final review and verification of the data are performed by designated employees using the sample results, quality control information, method criteria and Project Notes entered into the LIMS. Data are initially evaluated by the analyst and then a second designated employee knowledgeable in the test, other than the employee responsible for performing the test, reviews the data. The reviews include checks for correct transcription, calculations, passing calibrations, compliant quality control results, holding time compliance, and project specific requirements. Any issues or errors identified during this stage are addressed, corrected, and reviewed with the responsible person.

After determining that all necessary requirements for valid data and for the project are met, the reviewer electronically approves the data by changing the LIMS status of the data from "complete" to "verified". The LIMS is programmed with a list of approved reviewers for each test, and the system is password protected to ensure that only qualified individuals verify the data.

Designated projects require further review by QA prior to release of the Analysis Report and/or data package to the client. These projects are identified in the LIMS through QA review tracking numbers.

## 10.6 Data Qualification

Data qualifiers are used to provide additional information about the results reported. The most typical use for data qualifiers is for results that fall below the quantitation limit, in the region where it becomes more difficult to distinguish a positive result from the background instrument signal. The data systems used to generate and report results are programmed to flag values in this range as estimates.

Other qualifiers are applied to advise data users of any validation issues associated with the data. The laboratory makes every effort to meet all of the requirements for generation of data. Occasionally, generation of data that does not meet all the method requirements occurs due to sample matrix or other analytical problems. If the test cannot be repeated or reanalysis would not yield better quality data, qualified data is reported. Qualifiers can be in the form of comments on the analytical report or flags applied to the results.

Qualifications for regulated samples (e.g. drinking water, NPDES) may not be permissible. The process for evaluating regulatory sample qualifications is detailed in *QA-SOP11886 Processing Regulatory Compliance (i.e. SDWA, NPDES) Samples.*

## 10.7 Data Reporting

When all analyses are completed, reviewed and verified, the Analysis Report is auto-generated and released by the LIMS, or by QA for the designated QA review projects. The client receives a copy of the report containing the results of the analysis and, where necessary, qualifier flags and/or explanatory comments to address non-conformances. A QC Summary or QC Exception report is appended to the

Analysis Report when requested. To avoid ambiguity in interpreting results, a summary page that contains an explanation of all symbols and units used in reporting data is included with the Analysis Report submitted to clients. Some regulatory agencies also require the laboratory accreditation identification on the Analysis Reports. Additionally, some agencies require the certification status by parameter (analyte/method/matrix) on the Analysis Reports. Where required, this information is added. The current list of agencies and certification status by parameter can be accessed in the LIMS. Copies of reports and associated supporting raw data are retained in our archives. The report contains the signature of the assigned client service representative who is the key contact for any questions concerning the results. Personnel authorized to review, sign, and release Analysis Reports are maintained in the LIMS.

The laboratory offers a variety of data reporting levels and formats, from a basic report of sample and QC results only, to a comprehensive data package of QC/calibration information and raw data. The client and any agency involved direct the selection of report type. A summary of report formats and data packages types is provided in the laboratory *Schedule of Services*. Various electronic formats are also available formatted to client-specified file structure and sent via e-mail, direct upload, secure web-site access, or common courier. The secure web-site access is used for clients that require secure transfer of electronic data.

Client confidentiality of web-site data is ensured by the use of a secured firewall internet environment coupled with the use of a user ID and password to gain login access to the system. User accounts are configured to only allow access to specific data associated with the user's business account number.

Amendments to a final report after issue are in the form of an additional document or data transfer and include a reference to the original report. When a completely new final report is required, it is uniquely identified and includes a reference to the original report it replaces.

### 10.7.1 Reporting the Results

Analytical reports are generated with a cover page that summarizes all samples in that group. This page lists the laboratory assigned sample number and the corresponding client description. The cover page identifies the laboratory contact person's name and phone number if there is a question about the report. Within this package, each page is uniquely identified and paginated. Analytical test results for methods listed on the laboratory's accreditation scope meet all requirements of the relevant regulatory body accreditation, NELAP accreditation and ISO 17025 unless noted otherwise.

## 10.8 Data Storage, Security, and Archival

The laboratory has documented procedures and instructions for the identification, collection, access, indexing, filing, storage, maintenance, and disposition of data records. Records are in the form of paper records, electronic data files, magnetic tape, and CD-ROMs.

All data records are maintained in a confidential manner in an environment to minimize deterioration or damage and to prevent loss. Some records are stored in off-site facilities, in such a way that they are readily retrievable. Retention time for records is in accordance with specific procedures or instructions. Prior to the destruction of data/records, and if requested by a client or agency, the laboratory will notify the client/agency that their data is scheduled for destruction so arrangements can be made to have the original data sent to the client.

If specified in client contract(s), archived records are transferred according to their instructions in the event of a change in laboratory ownership or if the laboratory goes out of business. If not specified by the client, the sale agreement must require that archived records be maintained as scheduled by the new owners. In the case of bankruptcy, appropriate regulatory and state legal requirements concerning laboratory records must be followed.

The laboratory maintains all documentation which is necessary for historical reconstruction of data:

- Analysis reports
- Data notebooks
- Data logbooks
- Instrument output
- Correspondence and client files
- Instrument and equipment logbooks
- QA records
- Corporate documents
- Electronic records

# 11 AUDITS AND INSPECTIONS

## 11.1 Internal Quality Assurance Audits

The QA Department, which is independent of laboratory activities, performs routine and on-going system, traceability, and observation audits to objectively review current systems, operations, and procedures as well as automated data integrity audits of electronic data records. The goal of the audits is to ensure that the quality system activities are effective and in compliance with regulatory programs, including NELAP, ISO 17025, DoD, PALA, and state agencies, as well as internal policies and procedures. Audits are documented and tracked in a QA database.

Audits are scheduled and conducted following a predefined schedule, based on criticality of operation and prior audit results, with the goal of evaluating systems and technologies across the operation. If

warranted, additional audits are performed to follow up on promised corrective action or areas of concern.

Results of an audit are documented in a report format and distributed to applicable management personnel responsible for the area(s) under audit. Management is responsible to address all non-conformances found during an audit with root cause analysis and application of a corrective action plan.

Audit reports and responses are circulated to Management to communicate the outcome of the audit and the proposed plan(s) for corrective action, if warranted. If any of the audit findings cast doubt on the validity of the results, the clients must be notified within one business day from confirmation of the issue. Should an audit issue present a major concern regarding validity of laboratory methods, QA personnel can issue a stop work notice.

All records maintained as part of an audit are kept on file for five years.

On an annual basis, an audit of the QA Department is performed as directed by the laboratory's Executive Management. The auditors assigned to carry out this operation are qualified staff members independent of the QA Department.

The specific content and findings of internal audits are considered company confidential and are not shared with clients.

## 11.2 Review of the Quality Assurance Program

All levels of management are continually updated on the status of quality and compliance by circulation of pertinent documents. Management review is documented by signatures on the documents, electronic records of each person's review, along with any comments or request for additional follow-up. The types of documents circulated real-time include:

- Internal, client, and agency audit reports and responses
- Proficiency test results
- Investigation and corrective action reports
- Monthly QA status reports

Executive management reviews the elements of the total quality program on an annual basis to ensure its continuing suitability and effectiveness in meeting the stated objectives outlined in Section 2.4 of this manual. The evaluation entails review of reports to management, all audit findings, client complaints, laboratory investigations, staff adequacy and training, and projected growth in workload. Patterns or trends in any of these areas are reviewed as a means to continually improve the quality system. This review also includes an evaluation of any audit findings resulting from the audit of the QA Department. At the conclusion of this quality system review, executive management determines the

need to introduce changes or improvements into the quality systems at the laboratory. The minutes from the meeting and any recommendations for improvement are documented and a copy is forwarded to the QA staff for review and follow-up.

## 11.3 Good Laboratory Practice Critical Phase Inspections

Any project that is subject to Good Laboratory Practice (GLP) regulations is audited by the QA Department, as required by the regulations, at intervals adequate to ensure the integrity of the study. Inspections of a GLP project include direct observation of analysts as they perform various phases of the study. Data documentation is reviewed as part of the inspection. The purpose of this type of audit is to ensure that there are no deviations from written methods, procedures, or study protocols.

Results of inspections are documented in a report format and distributed to applicable management personnel responsible for the area(s) under audit. Management is responsible to address all non-conformances found during an inspection. Inspection reports and responses are circulated to applicable laboratory management and an off-site study director, as applicable, to communicate the outcome of the inspection and the proposed plan(s) for corrective action, if warranted.

All records maintained as part of an inspection are kept on file.

## 11.4 Client Audits

Because clients place great importance on compliance with applicable regulations, data quality, and project requirements, they may audit our facility as assurance that their objectives are being met. QA, management staff, CSRs, and the analytical laboratories play a key role in these audits. Visits by clients can range anywhere from a tour (to verify laboratory facilities and instrumentation) to an intensive inspection of technical operations, procedures, regulatory compliance, and/or review of specific project(s).

Audits are scheduled directly with the CSR or QA. The request to audit is communicated to all applicable laboratory departments. An escort (designated laboratory employee) remains with an auditor at all times. In accordance with our policy on client confidentiality, a client is permitted to review only data and results that apply to their work, or which have been approved by laboratory management.

Responsibilities are assigned to the following groups in regard to client audits:

### 11.4.1 QA Department

- Research previous audit reports and laboratory responses to past deficiencies.
- Follow-up with the applicable analytical laboratory areas to ensure action items were completed from the last audit, as necessary.
- Work with client to set audit agenda.

- Function as an escort during the audit
- Answer questions the auditor has in regard to laboratory and quality systems.
- Take notes of areas where corrective action or suggestions are recommended during the audit.
- Communicate audit issues to management at the completion of the audit.
- Respond to client audit reports.
- Ensure follow-up to cited items are addressed in a timely manner.

### 11.4.2 CSRs

- Gather and organize relevant information (e.g., client correspondence, analysis/project requests, copies of analytical data from archives).
- Be knowledgeable about client-specific project requirements and issues.
- Function as an escort during the audit.
- Communicate issues/problems to appropriate personnel.

### 11.4.3 Laboratories

- Gather and organize laboratory data and documentation in preparation for client review.
- Assure corrective action was implemented from past audit findings, if necessary.
- Be prepared to discuss project data/testing results during the audit.
- Be familiar with client-specific project requirements and be prepared to answer client questions.
- Be familiar with the location of routine laboratory information and equipment (e.g., SOPs, data notebooks, calibration data, etc.).
- Be prepared to answer specific technical questions in regard to laboratory procedures and instrumentation within the area.
- Functions as an audit escort within the department during the audit.
- Laboratory managers may function as an escort during the audit.

## 11.5 Agency Inspections

It is laboratory policy to cooperate to the fullest extent and maintain cordial relations with all government agencies. The QA Department is assigned the responsibility of hosting and working with agency representatives. The QA role includes, escorting the investigator(s); ensuring all questions are answered promptly and accurately; making note of all unresolved issues; informing management of the audit status and outcome; responding to the audit report and ensuring that appropriate corrective action is completed. CSRs and laboratory staff responsibilities are similar to those noted above for client audits.

Inspections can be performed by investigators or auditors from the EPA, states, third-party accreditation bodies (i.e. A2LA, United States Department of Agriculture (USDA)), or other regulatory agencies.

Government agencies have the right to investigate and inspect the laboratory during normal business hours and permission to inspect is granted by Executive Management.

Designated members of the QA Department are primary contacts for announced inspections. The QA Director is the primary contact for all unannounced agency inspections. If the QA Director is unavailable, Executive Management is notified, in addition to a member of the QA Department. The QA Director, or their designee, must obtain evidence of the investigator's authority either in the form of a letter or examination/explanation of credentials.

Inspections include the examination of records or the inspection of facilities. Investigators are usually concerned only with the records relating to their responsibilities. As a general rule, they are given copies of records and documents, if requested. The laboratory must have a record of all items provided to an investigator.

Investigators must be escorted through the laboratory. The laboratory is not obligated to show an investigator the following types of information: sales, financial or pricing information, or any personnel data other than training or qualification documentation. On a case-by-case basis, internal QA audit reports and investigation reports are made available for agency review. Any questions or concerns about a request made by an investigator in regard to recording devices or photographs must be reviewed with legal counsel.

The laboratory personnel are not permitted to sign affidavits. If an affidavit is presented during an inspection, all personnel are directed not to sign it, read it, nor listen to it being read. The only document that is acceptable to sign is an acknowledgement that an inspection report has been received. If there is any doubt as to what should be signed, legal counsel must be consulted.

## 11.6 Proficiency Testing

Many of the organizations that certify our laboratory to perform various analyses require proof of our competency. Laboratory performance is checked regularly by participation in a variety of proficiency

testing (PT) programs. When available, blind samples are obtained from vendors that are accredited to provide PT samples under the TNI and/or ISO 17025 standards for all test and matrices routinely tested at the laboratory. In addition, some individual certification programs require analysis of specific sets of proficiency samples.

Generally, the PT programs consist of samples or ampulated spiking solutions used to fortify laboratory samples. The laboratories analyze the samples in the same manner as a client sample and the data is sent to the agency or vendor for evaluation. After the study results are returned to the laboratory, any data falling outside the acceptance criteria is investigated, root cause is identified, and corrective action is implemented, if needed. Results are circulated to management. No PT samples or portion of a PT sample are sent to another laboratory for analysis.

Double blind samples are submitted to the laboratories with some client projects so that the laboratory is not aware that the samples are PTs. The acceptance criteria for these double blind samples are developed statistically using data from participating laboratories, providing a source of inter-laboratory comparison. The clients will provide the results to the laboratory. Results are reviewed, investigated as needed with response to the client.

If a trend in PT failures is identified, additional blind samples are ordered for that specific test as corrective action.

# 12 CORRECTIVE AND PREVENTATIVE ACTION

## 12.1 Laboratory Investigation and Corrective Actions

Due to the technical nature of laboratory work and the broad scope of our QA program, a wide variety of laboratory issues can require investigation, root cause analysis, documentation, and corrective action. Prompt investigation and implementation of corrective action ensure that only data of known quality are reported and prevent the recurrence of errors. The following list provides "examples" of the type of issues that warrant investigation:

- Noncompliant QC results*
- Failed PT samples
- Reporting incorrect results
- Contamination issues
- Client technical complaints
- Procedural errors
- Missed holding times

- Systematic problems that compromise the accuracy or compliance of the data generated
- Problems with instrumentation and equipment which could compromise the data generated

These investigations must include the following:

- Identification of the problem
- Steps taken to investigate the problem
- Explanation of probable root cause(s) of the problem
- Steps taken to prevent future occurrence
- Determination of samples or systems affected by the problem

*Note: individual QC noncompliance does not require in depth investigation. Actions are taken as defined in the corresponding method and documented in the data. An adverse trend with noncompliance would be investigated.

Management is informed of problem situations. The QA staff track documentation, the status of the investigation activities, evaluates investigations for completeness and appropriateness, and monitors corrective action for follow-up/closure. Technical management and/or QA may issue a stop work notice if issues indicate the potential for problems on a broad scale or present a critical concern regarding the validity of the laboratory methods. The goal is to identify root cause, have the corrective action implemented promptly, and to the degree appropriate for the magnitude and risk of the problem. Tracking and trending of laboratory issues is performed by QA staff and reported to management on a monthly basis or immediately upon detection of a trend with potential for putting the laboratory or our clients at risk.

## 12.2 Investigation Process

All results from quality control (QC) samples are logged into the LIMS quality control system, which is programmed to alert analysts to unacceptable results. Analysts are required to review the results and determine the source of the problem. The source of the problem and proposed action must be documented. Action for QC outliers may include, but is not limited to, re-analysis, re-extraction or re-digestion, instrument maintenance, or re-calibration. If these actions do not yield compliant data within the required hold time, a Nonconformance Form is initiated to document actions and communication with the client. The original form is archived with the associated raw data. Nonconformance Forms are reviewed by the technical department's management, or designee. A copy of the form is reviewed by QA.

Missed holding times are investigated and documented using a Missed Holding Time form. The form includes documentation of the affected samples, reason the hold was missed and corrective actions

taken, if applicable. Each form also has documented review and approval by the department manager, department director and the QA Director. Clients are informed of any problems involving holding time.

Other types of problems having potential impact on data quality or involve deviations to our processes are investigated and documented using an Investigation and Corrective Action Report (ICAR). This process was developed to ensure that laboratory problems are investigated, evaluated for root cause, corrective action is put into place to prevent recurrence, laboratory management review and QA approval occurs, and all steps are documented. These investigations are initiated and managed through a workflow interface (Jira). Any employee can initiate an ICAR through this system to document a laboratory problem. The investigation must be completed by designated members of management and approved/closed by QA. Each investigation has a unique tracking number assigned by Jira. Closed investigations are routed to the laboratory Vice-President, associated laboratory Director and the QA Director. Follow-up to ensure effective corrective action is managed by QA staff.

If a laboratory error is identified from the outcome of the investigation that impacts validity of client data, the client must be notified in writing of the situation and corrected data provided as soon as possible. If the root cause of the problem has affected any other client sample results, all affected clients are notified of the problem.

## 12.3 Client Feedback

The laboratory is in the business of providing high quality analytical testing services. The data that we supply to our clients must be technically complete, accurate, and compliant with applicable regulations. Complaints can be received via letter, phone call, e-mail, or face-to-face meeting.

When a complaint is received, it is our responsibility to determine, to the best of our ability, the extent of the issue and what data is in question. The person receiving the complaint documents this information and promptly forwards it to the appropriate management personnel where the work in question was performed. If a data reporting error is discovered, the final report and/or data must be regenerated with the correct value(s).

The CSR is responsible for entering client concerns into the LIMS and an automated summary report is sent to QA on a weekly basis for review. In some cases, an ICAR is initiated to address and document the situation. While an individual issue may not warrant a formal investigation, QA monitors these issues for potential trends and will issue an ICAR if a trend is evident.

On an annual basis, the laboratory sends a client satisfaction survey to all clients. The results of these surveys are compiled, routed to the laboratory executive managment and the QA Director, and used to identify areas of improvement for the laboratory.

## 12.4 Preventative Actions

All employees are empowered and encouraged to use the concept of Preventive Action to avoid a problematic situation. The company supports, embraces and drives the process for continuous quality improvement by several means, such as: Ethics Hotline, the Suggestion Box (accessible to all

employees on the company's Intranet 'LabLinks'), and training classes that include "Making Quality a Science" and Ethics. If an employee identifies a potential problem or an area of concern or it should be brought to the attention of his/her supervisor, Human Resources, QA Director or the Ethics Hotline.

The laboratory also utilizes a formal program to encourage preventive action through development of Lean processes. The goal of this program is to optimize processes to ensure efficiency and operational improvements while maintaining compliance. The efficiency gains are inherently coupled with minimizing errors and rework. Teams of employees learn the tools and techniques to evaluate a process, identify potential sources of errors, delays or problems in an operation, determine system changes that will minimize these and work to implement the improvements. Each project includes thorough documentation of the evaluation, measurement, and implementation phases. The process is continually monitored to ensure that the anticipated results are sustained.

Employees are also encouraged to communicate to their supervisor any area(s) or operation(s) that they believe could be streamlined, make their job easier, would provide a quality improvement, or could provide a cost savings to the company.

Described below are some of the systems available to employees to assist with building quality and efficiency into their daily jobs. They stress a proactive approach/environment to problem solving and to review quality systems and operational efficiencies.

- "Making Quality a Science" is an introductory total quality management (TQM) course required for all employees to teach why quality is important and to explain the laboratory's quality philosophy and processes, and how to apply quality thinking and techniques on the job. Topics discussed include: communication, teamwork, serving the client, measurement, quality tools, and continuous process improvement. To foster continuous improvements of laboratory systems, process improvement teams are formed, as needed, if an employee needs help in solving a problem or addressing an issue. The goal of these groups is to have representation from various areas of the laboratory work together to look at a problem, evaluate the need for a temporary fix, brainstorm root causes, plan process improvement, implement the process improvement, evaluate and follow-up to the corrective action.

- "Putting our Values to Work" (Ethics) is a seminar required for all employees to teach the laboratory's Statement of Values by examining how it translates to our everyday jobs and ethical decision making. Topics discussed include: Statement of Values, ethical paradigms, and ethical decision making. Mandatory ethics training refresher seminars are offered on an annual basis.

- The laboratory has contracted with an Ethics Hotline to provide an anonymous means of reporting ethics concerns or issues. The issue is forwarded by the service to the QA Director who will communicate internally with those who need to address the issue. All communication and actions are documented in a secure web interface managed by the hotline service company.

- The QA staff prepares monthly program status reports for management. The reports include a variety of metrics and graphs which are used to evaluate trends in laboratory performance across all quality and compliance areas. Management responds to any negative trends by developing a corrective action plan.

- The laboratory uses a Project Cycle process (further described in section 13.2) to proactively review and prepare for client projects in an effort to ensure full understanding by all laboratory staff of the client's needs and resolve any concerns in advance of receiving the work.

# 13 SERVICE TO CLIENTS

## 13.1 Service to Clients

We value our client relationships and support these partnerships through the following principles:

- Honesty and Fairness – Our corporate culture is founded on the principles of professionalism and high ethical standards in dealing with our clients. This may mean declining to provide the service requested (if we are convinced that to do so would be meaningless) or it may mean referring clients outside of our laboratory if we believe that another company can better meet their needs.

- Complete Service – We will give our clients full value on every service provided. We will provide detailed information on our methods, procedures, and QA programs if requested, and take a personal interest and initiative in helping solve our client's problems within the area of our professional expertise.

- Trustworthiness – All data and information developed for a client will be held confidential and not disclosed to a third party except on written request of the client. If information is subpoenaed, we must, by law, release it, but the client will be informed of the release.

- Commitment to Quality – We constantly strive to improve our service in quality, flexibility, and dependability, to keep our competitive edge. We will achieve this through: meeting the requirements of those we serve, staying apprised of regulatory and industry expectations, and providing prompt responses to client concerns.

- Basics of Superlative Service – Our focus is on our client's success. Through proactive collaborative communication, our leadership ensures we understand our client's expectations and strives to exceed them. We foster a service culture in our training, reward and recognition, and performance management process so each employee takes ownership to deliver superlative service to our clients. Feedback from clients, whether positive or negative, is an important part of our continuous improvement system. Ways in which feedback is gathered can include, but is not limited to, customer satisfaction surveys, client audits, and the customer complaint system, which is described within section 12.3.

We also view our fellow employees as our clients since they frequently receive the results of our labor. Meeting the requirements of the next employee in the workflow process is just as important as meeting the needs of an external client.

## 13.2 Review of Work Requests, Tenders, and Contracts

The laboratory places great importance on understanding and meeting client requirements for a project. We ensure, to the best of our ability, that client/project requirements are identified and communicated through the laboratory. Project evaluation can be achieved in various ways, including the review of analytical methods, protocols, business contracts, and quality project plans (QAPPs). The project review encompasses our Project Cycle process and individual topics to be evaluated for a project include, but are not limited to: scope of testing; required accreditations (i.e. individual state agencies, PALA, NELAP, DoD, and ISO 17025) held by the laboratory; appropriate and current testing methods; ability to meet project required reporting limits and QC (if applicable); inconsistencies clarified; and nonstandard work requests.

Project kick-off meetings can be arranged through the CSR or Business Development Group. These meetings allow the client and key technical personnel to discuss project issues and requirements prior to project initiation. Any differences between laboratory processes and the project requirements are discussed and addressed with the client and the laboratory staff before the project is accepted and samples arrive. Project-specific requirements are communicated to the laboratory through use of Project Notes (PNs). Accreditation-specific requirements (i.e. NJ DKQP, MA MCP, CT RCP, PALA, NELAP, DoD, and ISO 17025) have template PNs maintained by QA, and these are used to add to the project's PNs. Testing that cannot be performed at the laboratory may be subcontracted to another laboratory (see 13.4).

A key client contact, the CSR, is assigned to oversee the project. Communication between the client and laboratory staff is available and is coordinated through the CSR.

As a project continues, the CSRs provide continuous communication and status reports (if requested) about the project to the client. The CSR relays any project changes or modifications to the technical groups. If the client submits revised project documents (QAPPs, etc.) then the Project Cycle review process is repeated. The CSR also communicates any issues encountered by the technical laboratories back to the client and vice-versa.

## 13.3 Timely Delivery

Evaluating laboratory capacity and ability to perform specific projects is a joint responsibility between the Technical Director, Business Development, and the laboratory managers. We recognize that one of the most important aspects of the service we offer is turnaround time.

Many analysts are cross-trained to perform a variety of tests, and there is redundant equipment available in the laboratory area creating operation flexibility for routine work. Larger projects are reviewed against capacity estimates before bids are submitted to ensure that the client’s schedule is met. Turnaround time is continually measured.

Regularly scheduled meetings are held with technical and support management, and project management personnel to review progress with current projects, as well as special requirements of new work scheduled for the laboratory.

Management receives a daily report of the status of all samples in the lab, including those with priority status or those that have exceeded a preset turnaround time. This enables the planning and organizing of the workload through efficient scheduling.

Any changes to the established timeline by the client or the laboratory must be communicated to the client or laboratory as soon as possible. Upon communication of changes, a new timeline is established and agreed upon by both parties. If a client requires a change in the scope of the project (e.g., number of samples submitted, change in analyses, revised protocol) the laboratory must be informed in writing and a new timeline and cost estimate is be provided.

## 13.4 Subcontracting

The laboratory may subcontract tests to other laboratories if the requested testing is not routinely performed in our laboratory. To a lesser extent, samples may need to be subcontracted to an overflow laboratory to ensure hold times and/or turn-around-times (TAT) are met.

Testing is only subcontracted with the client's knowledge and approval. The CSR must notify the client in writing when any of their requested analyses will be subcontracted to another lab. Client approval must be obtained in writing before samples are shipped.

Subcontract laboratories are selected based on their qualifications and accreditations. The subcontractor is requested to sign a Laboratory Analytical Services Subcontract. See form *Q-EQA-FRM6867* to review details of the contract terms and information requested from the subcontract laboratory. If projects require a specific agency certification (i.e. individual state agencies, NELAP, DoD, PALA, ISO 17025), only an appropriately accredited laboratory is used. The client may also have a list of laboratories to be used for subcontracting. In these cases, the evaluation of the subcontract laboratory is made by the client.

Data obtained from subcontract laboratories is clearly marked as such when reported by the laboratory. The data are submitted to the client in the format obtained from the subcontractor.

## 13.5 Use of NELAP and A2LA Logo

It is not laboratory policy to use these logos on any company letterhead, including analytical reports.

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Q-EQA-FRM6867 Laboratory Analytical Services Subcontract (ELLE)
QA-SOP11886 Processing Regulatory Compliance (i.e. SDWA, NPDES) Samples

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Attachment:
Appendix A - Procedure Cross Reference List

End of document

**Version history**

| Version | Approval | Revision information |
|---|---|---|
| 15.1 | 19.OCT.2018 | Editorial updates only. |
| 16 | 18.MAR.2019 | |
| 17 | 11.JUL.2019 | |

**NOTE**: SOPs and Forms are indicated in the table with the unique D4 document number. The topic of the document is given in parentheses.

| EQPM Section # | Title | Procedure(s) |
|---|---|---|
| 1 | Introduction | |
| 1.1. | Mission Statement | Employee Handbook |
| 1.2. | Quality Policy | 11197 (Quality Statement)<br>Employee Handbook |
| 1.3. | Statement of Values | Employee Handbook |
| 1.5. | Certifications, Accreditations, and Registrations | Form 6840 (Cert Summary)<br>Company website |
| 2 | Organization and Personnel | |
| 2.1 | Company Overview and History | |
| 2.1.1 | Business Continuity and Contingency Plans | 13101 (Incident Response Plan)<br>14735 (Preparedness, Contingency)<br>12233 (Archiving SOP)<br>Form 6843 (Deputies form) |
| 2.2. | Organizational Structure | Organization Charts |
| 2.3. | Management Responsibilities | PQDs (job descriptions)<br>PMDs (individual job plans) |
| 2.4. | Overview of the Quality Assurance Program | Dept 4052 SOP Series |
| 2.5. | Quality Assurance Responsibilities | Dept 4052 SOP Series |
| 2.6. | Communication of Quality Issues to Management | 11912 (QA Reports) |
| 2.7. | Personnel Qualifications and Responsibilities | 16134 (Employee Training)<br>PQDs (job descriptions)<br>PMDs (individual job plans)<br>Task Specific Training |
| 2.8. | Relationship of Functional Groups and the Quality Assurance Program | Quality Orientation<br>TQM Training<br>PMDs (individual job plans)<br>Dept 4052 SOP Series<br>11895 (Project Cycle) |
| 2.9. | Balancing Laboratory Capacity and Workload | PMDs (individual job plans)<br>LIMS reports for mgt |
| 2.10. | Identification of Approved Signatories | 11186 (Date Entry, Verification and Reporting) |
| 2.11. | Personnel Training | 16134 (Employee Training)<br>11178 (DOCs)<br>PQDs (job descriptions)<br>PMDs (individual job plans)<br>Task Specific Training |
| 2.12. | Regulatory Training | 11194 (GLP) |
| 2.13. | Employee Safety | Analytical Methods<br>Chemical Hygiene Plan<br>14735 (Preparedness)<br>Dept 6098 SOP Series<br>PMDs (individual job plans) |

| EQPM Section # | Title | Procedure(s) |
|---|---|---|
| 2.14. | Client Services/Project Management Responsibilities | Dept 4039 SOP Series<br>11895 (Project Cycle) |
| 2.15. | Confidentiality | Employee Handbook<br>16221 (E-mail System)<br>6824 (Client and Agency Audits) |
| 2.16. | Business Conduct | Employee Handbook |
| 2.17. | Operational Integrity | 11176 (Manual Integration)<br>11882 (Chromatographic Integration)<br>11177 (Ethics Policy)<br>11197 (Quality Statement) |
| 3 | Buildings and Facilities | |
| 3.1. | Facility | Floor Plans |
| 3.2. | Security | 12733 (Building Security) |
| 3.3. | Disaster Recovery | 13101 (Incident Response Plan) |
| 3.4. | Environmental Monitoring | 11919 (VOA Storage)<br>11191 (ETM) |
| 3.5. | Water Systems | 11916 (Reagent Water) |
| 3.6. | Housekeeping/Cleaning | 15553 (Housekeeping) |
| 3.7. | Insect & Rodent Control | 16117 (Insect & Rodent Control) |
| 3.8. | Emergency Power Supply | 13101 (Incident Response Plan) |
| 3.9. | Facility Changes | 14744 (Facility Change Control)<br>11195 (Change Control) |
| 4 | Document Control | |
| 4.1. | Hierarchy of Internal Operating Procedures | 6823 (Writing SOPs) |
| 4.2. | Document Approval, Issue, Control, and Maintenance | 16131 (Document Control)<br>11189 (Method Validation) |
| 4.3. | Client-Supplied Methods and Documentation | 11193 Analytical Decision Making)<br>6825 (QA review of QAPPs)<br>11895 (Project Cycle)<br>12039 (Auditing Paperwork) |
| 4.4. | Laboratory Notebooks, Logbooks, and Forms | 16131 (Document Control)<br>11913 (Notebooks) |
| 4.5. | Control of External Documents | 16131 (Document Control)<br>Departmental "Controlled Documents" forms |
| 5 | Sample Handling | |
| 5.1. | Sample Collection | Dept 4031 SOP Series |
| 5.2. | Sample Receipt and Entry | Dept 6042 SOP Series |
| 5.3. | Sample Identification and Tracking | Dept 6042 SOP Series<br>11184 (LSAR) |
| 5.4. | Sample Storage | Dept 6055 SOP Series |
| 5.5. | Sample Return/Disposal | 12042 (Sample Discard)<br>15553 (Hazardous Wastes - Lab)<br>9017756 (Hazardous Wastes − Storage) |
| 5.6. | Legal Chain of Custody | 11914 (Legal COC) |
| 5.7. | Representativeness of Samples | Analytical Methods<br>11190 (Representative Solid Samples) |
| 6 | Technical Requirements - Traceability of Measurements | |

| EQPM Section # | Title | Procedure(s) |
|---|---|---|
| 6.1. | Reagents and Solvents | 11188 (Reagents and Standards)<br>Analytical Methods |
| 6.2. | Calibration Standards | 11188 (Reagents and Standards)<br>Analytical Methods |
| 6.3. | Equipment and Instrumentation | 11901 (Inst. & Equip M&C)<br>11880 (Balance, Syringe, Pipette Verification) |
| 6.4. | Computerized Systems and Computer Software | 11195 (Change Control)<br>11186 (Network Accounts)<br>16221 (E-mail System)<br>20940 (Computer Backup)<br>Employee Handbook<br>16227 (Computer Viruses) |
| 6.5. | Change Control | 11195 (Change Control) |
| 6.6. | Labware Cleaning | Departmental Procedures |
| 7 | Purchasing Equipment and Supplies | |
| 7.1 | Procurement | 11192 (Procurement)<br>9018236 (Receipt of Lab Supplies) |
| 7.2 | Supplier Evaluation | 11192 (Procurement)<br>11181 (Subcontracting)<br>11188 (Reagents and Standards)<br>6826 Preservative Checks) |
| 8 | Analytical Methods | |
| 8.1. | Scope of Testing | Schedule of Services<br>Company website |
| 8.2. | Analytical Test Methods | 11189 (Method Validation)<br>6853 (Writing Procedure Guidance) |
| 8.3. | Client Supplied Methods | 11189 (Method Validation) |
| 8.4. | Method Validation | 11189 (Method Validation) |
| 8.5. | Procedural Deviations | 11912 (ICARs) |
| 9 | Internal Quality Control Checks | |
| 9.1. | Laboratory Quality Control Samples and Acceptance Criteria | 11896 (QC Limits)<br>Analytical Methods |
| 9.2. | Quality Control Sample Frequency and Corrective Action | 11912 (Noncompliant Data)<br>Analytical Methods |
| 9.3. | Quality Control Charts | 6817 (End of Month QC Reports) |
| 9.4. | Measurement Uncertainty | 11896 (QC Limits) |
| 10 | Assuring Quality of Test Results | |
| 10.1. | Data Management | 11913 (Notebooks) |
| 10.2. | Data Documentation | 11913 (Notebooks)<br>11186 (Date Entry, Verification and Reporting)<br>11197 (Quality Statement) |
| 10.3. | Data Calculations | 11186 (Date Entry, Verification and Reporting)<br>Analytical Methods |
| 10.4. | Reporting Limits | 11892 (MDLs & LOQs) |

| EQPM Section # | Title | Procedure(s) |
|---|---|---|
| 10.5. | Data Review | 11913 (Notebooks)<br>11186 (Date Entry, Verification and Reporting) |
| 10.6. | Data Qualification | 11912 (Noncompliant Data) |
| 10.7. | Data Reporting | 11186 (Date Entry, Verification and Reporting)<br>11886 (MCL Exceedance) |
| 10.8. | Data Storage, Security, and Archival | 12233 (Data Archiving)<br>20940 (Computer Backup) |
| 11 | Audits and Inspections | |
| 11.1. | Internal Quality Assurance Audits | 7547 (Internal Audits)<br>11194 (GLP)<br>6859 (Internal Audit Checklist) |
| 11.2. | Review of the Quality Assurance Program | 7547 (Internal Audits)<br>6822 (QA Reports) |
| 11.3. | Good Laboratory Practice Critical Phase Inspections | 11194 (GLP) |
| 11.4. | Client Audits | Employee Handbook<br>6824 (Client and Agency Audits) |
| 11.5. | Agency Inspections | Employee Handbook<br>6824 (Client and Agency Audits) |
| 11.6. | Proficiency Testing | 11185 (PT Program)<br>6816 (PT Entry) |
| 12 | Corrective and Preventive Action | |
| 12.1. | Laboratory Investigations and Corrective Action | 11912 (Noncompliant Data), ICARs, Client Complaints) |
| 12.2. | Investigation Processes | 10401 Missed Hold Procedure)<br>6832 (Missed Hold form)<br>11912 (ICARs) |
| 12.3. | Client Feedback | 11912 (Client Complaints)<br>Annual Client Survey |
| 12.4. | Preventive Actions | Corporate Training<br>Lean Projects<br>11895 (Project Cycle)<br>1195 (Change Control)<br>7547 (Internal Audits) |
| 13 | Service to Clients | |
| 13.1. | Service to Clients | Employee Handbook<br>Ethics Statement<br>11197 (Quality Policy)<br>TQM Training |
| 13.2. | Review of Work Requests, Tenders, and Contracts | 12039 (Client Paperwork)<br>11895 (Project Cycle)<br>6825 (QAPP Review) |
| 13.3. | Timely Delivery | 11166 (Tracking Rush Samples)<br>11160 (Scheduling Rush Samples)<br>Departmental LIMS reports |

| EQPM Section # | Title | Procedure(s) |
|---|---|---|
| 13.4. | Subcontracting | 11181 (Subcontractor Checklist)<br>11181 Subcontracting)<br>11895 (Project Cycle) |

| Agency | Parameter | Applicable Matrices | Lab ID No. |
|---|---|---|---|
| Federal Programs: | | | |
| American Association for Laboratory Accreditation (A2LA) | Organics, inorganics, dioxin, PFAS, KY UST, WY Storage Tank Program, Food and Feed, and PFAS | Potable water, nonpotable water, solid and hazardous waste, air, tissue | 0001.01 |
| USDA Quarantine Soil Permit | All | Solid | P330-13-00350 |
| State Programs: | | | |
| State of Alaska, Department of Environmental Conservation Drinking Water Program | Organics, inorganics, PFAS | Potable water | PA00009 |
| State of Alaska, Department of Environmental Conservation Contaminated Sites Program | Organics, inorganics, UST analysis, PFAS | Nonpotable water, solid and hazardous waste | 17-027 |
| State of Arizona, Department of Health Services | Dioxin | Potable water, nonpotable water, solid and hazardous waste | AZ0780 |
| State of Arkansas, Department of Environmental Quality | Organics, inorganics, dioxin | Nonpotable water, solid and hazardous waste | 88-0660 |
| State of California, Department of Health ELAP | Organics, inorganics, dioxin | Potable water, nonpotable water, solid and hazardous waste | 2792 |
| State of Colorado, Department of Public Health and Environment | Organics, inorganics, dioxin | Potable water | PA00009 |
| State of Connecticut, Department of Public Health | Organics, inorganics, dioxin | Potable water, nonpotable water, solid and hazardous waste | PH-0746 |
| State of Delaware, Health and Social Services | Organics, inorganics, dioxin | Potable water | None |
| [3]State of Florida, Department of Health | Organics, inorganics, dioxin | Air and emissions, potable water, nonpotable water, solid and chemical materials | E87997 |
| State of Hawaii | Organics, inorganics, dioxin, PFAS | Potable water | None |
| [3]State of Illinois, Environmental Protection Agency | Organics, inorganics, dioxin | Nonpotable water, solid and chemical materials | 200027 |
| State of Iowa, Department of Natural Resources | Organics, inorganics, UST analysis | Nonpotable water, solid and hazardous waste | 361 |
| [3]State of Kansas, Department of Health and Environment | Organics, inorganics, dioxin | Potable water, nonpotable water, solid and chemical materials | E-10151 |
| Commonwealth of Kentucky, Department of Environmental Protection, Drinking Water Certification Program | Organics, inorganics, dioxin | Potable water | 90088 |
| Commonwealth of Kentucky, Department of Environmental Protection, Wastewater Certification Program | Organics, inorganics, dioxin | Nonpotable water | 90088 |
| [4]Commonwealth of Kentucky, Department for Environmental Protection – UST Branch | Organics, metals, UST analysis | Nonpotable water, solids | 108139 |
| [1, 3, 5] State of Louisiana, Department of Environmental Quality | Organics, inorganics, dioxin | Air emissions, biological tissue (direct accreditation), nonpotable water, solid chemical materials | 30729 02055 |

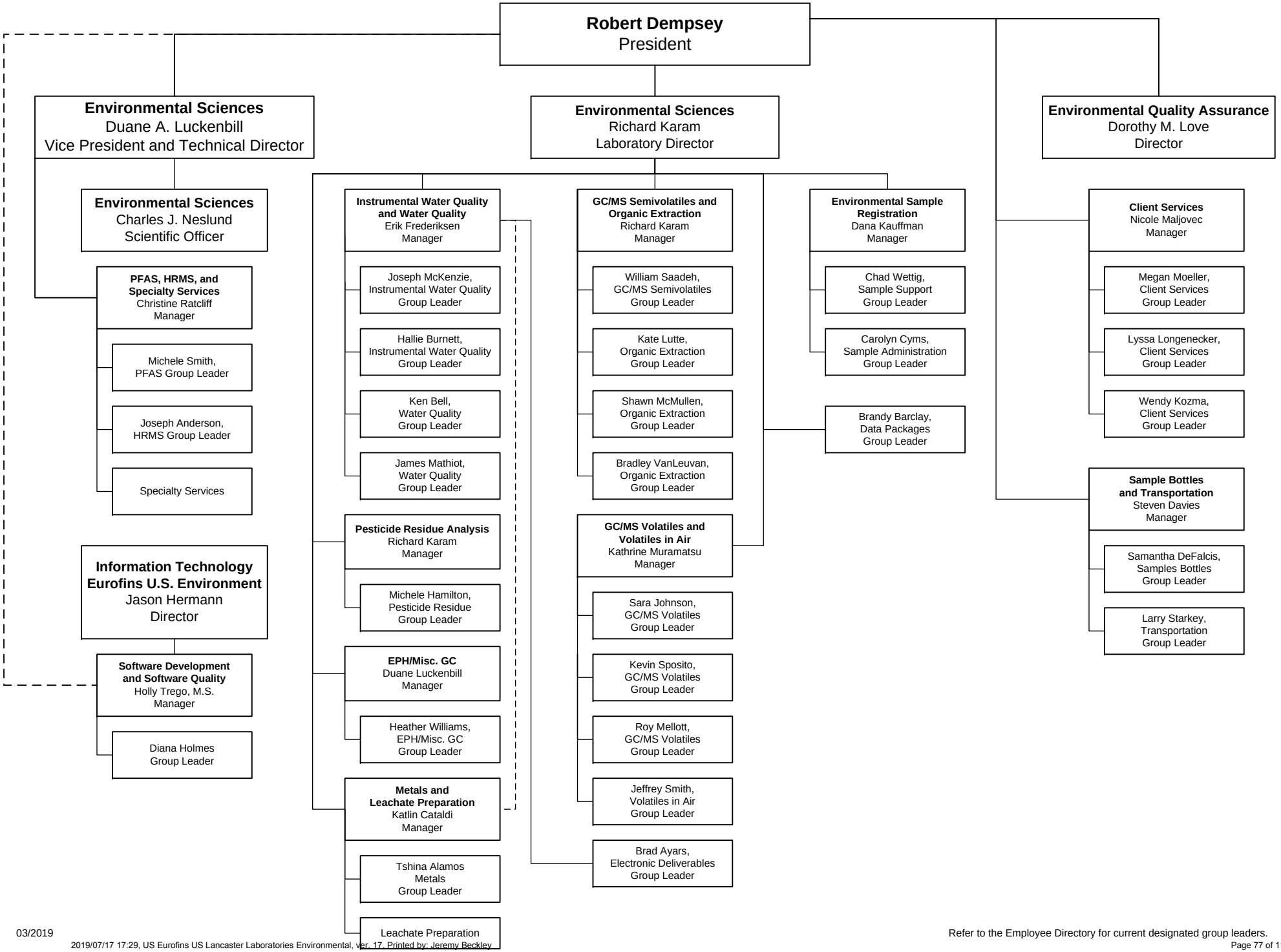
| Agency | Parameter | Applicable Matrices | Lab ID No. |
|---|---|---|---|
| State of Maryland, Department of the Environment | Organics, inorganics, dioxin, | Potable water | 100 |
| State of Michigan, Department of Environmental Quality | Organics, inorganics, dioxin | Potable water | 9930 |
| State of Missouri, Department of Natural Resources | Organics, inorganics, PFAS | Potable water | 450 |
| State of Montana, Department of Public Health and Human Services | Organics, inorganics, dioxin, PFAS | Potable water | CERT0098 |
| State of Montana, Department of Environmental Quality | Organics, UST analysis | Nonpotable water, solid and chemical materials | None |
| State of Nebraska, Department of Health and Human Services | Organics, inorganics, dioxin, , PFAS | Potable Water | NE-OS-32-17 |
| [3]State of Nevada, Department of Conservation and Natural Resources | Organics, inorganics, dioxin | Potable water, nonpotable water, solid and chemical materials | PA00009 |
| [3]State of New Hampshire, Department of Environmental Services | Organics, inorganics, dioxin, , PFAS | Potable water, nonpotable water, solid and chemical materials | 2730 |
| [3]State of New Jersey, Department of Environmental Protection (NJDEP) | Organics, inorganics, dioxin, , PFAS | Air and emissions, potable water, nonpotable water, solid and chemical materials, biological tissue | PA011 |
| [3]State of New York, Department of Health | Organics, inorganics, dioxin, , PFAS | Air, nonpotable water, potable water, solid and chemical materials | 10670 |
| State of North Carolina, Department of the Environment and Natural Resources | Organics, inorganics | Nonpotable water | 521 |
| State of North Carolina, Department of Health and Human Services | Organics, | Potable water | 42705 |
| State of North Dakota, Department of Health | Organics, inorganics, dioxin, PFAS | Potable water, nonpotable water, solids and hazardous materials | R-205 |
| [3] State of Oklahoma, Department of Environmental Quality | Organics, inorganics, dioxin | Nonpotable water, solid and hazardous waste | 9804 |
| [3]State of Oregon, Public Health Laboratory | Organics, inorganics, dioxin, PFAS | Air, potable water, nonpotable water, solid and chemical materials | PA200001 |
| [2]Commonwealth of Pennsylvania, Department of Environmental Protection (Bureau of Laboratories) | Organics, inorganics, dioxin, , PFAS | Potable water, nonpotable water, solid and chemical materials (direct accreditation) | 36-00037 |
| State of Rhode Island, Department of Health | Organics, inorganics, , PFAS | Potable water, nonpotable water | LAO00338 |
| State of South Carolina, Department of Health and Environmental Control | Organics, inorganics, dioxin | Nonpotable water, solid and hazardous waste | 89002 |
| State of Tennessee, Department of Environment & Conservation | Organics, inorganics, dioxin | Potable water | TN02838 |
| [3] State of Texas, Commission on Environmental Quality | Organics, inorganics, dioxin, | Air and emissions, potable water, nonpotable water, solid and chemical materials, biological tissue | T104704194 |
| [3]State of Utah, Department of Health | Organics, inorganics, dioxin, PFAS | Potable water, nonpotable water, solid and hazardous material | PA00009 |

| Agency | Parameter | Applicable Matrices | Lab ID No. |
|---|---|---|---|
| State of Vermont, Department of Health | Organics, inorganics, dioxin, , PFAS | Potable water | VT 36037 |
| [3] Commonwealth of Virginia, VELAP | Organics, inorganics, dioxin, | Air, Potable water, nonpotable water, solid and chemical materials | 460182 |
| State of Washington, Department of Ecology | Organics, inorganics, dioxin, PFAS | Air, Potable water, Nonpotable water, solid and chemical materials | C457 |
| State of West Virginia, Department of Health and Human Resources | Organics, inorganics | Potable water | 9906C |
| State of West Virginia, Department of Environmental Protection | Organics, inorganics, dioxin, , PFAS | Nonpotable water, solid and chemical materials, hazardous waste | 055 |
| State of Wisconsin, Department of Natural Resources | Organics, inorganics, dioxin | Nonpotable water, solid and hazardous waste | 998035060 |
| State of Wyoming and all Tribal Public Water Systems in Region 8 | Organics, inorganics, dioxin, | Potable water | 8TMS-L |
| [4]State of Wyoming – UST Branch | Organics, metals, UST analysis | Nonpotable water, solids and hazardous waste | None |
| State of Vermont, Department of Health | Organics, inorganics, dioxin, , PFAS | Potable water | VT 36037 |
| [3] Commonwealth of Virginia, VELAP | Organics, inorganics, dioxin, | Air, Potable water, nonpotable water, solid and chemical materials | 460182 |
| State of Washington, Department of Ecology | Organics, inorganics, dioxin, PFAS | Air, Potable water, Nonpotable water, solid and chemical materials | C457 |
| State of West Virginia, Department of Health and Human Resources | Organics, inorganics | Potable water | 9906C |
| State of West Virginia, Department of Environmental Protection | Organics, inorganics, dioxin, , PFAS | Nonpotable water, solid and chemical materials, hazardous waste | 055 |
| State of Wisconsin, Department of Natural Resources | Organics, inorganics, dioxin | Nonpotable water, solid and hazardous waste | 998035060 |
| State of Wyoming and all Tribal Public Water Systems in Region 8 | Organics, inorganics, dioxin, | Potable water | 8TMS-L |
| [4]State of Wyoming – UST Branch | Organics, metals, UST analysis | Nonpotable water, solids and hazardous waste | None |

[1] NELAP Primary AB: Air and Emissions
[2] NELAP Primary AB: Potable Water, Nonpotable water, solid and chemical materials
[3] NELAP Secondary AB
[4] Approval for UST work by A2LA
[5] NELAP Primary AB: Biological Tissue

**NOTE:** This list accurately reflects the certifications, accreditations, registrations, and contracts held at the time of publication and is subject to change. Check with your account manager on the status of any certification needed for a specific project. Our current scopes of accreditation can be viewed at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ .

# Eurofins Lancaster Laboratories Environmental



| | | |
|---|---|---|
| **Job Title:** | Vice President, Eurofins Lancaster Laboratories Environmental | |
| **Reports To:** | President | |
| **Position Location:** | Lancaster, PA | |
| **Day/Shift:** | Varies | |
| **FLSA Status:** | Exempt | (Exempt/Non-Exempt) |

| | |
|---|---|
| **Position Summary:** | Leading departments in accordance with vision, values, and strategic goals of company; overseeing and facilitating efficient operations and systems, sound business practices, consistent client service, and motivated staff |

## Essential Duties and Responsibilities:

- Demonstrates and promotes the company vision
- Regular attendance and punctuality
- Does everything reasonably possible to meet the annual budget
- Ensure that the quality policy/program is understood, implemented, and maintained at all levels of the organization; identify, prevent, or correct any departures from the quality system
- Oversee operations in accordance with policies set forth in the Key Group Documents
- Develop efficient and effective operations and systems that support the strategic goals of the company
- Utilize management operating system to track key performance indicators and drive continuous improvement
- Coach and develop individual and team to maximize performance
- Interact with clients as necessary to maintain and grow the business
- Build strategic relationships within the organization to achieve company goals
- Identify and evaluate issues and explore continuous improvement initiatives
- Perform administrative functions as needed, e.g., attend meetings and share information; prepare reports, job plans, and performance reviews
- Stay technologically current in field; attend seminars and/or training courses; publicize technical expertise through writing an article, presenting a poster session, or speaking at a seminar or technical meeting
- Perform other duties as requested by President
- Perform all functions in support of and in compliance with all state and federal employment regulations
- Conducts all activities in a safe and efficient manner
- Performs other duties as assigned

| | |
|---|---|
| **Basic Minimum Qualifications (BMQ):** | To perform this job successfully, the individual must be able to perform each essential duty satisfactorily. The requirements below are representative of the knowledge, skill or ability required. (List three to five key quantifiable skills or position requirements that the candidate must have to be considered for this position.) |
| **Education/Experience (BMQ):** | At least fifteen years related experience at ELLE or equivalent experience elsewhere |
| ***Additional preferences:*** | Bachelor's degree in appropriate field or equivalent experience; graduate courses are recommended; experience in a variety of technical areas |
| **Certificates and/or Licenses (BMQ):** | N/A |
| ***Additional preferences:*** | |
| **Supervisory Responsibility:** | Responsible for the direct management of Directors, Managers, and other leadership employees |
| **Ability and/or Skills (BMQ):** | Demonstrated expertise in laboratory operations and leadership skills; communicate effectively and to relate well to people in direct communication, as well as formal presentation; manage the work of other personnel; understand and promote company policy; excellent business sense; motivation to excel, both in technical matters and in management; professional appearance and conduct; consciousness of and a positive attitude toward quality, service, and safety procedures; sound reasoning and decision making; technical expertise; organization and problem-solving skills; good judgement, versatility and flexibility in dealing with people; ability to coordinate multiple priorities; foresight and planning; ability to synthesize and retain information; computer skills; ability to communicate effectively in written and oral forms; leadership skills |
| ***Additional preferences:*** | |
| **Other Factors:** | N/A |

**Disclaimer:**

This position description is written as a guideline to inform employees of what is generally expected of them at each job level. The description is not intended to be all encompassing or limiting in any manner; rather, it is hoped it will add understanding and better reflect the work performed at all levels of employment. Duties and responsibilities other than those listed may be included as needed within the work group or the company as a whole.

| | | |
|---|---|---|
| **Job Title:** | Operations Director, Eurofins Lancaster Laboratories Environmental | |
| **Reports To:** | President | |
| **Position Location:** | Lancaster, PA | |
| **Day/Shift:** | Varies | |
| **FLSA Status:** | Exempt | (Exempt/Non-Exempt) |

| | |
|---|---|
| **Position Summary:** | Leading departments in accordance with vision, values, and strategic goals of company; overseeing and facilitating efficient operations and systems, sound business practices, consistent client service, and motivated staff |

## Essential Duties and Responsibilities:

- Applies GMP/GLP in all areas of responsibility, as appropriate
- Demonstrates and promotes the company vision
- Regular attendance and punctuality
- Does everything reasonably possible to meet the annual budget
- Ensure that the quality policy/program is understood, implemented, and maintained at all levels of the organization; identify, prevent, or correct any departures from the quality system
- Develop efficient and effective operations and systems that support the strategic goals of the company
- Utilize management operating system to track key performance indicators and drive continuous improvement
- Coach and develop individual and team to maximize performance
- Interact with clients as necessary to maintain and grow the business
- Build strategic relationships within the organization to achieve company goals
- Identify and evaluate issues and explore continuous improvement initiatives
- Perform administrative functions as needed, e.g., attend meetings and share information; prepare reports, job plans, and performance reviews
- Stay technologically current in field; attend seminars and/or training courses; publicize technical expertise through writing an article, presenting a poster session, or speaking at a seminar or technical meeting
- Perform other duties as requested by President or designee
- Perform all functions in support of and in compliance with all state and federal employment regulations
- Conducts all activities in a safe and efficient manner
- Performs other duties as assigned

| | |
|---|---|
| **Basic Minimum Qualifications (BMQ):** | To perform this job successfully, the individual must be able to perform each essential duty satisfactorily. The requirements below are representative of the knowledge, skill or ability required. (List three to five key quantifiable skills or position requirements that the candidate must have to be considered for this position.) |
| **Education/Experience (BMQ):** | At least five years related experience at ELLE or equivalent experience elsewhere |
| ***Additional preferences:*** | Bachelor's degree in appropriate field or equivalent experience; graduate courses are recommended; experience in a variety of technical areas |
| **Certificates and/or Licenses (BMQ):** | N/A |
| ***Additional preferences:*** | |
| **Supervisory Responsibility:** | Responsible for the direct management of Managers and other leadership employees |
| **Ability and/or Skills (BMQ):** | Demonstrated expertise in laboratory operations and leadership skills; communicate effectively and to relate well to people in direct communication, as well as formal presentation; manage the work of other personnel; understand and promote company policy; excellent business sense; motivation to excel, both in technical matters and in management; professional appearance and conduct; consciousness of and a positive attitude toward quality, service, and safety procedures; sound reasoning and decision making; technical expertise; organization and problem-solving skills; good judgement, versatility and flexibility in dealing with people; ability to coordinate multiple priorities; foresight and planning; ability to synthesize and retain information; computer skills; ability to communicate effectively in written and oral forms; leadership skills |
| ***Additional preferences:*** | |
| **Other Factors:** | N/A |

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| | | |
|---|---|---|
| **Job Title:** | Quality Assurance Director | |
| **Reports To:** | President and/or designee | |
| **Position Location:** | Lancaster, PA | |
| **Day/Shift:** | Varies | |
| **FLSA Status:** | Exempt | (Exempt/Non-Exempt) |

**Position Summary:**

Overseeing all managerial and quality operations of the company; providing leadership and mentoring/coaching to QA staff; participating in short-term and long-term planning and goal setting for the company; facilitating adherence to government regulations; sustaining quality improvement and providing quality policy development; providing sound consultation to laboratories and clients on problems or interpretation of quality/compliance issues; keeping abreast of evolving regulatory and industry quality assurance requirements

**Essential Duties and Responsibilities:**

- Applies GMP/GLP in all areas of responsibility, as appropriate
- Demonstrates and promotes the company vision
- Regular attendance and punctuality
- Ensure that the quality policy program is understood, implemented, and maintained at all levels of the organization; identify, prevent, or correct any departures from the quality system
- Ensure that corrective action is appropriate; ensure that follow-up requirements are completed
- Encourage employee participation in process improvement initiatives
- Interview and make recommendations for new hires; train and develop staff; maintain job plans; handle personnel issues
- Handle agency audits, client audits, visits, and phone calls; prepare letters to clients; attendance at some local and national industry meetings
- Keep abreast of regulatory climate; assist technical operations with interpretation; advise on adjustment of lab policy as appropriate
- Perform all functions in support of and in compliance with all state and federal employment regulations
- Coach/mentor other members of the quality team
- Oversee regulatory training program; assist with, and present departmental and corporate training at a frequency to meet regulatory expectations and ensure compliance
- Work with operations and clients to drive challenging/complex resolutions and/or negotiate appropriate position or compromise; offer compliance options
- Identify and drive system improvements; diagnose complex issues
- Conducts all activities in a safe and efficient manner
- Performs other duties as assigned

| | |
|---|---|
| **Basic Minimum Qualifications (BMQ):** | To perform this job successfully, the individual must be able to perform each essential duty satisfactorily. The requirements below are representative of the knowledge, skill or ability required. (List three to five key quantifiable skills or position requirements that the candidate must have to be considered for this position.) |
| **Education/Experience (BMQ):** | At least six years' experience with QA |
| ***Additional preferences:*** | Bachelor's degree in chemistry or biology |
| **Certificates and/or Licenses (BMQ):** | N/A |
| ***Additional preferences:*** | |
| **Supervisory Responsibility:** | Provide leadership and direct management of any Group Leaders (if applicable) and other non-management employees in the department |
| **Ability and/or Skills (BMQ):** | Exhibit self-confidence and leadership; expertise in laboratory quality operations and regulatory environment; sound reasoning, decision making and problem-solving skills; good judgment and flexibility in dealing with others; ability to coordinate multiple priorities; communicate effectively in written and oral form; ability to manage the work of others and see projects through to completion; translate government regulations into laboratory policy/processes; utilize planning, organization and work management tools; ability to manage stress in self and others; dedication to quality, ethics, and customer service |
| ***Additional preferences:*** | |
| **Other Factors:** | N/A |

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| | | |
|---|---|---|
| **Job Title:** | Technical Department Manager | |
| **Reports To:** | Director or designee | |
| **Position Location:** | Lancaster, PA | |
| **Day/Shift:** | Varies | |
| **FLSA Status:** | Exempt | (Exempt/Non-Exempt) |

| | |
|---|---|
| **Position Summary:** | Performing a variety of technical and administrative tasks to develop, evaluate, and supervise staff; planning and monitoring work flow; designing, implementing, and utilizing departmental operations systems; promoting safety; remaining current on technical developments; communicating with clients; maintaining a strong commitment to quality |

**Essential Duties and Responsibilities:**

- Applies GMP/GLP in all areas of responsibility, as appropriate
- Demonstrates and promotes the company vision
- Regular attendance and punctuality
- Ensure that the quality policy program is understood, implemented, and maintained at all levels of the organization; identify, prevent, or correct any departures from the quality system
- Utilize the MOS to track key performance indicators and drive continuous improvement
- Produce motivated and satisfied employees
- Encourage employee participation in process improvement initiatives
- Oversee inventory, maintenance, and repair of departmental machines, tools, equipment, materials, and/or products
- Manage scheduling of personnel; evaluate personnel performance
- Participate in interview process, make recommendations for new hires; train and develop staff
- Review, prepare, and approve methods, data, and SOPs
- Communicate with clients on technical matters; meet with clients to discuss operations and conduct tours and audits
- Maintain client confidentiality
- Investigate and solve laboratory problems
- Perform all functions in support of and in compliance with all state and federal employment regulations
- Conducts all activities in a safe and efficient manner
- Performs other duties as assigned

| | |
|---|---|
| **Basic Minimum Qualifications (BMQ):** | To perform this job successfully, the individual must be able to perform each essential duty satisfactorily. The requirements below are representative of the knowledge, skill or ability required. (List three to five key quantifiable skills or position requirements that the candidate must have to be considered for this position.) |
| **Education/Experience (BMQ):** | At least five years related experience |
| ***Additional preferences:*** | Bachelor's degree in chemistry or related science; supervisory experience preferred |
| **Certificates and/or Licenses (BMQ):** | N/A |
| ***Additional preferences:*** | |
| **Supervisory Responsibility:** | Responsible for the direct management of the departmental Group Leaders |
| **Ability and/or Skills (BMQ):** | Knowledge of departmental techniques; manage personnel, resolve conflicts, and correct poor performance; attention to detail; tolerance for stress; integrity; computer skills; communicate effectively (verbally and written); perform multiple tasks simultaneously; logical thought; make decisions for self and others; independently develop solutions to complex problems |
| ***Additional preferences:*** | |
| **Other Factors:** | N/A |

**Disclaimer:**

This position description is written as a guideline to inform employees of what is generally expected of them at each job level. The description is not intended to be all encompassing or limiting in any manner; rather, it is hoped it will add understanding and better reflect the work performed at all levels of employment. Duties and responsibilities other than those listed may be included as needed within the work group or the company as a whole.

| | | |
|---|---|---|
| **Job Title:** | Support Department Manager | |
| **Reports To:** | Director | |
| **Position Location:** | Lancaster, PA | |
| **Day/Shift:** | Varies | |
| **FLSA Status:** | Exempt | (Exempt/Non-Exempt) |

| | |
|---|---|
| **Position Summary:** | Overseeing all managerial operations of the department, managing the department in an efficient and financially sound manner; providing leadership and coaching to assigned individuals; participating in long- and short-term planning and goal-setting for the group; coordinating functions and responsibilities of assigned department members to provide consistent service; coordinating internal efforts between departments; relaying corporate information appropriately |

**Essential Duties and Responsibilities:**

- Applies GMP/GLP in all areas of responsibility, as appropriate
- Demonstrates and promotes the company vision
- Regular attendance and punctuality
- Ensure that the quality policy program is understood, implemented, and maintained at all levels of the organization; identify, prevent, or correct any departures from the quality system
- Administrative including human resource interviews, job plans, performance reviews, personnel issues, group meetings, and sharing of corporate information
- Training of and delegation to members of the department to provide consistent service to internal and external clients
- Work with other departments to set goals, develop pricing strategies, manage workload, and resolve problems
- Create, implement, and oversee budgets and goals for the department in the context of corporate philosophy
- Evaluate, plan for, and provide adequate staffing, equipment, consumables, etc., for the department to function in an effective manner
- Communicate verbally, in writing, and face-to-face with clients to discuss and resolve problems, build strong relationships, and increase sales
- Perform all functions in support of and in compliance with all state and federal employment regulations
- Administrative activities (photocopying, word processing, paperwork delivery, etc.)
- Assist with financial and purchase order issues as needed
- Help coordinate interdepartmental cross-training and/or assistance as needed to balance workload
- Conducts all activities in a safe and efficient manner
- Performs other duties as assigned

| | |
|---|---|
| **Basic Minimum Qualifications (BMQ):** | To perform this job successfully, the individual must be able to perform each essential duty satisfactorily. The requirements below are representative of the knowledge, skill or ability required. (List three to five key quantifiable skills or position requirements that the candidate must have to be considered for this position.) |
| **Education/Experience (BMQ):** | Five years of related experience at LL or demonstrated equivalent experience elsewhere; computer skills in a variety of software; supervisory experience |
| ***Additional preferences:*** | Bachelor's degree in science (chemistry preferred) |
| **Certificates and/or Licenses (BMQ):** | N/A |
| ***Additional preferences:*** | |
| **Supervisory Responsibility:** | Responsible for the direct management of the Group Leaders of the department |
| **Ability and/or Skills (BMQ):** | Self confidence and leadership, ability to reason, make sound decisions, and delegate; empathy and sensitivity towards others; motivation to excel and inspire excellence in others; ability to develop strong relationships with clients resulting in client satisfaction and additional sales; ability to manage the work of others and see projects through to completion; strong communication including verbal, writing, and presentation skills; ability to communicate effectively and relate well to people; mental and emotional stability and maturity, ability to handle personal stress and diffuse stress in others; strong organizational and financial skills, ability to handle multiple priorities; good judgement and tact recognizing and solving problems; recognized as understanding, interpreting, and following company policy; sets example for others; dedication to quality, ethics, and customer service; pride in appearance, conduct, and company; sound persuasion and negotiation abilities; ability to view situations from a variety of perspectives; foresight and planning ability |
| ***Additional preferences:*** | |
| **Other Factors:** | N/A |

**Disclaimer:**

This position description is written as a guideline to inform employees of what is generally expected of them at each job level. The description is not intended to be all encompassing or limiting in any manner; rather, it is hoped it will add understanding and better reflect the work performed at all levels of employment. Duties and responsibilities other than those listed may be included as needed within the work group or the company as a whole.

| Document Number | Document Name | Document Responsible[1] |
|---|---|---|
| 1.01 Document Control | | |
| Standard Operating Procedure | | |
| G-DC-SOP12233 | Data and Record Storage, Security, Retention, Archival, and Disposal | 5_EUUSLA_Env Quality Assurance_Director |
| G-DC-SOP16131 | Document Control | 5_EUUSLA_Env Quality Assurance_Director |
| G-DC-SOP16196 | Position Qualification Descriptions (PQDs) and Essential Job Functions (EJFs) | 5_EUUSLA_Env Quality Assurance_Director |
| G-DC-SOP16244 | Writing and Reviewing ELLE Policies and Operating Procedures | 5_EUUSLA_Env Quality Assurance_Director |
| 1.02 EHS | | |
| Policies | | |
| G-EHS-QP12356 | Chemical Hygiene Plan | 5_EUUSLA_Env Quality Assurance_Director |
| G-EHS-QP14735 | Preparedness, Prevention, and Contingency Plan | 5_EUUSLA_Env Quality Assurance_Director |
| | Standard Operating Procedure | |
| G-EHS-SOP14741 | Emergency Evacuation Plan | 5_EUUSLA_Env Quality Assurance_Director |
| G-EHS-SOP13101 | Incidence Response Plan | 5_EUUSLA_Env Quality Assurance_Director |
| G-EHS-SOP14740 | Lockout/Tagout | 5_EUUSLA_Env Quality Assurance_Director |
| G-EHS-SOP22000 | Management of Hazardous Wastes in the Laboratory | 5_EUUSLA_Env Quality Assurance_Director |
| G-EHS-SOP14739 | Reporting Work Related Incidents | 5_EUUSLA_Env Quality Assurance_Director |
| G-EHS-SOP14738 | Safety Glasses | 5_EUUSLA_Env Quality Assurance_Director |
| 1.03 Facilities | | |
| Standard Operating Procedure | | |
| G-FAC-SOP12733 | Building Security | 5_EUUSLA_Env Quality Assurance_Director |
| G-FAC-SOP14744 | Facility Change Control Procedure | 5_EUUSLA_Env Quality Assurance_Director |
| G-FAC-SOP15553 | Facility Operation Manual | 5_EUUSLA_Env Quality Assurance_Director |
| G-FAC-SOP16117 | Insect and Rodent Control | 5_EUUSLA_Env Quality Assurance_Director |
| G-FAC-SOP16118 | Maintenance Connection Service Requestor Guidelines | 5_EUUSLA_Env Quality Assurance_Director |
| 1.04 Lists | | |
| List | | |
| G-LI9946 | Document List - Sorted by Chapter | 5_EUUSLA_Env Quality Assurance_All |
| G-LI9949 | List of documents by Expiration Date | 5_EUUSLA_Env Quality Assurance_All |
| G-LI9947 | List of Documents Under Revision by Chapter | 5_EUUSLA_Env Quality Assurance_All |
| G-LI9950 | Training Lists | 5_EUUSLA_Env Quality Assurance_All |
| G-LI9948 | Version List - Sorted by Chapter | 5_EUUSLA_Env Quality Assurance_All |
| 1.05 Templates | | |
| Work Instruction | | |
| G-TEMP-WI24324 | Change Plan Template | 5_EUUSLA_Env Quality Assurance_Director |
| G-TEMP-WI12535 | Level 2 Standard Operating Procedure Template | 5_EUUSLA_Env Quality Assurance_All |
| G-TEMP-WI12532 | Level 3 Template for Work Instruction for Analysis | 5_EUUSLA_Env Quality Assurance_All |

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| G-TEMP-WI12548 | Template for Revision Log for Existing SOPs | 5_EUUSLA_Env Quality Assurance_All |
| 1.06 External Documents | | |
| 2.01 Forms | | |
| 2.02 Training Forms | | |
| 3 Quality | | |
| Policies | | |
| QA-QP11177 | Laboratory Ethics and Data Integrity Policy | 5_EUUSLA_Env Quality Assurance_All |
| QA-QP11176 | Manual Integration for ELLE | 5_EUUSLA_Env Quality Assurance_All |
| | Quality Manual | |
| QA-QM11872 | Environmental Quality Policy Manual | 5_EUUSLA_Env Quality Assurance_All |
| Standard Operating Procedure | | |
| QA-SOP11880 | Balance, Syringe, Pipette, and Labware Verification | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11195 | Change Control Procedures for ELLE | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11882 | Chromatography Integration and Documentation | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11194 | Compliance with Environmental GLP Regulations | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11197 | Conflict of Interest Plan | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11186 | Data Entry, Verification and Reporting | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11178 | Demonstrations of Capability | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11892 | Determining Method Detection Limits and Limits of Quantitation | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP16134 | Employee Training Program | 5_EUUSLA_Env Quality Assurance_Director |
| QA-SOP11893 | Environmental Hazardous Sample Communication Procedure | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11895 | Environmental Project Cycle | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11896 | Establishing Control Limits | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11193 | Guidelines for Analytical Decision Making in Environmental Testing | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11180 | Guidelines for Writing Technical Reports | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11900 | HP-UX Target 3.5 Data System Accounts and Electronic Signature Security | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11901 | Instrument Maintenance and Calibration | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11912 | Investigation and Corrective Action for Client Complaints, Noncompliant Data, and Laboratory Problems | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11913 | Laboratory Notebooks, Logbooks, and Documentation | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11184 | Laboratory Sample Analysis Record (LSAR) Documentation | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11196 | Laboratory/Quality Systems Procedures Summary | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11914 | Legal Chain-of-Custody Documentation | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP10401 | Missed Holding Time Reports | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11919 | Monitoring of the Volatile Organics Analysis (VOA) Storage Areas for Contamination | 5_EUUSLA_Env Quality Assurance_All |

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| QA-SOP11191 | Monitoring Temperatures in Refrigerators, Freezers, Incubators, and Ovens Using the ETM | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11190 | Obtaining a Representative Environmental Solid Sample Aliquot | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11886 | Processing Regulatory Compliance (i.e. SDWA, NPDES) Samples | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11192 | Procurement of Environmental Laboratory Supplies | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11185 | Proficiency Test Samples | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11915 | Quarantine Soils Procedures | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11188 | Reagents and Standards | |
| QA-SOP11182 | Sample Requisition | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11181 | Subcontracting Analytical Testing | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11183 | Thermometer Use and Calibration | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11916 | Use and Maintenance of Reagent Water Supply | 5_EUUSLA_Env Quality Assurance_All |
| QA-SOP11189 | Validation and Authorization of Analytical Methods | 5_EUUSLA_Env Quality Assurance_All |
| 3.01 Environmental Quality Assurance | | |
| Work Instruction | | |
| Q-EQA-WI12060 | Director | 5_EUUSLA_Env Quality Assurance_Director |
| Q-EQA-WI6822 | ELLE QA Reports to Management | 5_EUUSLA_Env Quality Assurance_All |
| Q-EQA-WI6818 | Environmental Quality Assurance Functions for GLP Compliance | 5_EUUSLA_Env Quality Assurance_All |
| Q-EQA-WI6825 | Environmental Quality Assurance Review of Client Project and Bid Documents | 5_EUUSLA_Env Quality Assurance_All |
| Q-EQA-WI6815 | ETM System Probe Calibration | 5_EUUSLA_Env Quality Assurance_All |
| Q-EQA-WI6824 | Hosting of Environmental Client and Agency Audits | 5_EUUSLA_Env Quality Assurance_All |
| Q-EQA-WI6820 | Maintenance of Environmental Certifications and Accreditations | 5_EUUSLA_Env Quality Assurance_All |
| Q-EQA-WI6819 | Performing Electronic Data Audits using Mint Miner Software | 5_EUUSLA_Env Quality Assurance_All |
| Q-EQA-WI7547 | Performing Environmental Quality Assurance Audits | 5_EUUSLA_Env Quality Assurance_All |
| Q-EQA-WI7671 | Principal Specialist | 5_EUUSLA_Env Quality Assurance_Director |
| Q-EQA-WI6816 | Proficiency Test and Double Blind Samples | 5_EUUSLA_Env Quality Assurance_All |
| Q-EQA-WI6823 | QA Approval of Environmental Analytical Procedures and Standard Operating Procedures | 5_EUUSLA_Env Quality Assurance_All |
| Q-EQA-WI6826 | QA Processing for Bottle Lot and Preservative Checks | 5_EUUSLA_Env Quality Assurance_All |
| Q-EQA-WI6817 | Quality Assurance Review of End-of-Month QC Reports | 5_EUUSLA_Env Quality Assurance_All |
| Q-EQA-WI7670 | Senior Specialist | 5_EUUSLA_Env Quality Assurance_Director |
| Q-EQA-WI14178 | Specialist (Support) | 5_EUUSLA_Env Quality Assurance_Director |
| 4.06 IT/Software Development | | |
| Standard Operating Procedure | | |
| R-SD-SOP20940 | Computer Backup, Recovery, and Archive | 5_EUUSLA_Env Quality Assurance_Director |

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| R-SD-SOP16221 | E-Mail System | 5_EUUSLA_Env Quality Assurance_Director |
| R-SD-SOP16227 | Utilizing the Services and Support of the NSC Service Desk | 5_EUUSLA_Env Quality Assurance_Director |
| 4.07 Transportation | | |
| Work Instruction | | |
| R-TR-WI11282 | Administrator | 5_EUUSLA_Transportation_Manager |
| R-TR-WI11284 | Director, Environmental Support Services | 5_EUUSLA_Transportation_Manager |
| R-TR-WI11285 | Manager | 5_EUUSLA_Transportation_Manager |
| R-TR-WI11289 | Sample Administrator | 5_EUUSLA_Transportation_Manager |
| R-TR-WI11288 | Sample Pick-Up, Transportation, and Delivery | 5_EUUSLA_Transportation_Manager |
| R-TR-WI11290 | Specialist | 5_EUUSLA_Transportation_Manager |
| R-TR-WI11294 | Transportation Summary SOP | 5_EUUSLA_Transportation_Manager |
| R-TR-WI11297 | What to Do in Case of Vehicular Accident or Breakdown | 5_EUUSLA_Transportation_Manager |
| 5.01 Sample Bottles | | |
| Work Instruction | | |
| S-BOT-WI10641 | Bottle Preparation | 5_EUUSLA_Sample Bottles_Manager |
| S-BOT-WI10655 | Director, Environmental Support Services | 5_EUUSLA_Sample Bottles_Manager |
| S-BOT-WI10657 | Manager | 5_EUUSLA_Sample Bottles_Manager |
| S-BOT-WI10642 | Packing Bottle Orders | 5_EUUSLA_Sample Bottles_Manager |
| S-BOT-WI10643 | Preparation of Acid Dilutions | 5_EUUSLA_Sample Bottles_Manager |
| S-BOT-WI10644 | Preparation of Trip Blanks | 5_EUUSLA_Sample Bottles_Manager |
| S-BOT-WI10645 | Processing Bottle Orders | 5_EUUSLA_Sample Bottles_Manager |
| S-BOT-WI10660 | Senior Administrator | 5_EUUSLA_Sample Bottles_Manager |
| S-BOT-WI10661 | Specialist | 5_EUUSLA_Sample Bottles_Manager |
| 5.02 Client Services | | |
| Work Instruction | | |
| S-CS-WI12039 | Auditing Client Paperwork | 5_EUUSLA_Client Services_Manager |
| S-CS-WI10251 | Client Concern and ISPD Code Entry | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11140 | Client/Prospects Visits | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11141 | Creating Bottle Orders | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11142 | Creating Project Information Lists | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11143 | Daily or Weekly DEP Reporting | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11144 | Director, Environmental Services | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11149 | Group Leader | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11151 | Manager | 5_EUUSLA_Client Services_Manager |

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| S-CS-WI11152 | Monthly DEP Reporting | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11155 | Phone Log and Email Documentation | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11157 | Principal Specialist (Client Services) | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11159 | Sample Set-Up Form Creation Guide | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11160 | Scheduling and Pricing of Rush Samples | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11161 | Senior Administrator (Client Services) | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11162 | Senior Specialist (Client Services) | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11163 | Specialist (Client Services) | 5_EUUSLA_Client Services_Manager |
| S-CS-WI11166 | Tracking and Communicating Rush Results | 5_EUUSLA_Client Services_Manager |
| 5.03 Sample Administration | | |
| Work Instruction | | |
| S-SA-WI10713 | Administrator (Unpacking) | 5_EUUSLA_Sample |
| S-SA-WI10714 | Assigning Sample Delivery Group Numbers and Five-Digit Sample Codes to Sample Groups | 5_EUUSLA_Sample Administration_Manager |
| S-SA-WI10716 | Director, Environmental Support Services | 5_EUUSLA_Sample |
| S-SA-WI10717 | Entry of Environmental Samples Requiring Subcontracting | 5_EUUSLA_Sample |
| S-SA-WI10723 | Environmental Sample Entry | 5_EUUSLA_Sample Administration_Manager |
| S-SA-WI10725 | Environmental Sample Receipt and Unpacking | 5_EUUSLA_Sample Administration_Manager |
| S-SA-WI10726 | Filing of Sample Information | 5_EUUSLA_Sample Administration_Manager |
| S-SA-WI10727 | Group Leader | 5_EUUSLA_Sample Administration_Manager |
| S-SA-WI10730 | Manager | 5_EUUSLA_Sample Administration_Manager |
| S-SA-WI12043 | Sample Receipt at the Sample Receipt Desk | 5_EUUSLA_Sample Administration_Manager |
| S-SA-WI10736 | Senior Administrator (Sample Administration) | 5_EUUSLA_Sample Administration_Manager |
| S-SA-WI10737 | Senior Administrator (Unpacking) | 5_EUUSLA_Sample Administration_Manager |
| S-SA-WI10738 | Senior Specialist (Sample Administration) | 5_EUUSLA_Sample Administration_Manager |
| S-SA-WI10741 | Specialist (Sample Administration) | 5_EUUSLA_Sample Administration_Manager |
| S-SA-WI10742 | Specialist (Unpacking) | 5_EUUSLA_Sample Administration_Manager |
| S-SA-WI10743 | Taking the Temperature of Environmental Samples Upon Arrival at the Lab | 5_EUUSLA_Sample Administration_Manager |
| 5.04 Sample Support | | |
| Work Instruction | | |
| S-SS-WI10697 | % Moisture Calculation (Gravimetric) by SM 2540 G-1997 | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10662 | Accounts to be held after Client Hold Discard | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10666 | ASRS Emergency Failure Procedure | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10668 | Automated Storage and Retrieval System (ASRS) Lockout/Tagout Procedure | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI12042 | Automated Storage, Retrieval, and Discarding of Samples | 5_EUUSLA_Sample Support_Manager |

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| S-SS-WI10673 | Chemist | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10678 | Director, Environmental Support Services | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10682 | GC/MS - Bulk Solids Matrix Sample Preparation | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10683 | Glassware Cleaning | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10684 | Group Leader | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10685 | Hardware Procedures for ASRS | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10686 | Homogenization, Sample Splitting, and Subsampling of Solid Waste Samples from Environmental Sources | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10690 | Instructions for Collecting Data on the LLENS System | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10692 | Laboratory Assistant | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10693 | Laboratory Technician | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10695 | Liquid Sample Preservation, Sample Splitting, and Turbidity for metals by EPA Methods 200.7 and 200.8 | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10696 | Maintenance of Dessicators | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10699 | Non-Automated Storage, Retrieval, and Discarding of Samples | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10702 | Outlier Quality Control Data | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI10705 | Percent Solids by SM 2540G - 1997 | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI11168 | Pipette Dispenser Calibration Procedure | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI11169 | Preparation of Soil and Solid Samples for GC Volatile Analyses | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI11170 | Preparation of Soils for Volatile Analysis by EPA SW-846 Method 5035 and Method 5035A | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI11242 | Preparation of Vials for Field Preservation of Soils for Volatile Analysis | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI11259 | Prescreening Water and Soil Samples for Volatile Organic Compounds | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI11260 | Preservation and Bottles Room Preservative Traceability | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI11268 | Sample Preparation of Solid Samples Including Sieving and Milling for Extraction and Analysis by SW-846 8330B | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI11220 | Sample Support Ovens | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI11270 | Senior Technician | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI11225 | Subsampling for Subcontracted Analyses | 5_EUUSLA_Sample Support_Manager |
| S-SS-WI11272 | Water Content (Moisture) by ASTM D 2216 | 5_EUUSLA_Sample Support_Manager |
| 5.05 Data Deliverables | | |
| Work Instruction | | |
| S-DD-WI10752 | Administrator (Data Package Archivist) | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI10753 | Administrator (Data Package Assembly) | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI10754 | Administrator (Data Package Review) | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI10755 | Archiving Department 4025 Raw Sample Data and Other Miscellaneous Data | 5_EUUSLA_Data Deliverables_Manager |

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| S-DD-WI12037 | Assembly and Review of Environmental Data Packages | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI10804 | Director, Environmental Support Services | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI10806 | Generation and Content Review of GLP Compliant Data Packages | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI11121 | Group Leader | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI11122 | Manager | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI11123 | Overchecking the Electronic Data Deliverable | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI11124 | Preparation of Data Packages on CD ROM | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI11125 | Processing and Sending Data Packages | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI12068 | Senior Administrator (Data Package Assembly) | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI11126 | Senior Administrator (Data Package Review) | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI11127 | Senior Specialist (Data Package Assembly) | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI11128 | Senior Specialist (Data Packages) | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI11129 | Senior Specialist (Electronic Data Deliverables) | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI11130 | Specialist (Data Package Assembly) | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI11131 | Specialist (Data Package Review) | 5_EUUSLA_Data Deliverables_Manager |
| S-DD-WI11132 | Specialist (Electronic Data Deliverables) | 5_EUUSLA_Data Deliverables_Manager |
| 5.06 Service Centers | | |
| Work Instruction | | |
| S-SC-WI13221 | Preparation of Trip Blanks at BASC and STSC | 5_EUUSLA_Sample Bottles_Manager |
| 5.06.01 Bay Area Service Center | | |
| Work Instruction | | |
| S-SC-BA-WI11313 | Administrator | 5_EUUSLA_Sample Bottles_Manager |
| S-SC-BA-WI11314 | BASC Sample Pick-Up, Transportation, and Delivery | 5_EUUSLA_Sample Bottles_Manager |
| S-SC-BA-WI11323 | Group Leader | 5_EUUSLA_Sample Bottles_Manager |
| S-SC-BA-WI12044 | Handling Non-Routine Analytical Services for Chevron Texaco | 5_EUUSLA_Client Services_Manager |
| S-SC-BA-WI11324 | Laboratory Technician | 5_EUUSLA_Sample Bottles_Manager |
| S-SC-BA-WI11326 | Packing Bottle Orders at Bay Area Service Center | 5_EUUSLA_Sample Bottles_Manager |
| S-SC-BA-WI12309 | Preparation of Acid Dilutions | 5_EUUSLA_Sample Bottles_Manager |
| S-SC-BA-WI12045 | Processing Bay Area Service Center (BASC) Bottle Orders | 5_EUUSLA_Sample Bottles_Manager |
| S-SC-BA-WI11329 | Project Manager | 5_EUUSLA_Sample Bottles_Manager |
| S-SC-BA-WI11332 | Sample Receipt for the Bay Area Service Center | 5_EUUSLA_Sample Bottles_Manager |
| S-SC-BA-WI11333 | Senior Specialist | 5_EUUSLA_Sample Bottles_Manager |
| S-SC-BA-WI11334 | Specialist | 5_EUUSLA_Sample Bottles_Manager |

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| | External Documents | |
| S-SC-BA-EX11330 | Reagent Log Book for Eurofins Service Centers | 5_EUUSLA_Client Services_Manager |
| 5.07 Business Development | | |
| Work Instruction | | |
| S-BD-WI10778 | Director | 5_EUUSLA_Env Sciences_Manager |
| S-BD-WI10788 | Legal Review Process of Client Supplied Documents | 5_EUUSLA_Env Sciences_Manager |
| S-BD-WI10783 | Manager | 5_EUUSLA_Env Sciences_Manager |
| S-BD-WI11156 | Preparing Quotations | 5_EUUSLA_Env Sciences_Manager |
| S-BD-WI10785 | Principal Specialist (Business Development) | 5_EUUSLA_Env Sciences_Manager |
| S-BD-WI10786 | Principal Specialist Account Manager | 5_EUUSLA_Env Sciences_Manager |
| S-BD-WI10787 | Proposal Preparation | 5_EUUSLA_Env Sciences_Manager |
| S-BD-WI10791 | Senior Specialist (Business Development) | 5_EUUSLA_Env Sciences_Manager |
| S-BD-WI10792 | Senior Specialist Account Manager | 5_EUUSLA_Env Sciences_Manager |
| S-BD-WI10793 | Specialist (Business Development) | 5_EUUSLA_Env Sciences_Manager |
| S-BD-WI10794 | Specialist II (Support) | 5_EUUSLA_Env Sciences_Manager |
| S-BD-WI10795 | Vice President, Eurofins Lancaster Laboratories Environmental | 5_EUUSLA_Env Sciences_Manager |
| 8.02 Volatiles | | |
| Work Instruction | | |
| T-VOA-WI7865 | Associate Chemist | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7613 | Calibrating the 1-µL Standard Delivery Groove on the Archon Model 5100A and O.I 4660 Autosampler Systems | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7620 | Chemist | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7627 | Client Specific - Determination of Client Specific Target Compounds by Gas Chromatography/Mass Spectrometry (GC/MS) in Soils | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8221 | Client Specific - Method AK101 for the Determination of Gasoline Range Organics in Soil Analysis for the State of Alaska | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7711 | Client-specific Determination of Client Specific Target Compounds by Gas Chromatography/Mass Spectrometry (GC/MS) in Waters | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7706 | Determination of GRO by GC in Waters and Wastewaters by Method AK101 | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8614 | Determination of Target Compounds by GC/MS using Selective Ion Monitoring (SIM) by Method 8260C | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8194 | Determination of Volatile Target Compounds and Gasoline Range Organics (GRO) by Capillary Column Gas Chromatography/Mass Spectrometry (GC/MS) in Waters and Wastewaters by Method 8260C | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8225 | Determination of Volatile Target Compounds and Gasoline Range Organics (GRO) by GC/MS in Soils and Solids by Method 8260B | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8236 | Determination of Volatile Target compounds and Gasoline Range Organics (GRO) by GC/MS in Soils and Solids by Method 8260C | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8197 | Determination of Volatile Target Compounds and Gasoline Range Organics (GRO) by GCMS in Waters and Wastewaters by Method 8260B | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8584 | Determination of Volatile Target Compounds by Capillary Column Gas Chromatography/Mass Spectrometry (GC/MS) in Waters and Wastewaters by Method 6200B | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8224 | Determination of Volatiles Gasoline Range Organics in Soil and Water - Northwest GX Method | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7615 | Director | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7619 | GC and GC/MS Instrumentation Maintenance | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8220 | GC/MS Determination of 1,2,3-Trichloropropane Using Isotope Dilution and Selective Ion Monitoring (SIM) by EPA Method 524.2, Modified | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8480 | GC/MS Determination of Purgeable Organic Compounds in Water by EPA Method 524.2 | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7629 | GC/MS Volatile Standards Traceability | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8373 | GC/MS Volatiles Audit Process | 5_EUUSLA_GC/MS Volatiles_Manager |

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| T-VOA-WI7691 | Glassware Washing | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7675 | GRO in Soils by GC by SW-846, Methods 8015B, 8015C, 8015D | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8213 | GRO in Soils for South Carolina | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7727 | GRO in Water for South Carolina | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7690 | GRO in Waters and Wastewaters by GC by SW-846, Methods 8015B, 8015C, 8015D | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7624 | Group Leader | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7614 | Laboratory Technician | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8400 | Level II Review of GC/MS Volatiles | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8338 | Low Concentration Waters for Volatile Organic Analysis by EPA SOW 10/92 | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7861 | Manager | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7692 | Preparation and Analysis of Cleaning Blanks for GC and GC/MS Volatiles | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7870 | Preparation and Testing of Storage Blanks for GC/MS Volatile Analysis | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7605 | Preparation and Testing of Trip Blanks for GC/MS Volatile Analyses | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8196 | Preparation of Oil Samples | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7869 | Preservation and Residual Chlorine Checks of Samples for GC/MS Volatile Water Analysis | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7626 | Principal Chemist | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7625 | Principal Specialist | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8183 | Purgeable Aromatics by GC in High-Level Soils by Method 8021B | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8119 | Purgeable Aromatics in Water Samples by Method 602 | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8139 | Purgeable Aromatics in Water Samples by Method 8021B | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7621 | Senior Chemist | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7622 | Senior Specialist | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7623 | Senior Technician | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7866 | Specialist | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7607 | Statistical Calculations Used in the Analysis of Samples by EPA Methodology | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7717 | Targeted Library Search by GC/MS | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8515 | The Determination of 1,4-Dioxane by GC/MS using Isotope Dilution and Selective Ion Monitoring (SIM) by Method 8260B and 8260C | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7720 | The Determination of Ethylene Oxide and Crotonaldehyde by Gas Chromatography/Mass Spectrometry (GC/MS) in Water and Soil by SW-846 Method 8260B | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8544 | Toxicity Characteristic Leachate Procedure (TCLP); Determination of Volatile Target Compounds by GCMS in Zero Headspace Extraction (ZHE) by 8260B | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI7606 | Use of 40-mL Vials for Volatile Organic Analyses | 5_EUUSLA_GC/MS Volatiles_Manager |

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| T-VOA-WI7630 | Vinyl Chloride and Carbon Disulfide by GC/MS using Selective Ion Monitoring (SIM) in Waters by Method 8260B | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8265 | Volatile Organic Compounds in Wastewater by Isotope Dilution and GC/MS by EPA Method 1666 | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8330 | Volatile Organics Tentatively identified Compound Method | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8633 | Volatile Organics Tentatively Identified Compound Method (Interpretive) | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI8423 | Waters for Volatile Organic Compounds by Purge and Trap Gas Chromatography/Mass Spectrometry using EPA Method 624 | 5_EUUSLA_GC/MS Volatiles_Manager |
| T-VOA-WI18576 | Waters for Volatile Organic Compounds by Purge and Trap Gas Chromatography/Mass Spectrometry using EPA Method 624.1 | 5_EUUSLA_GC/MS Volatiles_Manager |
| 8.03 Metals | | |
| Work Instruction | | |
| T-MET-WI7882 | Associate Chemist | 5_EUUSLA_Metals_Manager |
| T-MET-WI7886 | Bottletop Dispensers | 5_EUUSLA_Metals_Manager |
| T-MET-WI7887 | Chemist | 5_EUUSLA_Metals_Manager |
| T-MET-WI11925 | Client Specific - 3030 C. Treatment for Acid-Extractable Metals for North Carolina Groundwater Samples | 5_EUUSLA_Metals_Manager |
| T-MET-WI11939 | Digestion by EPA 200.8 for the Analysis of Total Recoverable Metals in Water by ICPMS | 5_EUUSLA_Metals_Manager |
| T-MET-WI11938 | Digestion of Waters by EPA 200.7 for Analysis of Total Recoverable Metals by ICP | 5_EUUSLA_Metals_Manager |
| T-MET-WI11924 | Digestion of Aqueous Samples by SW-846 Method 7470A, EPA 245.1 | 5_EUUSLA_Metals_Manager |
| T-MET-WI11926 | Digestion of Oils by EPA 3050B mod. for ICP Analysis | 5_EUUSLA_Metals_Manager |
| T-MET-WI7920 | Dilute/Run and AVS/SEM Sample Handling for Metals | 5_EUUSLA_Metals_Manager |
| T-MET-WI8732 | Direct Analysis Preparation of Potable Water for ICP (EPA 200.7) or ICP-MS (EPA 200.8) | 5_EUUSLA_Metals_Manager |
| T-MET-WI7921 | Director | 5_EUUSLA_Metals_Manager |
| T-MET-WI11927 | Fixed-Volume Hand-Held Pipettes | 5_EUUSLA_Metals_Manager |
| T-MET-WI7922 | Glassware Cleaning | 5_EUUSLA_Metals_Manager |
| T-MET-WI7923 | Group Leader | 5_EUUSLA_Metals_Manager |
| T-MET-WI18028 | Instrument Maintenance for Agilent 7500 | 5_EUUSLA_Metals_Manager |
| T-MET-WI18026 | Instrument Operations for Agilent 7500 | 5_EUUSLA_Metals_Manager |
| T-MET-WI18027 | Instrument Operations for Agilent 7700 | 5_EUUSLA_Metals_Manager |
| T-MET-WI7941 | Laboratory Technician | 5_EUUSLA_Metals_Manager |
| T-MET-WI7943 | Langelier Index in Water | 5_EUUSLA_Metals_Manager |
| T-MET-WI7963 | Maintenance and Calibration of HACH Model 2100Q Laboratory Turbidimeter | 5_EUUSLA_Metals_Manager |
| T-MET-WI7964 | Manager | 5_EUUSLA_Metals_Manager |
| T-MET-WI7965 | Mercury in Aqueous, Solid and Tissue Samples by Cold Vapor AA | 5_EUUSLA_Metals_Manager |
| T-MET-WI11931 | Metals by ICP for Methods SW-846 6010B/C/D (aqueous, solid, tissue) and EPA 200.7 (aqueous) | 5_EUUSLA_Metals_Manager |
| T-MET-WI11933 | Metals by Inductively Coupled Plasma Mass Spectrometry for SW-846 Methods 6020/6020A/6020B(aqueous, solid, tissue) and EPA 200.8 (aqueous) | 5_EUUSLA_Metals_Manager |
| T-MET-WI7971 | Metals Use of the LLENS System | 5_EUUSLA_Metals_Manager |
| T-MET-WI11948 | Preparation of Solids by EPA 7471A or B for Mercury Analysis | 5_EUUSLA_Metals_Manager |
| T-MET-WI7972 | Principal Chemist | 5_EUUSLA_Metals_Manager |
| T-MET-WI8636 | Sample Prep of Sediments, Sludges, Soils, and Tissues by SW846 3050B for ICP and ICP-MS | 5_EUUSLA_Metals_Manager |
| T-MET-WI11937 | Sample Preparation of Leachates and Other Wastewater for Analysis of Total Metals by Inductively Coupled Plasma-Mass Spectrometer (ICP-MS) | 5_EUUSLA_Metals_Manager |
| T-MET-WI11941 | Sample Preparation of Wastewater and Leachates for Analysis of Total Metals by Inductively Coupled Plasma Atomic Emission Spectrometry | 5_EUUSLA_Metals_Manager |
| T-MET-WI8639 | Sample Preparation of Waters for Analysis of Total Recoverable Metals by Inductively Coupled Plasma Optical Emission Spectrometry | 5_EUUSLA_Metals_Manager |
| T-MET-WI8640 | Senior Chemist | 5_EUUSLA_Metals_Manager |
| T-MET-WI8641 | Senior Specialist | 5_EUUSLA_Metals_Manager |
| T-MET-WI8721 | Senior Technician (Instrument Room) | 5_EUUSLA_Metals_Manager |
| T-MET-WI8723 | Senior Technician (Prep Room) | 5_EUUSLA_Metals_Manager |
| T-MET-WI8729 | Specialist | 5_EUUSLA_Metals_Manager |
| T-MET-WI9082 | Working Instructions for Prep Solutions and Standards | 5_EUUSLA_Metals_Manager |
| T-MET-WI12063 | Working Instructions for Preparation of ICP Solutions and Standards | 5_EUUSLA_Metals_Manager |
| T-MET-WI12065 | Working Instructions for Preparation of ICP-MS Solutions and Standards | 5_EUUSLA_Metals_Manager |

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| T-MET-WI9084 | Working Instructions for Preparation of Mercury Solutions and Standards | 5_EUUSLA_Metals_Manager |
| 8.04 Pesticides | | |
| Work Instruction | | |
| T-PEST-WI9202 | Analysis of Chlorinated Herbicides by 8151A in Water | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9232 | Analysis of Pesticides by 8081B in Solid Samples using GC-ECD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9238 | Analysis of Polychlorinated Biphenyls (PCBs) by 8082A in Aqueous Samples using GC-ECD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9842 | Associate Chemist | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9843 | Captan and Captafol by Method 8081A in Waters and Solids using GC-ECD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9844 | Chemist | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9845 | Chlorinated Herbicides by 8151A in Solids by GC-ECD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9846 | Client Specific - HPLC Analysis for Cyclopamine in Biomass | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9847 | Common Equations Used During Chromatographic Analyses | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9851 | Creating Calibration Timed Events in Chrom Perfect | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9854 | Data Audit Procedure for Department 4024 | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9859 | Director | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9860 | EDB, DBCP and TCP by Method 8011 in Solids using Microextraction and GC-ECD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9952 | EDB/DBCP/and TCP by Method 504.1 or 8011 in Waters Using Microextraction and GC-ECD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI11965 | Formaldehyde and Other Aldehydes by Method 8315A in Aqueous and Solid Samples using HPLC | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9953 | Group Leader | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9954 | Interpretation of Chromatographic Data | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9961 | Low Level PCBs in Water by Method 8082/8082A using GC-ECD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9962 | Manager | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9980 | Monitoring QC Data Acceptance Limits | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9981 | Nitroaromatics and Nitroamines by Method 8330B in Water and Solids using HPLC with UV Detection | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9982 | Nitroaromatics and Nitroamines in Water and Solids by HPLC with UV Detection by Method 8330/A | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9983 | N-Methylcarbamate Pesticides by Method 8318/8318A in Solids | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9984 | N-Methylcarbamates by Method 531.1 in Groundwater and Drinking Water using High Performance Liquid Chromatography (HPLC) | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI11966 | OP Pesticides (Acephate and Methamidophos) by 8141A in Aqueous and Solid Samples using GC-NPD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI11967 | Organic Acids in Water by Methods 8015B/D or 8321B using HPLC/UV | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI11968 | Organophosphorous Pesticides by Method 8141A/8141B in Solid Samples using GC-NPD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI11970 | Organophosphorous Pesticides by Methods 8141A/8141B/622 in Aqueous Samples using GC-NPD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9987 | PCBs in Oil by SW-846 Method 8082/8082A | 5_EUUSLA_Pesticide Residue Analysis_Manager |

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| T-PEST-WI9989 | Perchlorate by Method 6850 in Waters and Solids by LC/MS/MS | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9992 | Pesticides by Method 8081A in Solid Samples using GC-ECD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9997 | Pesticides in Aqueous Samples by Method 608 | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI17994 | Pesticides in Aqueous Samples by Method 608.3 | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9998 | Pesticides in Water by Method 8081A using GC-ECD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9999 | Pesticides in Water by Method 8081B using GC-ECD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI9858 | Picric Acid in Solid Matrix By HPLC with UV by Method 8015B | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10000 | Picric Acid in Water by Method 8015B Using HPLC with UV Detection | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI11971 | Polychlorinated Biphenyls (PCBs) by Method 608 or 8082 in Waters | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI18000 | Polychlorinated Biphenyls (PCBs) by Method 608.3 | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI11972 | Polychlorinated Biphenyls (PCBs) by Method 8082 in Solids and Wipes | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10004 | Polychlorinated Biphenyls (PCBs) in Solid Samples by 8082A Using GC-ECD | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10006 | Prescreening Water and Soil Samples for Pesticides and PCBs | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10007 | Preventative and Corrective GC Maintenance | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10008 | Preventative and Corrective HPLC Maintenance for the Pesticide Residue Analysis Department | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10009 | Principal Chemist | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10010 | Principal Specialist | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10011 | QC Data Acceptability and Corrective Action | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10012 | Senior Chemist | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10013 | Senior Specialist | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10014 | Setting Retention Time Windows | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10015 | Setting Up Analysis Numbers in the Departmental Database | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10016 | Setting Up Single Component Initial Calibrations | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10017 | Specialist | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10018 | Standards Preparation, Coding, and Storage | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10019 | Standards Traceability and Monitoring | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10020 | Uploading Data to the LIMS | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10022 | Using "Datalog" Software for Data Acquisition of Multicomponent Pesticides/PCBs | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-PEST-WI10023 | Using "Datalog" Software for Single-component Data Acquisition | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| 8.05 GCMS Semivolatiles | | |
| Work Instruction | | |
| T-SVOA-WI11981 | Analysis of Chlorinated Herbicides in Water by Selective Ion Monitoring Gas Chromatography/Mass Spectroscopy (SIM/GC/MS) | 5_EUUSLA_GC/MS Semivolatiles_Manager |

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| T-SVOA-WI11979 | Associate Chemist | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9592 | Chemist | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9514 | Client Specific - Methyl Stearate in Plastic, Method 8270D, by GC/MS | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9535 | Determination of Benz(a)pyrene in Smokeless Tobacco by Selective Ion Monitoring Gas Chromatography/Mass Spectrometry (SIM/GC/MS) | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9252 | Determination of Parent and Alkyl Substituted Polynuclear Aromatic Hydrocarbons (PAHs), Alkanes and Geochemical Biomarkers by Gas Chromatography/Mass Spectrometry (GC/MS-SIM) | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9577 | Determination of Priority Pollutants by Method 625 | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9590 | Dioxin Screening (2,3,7,8-TCDD) of Aqueous and Solid Matrices using GC-MS SIM | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9593 | Director | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9594 | GC/MS Audit Process | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9596 | GC/MS Electronic Data Management and Handling | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9598 | GC/MS Preventative and Corrective Maintenance | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9603 | Group Leader | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9604 | Monitoring QC Data Acceptance Limits | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9610 | Principal Chemist | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI11980 | Principal Specialist | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI18565 | Priority Pollutants by Method 625.1 in Water Using GC/MS | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9611 | Quality Control Spike Mix Verification | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9613 | Semivolatile Compounds by Method 525.2 in Drinking Water using GC/MS | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9617 | Semivolatile Organic Compounds by Method 8270D/E in Aqueous and Non-Aqueous Matrices using GC-MS | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9623 | Semivolatile Organic Compounds, Including DRO/ORO, by Method 8270C in Aqueous and Non-Aqueous Matrices Using GC-MS | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI11997 | Semivolatile Organics Tentatively Identified Compound Method | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9624 | Semivolatile Run/Injection Log Generation | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI11998 | Semivolatile Spiking and Calibration Standards | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9995 | Semivolatiles by Methods 8270C/D SIM | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9634 | Senior Chemist | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9635 | Senior Specialist | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9587 | Tetraethyl lead (TEL) and Tetramethyl lead (TML) in Water and Solids by 8270C GC/MS | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI13634 | The Determination of 1,4-Dioxane by GC/MS using Isotope Dilution and Selective Ion Monitoring (SIM) by Method 8270C/D | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9625 | The Determination of d-Limonene in Plastic by Gas Chromatography/Mass Spectrometry (GC/MS) | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| T-SVOA-WI9626 | THPA, PHPI and PA by 8270C Mod. or CEPH 440 in Waters and Solids Using GC/MS | 5_EUUSLA_GC/MS Semivolatiles_Manager |
| 8.06 Instrumental Water Quality | | |

| Work Instruction | | |
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| T-WC-WI9861 | Accusterilizer - Steam Sterilizer | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10024 | Ammonia Nitrogen by EPA 350.1 in Waters and Solids Using Segmented Flow Analysis and Gas Diffusion | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11619 | Automated Determination of Phenols in Water, Wastewater, and Soils By Automated Flow Analyzer EPA 420.4, SW-846, 9066 | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10287 | Chemist | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11621 | Client Specific - Determination of Total Cyanide in Water, Wastewater, and Soils (Department of Defense) SW-846 9012B, SW-846 9012A | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11622 | Client Specific - Total Cyanide Distillation (Department of Defense) | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11624 | Department 4027 Chemical Inventory and Review Procedures | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11625 | Determination of Hexavalent Chromium by Ion Chromatography in Solids and Waters SW-846 7199 and EPA 218.6 | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11626 | Determination of Inorganic Anions by Ion Chromatography in Waters and Soil by EPA 300.0, SW 846 9056, and SW 846 9056A | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11627 | Determination of TOC and TC in Solids and Sludges by Combustion by SM 5310B, EPA 415.1, SW-846 9060/9060A | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11635 | Determination of Total and Available Cyanide in Water using Amperometric Detection by ASTM D 7511-09e2, -12 and Method OIA-1677-09 | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11636 | Determination of Total and Soluble Phosphorus in Water, Wastewater, and Soils (Colorimetric, Ascorbic Acid, Automated) by EPA 365.1 or SM 4500-P F-2011 | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10037 | Determination of Total Carbon in Water and Wastewater by SM-5310 C and EPA 415.1 | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10038 | Determination of Total Organic Carbon in Water and Wastewater (Quadruplicate Studies) | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10039 | Digestion of Total and Soluable Phosphorus in Water, Wastewater, and Soils EPA 361.1, SM20 4500 P B, and SM20 4500 P E | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10289 | Director | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10290 | Group Leader | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI12054 | Hexavalent Chromium by EPA 218.7 in Drinking Water | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11640 | ICS-1000, ICS 1100, ICS-2000 and ICS-3000 Ion Chromatography Systems | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10291 | Laboratory Technician | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11641 | Low Level Hexavalent Chromium by Ion Chromatography in Waters by EPA 218.6 | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI9889 | Maintenance and Calibration of A.I. Scientific AIM600 Digestor | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11643 | Maintenance of Continuous Flow Analyzers | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI9890 | Maintenance of the OI Analytical Model 1030 Total Organic Carbon Analyzer | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10292 | Manager | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10070 | Moisture by Moisture Analyzer in Solids by SM 2540 G-2011 | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11649 | Nitrate Nitrogen in Water and Wastewater (Colorimetric, Automated Cadmium Reduction) | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11650 | Nitrite Nitrogen in Water and Wastewater (Colorimetric, Automated) | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI9891 | pH Electrodes and Meters | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11651 | Phenol Distillation in Solids by EPA SW-846 9065 | 5_EUUSLA_Instrumental Water Quality_Manager |

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| T-WC-WI11652 | Quality Control for Analyses Performed in Instrumental Water Quality | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10083 | Reagent Water Extraction of Ions in soil, for analysis by method EPA 300.0 or SW 846 9056 | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10293 | Senior Chemist | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10294 | Senior Technician | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI22922 | Sulfate (turbidimetric) by EPA 375.4 in Waters by Spectrophotometry | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10085 | Total and Amenable Cyanide Distillation in Waters and Solids by SW-846 9012A/B, EPA 335.1/3/4, and SM 4500-CN G-1999/2011 | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10105 | Total Cyanide Analysis of Waters and Solids by Massachusetts Contingency Plan (MCP)/NJ DKQP | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10106 | Total Kjedahl Nitrogen Digestion of Solids and Soils by EPA 351.2 | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10107 | Total Kjedahl Nitrogen Digestion of Water and Wastewater by EPA 351.2 | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI12055 | Total Kjeldahl Nitrogen (TKN) by EPA 351.2, EPA 351.2 mod, SM4500-Norg or SM4500-N in Waters and Solids using Automated Flow Analysis or Discrete Analysis | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11637 | Total Organic Carbon (TOC), Dissolved Organic Carbon (DOC), and Total Inorganic Carbon (TIC) by SM 5310C or EPA 415.1 in Waters | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI11629 | Total, Amenable and Weak Acid Dissociable Cyanide in Waters and Soils, Free Cyanide in Water, Reactive Cyanide of Solids, by SW-846 Method 9012A/B, EPA 335.4/3, and SM 4500-CN G/E-1999/2011 | 5_EUUSLA_Instrumental Water Quality_Manager |
| T-WC-WI10285 | Weak Acid Dissociable Cyanide Distillation (as preparation for Analysis on the Flow Analyzer) | 5_EUUSLA_Instrumental Water Quality_Manager |
| 8.07 Leachate Preparation | | |
| Work Instruction | | |
| T-TL-WI14428 | Associate Chemist | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7142 | Calibration of the Leachate Tumblers | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7562 | Cation Exchange Capacity of Soils (Sodium Acetate) by Method 9081 | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7139 | Director | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7143 | Glassware Cleaning for Leachate Extractions | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7144 | Leachate Blank Evaluations | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7140 | Manager | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7146 | Manually Pressurized Zero Headspace Extractor (ZHE) | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7141 | pH Meters and Probes | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7257 | Procedure for Calculating and Reporting Weighted Average Results for TCLP Extracts | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7148 | Shake Extraction of Solid Waste with Water ASTM Method #D3987-85 | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7145 | Subsampling and Preservation of Leachates | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7558 | Synthetic Precipitation Leaching Procedure (SPLP) for Nonvolatile Leachates | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7561 | Synthetic Precipitation Leaching Procedure (SPLP) Zero headspace Leachates | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7151 | Toxicity Characteristic Leaching Procedure (TCLP) Nonvolatile Leachates | 5_EUUSLA_Leachate Preparation_Manager |
| T-TL-WI7258 | Toxicity Characteristic Leaching Procedure TCLP Zero Headspace Leachates, Method 1311 | 5_EUUSLA_Leachate Preparation_Manager |

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| T-TL-WI7563 | Waste Extraction Test Leaching Procedure for Volatile and Non-Volatile Analytes | 5_EUUSLA_Leachate Preparation_Manager |
| 8.08 Water Quality | | |
| Work Instruction | | |
| T-WC-WI10421 | #1443 Specific Gravity by SM 2710F-1997, #6569 Bulk Density by ASTM E868-82 Sec 9.9 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI9862 | Accumet Model AB30 pH/Ion/Conductivity Meter | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10422 | Acid Volatile Sulfide in Solids | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI9897 | Adjustable Volume Handheld Pipettes | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10423 | Ammonia Nitrogen by Ion-Selective Electrode Method (ISE) in Solids by EPA 350.3 and SM 4500-NH3B-1997, 2011 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10424 | Ammonia-Nitrogen for Soils (Tritrimetric Distillation Procedure) by 4500-NH3 B/C - 2011, or EPA 350.2 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11474 | Ammonia-Nitrogen for Waters (Titrimetric Distillation Procedure) by 4500-NH3 B/C -2011, or EPA 350.2 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10425 | Bellack Distillation for Fluoride in Waters and Solids by SM 4500 F B-2011, EPA 340.1 Procedure 6.1 or SM 4500 F B-1997 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10426 | BOD and CBOD in Waters by SM 5210 B-2011, Hach 10360, EPA 405.1, SM 5210 B-2001 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI9898 | Calibration of Hach 2100AN Turbidimeter | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI12050 | Chemical Oxygen Demand (COD) in Water by EPA 410.4 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11478 | Chemical Oxygen Demand (Low-Level) by 410.4 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10358 | Chemical Review | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11479 | Chemist | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10431 | Chloride (Titrimetric Determination) in Water by SM 4500-CL C-2011 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11480 | Chlorine Residual for waters by 4500 Cl F-2011, or EPA 330.4 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10436 | Client Specific - Hexavalent Chromium in Waters (Colorimetric) (Department of Defense) | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11482 | Color by 2120 B-2011, or EPA 110.2 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11483 | Colorimetric Sulfide in Waters (#0230), Sulfide as H2S (#10293 Calculation), Dissolved Sulfide in Waters (#10499) by 4500-S2 D-2011, 4500-S2 H-2011, or EPA 376.2 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11493 | Director | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10609 | Dissolved Oxygen by 4500 O G-2011, EPA 360.1 or Hach Method 10360 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11616 | Dissolved Oxygen Meter Calibration | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11494 | Dissolved Silica (Colormetric) in Water by SM4500SIO2 C-2011, SM4500SIO2 C-1997 or EPA 370.1 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI9900 | Equipment Incubators and Refrigerators | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI9901 | Equipment Muffle Furnaces and Ovens | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11495 | Ferrous Iron (colorimetric) in Waters and Solids by Method 3500-Fe B-2011 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11496 | Fixed Dissolved Solids (Calculation) by 2540 E - 2011 or EPA 160.4 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10610 | Fixed Suspended Solids (Gravimetric) (#207) Volatile Suspended Solids (Gravimetric) (#208) by SM 2540 E - 2011 or EPA 160.4 in Water | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10348 | Fixed Volume Hand-Held Pipettes | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10437 | Flash Point for Liquids and Solids by ASTM D93 or EPA 1010 A | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10612 | Flash Point for Liquids and Solids by ASTM Method D93-07, ASTM D93-90 or SW-846 1010A | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11499 | Group Leader | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11500 | Hexane Extractable Material (HEM) and Silica Gel Treated Hexane Extractable materials (SGT-HEM) in Waters by EPA Method 1664A, 1664B, and 1664. | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10614 | Hexavalent Chromium (Colorimetric) in Waters by CTRCP | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10615 | Hexavalent Chromium (Colorimetric) in Waters by MCP | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10616 | Hexavalent Chromium (Colorimetric) in Waters by SM846 7196A NJ DKQP | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10618 | Hexavalent Chromium in Solids (Alkaline Digestion and Analysis Methods) by SW-846 3060A and SW-846 7196A | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10617 | Hexavalent Chromium in Solids (Alkaline Digestion and Analysis Methods) by SW846 3060A, SW846 7196A NJ DKQP | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10432 | Hexavalent Chromium in Solids Alkaline Digestion and Analysis Methods (Department of Defense) by SW-846 3060A and SW-846 7196A | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10619 | Hexavalent Chromium in Solids by CTRCP (Alkaline Digestion and Analysis Methods) | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10622 | Hexavalent Chromium in Solids by MCP (Alkaline Digestion and Analysis Method) | 5_EUUSLA_Water Quality_Manager |

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| T-WC-WI11501 | Hexavalent Chromium in waters (Colorimetric) by SW-846 7196A | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10627 | Ignitability of Solids by 40 CFR, Part 261.21 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10359 | Instructions for Collecting Data on the LLENS System | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11504 | Laboratory Assistant | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11505 | Laboratory Technician | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11506 | Low-Level Hexavalent Chromium in waters (Colorimetric) by 3500-Cr B-2011 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10350 | Maintenance of Desiccators | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10351 | Maintenance of Hot Plates | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11507 | Manager | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10629 | Methylene-Blue-Active Substances (MBAS) by 5540 C-2011 or EPA 425.1 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11509 | Moisture (Gravimetric), Total Residue (#0521), Volatile Residue (#0522), Total Fixed Residue/Ash (#1029) by SM 2540 G-2011 or SM 2540 E-2011 in Solids | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11475 | Multi-Parameters in Solids and Waters by ManTech Multi-Parameter System | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11510 | n-Hexane Extractable Material (HEM) and Silica Gel Treated HEM (SGT-HEM) in Solids by EPA 9071B | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11511 | Orthophosphate (Colorimetric) by EPA 365.3 in Waters | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI15537 | Orthophosphate in waters by Colorimetry SM 4500 P E-2011 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11512 | Oxidation-Reduction Potential for Wastewaters and Soils by ASTM D1498, SM 2580 B-2011 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11513 | Paint Filter Liquids Test (Free Liquids Test) | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11514 | Particle Size Distribution of Soils and Solids/Grain Size Classification by ASTM D422-63 (reapproved 2007) | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11515 | Percent Solids for GC/MS by EPA 1666, Revision A - 1998 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11518 | pH by EPA 9045C, 9045D and Corrosivity by SW-846 Chap 7 of Solids, Soils, and Solvents using Electrometic Methods | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11519 | pH Probes and Meters | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11521 | Principal Chemist | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10360 | Quality Control Data for Wet Chemistry | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11572 | Reactive Sulfide | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11574 | Reactivity of Waste | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11575 | Senior Chemist | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11577 | Senior Specialist | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11576 | Senior Technician | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11578 | Settleable Solids in waters by 2540 F-2011, or EPA 160.5 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10349 | SKALAR COD Robot Analyzer and COD Spectrophotometers | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11584 | Specific Conductance in Solids by 2510B-2011, SW-846 9050, or EPA 120.1 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10352 | Spectronic Genesys 2 and Genesys 10 Vis Spectrophotometers | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10362 | Standardization of 0.02 and 0.1 Normal Sulfuric Acid | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11585 | Standardization of 0.02 Normal Sodium Hydroxide | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11586 | Sulfate (turbidimetric) by EPA 375.4 in Waters | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11587 | Sulfide Titration for Waters by 4500 S2 F-2011, EPA 376.1, SW-846 Method 9034 or 4500 S2 F-2000 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11589 | Sulfite in waters by 4500-SO3 B-2011, or EPA 377.1 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11597 | Total Dissolved Solids (Calculation) | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11598 | Total Dissolved Solids (TDS)(Gravimetric) by SM 2540 C-2011, SM 2540 C-1997 or EPA 160.1 in Waters and Wastewaters | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11599 | Total Dissolved Solids by 2540 C | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11600 | Total Fixed Solids (TFS), Total Volatile Solids (TVS) Gravimetric by SM 2540 E-2011, SM 2540 G-2011 or EPA 160.4 in Waters | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11603 | Total Solids (Gravimetric) by SM 2540 B-2011, SM 2540 G-2011, EPA 160.3, SM 2540 G-1991, SM 2540 B-1997, or SM 2540 G-1997 in Waters and Wastewaters | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI11604 | Total Suspended Solids (TSS)-Gravimetric by SM 2540 D-2011 or SM 2540 D-1997 and Total Filtered: Total Volume Test by NJDEP in Waters | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI15618 | Turbidity by EPA 180.1 Rev. 2 or SM 2130 B-2011 | 5_EUUSLA_Env Quality Assurance_All |
| T-WC-WI11605 | Volatile Dissolved Solids (Calculation) by SM 2540 E - 2011 or EPA 160.4 | 5_EUUSLA_Water Quality_Manager |
| T-WC-WI10364 | Water Quality Washroom Procedures | 5_EUUSLA_Water Quality_Manager |
| 8.09 Air Quality | | |
| Work Instruction | | |
| T-AQ-WI7174 | Analysis of Air for Selected Volatile Organic Compounds by Gas Chromatography with Flame Ionization Detector and Photo Using EPA Method 18 and 25 | 5_EUUSLA_Volatiles in Air_Manager |

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| T-AQ-WI7162 | Calibration of Pressure Gauges | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7157 | Chemist | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7165 | Cleaning and Handling of Flow Controllers | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7164 | Cleaning and Handling of Summa Canisters | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7270 | Director | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7159 | Group Leader | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7172 | Helium as a Tracer Gas | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7275 | Low-Level Volatile Organic Compounds in Air by EPA Method TO-15 Using GC/MSD in SIM Mode | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7161 | Manager | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7170 | Oxygen and Carbon Dioxide in Air | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7168 | Preparing Summa Can Order | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7160 | Principal Specialist | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7167 | Procedure for Compositing Samples from a Tedlar Bag | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7163 | Routine Instrument Maintenance for Volatiles in Air by GC and GC/MS | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7158 | Senior Chemist | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7169 | Standards Preparation, Validation, and Documentation Using EPA Method TO-14 and TO-15 | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7436 | The Determination of Volatile Organic Compounds in Air by GC/MS Using EPA MEthod TO-14 or TO-15 | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7271 | Volatiles in Air Audit Process | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7173 | Volatiles in Air Tentatively Identified Compound Method | 5_EUUSLA_Volatiles in Air_Manager |
| T-AQ-WI7171 | Volatiles in Air Tentatively Identified Compound Method (Interpretive) | 5_EUUSLA_Volatiles in Air_Manager |
| 8.10 EPH/Miscellaneous GC | | |
| Work Instruction | | |
| T-GC-WI9253 | Analysis of DRO/RRO by Alaska 102/103 in Waters and Soils | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9643 | Associate Chemist | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI15025 | Associate Specialist | 5_EUUSLA_Pesticide Residue Analysis_Manager |
| T-GC-WI9644 | Carbon Dioxide in Water Using Headspace Sampling Techniques and GC-TCD, Method RSK-175 or 8015 | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9649 | CCWE Water Miscible Solvents by Method 8015B | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9650 | Chemist | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9656 | Client Specific - Total Extractable Hydrocarbons (TEH) by Method 8015B Modified Using GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9657 | Common Equations Used During Chromatographic Analyses | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9663 | Determination of Diesel and Residual Range Organics using Alaska 102/103 Small Volume (SV) Protocols in Aqueous Samples | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9665 | Determination of Petroleum Range Organics in Waters and Solids using FL-PRO | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9668 | Director | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI12071 | DRO(C12-C23) and ORO(>C23-C32) by Method 8015B/CA LUFT in Water using GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9669 | DRO/ORO by 8015B/C/D and TPH by NWTPH-Dx (Modified) in Water using Mini-Extraction and GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |

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| T-GC-WI9671 | DRO/TPH by Method 8015 (B, C, of D) in Waters using Microextraction and GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9672 | EPH by Massachusetts Protocol (MAEPH) in Waters and Solids Using GC | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9673 | EPH in Waters and Solids Using GC-FID by Method ECY97-602 WA EPH | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9675 | Extractable Petroleum Products by Method OA-2 (Iowa Protocol) in Waters and Solids Using GC/FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9676 | Extraction of Soils/Solids for Glycol Analysis | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9677 | Extraction of Solids/Soils for Analysis of Alcohols by Method 8015B | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9678 | Fractionated EPH using LA RECAP Ranges in Waters and Solids by GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9679 | GC Routine and Nonroutine Maintenance for Instrumentation Used for VPH Analysis | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9680 | Glycols by Method 8015B/8015C in Water and Solid Matrices Using GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9681 | Group Leader | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9683 | Interpretation and Integration of Chromatographic Data | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9684 | Laboratory Technician | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9685 | MA DEP VPH in Waters and Solids Using GC | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9689 | Maintenance and Troubleshooting Procedures for GC-FID Instrumentation | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9690 | Manager | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9698 | Monitoring QC Data Acceptance Limits | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9736 | New Jersey Extractable Petroleum Hydrocarbons (NJEPH) in Waters and Solids using GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9740 | PMI VOCs (Direct Injection) by Method 1671A in Waters Using GC/FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9748 | Principal Chemist | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9749 | QC Data Acceptability and Corrective Action | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9756 | Qualitative/Quantitative GC Fingerprint in Petroleum Distillates, Fuels, and Oils by 8015B Mod/8015C Mod/ or 8015D Mod | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9757 | Senior Chemist | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9758 | Senior Specialist | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9759 | Senior Technician | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9769 | Terphenyls by Method 8015B in Water and Solids Using GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9770 | TNRCC TX Method 1005 - Total Petroleum Hydrocarbons (Gasoline Range, Diesel Range, and Extended Range Organics) in Waters and Solids | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9771 | Total Petroleum Hydrocarbons with Ranges by Methods 8015B/8015C/8015D in Waters and Solids by GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9772 | Total Saturated Hydrocarbons by Method 8015C in Waters and Solids using GC/FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9773 | TPH by CT ETPH | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9778 | TPH by Methods 8015B/C/D mod. in Waters and Solids Using GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9781 | TPH by NWTPH-Dx (modified) in Soils using GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9783 | TPH by NWTPH-Dx (modified) in Waters using GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9784 | TPH by TN EPH in Water and Soil using GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9788 | TPH DRO and TPH ORO by 8015B/8015C/8015D in Solids using GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9786 | TPH DRO and TPH ORO by 8015B/C/D in Water using GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9790 | TPH-DRO by 8015C South Carolina Methodology Using GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9791 | TPH-DX with Fuel Identification in Waters and Solids by NWTPH-DX | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9792 | TX 1006 Characterization of C6-C35 Petroleum Hydrocarbons in Waters and Solids | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9794 | Using "Range Compound Analysis" Software for Range Data Acquisition | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI24004 | Volatile Hydrocarbons in Water by ASTM Standard Test Method D8028-17 Using Headspace Sampling Techniques and GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9796 | Volatile Hydrocarbons in Water by Method RSK-175 and SW-846 8015 Using Headspace Sampling Techniques and GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9798 | Volatile Organic Concentration of Waste Samples by Method 25D Using FID and ELCD | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9822 | VPH in Waters and Solids Using GC-FID by Method ECY 97-602 WA VPH | 5_EUUSLA_EPH/Misc. GC_Manager |
| T-GC-WI9824 | Water Miscible Solvents by Method 8015B/8015C/8015D Using GC-FID | 5_EUUSLA_EPH/Misc. GC_Manager |
| 8.11.01 Prep for Pesticides | | |
| Work Instruction | | |
| T-OE-PEST-WI10281 | Cleanup Procedures for the Extraction of Pesticides and Polychlorinated Biphenyls (PCBs) | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10959 | Client Specific - Drying and Grinding for Cyclopamine | 5_EUUSLA_Organic Extraction_Manager |

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| T-OE-PEST-WI10958 | Client Specific - Microwave Extraction of Cyclopamine for a Biomass | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10886 | Client Specific - Soxhlet Extraction of Cyclopamine | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10907 | Extraction By Method 8318/8318A for Carbamate and Urea Pesticides in Solids | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10940 | Extraction for Perchlorate by Method 6850 in Solids | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10919 | Extraction of Chlorinated Herbicides in Water by SW-846 8151A | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI11372 | Extraction of Formaldehyde and Other Aldehydes in a Water by Method 8315A | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10942 | Extraction of Nitroaromatics and Nitroamines by Method 8330/A/B in Water | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI11373 | Extraction of Solid Samples for Formaldehyde and Aldehydes by Method 8315A | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10881 | Liquid/Liquid Extraction Procedure for the Determination of Organophosphorous Pesticides in a Wastewater Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI11381 | Microextraction by Method 504.1 or 8011 for EDB, DBCP, and TCP in Water | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10956 | Microextraction of EDB, DBCP, and TCP in Solids by Method 8011 | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10927 | Microwave Extraction Method 3546 for PCBs in a Solid Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10926 | Microwave Extraction Method 3546 for Pesticides in a Solid Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI11410 | Pesticide Extract Cleanup Using GPC by Method 3640A | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10920 | Separatory Funnel Extraction by Method 3510C, 608 or 622 for Pesticides and PCBs in a Wastewater | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10941 | Soxhlet Extraction (Method 3540C) for Triazine Herbicides and Organophosphorous Pesticides in a Solid Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10922 | Ultrasonic Extraction for PCBs in a Solid Matrix by Method 3550C | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10939 | Ultrasonic Extraction for Pesticides in a Solid Matrix by Method 3550 | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10912 | Ultrasonic Extraction of Chlorinated Herbicides by Method 3550B/C in a Solid Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10943 | Ultrasonic Extraction of Nitroaromatics and Nitroamines by Method 8330/A/B in Solids | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10918 | Waste Dilution by EPA 3580A for PCBs in Oil | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-PEST-WI10921 | Waste Dilution by EPA 3580A for Pesticides in a Non-Water Soluble Leachate Matrix | 5_EUUSLA_Organic Extraction_Manager |
| 8.11.02 Prep for SVOA | | |
| Work Instruction | | |
| T-OE-SVOA-WI10280 | Alumina Column Cleanup for DRO | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10938 | Extraction of Semi-Volatile Organic Compounds by Method 525.2 in Drinking Waters | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI11374 | Extraction Procedure for the Determination of PAHs in an XAD Air Tube Sample by TO-15A | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10882 | Extraction Procedure the the Determination of 2-Chlorobenzalmalonotrile (CS) and 3-Quinuclidinyl Benzilate (BZ) in Water and Wastewater | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10933 | Liquid -Liquid Extraction Procedure for the Determination of Target Compound list Analytes in a Water Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10923 | Liquid/Liquid Extraction Procedure for the Determination of Base-Neutrals and Acid Extractables in a Wastewater Matrix by Method 8270 | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10904 | Liquid/Liquid Extraction Procedure for the Determination of Neutral Extractables in a Wastewater Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10916 | Low-Level Sonic Probe Extraction Procedure by Method 3550C for the Determination of Semivolatiles in a Solid Matrix | 5_EUUSLA_Organic Extraction_Manager |

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| T-OE-SVOA-WI10915 | Low-Level Ultrasonic Extraction by Method 3550C for PAHs in a Solid Matrix by GC/MS | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10928 | Microwave Extraction by Method 3546 for Semivolatiles | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10880 | Microwave Extraction for the Determination of Semivolatiles in a Solid Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10554 | Semivolatile Extract Cleanup Using Gel Permeation Chromatography | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10935 | Separatory Funnel Extraction (Method 3510C) or Waste Dilution (Method 3580A) of Base Neutrals and Acid Extractables in Leachates | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10931 | Separatory Funnel Extraction by Method 3510C for BNAs by 8270 SIM in Wastewater | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI11432 | Separatory Funnel Extraction by Method 3510C for BNAs in Wastewater | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10924 | Separatory Funnel Extraction by Method 3510C for Tetraethyl Lead in Waters | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10947 | Separatory Funnel Extraction for BNAs in Wastewater by Method 625 | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10946 | Separatory Funnel Extraction for PAHs in Water by GC/MS Using Method 3510C | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI18058 | Separatory Funnel Extraction of Chlorinated Herbicides in Water by SW-846 Method 8151A | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10884 | Solid Phase Extraction Procedure for the Determination of THPA, THPI, and PA in a Water Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10925 | Sonic Probe Extraction Procedure for the Determination of Semivolatiles in a Solid Matrix by SIM | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10936 | Waste Dilution Procedure for the Determination of Acid Extractables and Base-Neutrals in a Non-Water Soluble Leachate Matrix by Method 3580A | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-SVOA-WI10917 | Waste Dilution, EPA 3580A for Acid Extractables and Base-Neutrals in a Non-Water Soluble Matrix | 5_EUUSLA_Organic Extraction_Manager |
| 8.11.03 Prep for GC | | |
| Work Instruction | | |
| T-OE-GC-WI10278 | 10g Silica Gel Cleanup by Method 3630C for Hydrocarbons by GC in Water and Solid Matrices | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10949 | 3 g Silica Gel Column Cleanup for DRO | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10944 | Client Specific - Separatory Funnel Extraction Method 3510C for DRO in Water or Wastewater | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI11367 | Client Specific - Separatory Funnel Extraction Procedure for the Determination of Extractable Petroleum Hydrocarbons in a Water Matrix by Washington Methodology | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10932 | Extraction by EPA 3546 or 3550 for DRO and/or RRO in Solids for Alaska Methodology | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI11364 | Extraction of Total Petroleum Hydrocarbon Organics in Waters by Texas Methodology | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI11365 | Extraction of Total Petroleum Hydrocarbons in a Solid Matrix by Texas Methodology | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10906 | Microextraction by Method 3511 for DRO in Water and Wastewater | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10899 | Microwave Extraction for EPH in a Solid Matrix by Montana Protocol | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10900 | Microwave Extraction for EPH in a Solid Matrix by Washington Protocol | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10930 | Microwave Extraction Method 3546 for DRO and Saturated Hydrocarbons in a Solid Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10883 | Microwave Extraction Method 3546 for NJ EPH in a Solid Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10909 | Microwave Extraction, Method 3546, for MA EPH in a Solid Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10910 | Quick Silica Gel Cleanup for Hydrocarbons by GC in Solid and Water Matrices | 5_EUUSLA_Organic Extraction_Manager |

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| T-OE-GC-WI10911 | Separatory Funnel Extraction by Method 3510C for DRO in Water by California Methodology | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10894 | Separatory Funnel Extraction for DRO and RRO by AK 102/103 in a Water Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10890 | Separatory Funnel Extraction for EPH in Water or Wastewater by Montana Protocol | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10893 | Separatory Funnel Extraction for EPH in Water or Wastewater by Tennessee Methodology | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10914 | Separatory Funnel Extraction for EPH in Waters by Massachusetts, New Jersey, and Louisiana Protocol | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10892 | Separatory Funnel Extraction for ETPH in Water or Wastewater Matrix by Connecticut Methodology | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10889 | Separatory Funnel Extraction for TPH in Water or Wastewater by FL-PRO | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10908 | Separatory Funnel Extraction Method ECY 97-602 NWTPH-DX for TPH in a Water or Wastewater Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10879 | Silica Gel Fractionation by Method 3630C for Hydrocarbons by GC in Water and Solid Matrices | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10898 | Sonic Probe Extraction by FL-PRO for Petroleum Range Organics in Solids | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10913 | Sonic Probe Extraction for TPH in Solids by Washington DX | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10957 | Sonic Probe Extraction of Glycols by Method 3550C from a Solid Matrix | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10897 | Sonication Extraction Method 3550B and C for DRO (CA) in Solids | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10945 | Sonication Extraction Method 3550C for DRO in Soils or Solids | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10937 | Ultrasonic Extraction by Method 3550C for Fingerprint on Petroleum Products in Solid Matrices | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10902 | Ultrasonic Extraction for EPH in a Solid Matrix by Tennessee Methodology | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10901 | Ultrasonic Extraction for ETPH in Solid Matrix by Connecticut Methodology | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GC-WI10905 | Waste Dilution for the Determination of Saturated Hydrocarbons in an Oil Matrix | 5_EUUSLA_Organic Extraction_Manager |
| 8.11.04 General | | |
| Work Instruction | | |
| T-OE-GEN-WI14427 | Associate Chemist | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11363 | Chemist | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10808 | Concentration Using a TurboVap LV Concentration Workstation | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11369 | Determining QC Sample Volume for Organic Extractions | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11370 | Director | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10862 | Electrothermal Heating Mantles | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI7154 | Food and Tissue Preparation | 5_EUUSLA_Leachate Preparation_Manager |
| T-OE-GEN-WI10864 | Glassware Cleaning for Organic Extractions | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10873 | Glassware Cleaning Using Automatic Washers for non-Organic Extraction Glassware | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11376 | Group Leader | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11377 | Laboratory Assistant | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11378 | Laboratory Technician | 5_EUUSLA_Organic Extraction_Manager |

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| T-OE-GEN-WI10877 | Maintenance and Calibration of the Microwave Accelerated Reaction System | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10872 | Maintenance of Accelerated Solvent Extractor (ASE) and the Pressurized Solvent Extractor (PSE) | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11379 | Manager | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11400 | Multipette Stream Operation and Calibration | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10863 | N-Evap | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10876 | Organic Extraction Standards Storage and Handling | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11408 | Percentage Lipids Using Soxhlet Extraction by Method 3540C | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10871 | Pesticide Extract Concentration Using a Zymark TurboVap II Concentration Workstation | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10866 | pH Meters and Electrodes | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI13363 | Pore Water Generation Procedure | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11415 | Principle Chemist | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10867 | Procedure for Containment and Clean Up of Hazardous materials Spills in Organic Prep Lab | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11418 | Refrigerated Recirculators | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11420 | Routine Maintenance of Miele Glass Washers | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11424 | Sampling Equiment Cleaning and Validation for Metals Analysis | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10868 | Scheduling Extraction Batches | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11427 | Semivolatile Extract Concentration Using a Zymark TurboVap II Concentration Workstation | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11428 | Senior Administrator | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11429 | Senior Chemist | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11430 | Senior Specialist | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11431 | Senior Technician | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10865 | Solvent, Reagent, and Amber GC Vial Lot Testing for Organic Extractions | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI11440 | Soxhlet Extraction Procedure for Extractable Matter in Textiles | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10869 | Spike Solution Testing and Approval | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10861 | Steam Bath and N-Evap Usage, Calibration and Maintenance | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10870 | Ultrasonic Probe Horn Cleaning | 5_EUUSLA_Organic Extraction_Manager |
| T-OE-GEN-WI10860 | Ultrasonic Processor Maintenance and Tuning | 5_EUUSLA_Organic Extraction_Manager |
| 8.12 PFAS by LC/MS/MS | | |
| Work Instruction | | |
| T-PFAS-WI7732 | Associate Chemist | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI20032 | Associate Specialist | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI7733 | Chemist | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI21864 | Client Specific Table 3 PFAS in Water and Soil Using LC/MS/MS | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI20127 | Client Specific: Table 3 Compounds by Direct Injection Using LC/MS/MS | 5_EUUSLA_PFAS_Manager |

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| T-PFAS-WI7745 | Director | 5_EUUSLA_Specialty Services_Manager |
| T-PFAS-WI18142 | Extraction and Analysis of Perfluoroethercarboxylic Acids (PFECA) in Solid Samples by Method 537, Ver. 1.1, Modified | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI7746 | Group Leader | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI7737 | Laboratory Technician | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI20005 | Manager | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI21568 | Manifold Cleaning for PFAS Extractions | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI21398 | New Jersey - Polyfluorinated Alkyl Substances (PFAS) in Aqueous Samples by Method 537 Version 1.1 Modified Using LC/MS/MS | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI12017 | Perfluorinated Alkyl Substances (PFASs) in Drinking Water by Method 537 Version 1.1 | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI18003 | Perfluoroethercarboxylic Acids (PFECA) in Aqueous Samples | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI21252 | PFAS Data Review Procedure | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI22030 | Polyfluorinated Alkyl Substances (PFAS) in Aqueous Samples by Method 537 Version 1.1 Modified QSM5.1 Table B-15 Using LC/MS/MS | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI14355 | Polyfluorinated Alkyl Substances (PFAS) in Aqueous Samples by Method 537 Version 1.1 Modified Using LC/MS/MS | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI22283 | Polyfluorinated Alkyl Substances (PFAS) in Solids by Method 537 Version 1.1 Modified QSM 5.1 Table B-15 Using LC/MS/MS | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI12031 | Polyfluorinated Alkyl Substances (PFAS) in Solids by Method 537 Version 1.1 Modified Using LC/MS/MS | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI23588 | Preventative and Corrective Maintenance for the API 4000 and AB Sciex 4500 Liquid Chromatograph Mass Spectrometers (LC/MS/MS) | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI7742 | Principal Chemist | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI7743 | Principal Specialist | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI7744 | Senior Chemist | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI20052 | Senior Specialist | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI20034 | Specialist | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI13881 | Standards Management in the PFAS Laboratory | 5_EUUSLA_PFAS_Manager |
| T-PFAS-WI18548 | Total Oxidizable Precursors in Aqueous Samples by LC/MS/MS with Isotope Dilution | 5_EUUSLA_PFAS_Manager |
| 8.13 Specialty Services | | |
| Work Instruction | | |
| T-SSG-WI7750 | Analysis of Fluorotelemer Alcohols in Water and Wastewater | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI14557 | Associate Chemist | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI14572 | Chemist | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI7753 | Client Specific - 1,4-Dioxane by Head Space (HS) GC/MS in Cosmetics | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI9093 | Client Specific - Analysis of Glycerol Monolaurate and Propylene Glycol Monolaurate in BioPolySan by Gas Chromatography Mass Spectroscopy (GC/MS) | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI12014 | Client Specific - Analysis of Iodoacetamide in Aqueous Samples by LC/MS/MS | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI12002 | Client Specific - Analysis of Piperonyl Butoxide (PBO) in Wastewater by GC/MS/MS | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI9160 | Client Specific - Analysis of p-tert-Octylphenol (PTOP) in Water by LC/MS/MS | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI9419 | Client Specific - Method for the Analysis of Dioxathion in Water and Solid Samples | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI9420 | Client Specific - Trace Analysis of 16 Phthalates in Cosmetic Products by Gas Chromatography Selective Ion Monitoring Mass Spectroscopy (GC/SIM/MS) or Selective Reaction Monitoring (GC/SRM/MS) (Client Specific Method) | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI13642 | Determination of Endothall in Aqueous Samples Using LC-MS by Method 8321B | 5_EUUSLA_Specialty Services_Director |
| T-SSG-WI12005 | Determination of Endothall in Solid Matrix Using LC-MS by Method 8231B | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI12008 | Determination of Glycols in Waters by Direct Injection LC/MS/MS following SW-846 8321A Modified Method | 5_EUUSLA_Specialty Services_Manager |

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|---|---|---|
| T-SSG-WI9448 | Determination of Hydrazine Monomethylhydrazine and 1,1-Dimethylhydrazine in Aqueous Samples by LC/MS/MS Using SW-846 8315A Modified | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI9431 | Determination of Hydrazine, Monomethylhydrazine and 1,1-Dimethylhydrazine in Soil samples by LC/MS/MS | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI9553 | Determination of N-Nitrosodimethylamine (NDMA) in Water and Soil by EPA 1625C | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI9451 | Determination of Perchlorate in Milk and Milk Powder by LCMSMS | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI14624 | Director | 5_EUUSLA_Specialty Services_Director |
| T-SSG-WI9483 | Extraction of Waters for Fluorotelomer Alcohols by Method 3510C | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI14626 | Group Leader | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI14575 | Laboratory Technician | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI12019 | Maintenance and Tuning for Thermo Scientific TSQ Quantum Access Tandem Mass Spectrometer with a Thermo Electron Accela HPLC System (LC/MS/MS) | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI20054 | Manager | 5_EUUSLA_Specialty Services_Director |
| T-SSG-WI9963 | Micromass Quattro Micro Tandem Mass Spectrometer with a Waters 2795 HPLC System (LC/MS/MS) | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI14578 | Principal Chemist | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI14614 | Principal Specialist | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI14620 | Senior Chemist | 5_EUUSLA_Specialty Services_Manager |
| T-SSG-WI7748 | Thermo Scientific Trace 1310 Gas Chromatograph Tandem Mass Spectrometer (GC/MS/MS) Preventative and Corrective Maintenance | 5_EUUSLA_Specialty Services_Manager |
| 8.14 HRMS Group | | |
| Work Instruction | | |
| T-HRMS-WI14558 | Associate Chemist | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI14574 | Chemist | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI20818 | Determination of % Moisture by Freeze Drying using ASTM D3974 | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI12003 | Determination of Dioxin-like Polychlorinated Biphenyls by HRGC/HRMS in Aqueous and Solid Matrices by Methods 1613B and 1668C | 5_EUUSLA_Specialty Services_Manager |
| T-HRMS-WI9452 | Determination of PCB Homologs in Waters and Solids by Method 680 | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI12013 | Determination of Percentage Lipids in Animal and Marine Tissue using EPA Method 1613B | 5_EUUSLA_Specialty Services_Manager |
| T-HRMS-WI21311 | Determination of Tetra- Through Octa- Chlorinated Dioxins and Furans in water and solid samples using HRGC/HRMS | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI9476 | Determination of Tetra- Through Octa- Chlorinated Dioxins and Furans in water/solid/food/feed samples using HRGC/HRMS by EPA 1613B or SW-846 Method 8290A | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI19229 | DFS HRGC/HRMS Preventative and Corrective Maintenance | 5_EUUSLA_Specialty Services_Manager |
| T-HRMS-WI14625 | Director | 5_EUUSLA_HRMS_Director |
| T-HRMS-WI9480 | Extraction of Water and Soil Samples by Method 680 | 5_EUUSLA_Specialty Services_Manager |
| T-HRMS-WI9485 | Glassware Cleaning for HRMS Extractions | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI14627 | Group Leader | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI14577 | Laboratory Technician | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI20068 | Manager | 5_EUUSLA_HRMS_Director |
| T-HRMS-WI21285 | PCB Congeners by HRGC/HRMS in Aqueous and Solid Matrices | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI9432 | PCB Congeners by Method 1668 HRGC/HRMS in Aqueous and Solid Matrices | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI9487 | Preparation of Aqueous and Solid Samples for Food and Feed Analysis by HRMS | 5_EUUSLA_Specialty Services_Manager |
| T-HRMS-WI9489 | Preparation of Oils and Oleoresins for Food and Feed Analysis by HRMS | 5_EUUSLA_Specialty Services_Manager |
| T-HRMS-WI14579 | Principal Chemist | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI14616 | Principal Specialist | 5_EUUSLA_HRMS_Manager |

| | | |
|---|---|---|
| T-HRMS-WI9433 | Processing High Resolution Mass Spectrometry Data Using TargetQuan | 5_EUUSLA_Specialty Services_Manager |
| T-HRMS-WI14623 | Senior Chemist | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI21528 | Separatory Funnel Extraction Procedure for HRMS Analysis in an Aqueous Matrix | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI12032 | Separatory Funnel Extraction Procedure for HRMS Analysis in an Aqueous Matrix Using Method 1613B, 8290A, 1668A, and 1668C | 5_EUUSLA_Specialty Services_Manager |
| T-HRMS-WI21536 | Soxhlet Extraction Procedure for HRMS Analysis in a Solid matrix | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI9488 | Soxhlet Extraction Procedure for HRMS Analysis in a Solid Matrix by Methods: 1613B, 8290A, 1668C, and 1668A | 5_EUUSLA_HRMS_Manager |
| T-HRMS-WI9446 | Standards Management in the High Resolution Mass Spectrometry Laboratory | 5_EUUSLA_HRMS_Manager |

| Instrument | # of Units | Detector Type/Manufacturer |
|---|---|---|
| **Liquid Chromatography/Gas Chromatography/Mass Spectrometry (LC/GC/MS)** | | |
| LC/MS/MS | 6 | AB Sciex 4000 with Exion LC |
| LC/MS/MS | 1 | Agilent |
| LC/MS/MS | 2 | Agilent LC with Micromass Quattro micro MS/MS and Waters 2996 Photodiode Array UV-Vis Detector |
| LC/MS/MS | 1 | Thermo Scientific TSQ Quantum Access with Acella LC |
| GC/MS | 30 | Agilent |
| GC/MS | 1 | Shimadzu |
| GC/MS | 1 | DSQ II MS |
| GC/MS/MS | 1 | Thermo TSQ 8000 MSMS |
| HRGC/HRMS | 5 | Thermo Scientific DFS |
| Gas Chromatograph | 3 | Flame Ionization / Photoionization |
| Gas Chromatograph | 2 | Thermal Conductivity |
| Gas Chromatograph | 17 | Electron Capture |
| Gas Chromatograph | 2 | Nitrogen/Phosphorus |
| Gas Chromatograph | 14 | Flame Ionization |
| **Auxiliary Equipment for Gas Chromatographs** | | |
| Most of the GC/MS and GC systems include autosamplers and approximately half are fitted with purge and trap concentrators for analysis of volatiles. | | |

| **High Performance Liquid Chromatography** | | |
|---|---|---|
| High Performance Liquid Chromatograph | 2 | Agilent 1100 LC |
| High Performance Liquid Chromatograph | 2 | Agilent 1200 HPLC |
| High Performance Liquid Chromatograph | 1 | Waters alliance 2695 |
| High Performance Liquid Chromatograph | 1 | Waters alliance 2795 |

| **Gel Permeation Chromatography** | | |
|---|---|---|
| Gel Permeation Chromatograph | 3 | J2Scientific AccuPrep |

| **Ion Chromatography** | | |
|---|---|---|
| Ion Chromatograph | 1 | Metrohm 881 IC Pro |
| Ion Chromatograph | 1 | Dionex ICS1000 |
| Ion Chromatograph | 1 | Dionex ICS3000 |
| Ion Chromatograph | 1 | Dionex ICS2000 |
| Ion Chromatograph | 4 | Dionex ICS1100 |
| Ion Chromatograph (Specialty Services) | 1 | Dionex ICS5000 with UltimMate 3000 Aux Pump |

| **Atomic Absorption/Emission Spectrophotometry** | | |
|---|---|---|
| ICP | 1 | Thermo ICAP™ 7400 Duo ICP Analyzer |
| ICP | 5 | Thermo ICAP™ 6500 Duo ICP Analyzer |
| ICP/MS | 1 | Agilent 7500ce |
| ICP/MS | 1 | Agilent 7700cx |
| ICP/MS | 1 | Agilent 7700x |
| ICP/MS | 1 | Agilent 7900 |
| Mercury Analyzer | 3 | Leeman Labs Hydra II |
| Prep Station | 3 | Thomas Cain DEENA 60 |

| UV Vis/IR Spectrophotometry: | | |
|---|---|---|
| UV-Vis Spectrophotometer | 3 | Thermo Genesys 30 |
| UV-Vis Spectrophotomenter | 1 | Hach DR2800 |

| Miscellaneous Chemistry Instrumentation | | |
|---|---|---|
| Auto-titrator System | 2 | Mantech |
| Automated COD Analyzer | 1 | Skalar |
| Turbidimeter | 1 | Hach 2100AN |
| Block Digestion Systems | 8 | Environmental Express SC150 |
| Block Digestion Systems | 6 | Environmental Express SC154 |
| Centrifuge | 5 | Various |
| Chilled water recirculators | | Various |
| Closed Cup Flashpoint Apparatus, Pensky-Martin | 1 | Fisher Scientific TA6 |
| Automated SPE HEM Extractor | 2 | Horizon SPE-DEX 3100 |
| Automated SPE HEM Extractor | 2 | Environmental Exprerss SPE-Express |
| Cyanide Midi Distillation Kits | 3 | Various |
| Automated BOD Analyzer | 3 | Mantech |
| Dissolved Oxygen Meter | 6 | YSI |
| Flow Solution Autoanalyzer | 1 | Astoria Pacific 302 |
| Flow Solution Autoanalyzer | 2 | OI FS3700 |
| Flow Solution Autoanalyzer | 1 | OI FS3100 |
| Flow Solution Autoanalyzer | 1 | Skalar San++ |
| Discrete Autoanalyzer | 1 | Thermo Gallery Plus |
| Glassware washer - automated | 6 | Miele – (2) PG8257 (1) G7827 (1) G7704 (2) G7883 |
| Kjehldal Distillation Apparatus | 2 | Fisher |
| Microwave Extractors | 3 | CEM MarsXpress |
| pH meters | 13 | Various |
| Phenol Midi Distillation | 2 | Andrews Glass |
| Pressurized Solvent Extractor | 2 | Dionex ASE200 |
| Puck Mill | 1 | ESSA/2000 |
| Sonicators | 12 | Various |
| Total Organic Carbon Analyzer | 4 | O.I. Corp. 1030 |
| Total Organic Carbon Automated Combustion Analyzer | 1 | Skalar Primacs ATC-100 |
| Turbidimeter | 1 | Hach 2100AN |
| Zero Headspace Extractor | 74 | Various Models |

| Microbiology Equipment | | |
|---|---|---|
| Autoclave | 2 | Steris – Amsco, |
| Balance | 5 | Mettler, PB 3002 |
| Balance | 1 | Mettler-Toledo, AT200 |
| Balance | 2 | Mettler-Toledo, PR2002 |
| Balance | 1 | Sartorius BP4100 |
| Biological Safety Cabinet | 4 | NuAire NU-425-600 Type A/B 3 |
| Biological Safety Cabinet | 1 | NuAire NU-435-600 Type B2 Fume Hood |
| Colony Counter | 1 | Quebec Dark Field |
| Incubator | 1 | PGC 9311-1127 |
| Incubator | 1 | PS WFY20SAWI |
| Microscope | 1 | Stereoscope with Zoom, AO Model 570 |
| Microscope | 1 | Zeiss |
| pH Meter | 2 | Orion Model 410A |
| Quanti-Tray Sealer | 1 | IDEXX Model 2X |
| Water Bath | 1 | Boekel Grant with Removal Heater Circulator |
| Water Bath | 1 | Thermo Electron Corp. |
| Water Bath | 1 | Precision Coliform Incubator Bath |
| Water Bath | 1 | VWR 1275PC |
| Water Bath | 2 | Thermo Scientific Model 2862 |
| UV Light | 1 | Spectronics |

**Computer Equipment**

Our laboratories make extensive use of computers for business applications, technical operations (e.g., our sample management system), and QA Program (see section on Quality Assurance). Numerous physical and virtual servers are used to support the systems. Internet access is provided with an ASA firewall to control incoming and outgoing traffic. The laboratory uses 3 phase power supply and backup generators for life safety and sample integrity preservation.

# COMMONWEALTH OF PENNSYLVANIA
# DEPARTMENT OF ENVIRONMENTAL PROTECTION

*BUREAU OF LABORATORIES*

*LABORATORY ACCREDITATION PROGRAM*

Certifies That

**36-00037**

**Eurofins Lancaster Laboratories Environmental LLC**

**2425 New Holland Pike, Lancaster, PA, 17601-5994**

Having duly met the requirement of
The act of June 29, 2002 (P.L. 596, No. 90)
dealing with Environmental Laboratories Accreditation
(27 Pa. C.S. 4104-4113) and the
National Environmental Laboratory Accreditation Program Standard
is hereby approved as an

# Accredited Laboratory

to conduct analysis within the fields of accreditations more fully described in the attached Scope of Accreditation

NELAP accreditation granted by the PA DEP to an environmental laboratory is conditioned upon continued compliance with the current edition of the NELAC Standard or TNI Standard and the following Subchapters and Sections of 25 Pa. Code Chapter 252: Subchapter A (relating to general provisions); Subchapter B (relating to application, fees and supporting documents); Subchapter E (relating to proficiency test study requirements); Subchapter F (relating to assessment requirements); Subchapter G (relating to miscellaneous provisions); Section 252.307; and Section 252.401.

Expiration Date: **01/31/2021**

Certificate Number: **019**

Dana T. Marshall, Acting Chief
Laboratory Accreditation Program
Bureau of Laboratories

Continued accreditation status depends on successful ongoing participation in the program
Certificate not transferable Surrender upon revocation
To be conspicuously displayed at the Laboratory
Not valid unless accompanied by a valid Scope of Accreditation
Shall not be used to imply endorsement by the Commonwealth of Pennsylvania
Customers are urged to verify the laboratory's current accreditation status
PA DEP is a NELAP recognized accreditation body

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

# Laboratory Scope of Accreditation

**Attached to Certificate of Accreditation 019-002 expiration date 01/31/2021. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.**


**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**


**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Drinking Water

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 110.2 | | Color | NELAP | PA | 04/04/2005 |
| EPA 150.1 | | pH | NELAP | PA | 02/28/2002 |
| EPA 1613 | B | Dioxin | NELAP | PA | 10/05/2010 |
| EPA 1664 | A | Oil and grease | NELAP | PA | 05/24/2011 |
| EPA 1664 | B | Oil and grease | NELAP | PA | 01/27/2014 |
| EPA 180.1 | | Turbidity | NELAP | PA | 04/04/2005 |
| EPA 200.7 | 4.4 | Barium | NELAP | PA | 01/22/2001 |
| EPA 200.7 | 4.4 | Calcium | NELAP | PA | 11/28/2001 |
| EPA 200.7 | 4.4 | Chromium | NELAP | PA | 01/22/2001 |
| EPA 200.7 | 4.4 | Cobalt | NELAP | PA | 10/16/2008 |
| EPA 200.7 | 4.4 | Copper | NELAP | PA | 01/22/2001 |
| EPA 200.7 | 4.4 | Iron | NELAP | PA | 04/04/2005 |
| EPA 200.7 | 4.4 | Lithium | NELAP | PA | 11/13/2012 |
| EPA 200.7 | 4.4 | Magnesium | NELAP | PA | 12/04/2007 |
| EPA 200.7 | 4.4 | Manganese | NELAP | PA | 04/04/2005 |
| EPA 200.7 | 4.4 | Nickel | NELAP | PA | 01/22/2001 |
| EPA 200.7 | 4.4 | Potassium | NELAP | PA | 05/24/2011 |
| EPA 200.7 | 4.4 | Silver | NELAP | PA | 01/26/2001 |
| EPA 200.7 | 4.4 | Sodium | NELAP | PA | 01/22/2001 |
| EPA 200.7 | 4.4 | Strontium | NELAP | PA | 05/24/2011 |
| EPA 200.7 | 4.4 | Sulfur | NELAP | PA | 11/09/2012 |
| EPA 200.7 | 4.4 | Tin | NELAP | PA | 11/03/2008 |
| EPA 200.7 | 4.4 | Vanadium | NELAP | PA | 10/16/2008 |
| EPA 200.7 | 4.4 | Zinc | NELAP | PA | 04/04/2005 |
| EPA 200.8 | 5.4 | Aluminum | NELAP | PA | 01/25/2019 |
| EPA 200.8 | 5.4 | Antimony | NELAP | PA | 02/10/2005 |
| EPA 200.8 | 5.4 | Arsenic | NELAP | PA | 02/10/2005 |
| EPA 200.8 | 5.4 | Barium | NELAP | PA | 11/16/2011 |
| EPA 200.8 | 5.4 | Beryllium | NELAP | PA | 02/10/2005 |
| EPA 200.8 | 5.4 | Cadmium | NELAP | PA | 02/10/2005 |
| EPA 200.8 | 5.4 | Calcium | NELAP | PA | 11/16/2011 |
| EPA 200.8 | 5.4 | Chromium | NELAP | PA | 02/10/2005 |
| EPA 200.8 | 5.4 | Copper | NELAP | PA | 03/09/2007 |
| EPA 200.8 | 5.4 | Iron | NELAP | PA | 11/02/2012 |
| EPA 200.8 | 5.4 | Lead | NELAP | PA | 02/10/2005 |
| EPA 200.8 | 5.4 | Magnesium | NELAP | PA | 11/02/2012 |
| EPA 200.8 | 5.4 | Manganese | NELAP | PA | 11/16/2011 |
| EPA 200.8 | 5.4 | Nickel | NELAP | PA | 02/10/2005 |
| EPA 200.8 | 5.4 | Potassium | NELAP | PA | 11/16/2011 |
| EPA 200.8 | 5.4 | Selenium | NELAP | PA | 02/10/2005 |
| EPA 200.8 | 5.4 | Sodium | NELAP | PA | 11/16/2011 |
| EPA 200.8 | 5.4 | Strontium | NELAP | PA | 11/16/2011 |

Martina M Harvey

The Pennsylvania Department of Environmental Protection Laboratory Accreditation Program is a NELAP recognized Accreditation Body. Customers are urged to verify the laboratory's current accreditation standing.

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

### Matrix: Drinking Water

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 200.8 | 5.4 | Thallium | NELAP | PA | 02/10/2005 |
| EPA 200.8 | 5.4 | Zinc | NELAP | PA | 11/16/2011 |
| EPA 245.1 | 3.0 | Mercury | NELAP | PA | 08/29/2001 |
| EPA 300.0 | 2.1 | Chloride | NELAP | PA | 05/17/2005 |
| EPA 300.0 | 2.1 | Fluoride | NELAP | PA | 01/22/2004 |
| EPA 300.0 | 2.1 | Nitrate as N | NELAP | PA | 10/31/2002 |
| EPA 300.0 | 2.1 | Nitrite as N | NELAP | PA | 10/31/2002 |
| EPA 300.0 | 2.1 | Sulfate | NELAP | PA | 07/07/2003 |
| EPA 335.4 | | Cyanide | NELAP | PA | 07/11/2006 |
| EPA 353.2 | | Nitrate as N | NELAP | PA | 02/28/2002 |
| EPA 353.2 | | Nitrite as N | NELAP | PA | 02/28/2002 |
| EPA 353.2 | | Total nitrate-nitrite | NELAP | PA | 05/24/2011 |
| EPA 524.2 | 4.1 | 1,1,1,2-Tetrachloroethane | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | 1,1,1-Trichloroethane | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | 1,1,2,2-Tetrachloroethane | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | 1,1,2-Trichloroethane | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | 1,1-Dichloro-2-propanone (1,1-Dichloropropanone) | NELAP | PA | 05/17/2005 |
| EPA 524.2 | 4.1 | 1,1-Dichloroethane | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | 1,1-Dichloroethene (1,1-Dichloroethylene) | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | 1,1-Dichloropropene | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | 1,2,3-Trichlorobenzene | NELAP | PA | 04/04/2005 |
| EPA 524.2 | 4.1 | 1,2,3-Trichloropropane (1,2,3-TCP) | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | 1,2,4-Trichlorobenzene | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | 1,2,4-Trimethylbenzene | NELAP | PA | 04/04/2005 |
| EPA 524.2 | 4.1 | 1,2-Dichlorobenzene (o-Dichlorobenzene) | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | 1,2-Dichloroethane | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | 1,2-Dichloropropane | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | 1,3,5-Trimethylbenzene | NELAP | PA | 05/17/2005 |
| EPA 524.2 | 4.1 | 1,3-Dichlorobenzene (m-Dichlorobenzene) | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | 1,3-Dichloropropane | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | 1,4-Dichlorobenzene (p-Dichlorobenzene) | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | 1-Chlorobutane | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | 2,2-Dichloropropane | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | 2-Butanone (Methyl ethyl ketone, MEK) | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | 2-Chlorotoluene | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | 2-Hexanone | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | 2-Nitropropane | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | 4-Chlorotoluene | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | 4-Methyl-2-pentanone (MIBK) | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Acetone | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Acrylonitrile | NELAP | PA | 05/24/2007 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Drinking Water

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 524.2 | 4.1 | Allyl chloride (3-Chloropropene) | NELAP | PA | 07/03/2007 |
| EPA 524.2 | 4.1 | Benzene | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | Bromobenzene | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | Bromochloromethane | NELAP | PA | 04/04/2005 |
| EPA 524.2 | 4.1 | Bromodichloromethane | NELAP | PA | 11/03/2016 |
| EPA 524.2 | 4.1 | Bromoform | NELAP | PA | 11/03/2016 |
| EPA 524.2 | 4.1 | Carbon disulfide | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Carbon tetrachloride | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | Chloroacetonitrile | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Chlorobenzene | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | Chloroethane | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | Chloroform | NELAP | PA | 11/03/2016 |
| EPA 524.2 | 4.1 | Dibromochloromethane | NELAP | PA | 11/03/2016 |
| EPA 524.2 | 4.1 | Dibromomethane | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | Dichlorodifluoromethane (Freon 12) | NELAP | PA | 04/04/2005 |
| EPA 524.2 | 4.1 | Diethyl ether (Ethyl ether) | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Diisopropyl ether (DIPE) | NELAP | PA | 01/07/2010 |
| EPA 524.2 | 4.1 | Ethyl methacrylate | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Ethyl tert-butyl ether (ETBE) | NELAP | PA | 01/24/2007 |
| EPA 524.2 | 4.1 | Ethylbenzene | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | Hexachlorobutadiene (1,3-Hexachlorobutadiene) | NELAP | PA | 04/04/2005 |
| EPA 524.2 | 4.1 | Hexachloroethane | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Isopropylbenzene (Cumene) | NELAP | PA | 04/04/2005 |
| EPA 524.2 | 4.1 | Methacrylonitrile | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Methyl bromide (Bromomethane) | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | Methyl chloride (Chloromethane) | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | Methyl iodide (Iodomethane) | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Methyl tert-butyl ether (MTBE) | NELAP | PA | 04/04/2005 |
| EPA 524.2 | 4.1 | Methylacrylate | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Methylene chloride (Dichloromethane) | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | Methylmethacrylate | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Naphthalene | NELAP | PA | 05/17/2005 |
| EPA 524.2 | 4.1 | Nitrobenzene | NELAP | PA | 05/17/2005 |
| EPA 524.2 | 4.1 | Pentachloroethane | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Propionitrile (Ethyl cyanide) | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Styrene | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | Tetrachloroethene (PCE, Perchloroethylene) | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | Tetrahydrofuran (THF) | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | Toluene | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | Total trihalomethanes (TTHMs) | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | Trichloroethene (TCE, Trichloroethylene) | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | Trichlorofluoromethane (Freon 11) | NELAP | PA | 04/04/2005 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

### Matrix: Drinking Water

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 524.2 | 4.1 | Vinyl chloride (Chloroethene) | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | Xylenes, total | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | cis-1,2-Dichloroethene | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | cis-1,3-Dichloropropene | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | m+p-Xylene | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | n-Butylbenzene | NELAP | PA | 04/04/2005 |
| EPA 524.2 | 4.1 | n-Propylbenzene | NELAP | PA | 05/17/2005 |
| EPA 524.2 | 4.1 | o-Xylene | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | p-Isopropyltoluene (4-Isopropyltoluene) | NELAP | PA | 05/17/2005 |
| EPA 524.2 | 4.1 | sec-Butylbenzene | NELAP | PA | 04/04/2005 |
| EPA 524.2 | 4.1 | tert-Amyl methyl ether (TAME) | NELAP | PA | 01/24/2007 |
| EPA 524.2 | 4.1 | tert-Butyl alcohol (2-Methyl-2-propanol) | NELAP | PA | 05/24/2007 |
| EPA 524.2 | 4.1 | tert-Butylbenzene | NELAP | PA | 04/04/2005 |
| EPA 524.2 | 4.1 | trans-1,2-Dichloroethene | NELAP | PA | 03/06/2018 |
| EPA 524.2 | 4.1 | trans-1,3-Dichloropropene | NELAP | PA | 10/31/2002 |
| EPA 524.2 | 4.1 | trans-1,4-Dichloro-2-butene | NELAP | PA | 05/24/2007 |
| EPA 525.2 | 2.0 | 2,3-Dichlorobiphenyl (BZ 5) | NELAP | PA | 05/17/2005 |
| EPA 525.2 | 2.0 | Acenaphthene | NELAP | PA | 05/25/2007 |
| EPA 525.2 | 2.0 | Acenaphthylene | NELAP | PA | 04/28/2010 |
| EPA 525.2 | 2.0 | Alachlor (Lasso) | NELAP | PA | 02/28/2002 |
| EPA 525.2 | 2.0 | Aldrin (HHDN) | NELAP | PA | 10/09/2013 |
| EPA 525.2 | 2.0 | Anthracene | NELAP | PA | 05/25/2007 |
| EPA 525.2 | 2.0 | Atrazine | NELAP | PA | 01/03/2002 |
| EPA 525.2 | 2.0 | Benzo[a]anthracene | NELAP | PA | 05/25/2007 |
| EPA 525.2 | 2.0 | Benzo[a]pyrene | NELAP | PA | 01/24/2001 |
| EPA 525.2 | 2.0 | Benzo[b]fluoranthene | NELAP | PA | 06/04/2007 |
| EPA 525.2 | 2.0 | Benzo[ghi]perylene | NELAP | PA | 07/03/2007 |
| EPA 525.2 | 2.0 | Benzo[k]fluoranthene | NELAP | PA | 06/04/2007 |
| EPA 525.2 | 2.0 | Benzyl butyl phthalate (Butyl benzyl phthalate) | NELAP | PA | 05/25/2007 |
| EPA 525.2 | 2.0 | Butachlor | NELAP | PA | 12/19/2002 |
| EPA 525.2 | 2.0 | Chrysene (Benzo[a]phenanthrene) | NELAP | PA | 05/25/2007 |
| EPA 525.2 | 2.0 | Di-n-butyl phthalate | NELAP | PA | 05/25/2007 |
| EPA 525.2 | 2.0 | Dibenzo[a,h]anthracene | NELAP | PA | 05/25/2007 |
| EPA 525.2 | 2.0 | Dieldrin | NELAP | PA | 05/17/2005 |
| EPA 525.2 | 2.0 | Diethyl phthalate | NELAP | PA | 05/25/2007 |
| EPA 525.2 | 2.0 | Dimethyl phthalate | NELAP | PA | 05/25/2007 |
| EPA 525.2 | 2.0 | Endrin | NELAP | PA | 05/17/2005 |
| EPA 525.2 | 2.0 | Fluoranthene | NELAP | PA | 03/07/2012 |
| EPA 525.2 | 2.0 | Fluorene | NELAP | PA | 02/07/2012 |
| EPA 525.2 | 2.0 | Heptachlor | NELAP | PA | 05/17/2005 |
| EPA 525.2 | 2.0 | Heptachlor epoxide | NELAP | PA | 05/17/2005 |
| EPA 525.2 | 2.0 | Hexachlorobenzene | NELAP | PA | 02/11/2005 |

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**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Drinking Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 525.2 | 2.0 | Hexachlorocyclopentadiene | NELAP | PA | 01/24/2001 |
| EPA 525.2 | 2.0 | Indeno(1,2,3-cd)pyrene | NELAP | PA | 02/07/2012 |
| EPA 525.2 | 2.0 | Methoxychlor | NELAP | PA | 01/24/2001 |
| EPA 525.2 | 2.0 | Metolachlor | NELAP | PA | 12/19/2002 |
| EPA 525.2 | 2.0 | Metribuzin | NELAP | PA | 12/19/2002 |
| EPA 525.2 | 2.0 | Phenanthrene | NELAP | PA | 05/25/2007 |
| EPA 525.2 | 2.0 | Propachlor (Ramrod) | NELAP | PA | 01/24/2001 |
| EPA 525.2 | 2.0 | Pyrene | NELAP | PA | 05/25/2007 |
| EPA 525.2 | 2.0 | Simazine | NELAP | PA | 01/03/2002 |
| EPA 525.2 | 2.0 | bis(2-Ethylhexyl) adipate (di(2-Ethylhexyl) adipate) | NELAP | PA | 01/24/2001 |
| EPA 525.2 | 2.0 | bis(2-Ethylhexyl) phthalate (DEHP) | NELAP | PA | 01/24/2001 |
| EPA 525.2 | 2.0 | gamma-BHC (Lindane, gamma-Hexachlorocyclohexane) | NELAP | PA | 01/24/2001 |
| EPA 531.1 | 3.1 | 3-Hydroxycarbofuran | NELAP | PA | 11/07/2006 |
| EPA 531.1 | 3.1 | Aldicarb (Temik) | NELAP | PA | 04/14/2015 |
| EPA 531.1 | 3.1 | Aldicarb sulfone | NELAP | PA | 01/24/2001 |
| EPA 531.1 | 3.1 | Aldicarb sulfoxide | NELAP | PA | 01/24/2001 |
| EPA 531.1 | 3.1 | Carbaryl (Sevin) | NELAP | PA | 10/09/2002 |
| EPA 531.1 | 3.1 | Carbofuran (Furaden) | NELAP | PA | 01/24/2001 |
| EPA 531.1 | 3.1 | Methomyl (Lannate) | NELAP | PA | 01/24/2001 |
| EPA 531.1 | 3.1 | Oxamyl (Vydate) | NELAP | PA | 01/24/2001 |
| EPA 537 | 1.1 | Perfluorobutanesulfonic acid (PFBS) | NELAP | PA | 05/14/2018 |
| EPA 537 | 1.1 | Perfluorodecanoic acid (PFDA) | NELAP | PA | 05/14/2018 |
| EPA 537 | 1.1 | Perfluorododecanoic acid (PFDoA) | NELAP | PA | 05/14/2018 |
| EPA 537 | 1.1 | Perfluoroheptanoic acid (PFHpA) | NELAP | PA | 05/14/2018 |
| EPA 537 | 1.1 | Perfluorohexanesulfonic acid (PFHxS) | NELAP | PA | 05/14/2018 |
| EPA 537 | 1.1 | Perfluorohexanoic acid (PFHxA) | NELAP | PA | 05/14/2018 |
| EPA 537 | 1.1 | Perfluorononanoic acid (PFNA) | NELAP | PA | 05/14/2018 |
| EPA 537 | 1.1 | Perfluorooctanesulfonic acid (PFOS) | NELAP | PA | 05/14/2018 |
| EPA 537 | 1.1 | Perfluorooctanoic acid (PFOA) | NELAP | PA | 05/14/2018 |
| EPA 537 | 1.1 | Perfluorotetradecanoic acid (PFTA) | NELAP | PA | 05/14/2018 |
| EPA 537 | 1.1 | Perfluorotridecanoic acid (PFTrDA) | NELAP | PA | 05/14/2018 |
| EPA 537 | 1.1 | Perfluoroundecanoic acid (PFUnA) | NELAP | PA | 05/14/2018 |
| EPA 537 | 1.1 | n-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA) | NELAP | PA | 07/16/2018 |
| EPA 537 | 1.1 | n-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA) | NELAP | PA | 05/14/2018 |
| EPA 537.1 | | 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | 9-Chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | Hexafluoropropylene oxide dimer acid (HFPO-DA) | NELAP | PA | 08/01/2019 |

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**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

### Matrix: Drinking Water

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 537.1 | | Perfluorobutanesulfonic acid (PFBS) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | Perfluorodecanoic acid (PFDA) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | Perfluorododecanoic acid (PFDoA) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | Perfluoroheptanoic acid (PFHpA) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | Perfluorohexanesulfonic acid (PFHxS) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | Perfluorohexanoic acid (PFHxA) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | Perfluorononanoic acid (PFNA) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | Perfluorooctanesulfonic acid (PFOS) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | Perfluorooctanoic acid (PFOA) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | Perfluorotetradecanoic acid (PFTA) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | Perfluorotridecanoic acid (PFTrDA) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | Perfluoroundecanoic acid (PFUnA) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | n-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA) | NELAP | PA | 08/01/2019 |
| EPA 537.1 | | n-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA) | NELAP | PA | 08/01/2019 |
| EPA 8015 | C, D | Nonhalogenated organics by GC/FID | NELAP | PA | 05/24/2011 |
| EPA 8015 | B, C, D | Ethane | NELAP | PA | 05/24/2011 |
| EPA 8015 | B, C, D | Methane | NELAP | PA | 05/24/2011 |
| EPA 8015 | B, C, D | Propane | NELAP | PA | 11/09/2012 |
| RSK-175 | | Acetylene (Ethyne) | NELAP | PA | 11/19/2015 |
| RSK-175 | | Carbon dioxide | NELAP | PA | 11/19/2015 |
| RSK-175 | | Ethane | NELAP | PA | 11/19/2015 |
| RSK-175 | | Ethene | NELAP | PA | 11/19/2015 |
| RSK-175 | | Isobutane (2-Methylpropane) | NELAP | PA | 11/19/2015 |
| RSK-175 | | Methane | NELAP | PA | 11/19/2015 |
| RSK-175 | | n-Butane | NELAP | PA | 11/19/2015 |
| SM 2120 B | | Color | NELAP | PA | 05/25/2005 |
| SM 2130 B | | Turbidity | NELAP | PA | 05/17/2005 |
| SM 2320 B | | Alkalinity as CaCO3 | NELAP | PA | 01/24/2001 |
| SM 2340 C | | Total hardness as CaCO3 | NELAP | PA | 05/24/2011 |
| SM 2510 B | | Conductivity | NELAP | PA | 05/17/2005 |
| SM 2540 B | | Residue, total | NELAP | PA | 09/04/2018 |
| SM 2540 C | | Total dissolved solids (TDS) | NELAP | PA | 06/02/2004 |
| SM 2540 D | | Residue, nonfilterable (TSS) | NELAP | PA | 05/24/2011 |
| SM 2550 B | | Temperature, deg. C | NELAP | PA | 04/04/2005 |
| SM 4500-Cl F | | Total residual chlorine | NELAP | PA | 05/24/2011 |
| SM 4500-F- C | | Fluoride | NELAP | PA | 10/15/2003 |
| SM 4500-H+ B | | pH | NELAP | PA | 05/16/2007 |
| SM 4500-P E | | Orthophosphate as P | NELAP | PA | 06/12/2007 |
| SM 4500-SiO2 C | 20-22 | Silica, dissolved | NELAP | PA | 05/24/2007 |
| SM 5310 C | | Total organic carbon (TOC) | NELAP | PA | 04/18/2013 |

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**DEP Laboratory ID: 36-00037**
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**PADWIS ID: 36037**

### Matrix: Drinking Water

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| SM 5540 C | | Surfactants as MBAS | NELAP | PA | 05/24/2007 |

### Matrix: Non-Potable Water

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| AK-101 | | Gasoline-range organics (GRO) | NELAP | PA | 12/12/2005 |
| AK-102 | | Diesel-range organics (DRO) | NELAP | PA | 12/12/2005 |
| ASTM D7511-09 | | Total cyanide | NELAP | PA | 02/15/2013 |
| ASTM D7511-12 | | Total cyanide | NELAP | PA | 01/25/2019 |
| EPA 1010 | A | Ignitability | NELAP | PA | 08/30/2019 |
| EPA 1010 | | Ignitability | NELAP | PA | 12/12/2005 |
| EPA 130.2 | | Hardness | NELAP | PA | 01/19/2005 |
| EPA 1311 | | Toxicity characteristic leaching procedure (TCLP) | NELAP | PA | 12/12/2005 |
| EPA 1312 | | Synthetic precipitation leaching procedure (SPLP) | NELAP | PA | 12/12/2005 |
| EPA 160.1 | | Residue, filterable (TDS) | NELAP | PA | 01/19/2005 |
| EPA 160.4 | | Residue, volatile | NELAP | PA | 01/19/2005 |
| EPA 1613 | B | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-hpcdd) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-hpcdf) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-hpcdf) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 1,2,3,7,8-Pentachlorodibenzofuran (PeCDF) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 2,3,4,7,8-Pentachlorodibenzofuran (PeCDF) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)(Dioxin) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | 2,3,7,8-Tetrachlorodibenzofuran (TCDF) | NELAP | PA | 06/30/2010 |
| EPA 1613 | B | Total heptachlorodibenzo-p-dioxin (HpCDD) | NELAP | PA | 08/06/2010 |
| EPA 1613 | B | Total heptachlorodibenzofuran (HpCDF) | NELAP | PA | 08/06/2010 |
| EPA 1613 | B | Total hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 08/06/2010 |
| EPA 1613 | B | Total hexachlorodibenzofuran (HxCDF) | NELAP | PA | 08/06/2010 |
| EPA 1613 | B | Total pentachlorodibenzo-p-dioxin (PeCDD) | NELAP | PA | 08/06/2010 |

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**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 1613 | B | Total pentachlorodibenzofuran (PeCDF) | NELAP | PA | 08/06/2010 |
| EPA 1613 | B | Total tetrachlorodibenzo-p-dioxin (TCDD) | NELAP | PA | 08/06/2010 |
| EPA 1613 | B | Total tetrachlorodibenzofuran (TCDF) | NELAP | PA | 08/06/2010 |
| EPA 1625 | C | N-Nitrosodimethylamine | NELAP | PA | 11/23/2010 |
| EPA 1664 | A | Non-polar material | NELAP | PA | 03/27/2018 |
| EPA 1664 | A | Oil and grease | NELAP | PA | 01/19/2005 |
| EPA 1664 | B | Non-polar material | NELAP | PA | 01/31/2020 |
| EPA 1664 | B | Oil and grease | NELAP | PA | 01/27/2014 |
| EPA 1666 | A | 4-Methyl-2-pentanone (MIBK) | NELAP | PA | 12/12/2005 |
| EPA 1666 | A | Diisopropyl ether (DIPE) | NELAP | PA | 01/19/2005 |
| EPA 1666 | A | Ethyl acetate | NELAP | PA | 01/19/2005 |
| EPA 1666 | A | Isobutyraldehyde | NELAP | PA | 01/19/2005 |
| EPA 1666 | A | Isopropyl acetate | NELAP | PA | 01/19/2005 |
| EPA 1666 | A | Isopropyl alcohol (2-Propanol) | NELAP | PA | 12/02/2009 |
| EPA 1666 | A | Methyl formate | NELAP | PA | 01/19/2005 |
| EPA 1666 | A | Tetrahydrofuran (THF) | NELAP | PA | 01/19/2005 |
| EPA 1666 | A | Xylenes, total | NELAP | PA | 01/19/2005 |
| EPA 1666 | A | n-Amyl acetate (n-Pentyl acetate) | NELAP | PA | 04/04/2005 |
| EPA 1666 | A | n-Amyl alcohol (1-Pentanol) | NELAP | PA | 04/04/2005 |
| EPA 1666 | A | n-Butyl acetate | NELAP | PA | 04/04/2005 |
| EPA 1666 | A | n-Heptane | NELAP | PA | 01/19/2005 |
| EPA 1666 | A | n-Hexane | NELAP | PA | 01/19/2005 |
| EPA 1666 | A | tert-Butyl alcohol (2-Methyl-2-propanol) | NELAP | PA | 04/04/2005 |
| EPA 1668 | A, C | PCBs as congeners by HRGC/HRMS | NELAP | PA | 03/04/2015 |
| EPA 1668 | A, C | 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (BZ 206) | NELAP | PA | 02/01/2013 |
| EPA 1668 | A, C | 2,2',3,3',4,4',5,5'-Octachlorobiphenyl (BZ 194) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4',5,6'-Octachlorobiphenyl (BZ 196) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl (BZ 207) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4',5,6-Octachlorobiphenyl (BZ 195) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4',5-Heptachlorobiphenyl (BZ 170) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl (BZ 197) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4',6-Heptachlorobiphenyl (BZ 171) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4'-Hexachlorobiphenyl (BZ 128) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5',6'-Heptachlorobiphenyl (BZ 177) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5',6,6'-Octachlorobiphenyl (BZ 201) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5',6-Heptachlorobiphenyl (BZ 175) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5'-Hexachlorobiphenyl (BZ 130) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5,5',6'-Octachlorobiphenyl (BZ 199) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl (BZ 208) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5,5',6-Octachlorobiphenyl (BZ 198) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5,5'-Heptachlorobiphenyl (BZ 172) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5,6'-Heptachlorobiphenyl (BZ 174) | NELAP | PA | 12/17/2012 |

Martina M Harvey

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 1668 | A, C | 2,2',3,3',4,5,6,6'-Octachlorobiphenyl (BZ 200) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5,6-Heptachlorobiphenyl (BZ 173) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5-Hexachlorobiphenyl (BZ 129) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,6'-Hexachlorobiphenyl (BZ 132) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,6,6'-Heptachlorobiphenyl (BZ 176) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,6-Hexachlorobiphenyl (BZ 131) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4-Pentachlorobiphenyl (BZ 82) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',5,5',6,6'-Octachlorobiphenyl (BZ 202) | NELAP | PA | 02/01/2013 |
| EPA 1668 | A, C | 2,2',3,3',5,5',6-Heptachlorobiphenyl (BZ 178) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',5,5'-Hexachlorobiphenyl (BZ 133) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',5,6'-Hexachlorobiphenyl (BZ 135) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',5,6,6'-Heptachlorobiphenyl (BZ 179) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',5,6-Hexachlorobiphenyl (BZ 134) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',5-Pentachlorobiphenyl (BZ 83) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',6,6'-Hexachlorobiphenyl (BZ 136) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',6-Pentachlorobiphenyl (BZ 84) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3'-Tetrachlorobiphenyl (BZ 40) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5',6-Hexachlorobiphenyl (BZ 149) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5'-Pentachlorobiphenyl (BZ 97) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5,5',6-Heptachlorobiphenyl (BZ 187) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5,5'-Hexachlorobiphenyl (BZ 146) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5,6'-Hexachlorobiphenyl (BZ 148) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5,6,6'-Heptachlorobiphenyl (BZ 188) | NELAP | PA | 02/01/2013 |
| EPA 1668 | A, C | 2,2',3,4',5,6-Hexachlorobiphenyl (BZ 147) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5-Pentachlorobiphenyl (BZ 90) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',6'-Pentachlorobiphenyl (BZ 98) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',6,6'-Hexachlorobiphenyl (BZ 150) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',6-Pentachlorobiphenyl (BZ 91) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4'-Tetrachlorobiphenyl (BZ 42) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5',6-Heptachlorobiphenyl (BZ 183) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5'-Hexachlorobiphenyl (BZ 138) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5,5',6-Octachlorobiphenyl (BZ 203) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5,5'-Heptachlorobiphenyl (BZ 180) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5,6'-Heptachlorobiphenyl (BZ 182) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5,6,6'-Octachlorobiphenyl (BZ 204) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5,6-Heptachlorobiphenyl (BZ 181) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5-Hexachlorobiphenyl (BZ 137) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',6'-Hexachlorobiphenyl (BZ 140) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',6,6'-Heptachlorobiphenyl (BZ 184) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',6-Hexachlorobiphenyl (BZ 139) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4'-Pentachlorobiphenyl (BZ 85) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5',6-Hexachlorobiphenyl (BZ 144) | NELAP | PA | 12/17/2012 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 1668 | A, C | 2,2',3,4,5'-Pentachlorobiphenyl (BZ 87) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5,5',6-Heptachlorobiphenyl (BZ 185) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5,5'-Hexachlorobiphenyl (BZ 141) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5,6'-Hexachlorobiphenyl (BZ 143) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5,6,6'-Heptachlorobiphenyl (BZ 186) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5,6-Hexachlorobiphenyl (BZ 142) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5-Pentachlorobiphenyl (BZ 86) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,6'-Pentachlorobiphenyl (BZ 89) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,6,6'-Hexachlorobiphenyl (BZ 145) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,6-Pentachlorobiphenyl (BZ 88) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4-Tetrachlorobiphenyl (BZ 41) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5',6-Pentachlorobiphenyl (BZ 95) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5'-Tetrachlorobiphenyl (BZ 44) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5,5',6-Hexachlorobiphenyl (BZ 151) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5,5'-Pentachlorobiphenyl (BZ 92) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5,6'-Pentachlorobiphenyl (BZ 94) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5,6,6'-Hexachlorobiphenyl (BZ 152) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5,6-Pentachlorobiphenyl (BZ 93) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5-Tetrachlorobiphenyl (BZ 43) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,6'-Tetrachlorobiphenyl (BZ 46) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,6,6'-Pentachlorobiphenyl (BZ 96) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,6-Tetrachlorobiphenyl (BZ 45) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3-Trichlorobiphenyl (BZ 16) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,4',5,5'-Hexachlorobiphenyl (BZ 153) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,4',5,6'-Hexachlorobiphenyl (BZ 154) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,4',5-Pentachlorobiphenyl (BZ 99) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,4',6,6'-Hexachlorobiphenyl (BZ 155) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,4',6-Pentachlorobiphenyl (BZ 100) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,4'-Tetrachlorobiphenyl (BZ 47) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,5',6-Pentachlorobiphenyl (BZ 103) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,5'-Tetrachlorobiphenyl (BZ 49) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,5,5'-Pentachlorobiphenyl (BZ 101) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,5,6'-Pentachlorobiphenyl (BZ 102) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,5-Tetrachlorobiphenyl (BZ 48) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,6'-Tetrachlorobiphenyl (BZ 51) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,6,6'-Pentachlorobiphenyl (BZ 104) | NELAP | PA | 02/01/2013 |
| EPA 1668 | A, C | 2,2',4,6-Tetrachlorobiphenyl (BZ 50) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4-Trichlorobiphenyl (BZ 17) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',5,5'-Tetrachlorobiphenyl (BZ 52) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',5,6'-Tetrachlorobiphenyl (BZ 53) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',5-Trichlorobiphenyl (BZ 18) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',6,6'-Tetrachlorobiphenyl (BZ 54) | NELAP | PA | 12/17/2012 |

Martina M'Harvey

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**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 1668 | A, C | 2,2',6-Trichlorobiphenyl (BZ 19) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2'-Dichlorobiphenyl (BZ 4) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4',5',6-Pentachlorobiphenyl (BZ 125) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4',5'-Tetrachlorobiphenyl (BZ 76) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4',5,5'-Pentachlorobiphenyl (BZ 124) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4',5-Tetrachlorobiphenyl (BZ 70) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4',6-Tetrachlorobiphenyl (BZ 71) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4'-Trichlorobiphenyl (BZ 33) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,4',5',6-Hexachlorobiphenyl (BZ 168) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,4',5'-Pentachlorobiphenyl (BZ 123) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,4',5,5'-Hexachlorobiphenyl (BZ 167) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,4',5-Pentachlorobiphenyl (BZ 118) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,4',6-Pentachlorobiphenyl (BZ 119) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,4'-Tetrachlorobiphenyl (BZ 66) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,5',6-Pentachlorobiphenyl (BZ 121) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,5'-Tetrachlorobiphenyl (BZ 68) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,5,5'-Pentachlorobiphenyl (BZ 120) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,5-Tetrachlorobiphenyl (BZ 67) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,6-Tetrachlorobiphenyl (BZ 69) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4-Trichlorobiphenyl (BZ 25) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',5',6-Tetrachlorobiphenyl (BZ 73) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',5'-Trichlorobiphenyl (BZ 34) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',5,5'-Tetrachlorobiphenyl (BZ 72) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',5-Trichlorobiphenyl (BZ 26) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',6-Trichlorobiphenyl (BZ 27) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3'-Dichlorobiphenyl (BZ 6) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4',5',6-Hexachlorobiphenyl (BZ 164) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4',5'-Pentachlorobiphenyl (BZ 122) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4',5,5',6-Heptachlorobiphenyl (BZ 193) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4',5,5'-Hexachlorobiphenyl (BZ 162) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4',5,6-Hexachlorobiphenyl (BZ 163) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4',5-Pentachlorobiphenyl (BZ 107) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4',6-Pentachlorobiphenyl (BZ 110) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4'-Tetrachlorobiphenyl (BZ 56) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4',5',6-Heptachlorobiphenyl (BZ 191) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4',5'-Hexachlorobiphenyl (BZ 157) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4',5,5',6-Octachlorobiphenyl (BZ 205) | NELAP | PA | 02/01/2013 |
| EPA 1668 | A, C | 2,3,3',4,4',5,5'-Heptachlorobiphenyl (BZ 189) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4',5,6-Heptachlorobiphenyl (BZ 190) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4',5-Hexachlorobiphenyl (BZ 156) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4',6-Hexachlorobiphenyl (BZ 158) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4'-Pentachlorobiphenyl (BZ 105) | NELAP | PA | 12/17/2012 |

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**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 1668 | A, C | 2,3,3',4,5',6-Hexachlorobiphenyl (BZ 161) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,5'-Pentachlorobiphenyl (BZ 108) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,5,5',6-Heptachlorobiphenyl (BZ 192) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,5,5'-Hexachlorobiphenyl (BZ 159) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,5,6-Hexachlorobiphenyl (BZ 160) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,5-Pentachlorobiphenyl (BZ 106) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,6-Pentachlorobiphenyl (BZ 109) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4-Tetrachlorobiphenyl (BZ 55) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',5',6-Pentachlorobiphenyl (BZ 113) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',5'-Tetrachlorobiphenyl (BZ 58) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',5,5',6-Hexachlorobiphenyl (BZ 165) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',5,5'-Pentachlorobiphenyl (BZ 111) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',5,6-Pentachlorobiphenyl (BZ 112) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',5-Tetrachlorobiphenyl (BZ 57) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',6-Tetrachlorobiphenyl (BZ 59) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3'-Trichlorobiphenyl (BZ 20) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4',5,6-Pentachlorobiphenyl (BZ 117) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4',5-Tetrachlorobiphenyl (BZ 63) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4',6-Tetrachlorobiphenyl (BZ 64) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4'-Trichlorobiphenyl (BZ 22) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,4',5,6-Hexachlorobiphenyl (BZ 166) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,4',5-Pentachlorobiphenyl (BZ 114) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,4',6-Pentachlorobiphenyl (BZ 115) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,4'-Tetrachlorobiphenyl (BZ 60) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,5,6-Pentachlorobiphenyl (BZ 116) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,5-Tetrachlorobiphenyl (BZ 61) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,6-Tetrachlorobiphenyl (BZ 62) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4-Trichlorobiphenyl (BZ 21) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,5,6-Tetrachlorobiphenyl (BZ 65) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,5-Trichlorobiphenyl (BZ 23) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,6-Trichlorobiphenyl (BZ 24) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3-Dichlorobiphenyl (BZ 5) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4',5-Trichlorobiphenyl (BZ 31) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4',6-Trichlorobiphenyl (BZ 32) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4'-Dichlorobiphenyl (BZ 8) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4,4',5-Tetrachlorobiphenyl (BZ 74) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4,4',6-Tetrachlorobiphenyl (BZ 75) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4,4'-Trichlorobiphenyl (BZ 28) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4,5-Trichlorobiphenyl (BZ 29) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4,6-Trichlorobiphenyl (BZ 30) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4-Dichlorobiphenyl (BZ 7) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,5-Dichlorobiphenyl (BZ 9) | NELAP | PA | 12/17/2012 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 1668 | A, C | 2,6-Dichlorobiphenyl (BZ 10) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2-Chlorobiphenyl (BZ 1) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4,4',5,5'-Hexachlorobiphenyl (BZ 169) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4,4',5-Pentachlorobiphenyl (BZ 126) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4,4'-Tetrachlorobiphenyl (BZ 77) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4,5'-Tetrachlorobiphenyl (BZ 79) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4,5,5'-Pentachlorobiphenyl (BZ 127) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4,5-Tetrachlorobiphenyl (BZ 78) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4-Trichlorobiphenyl (BZ 35) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',5,5'-Tetrachlorobiphenyl (BZ 80) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',5-Trichlorobiphenyl (BZ 36) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3'-Dichlorobiphenyl (BZ 11) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,4',5-Trichlorobiphenyl (BZ 39) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,4'-Dichlorobiphenyl (BZ 13) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,4,4',5-Tetrachlorobiphenyl (BZ 81) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,4,4'-Trichlorobiphenyl (BZ 37) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,4,5-Trichlorobiphenyl (BZ 38) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,4-Dichlorobiphenyl (BZ 12) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,5-Dichlorobiphenyl (BZ 14) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3-Chlorobiphenyl (BZ 2) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 4,4'-Dichlorobiphenyl (BZ 15) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 4-Chlorobiphenyl (BZ 3) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | Decachlorobiphenyl | NELAP | PA | 02/01/2013 |
| EPA 1671 | A | Acetonitrile | NELAP | PA | 01/19/2005 |
| EPA 1671 | A | Diethylamine | NELAP | PA | 01/19/2005 |
| EPA 1671 | A | Dimethyl sulfoxide | NELAP | PA | 01/19/2005 |
| EPA 1671 | A | Ethanol | NELAP | PA | 01/19/2005 |
| EPA 1671 | A | Methanol | NELAP | PA | 01/19/2005 |
| EPA 1671 | A | Methyl cellosolve (2-Methoxyethanol) | NELAP | PA | 01/19/2005 |
| EPA 1671 | A | Triethylamine | NELAP | PA | 01/19/2005 |
| EPA 1671 | A | n-Propanol (1-Propanol) | NELAP | PA | 01/19/2005 |
| EPA 170.1 | | Temperature, deg. C | NELAP | PA | 04/04/2005 |
| EPA 180.1 | | Turbidity | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Antimony | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Arsenic | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Barium | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Beryllium | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Boron | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Cadmium | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Calcium | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Chromium | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Cobalt | NELAP | PA | 01/19/2005 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 200.7 | 4.4 | Copper | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Iron | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Lead | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Lithium | NELAP | PA | 02/07/2012 |
| EPA 200.7 | 4.4 | Magnesium | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Manganese | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Molybdenum | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Nickel | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Potassium | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Selenium | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Silver | NELAP | PA | 04/04/2005 |
| EPA 200.7 | 4.4 | Sodium | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Strontium | NELAP | PA | 05/24/2011 |
| EPA 200.7 | 4.4 | Tellurium | NELAP | PA | 02/04/2016 |
| EPA 200.7 | 4.4 | Thorium | NELAP | PA | 11/19/2015 |
| EPA 200.7 | 4.4 | Tin | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Titanium | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Tungsten | NELAP | PA | 11/19/2015 |
| EPA 200.7 | 4.4 | Vanadium | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Zinc | NELAP | PA | 01/19/2005 |
| EPA 200.7 | 4.4 | Zirconium | NELAP | PA | 07/29/2015 |
| EPA 200.8 | 5.4 | Aluminum | NELAP | PA | 01/07/2010 |
| EPA 200.8 | 5.4 | Antimony | NELAP | PA | 04/04/2005 |
| EPA 200.8 | 5.4 | Arsenic | NELAP | PA | 04/04/2005 |
| EPA 200.8 | 5.4 | Barium | NELAP | PA | 04/04/2005 |
| EPA 200.8 | 5.4 | Beryllium | NELAP | PA | 04/04/2005 |
| EPA 200.8 | 5.4 | Cadmium | NELAP | PA | 04/04/2005 |
| EPA 200.8 | 5.4 | Calcium | NELAP | PA | 01/07/2010 |
| EPA 200.8 | 5.4 | Chromium | NELAP | PA | 04/04/2005 |
| EPA 200.8 | 5.4 | Cobalt | NELAP | PA | 11/23/2010 |
| EPA 200.8 | 5.4 | Copper | NELAP | PA | 04/04/2005 |
| EPA 200.8 | 5.4 | Iron | NELAP | PA | 11/23/2010 |
| EPA 200.8 | 5.4 | Lead | NELAP | PA | 04/04/2005 |
| EPA 200.8 | 5.4 | Magnesium | NELAP | PA | 01/07/2010 |
| EPA 200.8 | 5.4 | Manganese | NELAP | PA | 11/23/2010 |
| EPA 200.8 | 5.4 | Molybdenum | NELAP | PA | 01/07/2010 |
| EPA 200.8 | 5.4 | Nickel | NELAP | PA | 04/04/2005 |
| EPA 200.8 | 5.4 | Potassium | NELAP | PA | 01/07/2010 |
| EPA 200.8 | 5.4 | Selenium | NELAP | PA | 12/12/2005 |
| EPA 200.8 | 5.4 | Sodium | NELAP | PA | 01/07/2010 |
| EPA 200.8 | 5.4 | Strontium | NELAP | PA | 01/07/2010 |
| EPA 200.8 | 5.4 | Thallium | NELAP | PA | 05/31/2006 |

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**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 200.8 | 5.4 | Tin | NELAP | PA | 01/07/2010 |
| EPA 200.8 | 5.4 | Titanium | NELAP | PA | 09/19/2019 |
| EPA 200.8 | 5.4 | Uranium, total | NELAP | PA | 11/19/2015 |
| EPA 200.8 | 5.4 | Vanadium | NELAP | PA | 01/07/2010 |
| EPA 200.8 | 5.4 | Zinc | NELAP | PA | 01/18/2011 |
| EPA 218.6 | | Chromium VI | NELAP | PA | 04/04/2005 |
| EPA 245.1 | 3.0 | Mercury | NELAP | PA | 01/19/2005 |
| EPA 300.0 | 2.1 | Bromide | NELAP | PA | 04/04/2005 |
| EPA 300.0 | 2.1 | Chloride | NELAP | PA | 01/19/2005 |
| EPA 300.0 | 2.1 | Fluoride | NELAP | PA | 05/25/2005 |
| EPA 300.0 | 2.1 | Nitrate as N | NELAP | PA | 01/19/2005 |
| EPA 300.0 | 2.1 | Nitrite as N | NELAP | PA | 01/19/2005 |
| EPA 300.0 | 2.1 | Sulfate | NELAP | PA | 01/19/2005 |
| EPA 3005 | A | Preconcentration under acid | NELAP | PA | 12/12/2005 |
| EPA 3010 | A | Hot plate acid digestion (HNO3 + HCl) | NELAP | PA | 12/12/2005 |
| EPA 3020 | A | Hot plate acid digestion (HNO3 only) | NELAP | PA | 12/12/2005 |
| EPA 305.2 | | Acidity as CaCO3 | NELAP | PA | 03/27/2018 |
| EPA 3060 | A | Alkaline digestion of Cr(VI) | NELAP | PA | 01/24/2007 |
| EPA 310.1 | | Alkalinity as CaCO3 | NELAP | PA | 11/19/2015 |
| EPA 335.4 | | Total cyanide | NELAP | PA | 01/19/2005 |
| EPA 350.1 | 2.0 | Ammonia as N | NELAP | PA | 10/09/2013 |
| EPA 350.3 | | Ammonia as N | NELAP | PA | 01/19/2016 |
| EPA 351.2 | | Kjeldahl nitrogen, total (TKN) | NELAP | PA | 01/19/2005 |
| EPA 3510 | C | Separatory funnel liquid-liquid extraction | NELAP | PA | 12/12/2005 |
| EPA 3511 | | Organic compounds in water by microextraction | NELAP | PA | 03/07/2012 |
| EPA 3520 | C | Continuous liquid-liquid extraction | NELAP | PA | 12/12/2005 |
| EPA 353.2 | | Nitrate as N | NELAP | PA | 01/19/2005 |
| EPA 353.2 | | Nitrite as N | NELAP | PA | 01/19/2005 |
| EPA 353.2 | | Total nitrate-nitrite | NELAP | PA | 04/04/2005 |
| EPA 3620 | B | Florisil cleanup | NELAP | PA | 12/12/2005 |
| EPA 3620 | C | Florisil cleanup | NELAP | PA | 09/04/2018 |
| EPA 3630 | C | Silica gel cleanup | NELAP | PA | 12/12/2005 |
| EPA 3640 | A | Gel permeation cleanup (GPC) | NELAP | PA | 12/12/2005 |
| EPA 365.1 | | Phosphorus, total | NELAP | PA | 04/04/2005 |
| EPA 365.3 | | Orthophosphate as P | NELAP | PA | 01/19/2005 |
| EPA 3660 | B | Sulfur cleanup | NELAP | PA | 12/12/2005 |
| EPA 370.1 | | Silica, dissolved | NELAP | PA | 11/19/2015 |
| EPA 375.4 | | Sulfate | NELAP | PA | 04/04/2005 |
| EPA 410.4 | 2.0 | Chemical oxygen demand (COD) | NELAP | PA | 04/01/2005 |
| EPA 415.1 | | Total organic carbon (TOC) | NELAP | PA | 01/19/2005 |
| EPA 420.4 | | Total phenolics | NELAP | PA | 04/17/2007 |
| EPA 425.1 | | Surfactants as MBAS | NELAP | PA | 01/19/2005 |

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**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Non-Potable Water

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 5030 | B | Aqueous-phase purge-and-trap | NELAP | PA | 12/12/2005 |
| EPA 5030 | C | Aqueous-phase purge-and-trap | NELAP | PA | 01/27/2014 |
| EPA 524.2 | 4.1 | 1,2,4-Trimethylbenzene | NELAP | PA | 05/14/2018 |
| EPA 524.2 | 4.1 | 1,2-Dichlorobenzene (o-Dichlorobenzene) | NELAP | PA | 01/18/2011 |
| EPA 524.2 | 4.1 | 1,2-Dichloroethane | NELAP | PA | 01/18/2011 |
| EPA 524.2 | 4.1 | 1,3,5-Trimethylbenzene | NELAP | PA | 05/14/2018 |
| EPA 524.2 | 4.1 | 4-Methyl-2-pentanone (MIBK) | NELAP | PA | 05/24/2011 |
| EPA 524.2 | 4.1 | Acetone | NELAP | PA | 01/18/2011 |
| EPA 524.2 | 4.1 | Acrolein (Propenal) | NELAP | PA | 11/19/2015 |
| EPA 524.2 | 4.1 | Benzene | NELAP | PA | 01/18/2011 |
| EPA 524.2 | 4.1 | Chlorobenzene | NELAP | PA | 01/18/2011 |
| EPA 524.2 | 4.1 | Chloroform | NELAP | PA | 01/18/2011 |
| EPA 524.2 | 4.1 | Dichlorodifluoromethane (Freon 12) | NELAP | PA | 11/19/2015 |
| EPA 524.2 | 4.1 | Diisopropyl ether (DIPE) | NELAP | PA | 11/19/2015 |
| EPA 524.2 | 4.1 | Ethyl tert-butyl ether (ETBE) | NELAP | PA | 11/19/2015 |
| EPA 524.2 | 4.1 | Ethylbenzene | NELAP | PA | 05/14/2018 |
| EPA 524.2 | 4.1 | Isopropylbenzene (Cumene) | NELAP | PA | 05/14/2018 |
| EPA 524.2 | 4.1 | Methylene chloride (Dichloromethane) | NELAP | PA | 05/24/2011 |
| EPA 524.2 | 4.1 | Naphthalene | NELAP | PA | 05/14/2018 |
| EPA 524.2 | 4.1 | Tetrahydrofuran (THF) | NELAP | PA | 05/24/2011 |
| EPA 524.2 | 4.1 | Toluene | NELAP | PA | 01/18/2011 |
| EPA 524.2 | 4.1 | m+p-Xylene | NELAP | PA | 07/25/2011 |
| EPA 524.2 | 4.1 | n-Butylbenzene | NELAP | PA | 05/14/2018 |
| EPA 524.2 | 4.1 | n-Hexane | NELAP | PA | 11/19/2015 |
| EPA 524.2 | 4.1 | n-Propylbenzene | NELAP | PA | 05/14/2018 |
| EPA 524.2 | 4.1 | o-Xylene | NELAP | PA | 05/24/2011 |
| EPA 524.2 | 4.1 | p-Isopropyltoluene (4-Isopropyltoluene) | NELAP | PA | 05/14/2018 |
| EPA 524.2 | 4.1 | sec-Butylbenzene | NELAP | PA | 05/14/2018 |
| EPA 524.2 | 4.1 | tert-Amyl methyl ether (TAME) | NELAP | PA | 11/19/2015 |
| EPA 531.1 | 3.1 | 3-Hydroxycarbofuran | NELAP | PA | 11/19/2015 |
| EPA 531.1 | 3.1 | Aldicarb (Temik) | NELAP | PA | 11/19/2015 |
| EPA 531.1 | 3.1 | Aldicarb sulfone | NELAP | PA | 11/19/2015 |
| EPA 531.1 | 3.1 | Aldicarb sulfoxide | NELAP | PA | 11/19/2015 |
| EPA 531.1 | 3.1 | Methiocarb (Mesurol) | NELAP | PA | 11/19/2015 |
| EPA 531.1 | 3.1 | Methomyl (Lannate) | NELAP | PA | 11/19/2015 |
| EPA 531.1 | 3.1 | Propoxur (Baygon) | NELAP | PA | 11/19/2015 |
| EPA 537 Isotope Dilution | 1.1 | 10:2 Fluorotelomersulfonate (10:2 FTS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | 1H, 1H, 2H, 2H-Perfluorodecane sulfonic acid (8:2-FTS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | 1H, 1H, 2H, 2H-Perfluorododecane sulfonic acid (10:2-FTS) | NELAP | PA | 11/04/2019 |

Martina M'Harvey

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**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 537 Isotope Dilution | 1.1 | 1H, 1H, 2H, 2H-Perfluorohexane sulfonic acid (4:2-FTS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | 1H, 1H, 2H, 2H-Perfluorooctane sulfonic acid (6:2-FTS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | 4:2 Fluorotelomer sulfonate (4:2 FTS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | 6:2 Fluorotelomersulfonate (6:2FTS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | 8:2 Flurotelomersulfonate (8:2FTS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | N-Ethylperfluorooctanesulfonamide (EtFOSA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | N-Methylperfluorooctanesulfonamide (MeFOSA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | N-ethylperfluoro-1-octanesulfonamido ethanol (N-EtFOSE) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | N-methylperfluoro-1-octanesulfonamido ethanol (N-MeFOSE) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorobutanesulfonic acid (PFBS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorobutyric acid (PFBA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorodecane sulfonate (PFDS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorodecane sulfonic acid (PFDS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorodecanoic acid (PFDA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorododecane sulfonate | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorododecane sulfonic acid (PFDoS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorododecanoic acid (PFDoA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluoroheptanesulfonic acid (PFHpS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluoroheptanoic acid (PFHpA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorohexadecanoic acid (PFHxDA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorohexanesulfonic acid (PFHxS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorohexanoic acid (PFHxA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorononane sulfonic acid (PFNS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorononanesulfonate (PFNS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorononanoic acid (PFNA) | NELAP | PA | 08/30/2019 |

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**DEP Laboratory ID: 36-00037**
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**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 537 Isotope Dilution | 1.1 | Perfluorooctadecanoic acid (PFODA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorooctane sulfonamide (PFOSA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorooctanesulfonic acid (PFOS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorooctanoic acid (PFOA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluoropentane sulfonic acid (PFPeS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluoropentanesulfonate (PFPeS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluoropentanoic acid (PFPEA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorotetradecanoic acid (PFTA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorotridecanoic acid (PFTrDA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluoroundecanoic acid (PFUnA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | n-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | n-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA) | NELAP | PA | 08/30/2019 |
| EPA 6010 | B, C | Metals by ICP/AES | NELAP | PA | 03/26/2012 |
| EPA 6010 | D | Metals by ICP/AES | NELAP | PA | 07/09/2018 |
| EPA 6010 | B, C, D | Antimony | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Arsenic | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Barium | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Beryllium | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Boron | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Cadmium | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Calcium | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Chromium | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Cobalt | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Copper | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Iron | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Lead | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Lithium | NELAP | PA | 01/18/2011 |
| EPA 6010 | B, C, D | Magnesium | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Manganese | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Molybdenum | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Nickel | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Potassium | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Selenium | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Silver | NELAP | PA | 12/12/2005 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 6010 | B, C, D | Sodium | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Strontium | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Sulfur | NELAP | PA | 12/19/2011 |
| EPA 6010 | B, C, D | Tellurium | NELAP | PA | 02/04/2016 |
| EPA 6010 | B, C, D | Thorium | NELAP | PA | 11/19/2015 |
| EPA 6010 | B, C, D | Tin | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Titanium | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Tungsten | NELAP | PA | 11/19/2015 |
| EPA 6010 | B, C, D | Vanadium | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Zinc | NELAP | PA | 12/12/2005 |
| EPA 6010 | B, C, D | Zirconium | NELAP | PA | 07/29/2015 |
| EPA 6020 | A | Metals by ICP/MS | NELAP | PA | 03/26/2012 |
| EPA 6020 | B | Metals by ICP/MS | NELAP | PA | 07/09/2018 |
| EPA 6020 | A, B | Aluminum | NELAP | PA | 01/07/2010 |
| EPA 6020 | A, B | Antimony | NELAP | PA | 12/12/2005 |
| EPA 6020 | A, B | Arsenic | NELAP | PA | 12/12/2005 |
| EPA 6020 | A, B | Barium | NELAP | PA | 12/12/2005 |
| EPA 6020 | A, B | Beryllium | NELAP | PA | 12/12/2005 |
| EPA 6020 | A, B | Cadmium | NELAP | PA | 12/12/2005 |
| EPA 6020 | A, B | Calcium | NELAP | PA | 01/07/2010 |
| EPA 6020 | A, B | Chromium | NELAP | PA | 12/12/2005 |
| EPA 6020 | A, B | Cobalt | NELAP | PA | 11/23/2010 |
| EPA 6020 | A, B | Copper | NELAP | PA | 12/12/2005 |
| EPA 6020 | A, B | Iron | NELAP | PA | 11/23/2010 |
| EPA 6020 | A, B | Lead | NELAP | PA | 12/12/2005 |
| EPA 6020 | A, B | Magnesium | NELAP | PA | 01/07/2010 |
| EPA 6020 | A, B | Manganese | NELAP | PA | 11/23/2010 |
| EPA 6020 | A, B | Molybdenum | NELAP | PA | 01/07/2010 |
| EPA 6020 | A, B | Nickel | NELAP | PA | 07/23/2008 |
| EPA 6020 | A, B | Potassium | NELAP | PA | 01/07/2010 |
| EPA 6020 | A, B | Selenium | NELAP | PA | 12/12/2005 |
| EPA 6020 | A, B | Sodium | NELAP | PA | 01/07/2010 |
| EPA 6020 | A, B | Strontium | NELAP | PA | 01/07/2010 |
| EPA 6020 | A, B | Thallium | NELAP | PA | 12/12/2005 |
| EPA 6020 | A, B | Tin | NELAP | PA | 01/07/2010 |
| EPA 6020 | A, B | Uranium, total | NELAP | PA | 11/19/2015 |
| EPA 6020 | A, B | Vanadium | NELAP | PA | 01/07/2010 |
| EPA 6020 | A, B | Zinc | NELAP | PA | 01/18/2011 |
| EPA 6020 | | Titanium | NELAP | PA | 09/19/2019 |
| EPA 608 | | 4,4'-DDD | NELAP | PA | 01/19/2005 |
| EPA 608 | | 4,4'-DDE | NELAP | PA | 01/19/2005 |
| EPA 608 | | 4,4'-DDT | NELAP | PA | 01/19/2005 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 608 | | Aldrin (HHDN) | NELAP | PA | 01/19/2005 |
| EPA 608 | | Aroclor-1016 (PCB-1016) | NELAP | PA | 12/11/2006 |
| EPA 608 | | Aroclor-1221 (PCB-1221) | NELAP | PA | 12/11/2006 |
| EPA 608 | | Aroclor-1232 (PCB-1232) | NELAP | PA | 12/11/2006 |
| EPA 608 | | Aroclor-1242 (PCB-1242) | NELAP | PA | 12/11/2006 |
| EPA 608 | | Aroclor-1248 (PCB-1248) | NELAP | PA | 12/11/2006 |
| EPA 608 | | Aroclor-1254 (PCB-1254) | NELAP | PA | 12/11/2006 |
| EPA 608 | | Aroclor-1260 (PCB-1260) | NELAP | PA | 12/11/2006 |
| EPA 608 | | Aroclor-1262 (PCB-1262) | NELAP | PA | 01/19/2016 |
| EPA 608 | | Aroclor-1268 (PCB-1268) | NELAP | PA | 11/13/2012 |
| EPA 608 | | Chlordane (tech.) | NELAP | PA | 01/19/2005 |
| EPA 608 | | Dieldrin | NELAP | PA | 01/19/2005 |
| EPA 608 | | Endosulfan I | NELAP | PA | 01/19/2005 |
| EPA 608 | | Endosulfan II | NELAP | PA | 01/19/2005 |
| EPA 608 | | Endosulfan sulfate | NELAP | PA | 01/19/2005 |
| EPA 608 | | Endrin | NELAP | PA | 01/19/2005 |
| EPA 608 | | Endrin aldehyde | NELAP | PA | 01/19/2005 |
| EPA 608 | | Heptachlor | NELAP | PA | 01/19/2005 |
| EPA 608 | | Heptachlor epoxide | NELAP | PA | 01/19/2005 |
| EPA 608 | | Methoxychlor | NELAP | PA | 05/02/2006 |
| EPA 608 | | Mirex | NELAP | PA | 11/13/2012 |
| EPA 608 | | Toxaphene (Chlorinated camphene) | NELAP | PA | 01/19/2005 |
| EPA 608 | | alpha-BHC (alpha-Hexachlorocyclohexane) | NELAP | PA | 01/19/2005 |
| EPA 608 | | beta-BHC (beta-Hexachlorocyclohexane) | NELAP | PA | 01/19/2005 |
| EPA 608 | | delta-BHC (delta-Hexachlorocyclohexane) | NELAP | PA | 01/19/2005 |
| EPA 608 | | gamma-BHC (Lindane, gamma-Hexachlorocyclohexane) | NELAP | PA | 01/19/2005 |
| EPA 608.3 | | 2,4'-DDD | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | 2,4'-DDE | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | 2,4'-DDT | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | 4,4'-DDD | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | 4,4'-DDE | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | 4,4'-DDT | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Aldrin (HHDN) | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Aroclor-1016 (PCB-1016) | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Aroclor-1221 (PCB-1221) | NELAP | PA | 07/16/2018 |
| EPA 608.3 | | Aroclor-1232 (PCB-1232) | NELAP | PA | 07/16/2018 |
| EPA 608.3 | | Aroclor-1242 (PCB-1242) | NELAP | PA | 07/16/2018 |
| EPA 608.3 | | Aroclor-1248 (PCB-1248) | NELAP | PA | 07/16/2018 |
| EPA 608.3 | | Aroclor-1254 (PCB-1254) | NELAP | PA | 07/16/2018 |
| EPA 608.3 | | Aroclor-1260 (PCB-1260) | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Chlordane (tech.) | NELAP | PA | 05/14/2018 |

Martina M Harvey

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 608.3 | | Dieldrin | NELAP | PA | 07/05/2018 |
| EPA 608.3 | | Endosulfan I | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Endosulfan II | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Endosulfan sulfate | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Endrin | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Endrin aldehyde | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Endrin ketone | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Heptachlor | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Heptachlor epoxide | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Methoxychlor | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Mirex | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Telodrin | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | Toxaphene (Chlorinated camphene) | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | alpha-BHC (alpha-Hexachlorocyclohexane) | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | alpha-Chlordane | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | beta-BHC (beta-Hexachlorocyclohexane) | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | delta-BHC (delta-Hexachlorocyclohexane) | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | gamma-BHC (Lindane, gamma-Hexachlorocyclohexane) | NELAP | PA | 05/14/2018 |
| EPA 608.3 | | gamma-Chlordane | NELAP | PA | 05/14/2018 |
| EPA 622 | | Azinphos-methyl (Guthion) | NELAP | PA | 06/15/2009 |
| EPA 622 | | Bolstar (Sulprofos) | NELAP | PA | 06/15/2009 |
| EPA 622 | | Carbophenothion (Trithion) | NELAP | PA | 04/28/2010 |
| EPA 622 | | Chlorpyrifos | NELAP | PA | 06/15/2009 |
| EPA 622 | | Coumaphos | NELAP | PA | 06/15/2009 |
| EPA 622 | | Demeton-O | NELAP | PA | 06/15/2009 |
| EPA 622 | | Demeton-S | NELAP | PA | 06/15/2009 |
| EPA 622 | | Diazinon (Spectracide) | NELAP | PA | 06/15/2009 |
| EPA 622 | | Dichlorovos (DDVP, Dichlorvos) | NELAP | PA | 06/15/2009 |
| EPA 622 | | Disulfoton | NELAP | PA | 06/15/2009 |
| EPA 622 | | EPN (Santox) | NELAP | PA | 06/15/2009 |
| EPA 622 | | Ethion | NELAP | PA | 06/15/2009 |
| EPA 622 | | Ethoprop (Prophos) | NELAP | PA | 06/15/2009 |
| EPA 622 | | Famphur | NELAP | PA | 06/15/2009 |
| EPA 622 | | Fensulfothion | NELAP | PA | 06/15/2009 |
| EPA 622 | | Fenthion | NELAP | PA | 06/15/2009 |
| EPA 622 | | Malathion | NELAP | PA | 06/15/2009 |
| EPA 622 | | Merphos | NELAP | PA | 06/15/2009 |
| EPA 622 | | Methyl parathion (Parathion, methyl) | NELAP | PA | 06/15/2009 |
| EPA 622 | | Mevinphos | NELAP | PA | 06/15/2009 |
| EPA 622 | | Naled | NELAP | PA | 06/15/2009 |
| EPA 622 | | Parathion, ethyl (Ethyl parathion, Parathion) | NELAP | PA | 06/15/2009 |

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**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 622 | | Phorate (Thimet) | NELAP | PA | 06/15/2009 |
| EPA 622 | | Ronnel | NELAP | PA | 06/15/2009 |
| EPA 622 | | Stirophos (Tetrachlorovinphos) | NELAP | PA | 06/15/2009 |
| EPA 622 | | Tokuthion (Prothiophos) | NELAP | PA | 06/15/2009 |
| EPA 622 | | Trichloronate | NELAP | PA | 06/15/2009 |
| EPA 624 | | 1,1,1,2-Tetrachloroethane | NELAP | PA | 01/19/2005 |
| EPA 624 | | 1,1,1-Trichloroethane | NELAP | PA | 01/19/2005 |
| EPA 624 | | 1,1,2,2-Tetrachloroethane | NELAP | PA | 01/19/2005 |
| EPA 624 | | 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113) | NELAP | PA | 07/03/2007 |
| EPA 624 | | 1,1,2-Trichloroethane | NELAP | PA | 01/19/2005 |
| EPA 624 | | 1,1-Dichloroethane | NELAP | PA | 01/19/2005 |
| EPA 624 | | 1,1-Dichloroethene (1,1-Dichloroethylene) | NELAP | PA | 01/19/2005 |
| EPA 624 | | 1,1-Dichloropropene | NELAP | PA | 07/03/2007 |
| EPA 624 | | 1,2,3-Trichlorobenzene | NELAP | PA | 07/03/2007 |
| EPA 624 | | 1,2,3-Trichloropropane (1,2,3-TCP) | NELAP | PA | 07/03/2007 |
| EPA 624 | | 1,2,3-Trimethylbenzene | NELAP | PA | 07/03/2007 |
| EPA 624 | | 1,2,4-Trichlorobenzene | NELAP | PA | 07/03/2007 |
| EPA 624 | | 1,2,4-Trimethylbenzene | NELAP | PA | 07/03/2007 |
| EPA 624 | | 1,2-Dibromo-3-chloropropane (DBCP, Dibromochloropropane) | NELAP | PA | 07/03/2007 |
| EPA 624 | | 1,2-Dibromoethane (EDB, Ethylene dibromide) | NELAP | PA | 07/03/2007 |
| EPA 624 | | 1,2-Dichlorobenzene (o-Dichlorobenzene) | NELAP | PA | 01/19/2005 |
| EPA 624 | | 1,2-Dichloroethane | NELAP | PA | 01/19/2005 |
| EPA 624 | | 1,2-Dichloropropane | NELAP | PA | 01/19/2005 |
| EPA 624 | | 1,3,5-Trimethylbenzene | NELAP | PA | 07/03/2007 |
| EPA 624 | | 1,3-Dichlorobenzene (m-Dichlorobenzene) | NELAP | PA | 01/19/2005 |
| EPA 624 | | 1,3-Dichloropropane | NELAP | PA | 07/03/2007 |
| EPA 624 | | 1,4-Dichlorobenzene (p-Dichlorobenzene) | NELAP | PA | 01/19/2005 |
| EPA 624 | | 1,4-Dioxane (1,4-Diethyleneoxide) | NELAP | PA | 07/03/2007 |
| EPA 624 | | 2,2-Dichloropropane | NELAP | PA | 07/03/2007 |
| EPA 624 | | 2,4,4-Trimethyl-1-pentene (Diisobutylene) | NELAP | PA | 01/19/2016 |
| EPA 624 | | 2,4,4-Trimethyl-2-pentene | NELAP | PA | 01/19/2016 |
| EPA 624 | | 2-Butanone (Methyl ethyl ketone, MEK) | NELAP | PA | 07/03/2007 |
| EPA 624 | | 2-Chloroethyl vinyl ether | NELAP | PA | 01/19/2005 |
| EPA 624 | | 2-Chlorotoluene | NELAP | PA | 07/03/2007 |
| EPA 624 | | 2-Hexanone | NELAP | PA | 07/03/2007 |
| EPA 624 | | 4-Chloro-2-nitrophenol | NELAP | PA | 07/03/2007 |
| EPA 624 | | 4-Chlorotoluene | NELAP | PA | 07/03/2007 |
| EPA 624 | | 4-Methyl-2-pentanone (MIBK) | NELAP | PA | 05/02/2006 |
| EPA 624 | | Acetone | NELAP | PA | 07/03/2007 |
| EPA 624 | | Acetonitrile | NELAP | PA | 07/03/2007 |
| EPA 624 | | Acrolein (Propenal) | NELAP | PA | 01/19/2005 |

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**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 624 | | Acrylonitrile | NELAP | PA | 01/19/2005 |
| EPA 624 | | Allyl chloride (3-Chloropropene) | NELAP | PA | 07/03/2007 |
| EPA 624 | | Benzene | NELAP | PA | 01/19/2005 |
| EPA 624 | | Benzyl chloride | NELAP | PA | 11/19/2015 |
| EPA 624 | | Bromobenzene | NELAP | PA | 07/03/2007 |
| EPA 624 | | Bromochloromethane | NELAP | PA | 05/02/2006 |
| EPA 624 | | Bromodichloromethane | NELAP | PA | 01/19/2005 |
| EPA 624 | | Bromoform | NELAP | PA | 01/19/2005 |
| EPA 624 | | Carbon disulfide | NELAP | PA | 07/03/2007 |
| EPA 624 | | Carbon tetrachloride | NELAP | PA | 01/19/2005 |
| EPA 624 | | Chlorobenzene | NELAP | PA | 01/19/2005 |
| EPA 624 | | Chloroethane | NELAP | PA | 01/19/2005 |
| EPA 624 | | Chloroform | NELAP | PA | 01/19/2005 |
| EPA 624 | | Chloroprene (2-Chloro-1,3-butadiene) | NELAP | PA | 06/12/2009 |
| EPA 624 | | Cyclohexane | NELAP | PA | 07/03/2007 |
| EPA 624 | | Dibromochloromethane | NELAP | PA | 04/04/2005 |
| EPA 624 | | Dibromomethane | NELAP | PA | 07/03/2007 |
| EPA 624 | | Dichlorodifluoromethane (Freon 12) | NELAP | PA | 07/03/2007 |
| EPA 624 | | Diisopropyl ether (DIPE) | NELAP | PA | 05/02/2006 |
| EPA 624 | | Ethyl acetate | NELAP | PA | 01/20/2012 |
| EPA 624 | | Ethyl methacrylate | NELAP | PA | 07/03/2007 |
| EPA 624 | | Ethylbenzene | NELAP | PA | 01/19/2005 |
| EPA 624 | | Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane) | NELAP | PA | 02/01/2011 |
| EPA 624 | | Freon-123A | NELAP | PA | 02/01/2011 |
| EPA 624 | | Heptane | NELAP | PA | 11/19/2015 |
| EPA 624 | | Hexachlorobutadiene (1,3-Hexachlorobutadiene) | NELAP | PA | 01/19/2016 |
| EPA 624 | | Isobutyl alcohol (2-Methyl-1-propanol) | NELAP | PA | 07/03/2007 |
| EPA 624 | | Isopropyl acetate | NELAP | PA | 01/19/2016 |
| EPA 624 | | Isopropyl alcohol (2-Propanol) | NELAP | PA | 11/19/2015 |
| EPA 624 | | Isopropylbenzene (Cumene) | NELAP | PA | 05/02/2006 |
| EPA 624 | | Methacrylonitrile | NELAP | PA | 07/03/2007 |
| EPA 624 | | Methyl bromide (Bromomethane) | NELAP | PA | 01/19/2005 |
| EPA 624 | | Methyl chloride (Chloromethane) | NELAP | PA | 01/19/2005 |
| EPA 624 | | Methyl iodide (Iodomethane) | NELAP | PA | 07/03/2007 |
| EPA 624 | | Methyl tert-butyl ether (MTBE) | NELAP | PA | 12/12/2005 |
| EPA 624 | | Methylene chloride (Dichloromethane) | NELAP | PA | 01/19/2005 |
| EPA 624 | | Methylmethacrylate | NELAP | PA | 07/03/2007 |
| EPA 624 | | Naphthalene | NELAP | PA | 07/03/2007 |
| EPA 624 | | Pentachloroethane | NELAP | PA | 07/03/2007 |
| EPA 624 | | Propionitrile (Ethyl cyanide) | NELAP | PA | 07/03/2007 |
| EPA 624 | | Styrene | NELAP | PA | 05/02/2006 |
| EPA 624 | | Tetrachloroethene (PCE, Perchloroethylene) | NELAP | PA | 01/19/2005 |

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**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 624 | | Tetrahydrofuran (THF) | NELAP | PA | 07/03/2007 |
| EPA 624 | | Toluene | NELAP | PA | 01/19/2005 |
| EPA 624 | | Trichloroethene (TCE, Trichloroethylene) | NELAP | PA | 01/19/2005 |
| EPA 624 | | Trichlorofluoromethane (Freon 11) | NELAP | PA | 01/19/2005 |
| EPA 624 | | Vinyl acetate | NELAP | PA | 07/03/2007 |
| EPA 624 | | Vinyl chloride (Chloroethene) | NELAP | PA | 01/19/2005 |
| EPA 624 | | Xylenes, total | NELAP | PA | 01/19/2005 |
| EPA 624 | | cis-1,2-Dichloroethene | NELAP | PA | 06/12/2009 |
| EPA 624 | | cis-1,3-Dichloropropene | NELAP | PA | 01/19/2005 |
| EPA 624 | | m+p-Xylene | NELAP | PA | 01/19/2016 |
| EPA 624 | | n-Butyl acetate | NELAP | PA | 01/19/2016 |
| EPA 624 | | n-Butylbenzene | NELAP | PA | 07/03/2007 |
| EPA 624 | | n-Heptane | NELAP | PA | 07/03/2007 |
| EPA 624 | | n-Hexane | NELAP | PA | 07/03/2007 |
| EPA 624 | | n-Propyl acetate | NELAP | PA | 01/19/2016 |
| EPA 624 | | n-Propylbenzene | NELAP | PA | 07/03/2007 |
| EPA 624 | | o-Xylene | NELAP | PA | 01/19/2016 |
| EPA 624 | | p-Isopropyltoluene (4-Isopropyltoluene) | NELAP | PA | 07/03/2007 |
| EPA 624 | | sec-Butylbenzene | NELAP | PA | 07/03/2007 |
| EPA 624 | | tert-Amyl methyl ether (TAME) | NELAP | PA | 05/02/2006 |
| EPA 624 | | tert-Butyl alcohol (2-Methyl-2-propanol) | NELAP | PA | 05/02/2006 |
| EPA 624 | | tert-Butyl ethyl ether | NELAP | PA | 05/02/2006 |
| EPA 624 | | tert-Butylbenzene | NELAP | PA | 07/03/2007 |
| EPA 624 | | trans-1,2-Dichloroethene | NELAP | PA | 01/19/2005 |
| EPA 624 | | trans-1,3-Dichloropropene | NELAP | PA | 01/19/2005 |
| EPA 624 | | trans-1,4-Dichloro-2-butene | NELAP | PA | 01/19/2016 |
| EPA 624.1 | | 1,1,1,2-Tetrachloroethane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,1,1-Trichloro-2,2,2-trifluoroethane (Freon 113a) | NELAP | PA | 07/16/2018 |
| EPA 624.1 | | 1,1,1-Trichloroethane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,1,2,2-Tetrachloroethane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,1,2-Trichloroethane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,1-Dichloroethane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,1-Dichloroethene (1,1-Dichloroethylene) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,1-Dichloropropene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,2,3-Trichlorobenzene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,2,3-Trichloropropane (1,2,3-TCP) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,2,4-Trichlorobenzene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,2,4-Trimethylbenzene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,2-Dibromo-3-chloropropane (DBCP, Dibromochloropropane) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,2-Dibromoethane (EDB, Ethylene dibromide) | NELAP | PA | 05/14/2018 |

Martina M'Harvey

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 624.1 | | 1,2-Dichlorobenzene (o-Dichlorobenzene) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,2-Dichloroethane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,2-Dichloropropane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,3,5-Trimethylbenzene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,3-Dichlorobenzene (m-Dichlorobenzene) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,3-Dichloropropane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,4-Dichlorobenzene (p-Dichlorobenzene) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 1,4-Dioxane (1,4-Diethyleneoxide) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 2,2-Dichloropropane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 2-Butanone (Methyl ethyl ketone, MEK) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 2-Chloroethyl vinyl ether | NELAP | PA | 07/16/2018 |
| EPA 624.1 | | 2-Chlorotoluene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 2-Hexanone | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 4-Chlorotoluene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | 4-Methyl-2-pentanone (MIBK) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Acetone | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Acetonitrile | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Acrolein (Propenal) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Acrylonitrile | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Benzene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Benzyl chloride | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Bromobenzene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Bromochloromethane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Bromodichloromethane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Bromoform | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Carbon disulfide | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Carbon tetrachloride | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Chlorobenzene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Chlorodifluoromethane (Freon 22) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Chloroethane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Chloroform | NELAP | PA | 07/05/2018 |
| EPA 624.1 | | Chloroprene (2-Chloro-1,3-butadiene) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Cyclohexane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Dibromochloromethane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Dibromomethane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Dichlorodifluoromethane (Freon 12) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Dichlorofluoromethane (Freon 21) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Diisopropyl ether (DIPE) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Ethyl acetate | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Ethyl methacrylate | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Ethylbenzene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Freon-123A | NELAP | PA | 05/14/2018 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 624.1 | | Hexachlorobutadiene (1,3-Hexachlorobutadiene) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Isobutyl alcohol (2-Methyl-1-propanol) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Isopropyl acetate | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Isopropyl alcohol (2-Propanol) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Isopropylbenzene (Cumene) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Methacrylonitrile | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Methyl bromide (Bromomethane) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Methyl chloride (Chloromethane) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Methyl iodide (Iodomethane) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Methyl tert-butyl ether (MTBE) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Methylene chloride (Dichloromethane) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Methylmethacrylate | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Naphthalene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Propionitrile (Ethyl cyanide) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Styrene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Tetrachloroethene (PCE, Perchloroethylene) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Tetrahydrofuran (THF) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Toluene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Trichloroethene (TCE, Trichloroethylene) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Trichlorofluoromethane (Freon 11) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Vinyl acetate | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Vinyl chloride (Chloroethene) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | Xylenes, total | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | cis-1,2-Dichloroethene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | cis-1,3-Dichloropropene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | cis-1,4-Dichloro-2-butene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | m+p-Xylene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | n-Butyl acetate | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | n-Butylbenzene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | n-Heptane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | n-Hexane | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | n-Propyl acetate | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | n-Propylbenzene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | o-Xylene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | p-Isopropyltoluene (4-Isopropyltoluene) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | sec-Butylbenzene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | tert-Amyl ethyl ether (TAEE) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | tert-Amyl methyl ether (TAME) | NELAP | PA | 07/05/2018 |
| EPA 624.1 | | tert-Butyl alcohol (2-Methyl-2-propanol) | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | tert-Butyl ethyl ether | NELAP | PA | 07/16/2018 |
| EPA 624.1 | | tert-Butylbenzene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | trans-1,2-Dichloroethene | NELAP | PA | 05/14/2018 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 624.1 | | trans-1,3-Dichloropropene | NELAP | PA | 05/14/2018 |
| EPA 624.1 | | trans-1,4-Dichloro-2-butene | NELAP | PA | 05/14/2018 |
| EPA 625 | | 1,1'-Biphenyl (Biphenyl, Lemonene) | NELAP | PA | 07/03/2007 |
| EPA 625 | | 1,2,4,5-Tetrachlorobenzene | NELAP | PA | 05/02/2006 |
| EPA 625 | | 1,2,4-Trichlorobenzene | NELAP | PA | 01/19/2005 |
| EPA 625 | | 1,2-Dichlorobenzene (o-Dichlorobenzene) | NELAP | PA | 01/19/2005 |
| EPA 625 | | 1,2-Diphenylhydrazine | NELAP | PA | 05/02/2006 |
| EPA 625 | | 1,3-Dichlorobenzene (m-Dichlorobenzene) | NELAP | PA | 01/19/2005 |
| EPA 625 | | 1,4-Dichlorobenzene (p-Dichlorobenzene) | NELAP | PA | 01/19/2005 |
| EPA 625 | | 1,4-Dioxane (1,4-Diethyleneoxide) | NELAP | PA | 07/03/2007 |
| EPA 625 | | 1-Methylnaphthalene | NELAP | PA | 01/19/2016 |
| EPA 625 | | 1-Methylphenanthrene | NELAP | PA | 05/02/2006 |
| EPA 625 | | 2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl) ether) | NELAP | PA | 01/19/2016 |
| EPA 625 | | 2,2'-oxybis(1-Chloropropane) | NELAP | PA | 01/19/2005 |
| EPA 625 | | 2,3,4,6-Tetrachlorophenol | NELAP | PA | 07/03/2007 |
| EPA 625 | | 2,3-Dichloroaniline | NELAP | PA | 05/02/2006 |
| EPA 625 | | 2,3-Dinitrotoluene | NELAP | PA | 07/03/2007 |
| EPA 625 | | 2,4,5-Trichlorophenol | NELAP | PA | 07/03/2007 |
| EPA 625 | | 2,4,6-Trichlorophenol | NELAP | PA | 01/19/2005 |
| EPA 625 | | 2,4-Dichlorophenol | NELAP | PA | 01/19/2005 |
| EPA 625 | | 2,4-Dimethylphenol | NELAP | PA | 01/19/2005 |
| EPA 625 | | 2,4-Dinitrophenol | NELAP | PA | 01/19/2005 |
| EPA 625 | | 2,4-Dinitrotoluene (2,4-DNT) | NELAP | PA | 01/19/2005 |
| EPA 625 | | 2,6-Dichlorophenol | NELAP | PA | 07/03/2007 |
| EPA 625 | | 2,6-Dinitrotoluene (2,6-DNT) | NELAP | PA | 01/19/2005 |
| EPA 625 | | 2-Chloronaphthalene | NELAP | PA | 01/19/2005 |
| EPA 625 | | 2-Chlorophenol | NELAP | PA | 01/19/2005 |
| EPA 625 | | 2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol) | NELAP | PA | 01/19/2005 |
| EPA 625 | | 2-Methylnaphthalene | NELAP | PA | 07/03/2007 |
| EPA 625 | | 2-Methylphenol (o-Cresol) | NELAP | PA | 07/03/2007 |
| EPA 625 | | 2-Nitroaniline | NELAP | PA | 07/03/2007 |
| EPA 625 | | 2-Nitrophenol | NELAP | PA | 01/19/2005 |
| EPA 625 | | 3+4-Methylphenol (m+p-Cresol) | NELAP | PA | 07/03/2007 |
| EPA 625 | | 3,3'-Dichlorobenzidine | NELAP | PA | 01/19/2005 |
| EPA 625 | | 3-Nitroaniline | NELAP | PA | 07/03/2007 |
| EPA 625 | | 4-Bromophenyl phenyl ether | NELAP | PA | 01/19/2005 |
| EPA 625 | | 4-Chloro-3-methylphenol | NELAP | PA | 01/19/2005 |
| EPA 625 | | 4-Chloroaniline | NELAP | PA | 07/03/2007 |
| EPA 625 | | 4-Chlorophenyl phenyl ether | NELAP | PA | 01/19/2005 |
| EPA 625 | | 4-Nitroaniline | NELAP | PA | 07/03/2007 |

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**Lancaster, PA 17601-5994**
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**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 625 | | 4-Nitrophenol | NELAP | PA | 01/19/2005 |
| EPA 625 | | Acenaphthene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Acenaphthylene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Acetophenone | NELAP | PA | 05/02/2006 |
| EPA 625 | | Aniline | NELAP | PA | 05/02/2006 |
| EPA 625 | | Anthracene | NELAP | PA | 04/04/2005 |
| EPA 625 | | Benzidine | NELAP | PA | 01/19/2005 |
| EPA 625 | | Benzo[a]anthracene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Benzo[a]pyrene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Benzo[b]fluoranthene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Benzo[ghi]perylene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Benzo[k]fluoranthene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Benzoic acid | NELAP | PA | 05/02/2006 |
| EPA 625 | | Benzyl alcohol | NELAP | PA | 07/03/2007 |
| EPA 625 | | Butyl benzyl phthalate (Benzyl butyl phthalate) | NELAP | PA | 01/19/2005 |
| EPA 625 | | Carbazole | NELAP | PA | 05/02/2006 |
| EPA 625 | | Chrysene (Benzo[a]phenanthrene) | NELAP | PA | 01/19/2005 |
| EPA 625 | | Di-n-butyl phthalate | NELAP | PA | 01/19/2005 |
| EPA 625 | | Di-n-octyl phthalate | NELAP | PA | 01/19/2005 |
| EPA 625 | | Dibenzo[a,h]anthracene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Dibenzofuran | NELAP | PA | 07/03/2007 |
| EPA 625 | | Diethyl phthalate | NELAP | PA | 01/19/2005 |
| EPA 625 | | Dimethyl phthalate | NELAP | PA | 01/19/2005 |
| EPA 625 | | Diphenyl ether | NELAP | PA | 07/03/2007 |
| EPA 625 | | Fluoranthene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Fluorene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Hexachlorobenzene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Hexachlorobutadiene (1,3-Hexachlorobutadiene) | NELAP | PA | 01/19/2005 |
| EPA 625 | | Hexachlorocyclopentadiene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Hexachloroethane | NELAP | PA | 01/19/2005 |
| EPA 625 | | Indeno(1,2,3-cd)pyrene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Isophorone | NELAP | PA | 01/19/2005 |
| EPA 625 | | N-Nitrosodi-n-butylamine | NELAP | PA | 05/02/2006 |
| EPA 625 | | N-Nitrosodi-n-propylamine | NELAP | PA | 01/19/2005 |
| EPA 625 | | N-Nitrosodiethylamine | NELAP | PA | 05/02/2006 |
| EPA 625 | | N-Nitrosodimethylamine | NELAP | PA | 01/19/2005 |
| EPA 625 | | N-Nitrosodiphenylamine | NELAP | PA | 01/19/2005 |
| EPA 625 | | N-Nitrosopyrrolidine | NELAP | PA | 05/02/2006 |
| EPA 625 | | Naphthalene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Nitrobenzene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Pentachlorobenzene | NELAP | PA | 07/03/2007 |
| EPA 625 | | Pentachlorophenol (PCP) | NELAP | PA | 01/19/2005 |

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**Lancaster, PA 17601-5994**
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**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 625 | | Phenanthrene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Phenol | NELAP | PA | 01/19/2005 |
| EPA 625 | | Pyrene | NELAP | PA | 01/19/2005 |
| EPA 625 | | Pyridine | NELAP | PA | 05/02/2006 |
| EPA 625 | | alpha-Terpineol | NELAP | PA | 05/02/2006 |
| EPA 625 | | bis(2-Chloroethoxy)methane | NELAP | PA | 01/19/2005 |
| EPA 625 | | bis(2-Chloroethyl) ether | NELAP | PA | 01/19/2005 |
| EPA 625 | | bis(2-Ethylhexyl) phthalate (DEHP) | NELAP | PA | 01/19/2005 |
| EPA 625 | | n-Decane | NELAP | PA | 05/02/2006 |
| EPA 625 | | n-Docosane | NELAP | PA | 05/02/2006 |
| EPA 625 | | n-Dodecane | NELAP | PA | 05/02/2006 |
| EPA 625 | | n-Eicosane | NELAP | PA | 05/02/2006 |
| EPA 625 | | n-Hexadecane | NELAP | PA | 05/02/2006 |
| EPA 625 | | n-Octadecane | NELAP | PA | 05/02/2006 |
| EPA 625 | | n-Tetradecane | NELAP | PA | 05/02/2006 |
| EPA 625 | | o-Toluidine (2-Toluidine, 2-Methylaniline) | NELAP | PA | 07/03/2007 |
| EPA 625.1 | | 1,1'-Biphenyl (Biphenyl, Lemonene) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 1,2,4,5-Tetrachlorobenzene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 1,2,4-Trichlorobenzene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 1,2-Dichlorobenzene (o-Dichlorobenzene) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 1,2-Diphenylhydrazine | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 1,3-Dichlorobenzene (m-Dichlorobenzene) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 1,4-Dichlorobenzene (p-Dichlorobenzene) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 1,4-Dioxane (1,4-Diethyleneoxide) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 1-Methylnaphthalene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 1-Methylphenanthrene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2,2'-oxybis(1-Chloropropane) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2,3,4,6-Tetrachlorophenol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2,3-Dichloroaniline | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2,3-Dinitrotoluene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2,4,5-Trichlorophenol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2,4,6-Trichlorophenol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2,4-Dichlorophenol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2,4-Dimethylphenol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2,4-Dinitrophenol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2,4-Dinitrotoluene (2,4-DNT) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2,6-Dichlorophenol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2,6-Dinitrotoluene (2,6-DNT) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2-Chloronaphthalene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2-Chlorophenol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol) | NELAP | PA | 05/14/2018 |

Martin McHarvey

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**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 625.1 | | 2-Methylnaphthalene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2-Methylphenol (o-Cresol) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2-Nitroaniline | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 2-Nitrophenol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 3+4-Methylphenol (m+p-Cresol) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 3,3'-Dichlorobenzidine | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 3-Nitroaniline | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 4-Bromophenyl phenyl ether | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 4-Chloro-3-methylphenol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 4-Chloroaniline | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 4-Chlorophenyl phenyl ether | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 4-Nitroaniline | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | 4-Nitrophenol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Acenaphthene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Acenaphthylene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Acetophenone | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Aniline | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Anthracene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Benzidine | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Benzo[a]anthracene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Benzo[a]pyrene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Benzo[b]fluoranthene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Benzo[ghi]perylene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Benzo[k]fluoranthene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Benzoic acid | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Benzyl alcohol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Butyl benzyl phthalate (Benzyl butyl phthalate) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Carbazole | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Chrysene (Benzo[a]phenanthrene) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Di-n-butyl phthalate | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Di-n-octyl phthalate | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Dibenzo[a,h]anthracene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Dibenzofuran | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Diethyl phthalate | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Dimethyl phthalate | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Diphenyl ether | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Fluoranthene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Fluorene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Hexachlorobenzene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Hexachlorobutadiene (1,3-Hexachlorobutadiene) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Hexachlorocyclopentadiene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Hexachloroethane | NELAP | PA | 05/14/2018 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 625.1 | | Indeno(1,2,3-cd)pyrene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Isophorone | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | N-Nitrosodi-n-butylamine | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | N-Nitrosodi-n-propylamine | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | N-Nitrosodiethylamine | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | N-Nitrosodimethylamine | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | N-Nitrosodiphenylamine | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | N-Nitrosopyrrolidine | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Naphthalene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Nitrobenzene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Pentachlorobenzene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Pentachlorophenol (PCP) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Phenanthrene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Phenol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Pyrene | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | Pyridine | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | alpha-Terpineol | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | bis(2-Chloroethoxy)methane | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | bis(2-Chloroethyl) ether | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | bis(2-Chloroisopropyl)ether | NELAP | PA | 07/16/2018 |
| EPA 625.1 | | bis(2-Ethylhexyl) phthalate (DEHP) | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | n-Decane | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | n-Docosane | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | n-Eicosane | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | n-Hexadecane | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | n-Octadecane | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | n-Tetradecane | NELAP | PA | 05/14/2018 |
| EPA 625.1 | | o-Toluidine (2-Toluidine, 2-Methylaniline) | NELAP | PA | 05/14/2018 |
| EPA 680 | | Decachlorobiphenyl | NELAP | PA | 01/19/2016 |
| EPA 680 | | Dichlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Heptachlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Hexachlorbiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Monochlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Nonachlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Octachlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Pentachlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Tetrachlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Trichlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 6850 | | Perchlorate | NELAP | PA | 01/19/2011 |
| EPA 7196 | A | Chromium VI | NELAP | PA | 04/06/2006 |
| EPA 7199 | | Chromium VI | NELAP | PA | 01/04/2006 |
| EPA 7470 | A | Mercury | NELAP | PA | 11/21/2005 |

Martina M Harvey

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8011 | | 1,2-Dibromo-3-chloropropane (DBCP, Dibromochloropropane) | NELAP | PA | 05/02/2006 |
| EPA 8011 | | 1,2-Dibromoethane (EDB, Ethylene dibromide) | NELAP | PA | 12/12/2005 |
| EPA 8015 | B, C | Nonhalogenated organics by GC/FID | NELAP | PA | 03/26/2012 |
| EPA 8015 | D | Nonhalogenated organics by GC/FID | NELAP | PA | 07/29/2015 |
| EPA 8015 | B, C, D | Diesel-range organics (DRO) | NELAP | PA | 12/12/2005 |
| EPA 8015 | B, C, D | Diethylene glycol | NELAP | PA | 01/20/2012 |
| EPA 8015 | B, C, D | Ethane | NELAP | PA | 12/04/2007 |
| EPA 8015 | B, C, D | Ethanol | NELAP | PA | 12/04/2007 |
| EPA 8015 | B, C, D | Ethene | NELAP | PA | 12/04/2007 |
| EPA 8015 | B, C, D | Ethylene glycol | NELAP | PA | 12/04/2007 |
| EPA 8015 | B, C, D | Gasoline-range organics (GRO) | NELAP | PA | 12/12/2005 |
| EPA 8015 | B, C, D | Isobutyl alcohol (2-Methyl-1-propanol) | NELAP | PA | 02/07/2012 |
| EPA 8015 | B, C, D | Isopropyl alcohol (2-Propanol) | NELAP | PA | 12/04/2007 |
| EPA 8015 | B, C, D | Methane | NELAP | PA | 12/04/2007 |
| EPA 8015 | B, C, D | Methanol | NELAP | PA | 12/04/2007 |
| EPA 8015 | B, C, D | Propane | NELAP | PA | 12/04/2007 |
| EPA 8015 | B, C, D | Propylene glycol | NELAP | PA | 01/20/2012 |
| EPA 8015 | B, C, D | Total petroleum hydrocarbons (TPH) | NELAP | PA | 01/24/2007 |
| EPA 8015 | B, C, D | Triethylene glycol | NELAP | PA | 01/20/2012 |
| EPA 8015 | B, C, D | n-Butyl alcohol (n-Butanol, 1-Butanol) | NELAP | PA | 02/07/2012 |
| EPA 8015 | B, C, D | n-Propanol (1-Propanol) | NELAP | PA | 02/07/2012 |
| EPA 8081 | A | Organochlorine pesticides by GC/ECD | NELAP | PA | 03/26/2012 |
| EPA 8081 | B | Organochlorine pesticides by GC/ECD | NELAP | PA | 01/01/2013 |
| EPA 8081 | A, B | 2,4'-DDD | NELAP | PA | 11/19/2015 |
| EPA 8081 | A, B | 2,4'-DDE | NELAP | PA | 11/19/2015 |
| EPA 8081 | A, B | 2,4'-DDT | NELAP | PA | 11/19/2015 |
| EPA 8081 | A, B | 4,4'-DDD | NELAP | PA | 02/10/2006 |
| EPA 8081 | A, B | 4,4'-DDE | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | 4,4'-DDT | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | Aldrin (HHDN) | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | Chlordane (tech.) | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | Dieldrin | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | Endosulfan I | NELAP | PA | 02/10/2006 |
| EPA 8081 | A, B | Endosulfan II | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | Endosulfan sulfate | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | Endrin | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | Endrin aldehyde | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | Endrin ketone | NELAP | PA | 02/10/2006 |
| EPA 8081 | A, B | Heptachlor | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | Heptachlor epoxide | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | Kepone | NELAP | PA | 05/02/2006 |

Martina M'Harvey

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8081 | A, B | Methoxychlor | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | Mirex | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | Toxaphene (Chlorinated camphene) | NELAP | PA | 12/12/2005 |
| EPA 8081 | A, B | alpha-BHC (alpha-Hexachlorocyclohexane) | NELAP | PA | 02/10/2006 |
| EPA 8081 | A, B | alpha-Chlordane | NELAP | PA | 02/10/2006 |
| EPA 8081 | A, B | beta-BHC (beta-Hexachlorocyclohexane) | NELAP | PA | 02/10/2006 |
| EPA 8081 | A, B | delta-BHC (delta-Hexachlorocyclohexane) | NELAP | PA | 02/10/2006 |
| EPA 8081 | A, B | gamma-BHC (Lindane, gamma-Hexachlorocyclohexane) | NELAP | PA | 02/10/2006 |
| EPA 8081 | A, B | gamma-Chlordane | NELAP | PA | 02/10/2006 |
| EPA 8082 | A | PCBs by GC/ECD | NELAP | PA | 03/26/2012 |
| EPA 8082 | A | Aroclor-1016 (PCB-1016) | NELAP | PA | 12/11/2006 |
| EPA 8082 | A | Aroclor-1221 (PCB-1221) | NELAP | PA | 12/11/2006 |
| EPA 8082 | A | Aroclor-1232 (PCB-1232) | NELAP | PA | 12/11/2006 |
| EPA 8082 | A | Aroclor-1242 (PCB-1242) | NELAP | PA | 12/11/2006 |
| EPA 8082 | A | Aroclor-1248 (PCB-1248) | NELAP | PA | 12/11/2006 |
| EPA 8082 | A | Aroclor-1254 (PCB-1254) | NELAP | PA | 12/11/2006 |
| EPA 8082 | A | Aroclor-1260 (PCB-1260) | NELAP | PA | 12/11/2006 |
| EPA 8082 | A | Aroclor-1262 (PCB-1262) | NELAP | PA | 07/23/2008 |
| EPA 8082 | A | Aroclor-1268 (PCB-1268) | NELAP | PA | 07/23/2008 |
| EPA 8082 | A | Decachlorobiphenyl | NELAP | PA | 12/17/2012 |
| EPA 8141 | A, B | Organophosphorus compounds by GC/NPD | NELAP | PA | 03/26/2012 |
| EPA 8141 | A, B | Alachlor (Lasso) | NELAP | PA | 01/21/2009 |
| EPA 8141 | A, B | Atrazine | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Azinphos-methyl (Guthion) | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Bolstar (Sulprofos) | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Carbophenothion (Trithion) | NELAP | PA | 11/09/2012 |
| EPA 8141 | A, B | Chlorpyrifos | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Coumaphos | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Demeton-O | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Demeton-S | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Diazinon (Spectracide) | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Dichlorovos (DDVP, Dichlorvos) | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Disulfoton | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | EPN (Santox) | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Ethion | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Ethoprop (Prophos) | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Famphur | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Fensulfothion | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Fenthion | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Malathion | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Merphos | NELAP | PA | 12/12/2005 |

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**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8141 | A, B | Methyl parathion (Parathion, methyl) | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Metolachlor | NELAP | PA | 01/24/2007 |
| EPA 8141 | A, B | Mevinphos | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Naled | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Parathion, ethyl (Ethyl parathion, Parathion) | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Phorate (Thimet) | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Ronnel | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Simazine | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Stirophos (Tetrachlorovinphos) | NELAP | PA | 05/02/2006 |
| EPA 8141 | A, B | Tokuthion (Prothiophos) | NELAP | PA | 12/12/2005 |
| EPA 8141 | A, B | Trichloronate | NELAP | PA | 05/02/2006 |
| EPA 8151 | A | Chlorinated herbicides by GC/ECD | NELAP | PA | 03/26/2012 |
| EPA 8151 | A | 2,4,5-T | NELAP | PA | 12/12/2005 |
| EPA 8151 | A | 2,4,5-TP (Silvex) | NELAP | PA | 12/12/2005 |
| EPA 8151 | A | 2,4-D | NELAP | PA | 12/12/2005 |
| EPA 8151 | A | 2,4-DB (Butoxon) | NELAP | PA | 12/12/2005 |
| EPA 8151 | A | Dalapon (2,2-Dichloropropionic acid) | NELAP | PA | 12/12/2005 |
| EPA 8151 | A | Dicamba | NELAP | PA | 12/12/2005 |
| EPA 8151 | A | Dichloroprop (Dichlorprop) | NELAP | PA | 01/24/2007 |
| EPA 8151 | A | Dinoseb (2-sec-Butyl-4,6-dinitrophenol, DNBP) | NELAP | PA | 12/12/2005 |
| EPA 8151 | A | MCPA | NELAP | PA | 12/12/2005 |
| EPA 8151 | A | MCPP (Mecoprop) | NELAP | PA | 12/12/2005 |
| EPA 8151 | A | Pentachlorophenol (PCP) | NELAP | PA | 12/12/2005 |
| EPA 8151 | A | Picloram (4-Amino-3,5,6-trichloro-2-pyridinecarboxylic acid) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C | VOCs by GC/MS | NELAP | PA | 03/26/2012 |
| EPA 8260 | D | VOCs by GC/MS | NELAP | PA | 11/04/2019 |
| EPA 8260 | B, C | 1,3-Dichloro-2-butene | NELAP | PA | 01/19/2016 |
| EPA 8260 | B, C | 3,3'-Dimethyl-1-butanol | NELAP | PA | 04/17/2009 |
| EPA 8260 | B, C | Crotonaldehyde | NELAP | PA | 10/30/2014 |
| EPA 8260 | B, C | Cyclohexanone | NELAP | PA | 06/07/2012 |
| EPA 8260 | B, C | Dimethyl ether | NELAP | PA | 06/07/2012 |
| EPA 8260 | B, C | Epichlorohydrin (1-Chloro-2,3-epoxypropane) | NELAP | PA | 04/17/2009 |
| EPA 8260 | B, C | Ethylene oxide | NELAP | PA | 10/30/2014 |
| EPA 8260 | B, C | Gasoline-range organics (GRO) | NELAP | PA | 06/08/2006 |
| EPA 8260 | B, C | Hexachloroethane | NELAP | PA | 05/23/2012 |
| EPA 8260 | B, C | n-Propylamine | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C | tert-Amyl alcohol (2-Methyl-2-butanol) | NELAP | PA | 04/17/2009 |
| EPA 8260 | B, C | tert-Butyl formate | NELAP | PA | 04/17/2009 |
| EPA 8260 | B, C, D | 1,1,1,2-Tetrachloroethane | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,1,1-Trichloroethane | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,1,2,2-Tetrachloroethane | NELAP | PA | 12/12/2005 |

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**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
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**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8260 | B, C, D | 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,1,2-Trichloroethane | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,1-Dichloroethane | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,1-Dichloroethene (1,1-Dichloroethylene) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,1-Dichloropropene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,2,3-Trichlorobenzene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,2,3-Trichloropropane (1,2,3-TCP) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,2,3-Trimethylbenzene | NELAP | PA | 01/19/2016 |
| EPA 8260 | B, C, D | 1,2,4-Trichlorobenzene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,2,4-Trimethylbenzene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,2-Dibromo-3-chloropropane (DBCP, Dibromochloropropane) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,2-Dibromoethane (EDB, Ethylene dibromide) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,2-Dichloro-1,1,2-trifluoroethane | NELAP | PA | 03/19/2015 |
| EPA 8260 | B, C, D | 1,2-Dichlorobenzene (o-Dichlorobenzene) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,2-Dichloroethane | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,2-Dichloropropane | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,2-Diethylbenzene | NELAP | PA | 01/19/2016 |
| EPA 8260 | B, C, D | 1,3,5-Trichlorobenzene | NELAP | PA | 01/19/2016 |
| EPA 8260 | B, C, D | 1,3,5-Trimethylbenzene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,3-Butadiene (Divinyl) | NELAP | PA | 01/19/2016 |
| EPA 8260 | B, C, D | 1,3-Dichlorobenzene (m-Dichlorobenzene) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,3-Dichloropropane | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,3-Diethylbenzene | NELAP | PA | 01/19/2016 |
| EPA 8260 | B, C, D | 1,4-Dichlorobenzene (p-Dichlorobenzene) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 1,4-Dioxane (1,4-Diethyleneoxide) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 2,2-Dichloropropane | NELAP | PA | 05/02/2006 |
| EPA 8260 | B, C, D | 2-Butanone (Methyl ethyl ketone, MEK) | NELAP | PA | 05/02/2006 |
| EPA 8260 | B, C, D | 2-Chloroethyl vinyl ether | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 2-Chlorotoluene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 2-Hexanone | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 2-Nitropropane | NELAP | PA | 01/19/2011 |
| EPA 8260 | B, C, D | 4-Chlorotoluene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | 4-Methyl-2-pentanone (MIBK) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Acetone | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Acetonitrile | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Acrolein (Propenal) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Acrylonitrile | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Allyl chloride (3-Chloropropene) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Benzene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Benzyl chloride | NELAP | PA | 07/03/2007 |
| EPA 8260 | B, C, D | Bromobenzene | NELAP | PA | 12/12/2005 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8260 | B, C, D | Bromochloromethane | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Bromodichloromethane | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Bromoform | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Carbon disulfide | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Carbon tetrachloride | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Chlorobenzene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Chloroethane | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Chloroform | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Chloroprene (2-Chloro-1,3-butadiene) | NELAP | PA | 07/03/2007 |
| EPA 8260 | B, C, D | Cyclohexane | NELAP | PA | 07/03/2007 |
| EPA 8260 | B, C, D | Dibromochloromethane | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Dibromomethane | NELAP | PA | 05/02/2006 |
| EPA 8260 | B, C, D | Dichlorodifluoromethane (Freon 12) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Diethyl ether (Ethyl ether) | NELAP | PA | 02/01/2011 |
| EPA 8260 | B, C, D | Diisopropyl ether (DIPE) | NELAP | PA | 07/03/2007 |
| EPA 8260 | B, C, D | Ethanol | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | Ethyl acetate | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | Ethyl methacrylate | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | Ethyl tert-butyl ether (ETBE) | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | Ethylbenzene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane) | NELAP | PA | 03/04/2015 |
| EPA 8260 | B, C, D | Heptane | NELAP | PA | 01/20/2012 |
| EPA 8260 | B, C, D | Hexachlorobutadiene (1,3-Hexachlorobutadiene) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Isobutyl alcohol (2-Methyl-1-propanol) | NELAP | PA | 07/03/2007 |
| EPA 8260 | B, C, D | Isopropyl alcohol (2-Propanol) | NELAP | PA | 01/18/2011 |
| EPA 8260 | B, C, D | Isopropylbenzene (Cumene) | NELAP | PA | 05/02/2006 |
| EPA 8260 | B, C, D | Methacrylonitrile | NELAP | PA | 07/03/2007 |
| EPA 8260 | B, C, D | Methyl acetate | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | Methyl bromide (Bromomethane) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Methyl chloride (Chloromethane) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Methyl iodide (Iodomethane) | NELAP | PA | 05/25/2007 |
| EPA 8260 | B, C, D | Methyl tert-butyl ether (MTBE) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Methylcyclohexane | NELAP | PA | 01/21/2009 |
| EPA 8260 | B, C, D | Methylene chloride (Dichloromethane) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Methylmethacrylate | NELAP | PA | 05/25/2007 |
| EPA 8260 | B, C, D | Naphthalene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Pentachloroethane | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | Propionitrile (Ethyl cyanide) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Styrene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Tetrachloroethene (PCE, Perchloroethylene) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Tetrahydrofuran (THF) | NELAP | PA | 01/18/2011 |
| EPA 8260 | B, C, D | Toluene | NELAP | PA | 12/12/2005 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8260 | B, C, D | Trichloroethene (TCE, Trichloroethylene) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Trichlorofluoromethane (Freon 11) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Vinyl acetate | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Vinyl chloride (Chloroethene) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | Xylenes, total | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | cis-1,2-Dichloroethene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | cis-1,3-Dichloropropene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | m+p-Xylene | NELAP | PA | 04/17/2009 |
| EPA 8260 | B, C, D | n-Butyl acetate | NELAP | PA | 01/19/2016 |
| EPA 8260 | B, C, D | n-Butyl alcohol (n-Butanol, 1-Butanol) | NELAP | PA | 04/17/2009 |
| EPA 8260 | B, C, D | n-Butylbenzene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | n-Hexane | NELAP | PA | 01/20/2012 |
| EPA 8260 | B, C, D | n-Propylbenzene | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | o-Xylene | NELAP | PA | 04/17/2009 |
| EPA 8260 | B, C, D | p-Isopropyltoluene (4-Isopropyltoluene) | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | sec-Butylbenzene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | tert-Amyl methyl ether (TAME) | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | tert-Butyl alcohol (2-Methyl-2-propanol) | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | tert-Butylbenzene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | trans-1,2-Dichloroethene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | trans-1,3-Dichloropropene | NELAP | PA | 12/12/2005 |
| EPA 8260 | B, C, D | trans-1,4-Dichloro-2-butene | NELAP | PA | 07/03/2007 |
| EPA 8260 SIM | B, C | 1,4-Dioxane (1,4-Diethyleneoxide) | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | SOCs by GC/MS | NELAP | PA | 03/26/2012 |
| EPA 8270 | C, D | 1,1'-Biphenyl (Biphenyl, Lemonene) | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | 1,2,3,4-Tetrachlorobenzene | NELAP | PA | 07/03/2007 |
| EPA 8270 | C, D | 1,2,3,4-Tetrahydronaphthalene | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | 1,2,3,5-Tetrachlorobenzene | NELAP | PA | 07/03/2007 |
| EPA 8270 | C, D | 1,2,4,5-Tetrachlorobenzene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 1,2,4-Trichlorobenzene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 1,2-Dichlorobenzene (o-Dichlorobenzene) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 1,2-Diphenylhydrazine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 1,3,5-Trinitrobenzene (1,3,5-TNB) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 1,3-Dichlorobenzene (m-Dichlorobenzene) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 1,3-Dinitrobenzene (1,3-DNB) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 1,4-Dichlorobenzene (p-Dichlorobenzene) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 1,4-Dinitrobenzene (1,4-DNB) | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | 1,4-Dioxane (1,4-Diethyleneoxide) | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | 1,4-Naphthoquinone | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 1,4-Phenylenediamine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 1-Chloronaphthalene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 1-Methylnaphthalene | NELAP | PA | 04/17/2009 |

Martina M Harvey

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**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8270 | C, D | 1-Naphthylamine (alpha-Naphthylamine) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl) ether) | NELAP | PA | 01/19/2011 |
| EPA 8270 | C, D | 2,2'-oxybis(1-Chloropropane) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2,3,4,6-Tetrachlorophenol | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2,4,5-Trichlorophenol | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2,4,6-Trichlorophenol | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2,4-Dichlorophenol | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2,4-Dimethylphenol | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2,4-Dinitrophenol | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2,4-Dinitrotoluene (2,4-DNT) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2,6-Dichlorophenol | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2,6-Dinitrotoluene (2,6-DNT) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2-Acetylaminofluorene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2-Butoxyethanol | NELAP | PA | 02/07/2012 |
| EPA 8270 | C, D | 2-Chloronaphthalene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2-Chlorophenol | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2-Methylnaphthalene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2-Methylphenol (o-Cresol) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2-Naphthylamine (beta-Naphthylamine) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2-Nitroaniline | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2-Nitrophenol | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 2-Picoline (2-Methylpyridine) | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | 3+4-Methylphenol (m+p-Cresol) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 3,3'-Dichlorobenzidine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 3,3'-Dimethylbenzidine | NELAP | PA | 07/03/2007 |
| EPA 8270 | C, D | 3-Methylcholanthrene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 3-Nitroaniline | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 4,4'-Methylenebis(2-chloroaniline) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 4-Aminobiphenyl | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 4-Bromophenyl phenyl ether | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 4-Chloro-3-methylphenol | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 4-Chloroaniline | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 4-Chlorophenyl phenyl ether | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 4-Nitroaniline | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 4-Nitrophenol | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 4-Nitroquinoline-1-oxide | NELAP | PA | 07/03/2007 |
| EPA 8270 | C, D | 5-Nitro-o-toluidine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | 6-Methylchrysene | NELAP | PA | 01/19/2011 |
| EPA 8270 | C, D | 7,12-Dimethylbenz(a)anthracene | NELAP | PA | 12/12/2005 |

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**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8270 | C, D | Acenaphthene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Acenaphthylene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Acetophenone | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Aniline | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Anthracene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Aramite | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Atrazine | NELAP | PA | 01/22/2007 |
| EPA 8270 | C, D | Benzaldehyde | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | Benzenethiol | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | Benzidine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Benzo[a]anthracene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Benzo[a]pyrene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Benzo[b]fluoranthene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Benzo[ghi]perylene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Benzo[k]fluoranthene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Benzoic acid | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Benzyl alcohol | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Butyl benzyl phthalate (Benzyl butyl phthalate) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Caprolactam | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | Carbazole | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Chlorobenzilate | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Chrysene (Benzo[a]phenanthrene) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Di-n-butyl phthalate | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Di-n-octyl phthalate | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Diallate (cis or trans) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Dibenz[a,h]acridine | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | Dibenz[a,j]acridine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Dibenzo[a,h]anthracene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Dibenzofuran | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Diethyl phthalate | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Dimethoate | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Dimethyl phthalate | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Dimethylaminoazobenzene (4-Dimethylaminoazobenzene) | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | Dinoseb (2-sec-Butyl-4,6-dinitrophenol, DNBP) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Diphenylamine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Disulfoton | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Ethyl methanesulfonate | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Famphur | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Fluoranthene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Fluorene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Hexachlorobenzene | NELAP | PA | 12/12/2005 |

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**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8270 | C, D | Hexachlorobutadiene (1,3-Hexachlorobutadiene) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Hexachlorocyclopentadiene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Hexachloroethane | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Hexachloropropene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Indene | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | Indeno(1,2,3-cd)pyrene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Isodrin | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Isophorone | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Isosafrole | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Kepone | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Methapyrilene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Methyl methanesulfonate | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Methyl parathion (Parathion, methyl) | NELAP | PA | 05/25/2007 |
| EPA 8270 | C, D | N,N-Dimethylacetamide | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | N,N-Dimethylformamide | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | N-Nitrosodi-n-butylamine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | N-Nitrosodi-n-propylamine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | N-Nitrosodiethylamine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | N-Nitrosodimethylamine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | N-Nitrosodiphenylamine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | N-Nitrosomethylethylamine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | N-Nitrosomorpholine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | N-Nitrosopiperidine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | N-Nitrosopyrrolidine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Naphthalene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Nitrobenzene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | O,O,O-Triethyl phosphorothioate | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Parathion, ethyl (Ethyl parathion, Parathion) | NELAP | PA | 05/25/2007 |
| EPA 8270 | C, D | Pentachlorobenzene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Pentachloronitrobenzene (PCNB) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Pentachlorophenol (PCP) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Phenacetin | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Phenanthrene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Phenol | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Phorate (Thimet) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Phthalic anhydride | NELAP | PA | 01/21/2009 |
| EPA 8270 | C, D | Pronamide (Kerb) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Pyrene | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Pyridine | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Quinoline | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | Safrole | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | Sulfotepp (Tetraethyl dithiopyrophosphate) | NELAP | PA | 04/17/2009 |

**Attached to Certificate of Accreditation 019-002 expiration date 01/31/2021. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.**

**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8270 | C, D | Tetraethyl lead | NELAP | PA | 03/07/2012 |
| EPA 8270 | C, D | Thionazine (Thionazin, Zinophos) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | a,a-Dimethylphenethylamine (Phentermine) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | a-Methylstyrene | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | bis(2-Chloroethoxy)methane | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | bis(2-Chloroethyl) ether | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | bis(2-Chloromethyl) ether | NELAP | PA | 01/21/2009 |
| EPA 8270 | C, D | bis(2-Ethylhexyl) phthalate (DEHP) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | o-Toluidine (2-Toluidine, 2-Methylaniline) | NELAP | PA | 12/12/2005 |
| EPA 8270 | C, D | p-(Dimethylamino)azobenzene | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | tris-(2,3-Dibromopropyl) phosphate (tris-BP) | NELAP | PA | 04/17/2009 |
| EPA 8270 SIM | C, D | 1,4-Dioxane (1,4-Diethyleneoxide) | NELAP | PA | 08/01/2018 |
| EPA 8270 SIM | C, D | 1-Methylnaphthalene | NELAP | PA | 07/25/2011 |
| EPA 8270 SIM | C, D | 2-Methylnaphthalene | NELAP | PA | 05/23/2012 |
| EPA 8270 SIM | C, D | Acenaphthene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Acenaphthylene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Anthracene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Benzo[a]anthracene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Benzo[a]pyrene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Benzo[b]fluoranthene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Benzo[ghi]perylene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Benzo[k]fluoranthene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Chrysene (Benzo[a]phenanthrene) | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Dibenzo[a,h]anthracene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Fluoranthene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Fluorene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Indeno(1,2,3-cd)pyrene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Naphthalene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Phenanthrene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Pyrene | NELAP | PA | 12/04/2007 |
| EPA 8290 | A | PCDDs and PCDFs by HRGC-HRMS | NELAP | PA | 03/04/2015 |
| EPA 8290 | | PCDDs and PCDFs by HRGC-HRMS | NELAP | PA | 03/26/2012 |
| EPA 8290 | A | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-hpcdd) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-hpcdf) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-hpcdf) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 08/06/2010 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8290 | A | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,7,8-Pentachlorodibenzofuran (PeCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 2,3,4,7,8-Pentachlorodibenzofuran (PeCDF) | NELAP | PA | 08/06/2010 |
| EPA 8290 | A | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)(Dioxin) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 2,3,7,8-Tetrachlorodibenzofuran (TCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total TCDD | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total TCDF | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total heptachlorodibenzo-p-dioxin (HpCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total heptachlorodibenzofuran (HpCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total hexachlorodibenzofuran (HxCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total pentachlorodibenzo-p-dioxin (PeCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total pentachlorodibenzofuran (PeCDF) | NELAP | PA | 06/30/2010 |
| EPA 8315 | A | Carbonyl compounds by HPLC | NELAP | PA | 03/26/2012 |
| EPA 8315 | A | 2,5-Dimethylbenzaldehyde | NELAP | PA | 12/12/2005 |
| EPA 8315 | A | Acetaldehyde | NELAP | PA | 12/12/2005 |
| EPA 8315 | A | Benzaldehyde | NELAP | PA | 12/12/2005 |
| EPA 8315 | A | Butanal (Butyraldehyde) | NELAP | PA | 05/02/2006 |
| EPA 8315 | A | Crotonaldehyde | NELAP | PA | 12/12/2005 |
| EPA 8315 | A | Formaldehyde | NELAP | PA | 12/12/2005 |
| EPA 8315 | A | Hexanal (Hexaldehyde) | NELAP | PA | 01/21/2009 |
| EPA 8315 | A | Isovaleraldehyde | NELAP | PA | 12/12/2005 |
| EPA 8315 | A | Pentanal (Valeraldehyde) | NELAP | PA | 12/12/2005 |
| EPA 8315 | A | Propanal (Propionaldehyde) | NELAP | PA | 01/21/2009 |
| EPA 8315 | A | m-Tolualdehyde (1,3-Tolualdehyde) | NELAP | PA | 05/02/2006 |
| EPA 8315 | A | o-Tolualdehyde (1,2-Tolualdehyde) | NELAP | PA | 01/24/2007 |
| EPA 8315 | A | p-Tolualdehyde (1,4-Tolualdehyde) | NELAP | PA | 01/24/2007 |
| EPA 8330 | A | Nitroaromatics and nitramines by HPLC/UV | NELAP | PA | 03/26/2012 |
| EPA 8330 | B | Nitroaromatics and nitramines by HPLC/UV | NELAP | PA | 07/29/2015 |
| EPA 8330 | A, B | 1,3,5-Trinitrobenzene (1,3,5-TNB) | NELAP | PA | 12/12/2005 |
| EPA 8330 | A, B | 1,3-Dinitrobenzene (1,3-DNB) | NELAP | PA | 12/12/2005 |
| EPA 8330 | A, B | 2,4,6-Trinitrotoluene (2,4,6-TNT) | NELAP | PA | 12/12/2005 |
| EPA 8330 | A, B | 2,4-Diamino-6-nitrotoluene | NELAP | PA | 07/29/2015 |
| EPA 8330 | A, B | 2,4-Dinitrotoluene (2,4-DNT) | NELAP | PA | 06/11/2007 |
| EPA 8330 | A, B | 2,6-Diamino-4-nitrotoluene | NELAP | PA | 07/29/2015 |
| EPA 8330 | A, B | 2,6-Dinitrotoluene (2,6-DNT) | NELAP | PA | 06/11/2007 |

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**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Non-Potable Water

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8330 | A, B | 2-Amino-4,6-dinitrotoluene (2-Am-DNT) | NELAP | PA | 12/12/2005 |
| EPA 8330 | A, B | 2-Nitrotoluene | NELAP | PA | 12/12/2005 |
| EPA 8330 | A, B | 3,5-Dinitroaniline | NELAP | PA | 07/29/2015 |
| EPA 8330 | A, B | 3-Nitrotoluene | NELAP | PA | 12/12/2005 |
| EPA 8330 | A, B | 4-Amino-2,6-dinitrotoluene (4-Am-DNT) | NELAP | PA | 12/12/2005 |
| EPA 8330 | A, B | 4-Nitrotoluene | NELAP | PA | 12/12/2005 |
| EPA 8330 | A, B | Methyl-2,4,6-trinitrophenylnitramine (Tetryl) | NELAP | PA | 12/12/2005 |
| EPA 8330 | A, B | Nitrobenzene | NELAP | PA | 06/11/2007 |
| EPA 8330 | A, B | Nitroglycerin | NELAP | PA | 01/24/2007 |
| EPA 8330 | A, B | Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) | NELAP | PA | 12/12/2005 |
| EPA 8330 | A, B | Pentaerythritol tetranitrate (PETN) | NELAP | PA | 05/02/2006 |
| EPA 8330 | A, B | RDX (Hexahydro-1,3,5-trinitro-1,3,5-triazine) | NELAP | PA | 12/12/2005 |
| EPA 9012 | A, B | Total cyanide | NELAP | PA | 05/24/2011 |
| EPA 9040 | C | pH | NELAP | PA | 12/12/2005 |
| EPA 9050 | A | Conductivity | NELAP | PA | 01/27/2014 |
| EPA 9050 | | Conductivity | NELAP | PA | 12/12/2005 |
| EPA 9056 | A | Anions by IC | NELAP | PA | 03/19/2015 |
| EPA 9056 | A | Bromide | NELAP | PA | 12/12/2005 |
| EPA 9056 | A | Chloride | NELAP | PA | 12/12/2005 |
| EPA 9056 | A | Fluoride | NELAP | PA | 12/12/2005 |
| EPA 9056 | A | Nitrate as N | NELAP | PA | 12/12/2005 |
| EPA 9056 | A | Nitrite as N | NELAP | PA | 01/19/2005 |
| EPA 9056 | A | Sulfate | NELAP | PA | 12/12/2005 |
| EPA 9060 | A | Total organic carbon (TOC) | NELAP | PA | 12/12/2005 |
| EPA 9066 | | Total phenolics | NELAP | PA | 12/12/2005 |
| MA DEP EPH | 1.1 | C11-C22 Aromatics | NELAP | PA | 07/15/2013 |
| MA DEP EPH | 1.1 | C19-C36 Aliphatics | NELAP | PA | 07/15/2013 |
| MA DEP EPH | 1.1 | C9-C18 Aliphatics | NELAP | PA | 07/15/2013 |
| MA DEP VPH | 1.1 | C5-C8 Aliphatics | NELAP | PA | 07/15/2013 |
| MA DEP VPH | 1.1 | C9-C10 Aromatics | NELAP | PA | 07/29/2015 |
| MA DEP VPH | 1.1 | C9-C12 Aliphatics | NELAP | PA | 07/15/2013 |
| MA DEP VPH | 2.1 | C5-C8 Aliphatics | NELAP | PA | 07/16/2018 |
| MA DEP VPH | 2.1 | C9-C10 Aromatics | NELAP | PA | 07/16/2018 |
| MA DEP VPH | 2.1 | C9-C12 Aliphatics | NELAP | PA | 07/16/2018 |
| NWTPH-Dx | | Diesel-range organics (DRO) | NELAP | PA | 12/12/2005 |
| NWTPH-Gx | | Gasoline-range organics (GRO) | NELAP | PA | 12/12/2005 |
| OIA 1677-09 | | Available cyanide | NELAP | PA | 10/09/2013 |
| OIA 1677-09 | | Free cyanide | NELAP | PA | 10/09/2013 |
| RSK-175 | | Acetylene (Ethyne) | NELAP | PA | 01/20/2012 |
| RSK-175 | | Carbon dioxide | NELAP | PA | 11/19/2015 |
| RSK-175 | | Ethane | NELAP | PA | 06/29/2010 |

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**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

**Matrix: Non-Potable Water**

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| RSK-175 | | Ethene | NELAP | PA | 06/29/2010 |
| RSK-175 | | Isobutane (2-Methylpropane) | NELAP | PA | 11/19/2015 |
| RSK-175 | | Methane | NELAP | PA | 06/29/2010 |
| RSK-175 | | Propane | NELAP | PA | 06/29/2010 |
| RSK-175 | | n-Butane | NELAP | PA | 12/22/2011 |
| SM 2120 B | | Color | NELAP | PA | 04/17/2007 |
| SM 2310 B | | Acidity as CaCO3 | NELAP | PA | 03/27/2018 |
| SM 2320 B | | Alkalinity as CaCO3 | NELAP | PA | 01/19/2005 |
| SM 2340 C | | Total hardness as CaCO3 | NELAP | PA | 04/17/2007 |
| SM 2510 B | | Conductivity | NELAP | PA | 12/12/2005 |
| SM 2540 B | | Residue, total | NELAP | PA | 04/17/2007 |
| SM 2540 C | | Residue, filterable (TDS) | NELAP | PA | 04/17/2007 |
| SM 2540 D | | Residue, nonfilterable (TSS) | NELAP | PA | 04/17/2007 |
| SM 2540 F | | Residue, settleable | NELAP | PA | 04/17/2007 |
| SM 2550 B | | Temperature, deg. C | NELAP | PA | 08/30/2019 |
| SM 3500-Cr B | 20-22 | Chromium VI | NELAP | PA | 05/24/2007 |
| SM 3500-Fe B | 20-22 | Ferrous iron | NELAP | PA | 06/15/2009 |
| SM 4500-CN- G | | Amenable cyanide | NELAP | PA | 05/24/2007 |
| SM 4500-Cl F | | Total residual chlorine | NELAP | PA | 01/11/2012 |
| SM 4500-Cl- C | | Chloride | NELAP | PA | 04/17/2007 |
| SM 4500-F- B | | Preliminary distillation of fluoride | NELAP | PA | 04/28/2010 |
| SM 4500-F- C | | Fluoride | NELAP | PA | 01/19/2005 |
| SM 4500-H+ B | | pH | NELAP | PA | 04/17/2007 |
| SM 4500-NH3 B | | Ammonia distillation | NELAP | PA | 04/17/2007 |
| SM 4500-NH3 C | | Ammonia as N | NELAP | PA | 07/05/2018 |
| SM 4500-NH3 D | | Ammonia as N | NELAP | PA | 04/17/2007 |
| SM 4500-O G | | Oxygen (dissolved) | NELAP | PA | 04/17/2007 |
| SM 4500-P B | | Preliminary treatment of phosphate samples | NELAP | PA | 04/28/2010 |
| SM 4500-P E | | Orthophosphate as P | NELAP | PA | 12/12/2005 |
| SM 4500-P F | | Phosphorus, total | NELAP | PA | 04/28/2010 |
| SM 4500-S2- D | | Sulfide | NELAP | PA | 04/17/2007 |
| SM 4500-S2- F | | Sulfide | NELAP | PA | 04/17/2007 |
| SM 4500-SO3 B | | Sulfite, SO3 | NELAP | PA | 04/17/2007 |
| SM 4500-SiO2 C | 20-22 | Silica, as SiO2 | NELAP | PA | 05/25/2007 |
| SM 4500-SiO2 C | 20-22 | Silica, dissolved | NELAP | PA | 05/24/2007 |
| SM 5210 B | | Biochemical oxygen demand (BOD) | NELAP | PA | 04/04/2005 |
| SM 5210 B | | Carbonaceous BOD (CBOD) | NELAP | PA | 05/14/2018 |
| SM 5310 C | | Total organic carbon (TOC) | NELAP | PA | 05/24/2007 |
| SM 5540 C | | Surfactants as MBAS | NELAP | PA | 04/17/2007 |
| TX1005 (TNRCC) | | Total petroleum hydrocarbons (TPH) | NELAP | PA | 12/12/2005 |
| TX1006 (TNRCC) | | Total petroleum hydrocarbons (TPH) | NELAP | PA | 12/12/2005 |
| WA-EPH | | Diesel-range organics (DRO) | NELAP | PA | 12/12/2005 |

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**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

### Matrix: Non-Potable Water

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| WA-VPH | | Gasoline-range organics (GRO) | NELAP | PA | 12/12/2005 |

### Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| AK-101 | | Gasoline-range organics (GRO) | NELAP | PA | 12/12/2005 |
| AK-102 | | Diesel-range organics (DRO) | NELAP | PA | 12/12/2005 |
| AK-103 | | Residual-range organics (RRO) | NELAP | PA | 03/19/2015 |
| ASTM D3987-12 | | Shake extraction of solid waste with water | NELAP | PA | 08/30/2019 |
| ASTM D3987-85 | | Shake extraction of solid waste with water | NELAP | PA | 07/21/2017 |
| EPA 1010 | A | Ignitability | NELAP | PA | 11/19/2015 |
| EPA 1010 | | Ignitability | NELAP | PA | 01/19/2005 |
| EPA 1311 | | Toxicity characteristic leaching procedure (TCLP) | NELAP | PA | 12/12/2005 |
| EPA 1312 | | Synthetic precipitation leaching procedure (SPLP) | NELAP | PA | 12/12/2005 |
| EPA 1613 | B | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-hpcdd) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-hpcdf) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-hpcdf) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 1,2,3,7,8-Pentachlorodibenzofuran (PeCDF) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 2,3,4,7,8-Pentachlorodibenzofuran (PeCDF) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)(Dioxin) | NELAP | PA | 07/05/2018 |
| EPA 1613 | B | 2,3,7,8-Tetrachlorodibenzofuran (TCDF) | NELAP | PA | 07/05/2018 |
| EPA 1668 | A, C | PCBs as congeners by HRGC/HRMS | NELAP | PA | 03/04/2015 |
| EPA 1668 | A, C | 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (BZ 206) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4',5,5'-Octachlorobiphenyl (BZ 194) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4',5,6'-Octachlorobiphenyl (BZ 196) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl (BZ 207) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4',5,6-Octachlorobiphenyl (BZ 195) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4',5-Heptachlorobiphenyl (BZ 170) | NELAP | PA | 12/17/2012 |

Martina M Harvey

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

### Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 1668 | A, C | 2,2',3,3',4,4',6,6'-Octachlorobiphenyl (BZ 197) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4',6-Heptachlorobiphenyl (BZ 171) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,4'-Hexachlorobiphenyl (BZ 128) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5',6'-Heptachlorobiphenyl (BZ 177) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5',6,6'-Octachlorobiphenyl (BZ 201) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5',6-Heptachlorobiphenyl (BZ 175) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5'-Hexachlorobiphenyl (BZ 130) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5,5',6'-Octachlorobiphenyl (BZ 199) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl (BZ 208) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5,5',6-Octachlorobiphenyl (BZ 198) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5,5'-Heptachlorobiphenyl (BZ 172) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5,6'-Heptachlorobiphenyl (BZ 174) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5,6,6'-Octachlorobiphenyl (BZ 200) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5,6-Heptachlorobiphenyl (BZ 173) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,5-Hexachlorobiphenyl (BZ 129) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,6'-Hexachlorobiphenyl (BZ 132) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,6,6'-Heptachlorobiphenyl (BZ 176) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4,6-Hexachlorobiphenyl (BZ 131) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',4-Pentachlorobiphenyl (BZ 82) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',5,5',6,6'-Octachlorobiphenyl (BZ 202) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',5,5',6-Heptachlorobiphenyl (BZ 178) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',5,5'-Hexachlorobiphenyl (BZ 133) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',5,6'-Hexachlorobiphenyl (BZ 135) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',5,6,6'-Heptachlorobiphenyl (BZ 179) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',5,6-Hexachlorobiphenyl (BZ 134) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',5-Pentachlorobiphenyl (BZ 83) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',6,6'-Hexachlorobiphenyl (BZ 136) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3',6-Pentachlorobiphenyl (BZ 84) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,3'-Tetrachlorobiphenyl (BZ 40) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5',6-Hexachlorobiphenyl (BZ 149) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5'-Pentachlorobiphenyl (BZ 97) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5,5',6-Heptachlorobiphenyl (BZ 187) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5,5'-Hexachlorobiphenyl (BZ 146) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5,6'-Hexachlorobiphenyl (BZ 148) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5,6,6'-Heptachlorobiphenyl (BZ 188) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5,6-Hexachlorobiphenyl (BZ 147) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',5-Pentachlorobiphenyl (BZ 90) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',6'-Pentachlorobiphenyl (BZ 98) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',6,6'-Hexachlorobiphenyl (BZ 150) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4',6-Pentachlorobiphenyl (BZ 91) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4'-Tetrachlorobiphenyl (BZ 42) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5',6-Heptachlorobiphenyl (BZ 183) | NELAP | PA | 12/17/2012 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

### Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 1668 | A, C | 2,2',3,4,4',5'-Hexachlorobiphenyl (BZ 138) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5,5',6-Octachlorobiphenyl (BZ 203) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5,5'-Heptachlorobiphenyl (BZ 180) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5,6'-Heptachlorobiphenyl (BZ 182) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5,6,6'-Octachlorobiphenyl (BZ 204) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5,6-Heptachlorobiphenyl (BZ 181) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',5-Hexachlorobiphenyl (BZ 137) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',6'-Hexachlorobiphenyl (BZ 140) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',6,6'-Heptachlorobiphenyl (BZ 184) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4',6-Hexachlorobiphenyl (BZ 139) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,4'-Pentachlorobiphenyl (BZ 85) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5',6-Hexachlorobiphenyl (BZ 144) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5'-Pentachlorobiphenyl (BZ 87) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5,5',6-Heptachlorobiphenyl (BZ 185) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5,5'-Hexachlorobiphenyl (BZ 141) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5,6'-Hexachlorobiphenyl (BZ 143) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5,6,6'-Heptachlorobiphenyl (BZ 186) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5,6-Hexachlorobiphenyl (BZ 142) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,5-Pentachlorobiphenyl (BZ 86) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,6'-Pentachlorobiphenyl (BZ 89) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,6,6'-Hexachlorobiphenyl (BZ 145) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4,6-Pentachlorobiphenyl (BZ 88) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,4-Tetrachlorobiphenyl (BZ 41) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5',6-Pentachlorobiphenyl (BZ 95) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5'-Tetrachlorobiphenyl (BZ 44) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5,5',6-Hexachlorobiphenyl (BZ 151) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5,5'-Pentachlorobiphenyl (BZ 92) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5,6'-Pentachlorobiphenyl (BZ 94) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5,6,6'-Hexachlorobiphenyl (BZ 152) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5,6-Pentachlorobiphenyl (BZ 93) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,5-Tetrachlorobiphenyl (BZ 43) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,6'-Tetrachlorobiphenyl (BZ 46) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,6,6'-Pentachlorobiphenyl (BZ 96) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3,6-Tetrachlorobiphenyl (BZ 45) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',3-Trichlorobiphenyl (BZ 16) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,4',5,5'-Hexachlorobiphenyl (BZ 153) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,4',5,6'-Hexachlorobiphenyl (BZ 154) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,4',5-Pentachlorobiphenyl (BZ 99) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,4',6,6'-Hexachlorobiphenyl (BZ 155) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,4',6-Pentachlorobiphenyl (BZ 100) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,4'-Tetrachlorobiphenyl (BZ 47) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,5',6-Pentachlorobiphenyl (BZ 103) | NELAP | PA | 12/17/2012 |

Martina M'Harvey

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

### Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 1668 | A, C | 2,2',4,5'-Tetrachlorobiphenyl (BZ 49) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,5,5'-Pentachlorobiphenyl (BZ 101) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,5,6'-Pentachlorobiphenyl (BZ 102) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,5-Tetrachlorobiphenyl (BZ 48) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,6'-Tetrachlorobiphenyl (BZ 51) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,6,6'-Pentachlorobiphenyl (BZ 104) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4,6-Tetrachlorobiphenyl (BZ 50) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',4-Trichlorobiphenyl (BZ 17) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',5,5'-Tetrachlorobiphenyl (BZ 52) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',5,6'-Tetrachlorobiphenyl (BZ 53) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',5-Trichlorobiphenyl (BZ 18) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',6,6'-Tetrachlorobiphenyl (BZ 54) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2',6-Trichlorobiphenyl (BZ 19) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,2'-Dichlorobiphenyl (BZ 4) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4',5',6-Pentachlorobiphenyl (BZ 125) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4',5'-Tetrachlorobiphenyl (BZ 76) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4',5,5'-Pentachlorobiphenyl (BZ 124) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4',5-Tetrachlorobiphenyl (BZ 70) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4',6-Tetrachlorobiphenyl (BZ 71) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4'-Trichlorobiphenyl (BZ 33) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,4',5',6-Hexachlorobiphenyl (BZ 168) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,4',5'-Pentachlorobiphenyl (BZ 123) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,4',5,5'-Hexachlorobiphenyl (BZ 167) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,4',5-Pentachlorobiphenyl (BZ 118) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,4',6-Pentachlorobiphenyl (BZ 119) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,4'-Tetrachlorobiphenyl (BZ 66) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,5',6-Pentachlorobiphenyl (BZ 121) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,5'-Tetrachlorobiphenyl (BZ 68) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,5,5'-Pentachlorobiphenyl (BZ 120) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,5-Tetrachlorobiphenyl (BZ 67) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4,6-Tetrachlorobiphenyl (BZ 69) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',4-Trichlorobiphenyl (BZ 25) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',5',6-Tetrachlorobiphenyl (BZ 73) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',5'-Trichlorobiphenyl (BZ 34) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',5,5'-Tetrachlorobiphenyl (BZ 72) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',5-Trichlorobiphenyl (BZ 26) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3',6-Trichlorobiphenyl (BZ 27) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3'-Dichlorobiphenyl (BZ 6) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4',5',6-Hexachlorobiphenyl (BZ 164) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4',5'-Pentachlorobiphenyl (BZ 122) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4',5,5',6-Heptachlorobiphenyl (BZ 193) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4',5,5'-Hexachlorobiphenyl (BZ 162) | NELAP | PA | 12/17/2012 |

Martina M'Harvey

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**Lancaster, PA 17601-5994**
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**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

### Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 1668 | A, C | 2,3,3',4',5,6-Hexachlorobiphenyl (BZ 163) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4',5-Pentachlorobiphenyl (BZ 107) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4',6-Pentachlorobiphenyl (BZ 110) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4'-Tetrachlorobiphenyl (BZ 56) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4',5',6-Heptachlorobiphenyl (BZ 191) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4',5'-Hexachlorobiphenyl (BZ 157) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4',5,5',6-Octachlorobiphenyl (BZ 205) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4',5,5'-Heptachlorobiphenyl (BZ 189) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4',5,6-Heptachlorobiphenyl (BZ 190) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4',5-Hexachlorobiphenyl (BZ 156) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4',6-Hexachlorobiphenyl (BZ 158) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,4'-Pentachlorobiphenyl (BZ 105) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,5',6-Hexachlorobiphenyl (BZ 161) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,5'-Pentachlorobiphenyl (BZ 108) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,5,5',6-Heptachlorobiphenyl (BZ 192) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,5,5'-Hexachlorobiphenyl (BZ 159) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,5,6-Hexachlorobiphenyl (BZ 160) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,5-Pentachlorobiphenyl (BZ 106) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4,6-Pentachlorobiphenyl (BZ 109) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',4-Tetrachlorobiphenyl (BZ 55) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',5',6-Pentachlorobiphenyl (BZ 113) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',5'-Tetrachlorobiphenyl (BZ 58) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',5,5',6-Hexachlorobiphenyl (BZ 165) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',5,5'-Pentachlorobiphenyl (BZ 111) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',5,6-Pentachlorobiphenyl (BZ 112) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',5-Tetrachlorobiphenyl (BZ 57) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3',6-Tetrachlorobiphenyl (BZ 59) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,3'-Trichlorobiphenyl (BZ 20) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4',5,6-Pentachlorobiphenyl (BZ 117) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4',5-Tetrachlorobiphenyl (BZ 63) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4',6-Tetrachlorobiphenyl (BZ 64) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4'-Trichlorobiphenyl (BZ 22) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,4',5,6-Hexachlorobiphenyl (BZ 166) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,4',5-Pentachlorobiphenyl (BZ 114) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,4',6-Pentachlorobiphenyl (BZ 115) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,4'-Tetrachlorobiphenyl (BZ 60) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,5,6-Pentachlorobiphenyl (BZ 116) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,5-Tetrachlorobiphenyl (BZ 61) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4,6-Tetrachlorobiphenyl (BZ 62) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,4-Trichlorobiphenyl (BZ 21) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,5,6-Tetrachlorobiphenyl (BZ 65) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3,5-Trichlorobiphenyl (BZ 23) | NELAP | PA | 12/17/2012 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

### Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 1668 | A, C | 2,3,6-Trichlorobiphenyl (BZ 24) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,3-Dichlorobiphenyl (BZ 5) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4',5-Trichlorobiphenyl (BZ 31) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4',6-Trichlorobiphenyl (BZ 32) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4'-Dichlorobiphenyl (BZ 8) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4,4',5-Tetrachlorobiphenyl (BZ 74) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4,4',6-Tetrachlorobiphenyl (BZ 75) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4,4'-Trichlorobiphenyl (BZ 28) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4,5-Trichlorobiphenyl (BZ 29) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4,6-Trichlorobiphenyl (BZ 30) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,4-Dichlorobiphenyl (BZ 7) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,5-Dichlorobiphenyl (BZ 9) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2,6-Dichlorobiphenyl (BZ 10) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 2-Chlorobiphenyl (BZ 1) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4,4',5,5'-Hexachlorobiphenyl (BZ 169) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4,4',5-Pentachlorobiphenyl (BZ 126) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4,4'-Tetrachlorobiphenyl (BZ 77) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4,5'-Tetrachlorobiphenyl (BZ 79) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4,5,5'-Pentachlorobiphenyl (BZ 127) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4,5-Tetrachlorobiphenyl (BZ 78) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',4-Trichlorobiphenyl (BZ 35) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',5,5'-Tetrachlorobiphenyl (BZ 80) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3',5-Trichlorobiphenyl (BZ 36) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,3'-Dichlorobiphenyl (BZ 11) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,4',5-Trichlorobiphenyl (BZ 39) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,4'-Dichlorobiphenyl (BZ 13) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,4,4',5-Tetrachlorobiphenyl (BZ 81) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,4,4'-Trichlorobiphenyl (BZ 37) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,4,5-Trichlorobiphenyl (BZ 38) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,4-Dichlorobiphenyl (BZ 12) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3,5-Dichlorobiphenyl (BZ 14) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 3-Chlorobiphenyl (BZ 2) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 4,4'-Dichlorobiphenyl (BZ 15) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | 4-Chlorobiphenyl (BZ 3) | NELAP | PA | 12/17/2012 |
| EPA 1668 | A, C | Decachlorobiphenyl | NELAP | PA | 12/17/2012 |
| EPA 300.0 | 2.1 | Bromide | NELAP | PA | 03/09/2016 |
| EPA 300.0 | 2.1 | Chloride | NELAP | PA | 11/27/2019 |
| EPA 300.0 | 2.1 | Fluoride | NELAP | PA | 10/16/2012 |
| EPA 300.0 | 2.1 | Nitrate as N | NELAP | PA | 11/27/2019 |
| EPA 300.0 | 2.1 | Nitrite as N | NELAP | PA | 10/16/2012 |
| EPA 300.0 | 2.1 | Sulfate | NELAP | PA | 10/16/2012 |
| EPA 3050 | B | Acid digestion of solids | NELAP | PA | 04/04/2005 |

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**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 3060 | A | Alkaline digestion of Cr(VI) | NELAP | PA | 04/04/2005 |
| EPA 350.3 | | Ammonia as N | NELAP | PA | 12/08/2014 |
| EPA 351.2 | | Kjeldahl nitrogen, total (TKN) | NELAP | PA | 08/30/2019 |
| EPA 3510 | C | Separatory funnel liquid-liquid extraction | NELAP | PA | 04/04/2005 |
| EPA 3540 | C | Soxhlet extraction | NELAP | PA | 04/04/2005 |
| EPA 3546 | | Microwave extraction | NELAP | PA | 09/25/2009 |
| EPA 3550 | B | Ultrasonic extraction | NELAP | PA | 04/04/2005 |
| EPA 3550 | C | Ultrasonic extraction | NELAP | PA | 03/04/2015 |
| EPA 3620 | B | Florisil cleanup | NELAP | PA | 04/04/2005 |
| EPA 3620 | C | Florisil cleanup | NELAP | PA | 09/04/2018 |
| EPA 3630 | C | Silica gel cleanup | NELAP | PA | 04/04/2005 |
| EPA 3640 | A | Gel permeation cleanup (GPC) | NELAP | PA | 04/04/2005 |
| EPA 365.1 | | Phosphorus, total | NELAP | PA | 11/19/2015 |
| EPA 3660 | B | Sulfur cleanup | NELAP | PA | 04/04/2005 |
| EPA 3665 | A | Sulfuric acid/permanganate clean-up | NELAP | PA | 04/04/2005 |
| EPA 5030 | | Bulk purge-and-trap (methanol) | NELAP | PA | 12/04/2007 |
| EPA 5035 | A | Closed-system purge-and-trap (bisulfate option) | NELAP | PA | 09/04/2018 |
| EPA 5035 | A | Closed-system purge-and-trap (methanol option) | NELAP | PA | 09/04/2018 |
| EPA 5035 | A | Closed-system purge-and-trap (unpreserved) | NELAP | PA | 09/04/2018 |
| EPA 5035 | | Closed-system purge-and-trap (bisulfate option) | NELAP | PA | 12/12/2005 |
| EPA 5035 | | Closed-system purge-and-trap (methanol option) | NELAP | PA | 04/04/2005 |
| EPA 5035 | | Closed-system purge-and-trap (unpreserved) | NELAP | PA | 04/04/2005 |
| EPA 537 Isotope Dilution | 1.1 | 10:2 Fluorotelomersulfonate (10:2 FTS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | 1H, 1H, 2H, 2H-Perfluorodecane sulfonic acid (8:2-FTS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | 1H, 1H, 2H, 2H-Perfluorododecane sulfonic acid (10:2-FTS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | 1H, 1H, 2H, 2H-Perfluorohexane sulfonic acid (4:2-FTS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | 1H, 1H, 2H, 2H-Perfluorooctane sulfonic acid (6:2-FTS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | 4:2 Fluorotelomer sulfonate (4:2 FTS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | 6:2 Fluorotelomersulfonate (6:2FTS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | 8:2 Flurotelomersulfonate (8:2FTS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | N-Ethylperfluorooctanesulfonamide (EtFOSA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | N-Methylperfluorooctanesulfonamide (MeFOSA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | N-ethylperfluoro-1-octanesulfonamido ethanol (N-EtFOSE) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | N-methylperfluoro-1-octanesulfonamido ethanol (N-MeFOSE) | NELAP | PA | 08/30/2019 |

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**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 537 Isotope Dilution | 1.1 | Perfluorobutanesulfonic acid (PFBS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorobutyric acid (PFBA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorodecane sulfonate (PFDS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorodecane sulfonic acid (PFDS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorodecanoic acid (PFDA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorododecane sulfonate | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorododecane sulfonic acid (PFDoS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorododecanoic acid (PFDoA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluoroheptanesulfonic acid (PFHpS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluoroheptanoic acid (PFHpA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorohexadecanoic acid (PFHxDA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorohexanesulfonic acid (PFHxS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorohexanoic acid (PFHxA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorononane sulfonic acid (PFNS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorononanesulfonate (PFNS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorononanoic acid (PFNA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorooctadecanoic acid (PFODA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorooctane sulfonamide (PFOSA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorooctanesulfonic acid (PFOS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorooctanoic acid (PFOA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluoropentane sulfonic acid (PFPeS) | NELAP | PA | 11/04/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluoropentanesulfonate (PFPeS) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluoropentanoic acid (PFPEA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorotetradecanoic acid (PFTA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | Perfluorotridecanoic acid (PFTrDA) | NELAP | PA | 08/30/2019 |

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**DEP Laboratory ID: 36-00037**
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### Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 537 Isotope Dilution | 1.1 | Perfluoroundecanoic acid (PFUnA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | n-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA) | NELAP | PA | 08/30/2019 |
| EPA 537 Isotope Dilution | 1.1 | n-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA) | NELAP | PA | 08/30/2019 |
| EPA 6010 | B, C | Metals by ICP/AES | NELAP | PA | 03/26/2012 |
| EPA 6010 | D | Metals by ICP/AES | NELAP | PA | 07/09/2018 |
| EPA 6010 | B, C, D | Aluminum | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Antimony | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Arsenic | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Barium | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Beryllium | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Boron | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Cadmium | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Calcium | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Chromium | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Cobalt | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Copper | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Iron | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Lead | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Lithium | NELAP | PA | 01/20/2012 |
| EPA 6010 | B, C, D | Magnesium | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Manganese | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Molybdenum | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Nickel | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Potassium | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Selenium | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Silica, as SiO2 | NELAP | PA | 01/20/2012 |
| EPA 6010 | B, C, D | Silver | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Sodium | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Strontium | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Sulfur | NELAP | PA | 12/19/2011 |
| EPA 6010 | B, C, D | Tellurium | NELAP | PA | 02/04/2016 |
| EPA 6010 | B, C, D | Thallium | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Thorium | NELAP | PA | 11/19/2015 |
| EPA 6010 | B, C, D | Tin | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Titanium | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Tungsten | NELAP | PA | 11/19/2015 |
| EPA 6010 | B, C, D | Vanadium | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Zinc | NELAP | PA | 01/19/2005 |
| EPA 6010 | B, C, D | Zirconium | NELAP | PA | 07/29/2015 |
| EPA 6020 | A | Metals by ICP/MS | NELAP | PA | 03/26/2012 |

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**DEP Laboratory ID: 36-00037**
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**TNI Code: TNI02128**
**PADWIS ID: 36037**

### Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 6020 | B | Metals by ICP/MS | NELAP | PA | 07/09/2018 |
| EPA 6020 | A, B | Aluminum | NELAP | PA | 04/29/2010 |
| EPA 6020 | A, B | Antimony | NELAP | PA | 01/19/2005 |
| EPA 6020 | A, B | Arsenic | NELAP | PA | 01/19/2005 |
| EPA 6020 | A, B | Barium | NELAP | PA | 01/20/2012 |
| EPA 6020 | A, B | Beryllium | NELAP | PA | 01/19/2005 |
| EPA 6020 | A, B | Cadmium | NELAP | PA | 01/19/2005 |
| EPA 6020 | A, B | Calcium | NELAP | PA | 04/29/2010 |
| EPA 6020 | A, B | Chromium | NELAP | PA | 01/19/2005 |
| EPA 6020 | A, B | Cobalt | NELAP | PA | 04/29/2010 |
| EPA 6020 | A, B | Copper | NELAP | PA | 01/19/2005 |
| EPA 6020 | A, B | Iron | NELAP | PA | 04/29/2010 |
| EPA 6020 | A, B | Lead | NELAP | PA | 01/19/2005 |
| EPA 6020 | A, B | Magnesium | NELAP | PA | 04/29/2010 |
| EPA 6020 | A, B | Manganese | NELAP | PA | 04/29/2010 |
| EPA 6020 | A, B | Molybdenum | NELAP | PA | 07/25/2011 |
| EPA 6020 | A, B | Nickel | NELAP | PA | 04/04/2005 |
| EPA 6020 | A, B | Potassium | NELAP | PA | 04/29/2010 |
| EPA 6020 | A, B | Selenium | NELAP | PA | 04/04/2005 |
| EPA 6020 | A, B | Silver | NELAP | PA | 02/23/2010 |
| EPA 6020 | A, B | Sodium | NELAP | PA | 04/29/2010 |
| EPA 6020 | A, B | Strontium | NELAP | PA | 04/29/2010 |
| EPA 6020 | A, B | Thallium | NELAP | PA | 01/19/2005 |
| EPA 6020 | A, B | Tin | NELAP | PA | 04/29/2010 |
| EPA 6020 | A, B | Titanium | NELAP | PA | 04/29/2010 |
| EPA 6020 | A, B | Uranium, total | NELAP | PA | 11/19/2015 |
| EPA 6020 | A, B | Vanadium | NELAP | PA | 01/07/2010 |
| EPA 6020 | A, B | Zinc | NELAP | PA | 02/01/2011 |
| EPA 680 | | Decachlorobiphenyl | NELAP | PA | 01/19/2016 |
| EPA 680 | | Dichlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Heptachlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Hexachlorbiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Monochlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Nonachlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Octachlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Pentachlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Tetrachlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 680 | | Trichlorobiphenyls | NELAP | PA | 01/19/2016 |
| EPA 6850 | | Perchlorate | NELAP | PA | 01/19/2011 |
| EPA 7.3.3.2 | | Reactive cyanide | NELAP | PA | 12/12/2005 |
| EPA 7.3.4.2 | | Reactive sulfide | NELAP | PA | 12/12/2005 |
| EPA 7196 | A | Chromium VI | NELAP | PA | 07/09/2018 |

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## Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 7199 | | Chromium VI | NELAP | PA | 05/02/2006 |
| EPA 7471 | A, B | Mercury | NELAP | PA | 10/17/2007 |
| EPA 8011 | | 1,2,3-Trichloropropane (1,2,3-TCP) | NELAP | PA | 07/05/2018 |
| EPA 8011 | | 1,2-Dibromo-3-chloropropane (DBCP, Dibromochloropropane) | NELAP | PA | 07/05/2018 |
| EPA 8011 | | 1,2-Dibromoethane (EDB, Ethylene dibromide) | NELAP | PA | 07/09/2018 |
| EPA 8015 | B, C | Nonhalogenated organics by GC/FID | NELAP | PA | 03/26/2012 |
| EPA 8015 | D | Nonhalogenated organics by GC/FID | NELAP | PA | 07/29/2015 |
| EPA 8015 | B, C, D | Diesel-range organics (DRO) | NELAP | PA | 04/04/2005 |
| EPA 8015 | B, C, D | Ethanol | NELAP | PA | 01/19/2005 |
| EPA 8015 | B, C, D | Ethylene glycol | NELAP | PA | 12/04/2007 |
| EPA 8015 | B, C, D | Gasoline-range organics (GRO) | NELAP | PA | 04/04/2005 |
| EPA 8015 | B, C, D | Isopropyl alcohol (2-Propanol) | NELAP | PA | 12/04/2007 |
| EPA 8015 | B, C, D | Methanol | NELAP | PA | 01/19/2005 |
| EPA 8015 | B, C, D | Triethylene glycol | NELAP | PA | 07/05/2018 |
| EPA 8081 | A | Organochlorine pesticides by GC/ECD | NELAP | PA | 03/26/2012 |
| EPA 8081 | B | Organochlorine pesticides by GC/ECD | NELAP | PA | 01/01/2013 |
| EPA 8081 | A, B | 2,4'-DDD | NELAP | PA | 11/19/2015 |
| EPA 8081 | A, B | 2,4'-DDE | NELAP | PA | 11/19/2015 |
| EPA 8081 | A, B | 2,4'-DDT | NELAP | PA | 11/19/2015 |
| EPA 8081 | A, B | 4,4'-DDD | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | 4,4'-DDE | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | 4,4'-DDT | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Aldrin (HHDN) | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Chlordane (tech.) | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Dieldrin | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Endosulfan I | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Endosulfan II | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Endosulfan sulfate | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Endrin | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Endrin aldehyde | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Endrin ketone | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Heptachlor | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Heptachlor epoxide | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Kepone | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Methoxychlor | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Mirex | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | Toxaphene (Chlorinated camphene) | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | alpha-BHC (alpha-Hexachlorocyclohexane) | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | alpha-Chlordane | NELAP | PA | 04/04/2005 |
| EPA 8081 | A, B | beta-BHC (beta-Hexachlorocyclohexane) | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | delta-BHC (delta-Hexachlorocyclohexane) | NELAP | PA | 01/19/2005 |

Martina M Harvey

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8081 | A, B | gamma-BHC (Lindane, gamma-Hexachlorocyclohexane) | NELAP | PA | 01/19/2005 |
| EPA 8081 | A, B | gamma-Chlordane | NELAP | PA | 04/04/2005 |
| EPA 8082 | A | PCBs by GC/ECD | NELAP | PA | 03/26/2012 |
| EPA 8082 | A | Aroclor-1016 (PCB-1016) | NELAP | PA | 01/02/2007 |
| EPA 8082 | A | Aroclor-1016 (in oil) | NELAP | PA | 07/09/2018 |
| EPA 8082 | A | Aroclor-1221 (PCB-1221) | NELAP | PA | 01/02/2007 |
| EPA 8082 | A | Aroclor-1221 (in oil) | NELAP | PA | 07/09/2018 |
| EPA 8082 | A | Aroclor-1232 (PCB-1232) | NELAP | PA | 01/02/2007 |
| EPA 8082 | A | Aroclor-1232 (in oil) | NELAP | PA | 07/09/2018 |
| EPA 8082 | A | Aroclor-1242 (PCB-1242) | NELAP | PA | 01/02/2007 |
| EPA 8082 | A | Aroclor-1242 (in oil) | NELAP | PA | 07/09/2018 |
| EPA 8082 | A | Aroclor-1248 (PCB-1248) | NELAP | PA | 01/02/2007 |
| EPA 8082 | A | Aroclor-1248 (in oil) | NELAP | PA | 07/09/2018 |
| EPA 8082 | A | Aroclor-1254 (PCB-1254) | NELAP | PA | 01/02/2007 |
| EPA 8082 | A | Aroclor-1254 (in oil) | NELAP | PA | 07/09/2018 |
| EPA 8082 | A | Aroclor-1260 (PCB-1260) | NELAP | PA | 01/02/2007 |
| EPA 8082 | A | Aroclor-1260 (in oil) | NELAP | PA | 07/09/2018 |
| EPA 8082 | A | Aroclor-1262 (PCB-1262) | NELAP | PA | 07/23/2008 |
| EPA 8082 | A | Aroclor-1268 (PCB-1268) | NELAP | PA | 07/23/2008 |
| EPA 8082 | A | Decachlorobiphenyl | NELAP | PA | 12/17/2012 |
| EPA 8141 | A, B | Organophosphorus compounds by GC/NPD | NELAP | PA | 03/26/2012 |
| EPA 8141 | A, B | Alachlor (Lasso) | NELAP | PA | 01/21/2009 |
| EPA 8141 | A, B | Atrazine | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Azinphos-methyl (Guthion) | NELAP | PA | 04/04/2005 |
| EPA 8141 | A, B | Bolstar (Sulprofos) | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Carbophenothion (Trithion) | NELAP | PA | 11/09/2012 |
| EPA 8141 | A, B | Chlorpyrifos | NELAP | PA | 04/04/2005 |
| EPA 8141 | A, B | Coumaphos | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Demeton-O | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Demeton-S | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Diazinon (Spectracide) | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Dichlorovos (DDVP, Dichlorvos) | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Disulfoton | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | EPN (Santox) | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Ethion | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Ethoprop (Prophos) | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Famphur | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Fensulfothion | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Fenthion | NELAP | PA | 04/04/2005 |
| EPA 8141 | A, B | Malathion | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Merphos | NELAP | PA | 01/19/2005 |

Martina M Harvey

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8141 | A, B | Methyl parathion (Parathion, methyl) | NELAP | PA | 05/25/2005 |
| EPA 8141 | A, B | Mevinphos | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Naled | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Parathion, ethyl (Ethyl parathion, Parathion) | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Phorate (Thimet) | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Ronnel | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Simazine | NELAP | PA | 01/04/2006 |
| EPA 8141 | A, B | Stirophos (Tetrachlorovinphos) | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Tokuthion (Prothiophos) | NELAP | PA | 01/19/2005 |
| EPA 8141 | A, B | Trichloronate | NELAP | PA | 01/19/2005 |
| EPA 8151 | A | Chlorinated herbicides by GC/ECD | NELAP | PA | 03/26/2012 |
| EPA 8151 | A | 2,4,5-T | NELAP | PA | 01/19/2005 |
| EPA 8151 | A | 2,4,5-TP (Silvex) | NELAP | PA | 01/19/2005 |
| EPA 8151 | A | 2,4-D | NELAP | PA | 01/19/2005 |
| EPA 8151 | A | 2,4-DB (Butoxon) | NELAP | PA | 04/04/2005 |
| EPA 8151 | A | Dalapon (2,2-Dichloropropionic acid) | NELAP | PA | 01/19/2005 |
| EPA 8151 | A | Dicamba | NELAP | PA | 01/19/2005 |
| EPA 8151 | A | Dichloroprop (Dichlorprop) | NELAP | PA | 01/19/2005 |
| EPA 8151 | A | Dinoseb (2-sec-Butyl-4,6-dinitrophenol, DNBP) | NELAP | PA | 01/19/2005 |
| EPA 8151 | A | MCPA | NELAP | PA | 01/19/2005 |
| EPA 8151 | A | MCPP (Mecoprop) | NELAP | PA | 05/02/2006 |
| EPA 8151 | A | Pentachlorophenol (PCP) | NELAP | PA | 01/19/2005 |
| EPA 8151 | A | Picloram (4-Amino-3,5,6-trichloro-2-pyridinecarboxylic acid) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C | VOCs by GC/MS | NELAP | PA | 03/26/2012 |
| EPA 8260 | D | VOCs by GC/MS | NELAP | PA | 11/04/2019 |
| EPA 8260 | B, C | 2-Chloroethyl vinyl ether | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C | 3,3'-Dimethyl-1-butanol | NELAP | PA | 04/17/2009 |
| EPA 8260 | B, C | 4-Chloro-2-nitrophenol | NELAP | PA | 05/02/2006 |
| EPA 8260 | B, C | Crotonaldehyde | NELAP | PA | 10/30/2014 |
| EPA 8260 | B, C | Epichlorohydrin (1-Chloro-2,3-epoxypropane) | NELAP | PA | 01/04/2006 |
| EPA 8260 | B, C | Ethylene oxide | NELAP | PA | 10/30/2014 |
| EPA 8260 | B, C | Gasoline-range organics (GRO) | NELAP | PA | 06/08/2006 |
| EPA 8260 | B, C | tert-Amyl alcohol (2-Methyl-2-butanol) | NELAP | PA | 04/17/2009 |
| EPA 8260 | B, C | tert-Butyl ethyl ether | NELAP | PA | 05/25/2007 |
| EPA 8260 | B, C | tert-Butyl formate | NELAP | PA | 04/17/2009 |
| EPA 8260 | B, C, D | 1,1,1,2-Tetrachloroethane | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,1,1-Trichloroethane | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,1,2,2-Tetrachloroethane | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113) | NELAP | PA | 05/02/2006 |
| EPA 8260 | B, C, D | 1,1,2-Trichloroethane | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,1-Dichloroethane | NELAP | PA | 01/19/2005 |

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**Eurofins Lancaster Laboratories Environmental LLC**
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**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

### Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8260 | B, C, D | 1,1-Dichloroethene (1,1-Dichloroethylene) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,1-Dichloropropene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,2,3-Trichlorobenzene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,2,3-Trichloropropane (1,2,3-TCP) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,2,3-Trimethylbenzene | NELAP | PA | 09/04/2018 |
| EPA 8260 | B, C, D | 1,2,4-Trichlorobenzene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,2,4-Trimethylbenzene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,2-Dibromo-3-chloropropane (DBCP, Dibromochloropropane) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,2-Dibromoethane (EDB, Ethylene dibromide) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,2-Dichlorobenzene (o-Dichlorobenzene) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,2-Dichloroethane | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,2-Dichloropropane | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,3,5-Trimethylbenzene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,3-Dichlorobenzene (m-Dichlorobenzene) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,3-Dichloropropane | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,4-Dichlorobenzene (p-Dichlorobenzene) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 1,4-Dioxane (1,4-Diethyleneoxide) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 2,2-Dichloropropane | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 2-Butanone (Methyl ethyl ketone, MEK) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 2-Chlorotoluene | NELAP | PA | 05/02/2006 |
| EPA 8260 | B, C, D | 2-Hexanone | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 2-Nitropropane | NELAP | PA | 12/17/2012 |
| EPA 8260 | B, C, D | 4-Chlorotoluene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | 4-Methyl-2-pentanone (MIBK) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Acetone | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Acetonitrile | NELAP | PA | 01/04/2006 |
| EPA 8260 | B, C, D | Acrolein (Propenal) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Acrylonitrile | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Allyl chloride (3-Chloropropene) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Benzene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Benzyl chloride | NELAP | PA | 01/04/2006 |
| EPA 8260 | B, C, D | Bromobenzene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Bromochloromethane | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Bromodichloromethane | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Bromoform | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Carbon disulfide | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Carbon tetrachloride | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Chlorobenzene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Chloroethane | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Chloroform | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Chloroprene (2-Chloro-1,3-butadiene) | NELAP | PA | 04/17/2009 |

Martina M'Harvey

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**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8260 | B, C, D | Cyclohexane | NELAP | PA | 06/29/2010 |
| EPA 8260 | B, C, D | Cyclohexanone | NELAP | PA | 07/03/2007 |
| EPA 8260 | B, C, D | Dibromochloromethane | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Dibromomethane | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Dichlorodifluoromethane (Freon 12) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Diisopropyl ether (DIPE) | NELAP | PA | 07/03/2007 |
| EPA 8260 | B, C, D | Ethanol | NELAP | PA | 01/04/2006 |
| EPA 8260 | B, C, D | Ethyl acetate | NELAP | PA | 01/04/2006 |
| EPA 8260 | B, C, D | Ethyl methacrylate | NELAP | PA | 01/04/2006 |
| EPA 8260 | B, C, D | Ethyl tert-butyl ether (ETBE) | NELAP | PA | 07/03/2007 |
| EPA 8260 | B, C, D | Ethylbenzene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Hexachlorobutadiene (1,3-Hexachlorobutadiene) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Isobutyl alcohol (2-Methyl-1-propanol) | NELAP | PA | 07/03/2007 |
| EPA 8260 | B, C, D | Isopropyl alcohol (2-Propanol) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Isopropylbenzene (Cumene) | NELAP | PA | 08/07/2005 |
| EPA 8260 | B, C, D | Methacrylonitrile | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | Methyl acetate | NELAP | PA | 06/29/2010 |
| EPA 8260 | B, C, D | Methyl bromide (Bromomethane) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Methyl chloride (Chloromethane) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Methyl iodide (Iodomethane) | NELAP | PA | 05/02/2006 |
| EPA 8260 | B, C, D | Methyl tert-butyl ether (MTBE) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Methylcyclohexane | NELAP | PA | 01/21/2009 |
| EPA 8260 | B, C, D | Methylene chloride (Dichloromethane) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Methylmethacrylate | NELAP | PA | 05/02/2006 |
| EPA 8260 | B, C, D | Naphthalene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Pentachloroethane | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | Propionitrile (Ethyl cyanide) | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | Styrene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Tetrachloroethene (PCE, Perchloroethylene) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Tetrahydrofuran (THF) | NELAP | PA | 06/07/2012 |
| EPA 8260 | B, C, D | Toluene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Trichloroethene (TCE, Trichloroethylene) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Trichlorofluoromethane (Freon 11) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Vinyl acetate | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Vinyl chloride (Chloroethene) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | Xylenes, total | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | cis-1,2-Dichloroethene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | cis-1,3-Dichloropropene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | m+p-Xylene | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | n-Butyl acetate | NELAP | PA | 01/19/2016 |
| EPA 8260 | B, C, D | n-Butyl alcohol (n-Butanol, 1-Butanol) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | n-Butylbenzene | NELAP | PA | 01/19/2005 |

Martina M. Harvey

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**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8260 | B, C, D | n-Hexane | NELAP | PA | 09/04/2018 |
| EPA 8260 | B, C, D | n-Propylbenzene | NELAP | PA | 01/04/2006 |
| EPA 8260 | B, C, D | o-Xylene | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | p-Isopropyltoluene (4-Isopropyltoluene) | NELAP | PA | 01/24/2007 |
| EPA 8260 | B, C, D | sec-Butylbenzene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | tert-Amyl methyl ether (TAME) | NELAP | PA | 07/03/2007 |
| EPA 8260 | B, C, D | tert-Butyl alcohol (2-Methyl-2-propanol) | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | tert-Butylbenzene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | trans-1,2-Dichloroethene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | trans-1,3-Dichloropropene | NELAP | PA | 01/19/2005 |
| EPA 8260 | B, C, D | trans-1,4-Dichloro-2-butene | NELAP | PA | 07/03/2007 |
| EPA 8260 SIM | B, C | 1,4-Dioxane (1,4-Diethyleneoxide) | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | SOCs by GC/MS | NELAP | PA | 03/26/2012 |
| EPA 8270 | C, D | 1,1'-Biphenyl (Biphenyl, Lemonene) | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | 1,2,3,4-Tetrachlorobenzene | NELAP | PA | 07/03/2007 |
| EPA 8270 | C, D | 1,2,3,4-Tetrahydronaphthalene | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | 1,2,3,5-Tetrachlorobenzene | NELAP | PA | 07/03/2007 |
| EPA 8270 | C, D | 1,2,4,5-Tetrachlorobenzene | NELAP | PA | 04/04/2005 |
| EPA 8270 | C, D | 1,2,4-Trichlorobenzene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 1,2-Dichlorobenzene (o-Dichlorobenzene) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 1,2-Dinitrobenzene (1,2-DNB) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 1,2-Diphenylhydrazine | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | 1,3,5-Trinitrobenzene (1,3,5-TNB) | NELAP | PA | 01/04/2006 |
| EPA 8270 | C, D | 1,3-Dichlorobenzene (m-Dichlorobenzene) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 1,3-Dinitrobenzene (1,3-DNB) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 1,4-Dichlorobenzene (p-Dichlorobenzene) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 1,4-Dinitrobenzene (1,4-DNB) | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | 1,4-Dioxane (1,4-Diethyleneoxide) | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | 1,4-Naphthoquinone | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 1,4-Phenylenediamine | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 1-Chloronaphthalene | NELAP | PA | 01/04/2006 |
| EPA 8270 | C, D | 1-Methylnaphthalene | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | 1-Naphthylamine (alpha-Naphthylamine) | NELAP | PA | 04/04/2005 |
| EPA 8270 | C, D | 2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl) ether) | NELAP | PA | 10/30/2014 |
| EPA 8270 | C, D | 2,2'-oxybis(1-Chloropropane) | NELAP | PA | 01/04/2006 |
| EPA 8270 | C, D | 2,3,4,6-Tetrachlorophenol | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2,4,5-Trichlorophenol | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2,4,6-Trichlorophenol | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2,4-Dichlorophenol | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2,4-Dimethylphenol | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2,4-Dinitrophenol | NELAP | PA | 01/19/2005 |

Martina M'Harvey

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8270 | C, D | 2,4-Dinitrotoluene (2,4-DNT) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2,6-Dichlorophenol | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2,6-Dinitrotoluene (2,6-DNT) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2-Acetylaminofluorene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2-Chloronaphthalene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2-Chlorophenol | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2-Methylnaphthalene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2-Methylphenol (o-Cresol) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2-Naphthylamine (beta-Naphthylamine) | NELAP | PA | 05/17/2005 |
| EPA 8270 | C, D | 2-Nitroaniline | NELAP | PA | 04/04/2005 |
| EPA 8270 | C, D | 2-Nitrophenol | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 2-Picoline (2-Methylpyridine) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 3+4-Methylphenol (m+p-Cresol) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 3,3'-Dichlorobenzidine | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 3,3'-Dimethoxybenzidine | NELAP | PA | 04/17/2009 |
| EPA 8270 | C, D | 3,3'-Dimethylbenzidine | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 3-Methylcholanthrene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 3-Nitroaniline | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 4,4'-Methylenebis(2-chloroaniline) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 4-Aminobiphenyl | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 4-Bromophenyl phenyl ether | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 4-Chloro-3-methylphenol | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 4-Chloroaniline | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 4-Chlorophenyl phenyl ether | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 4-Nitroaniline | NELAP | PA | 04/04/2005 |
| EPA 8270 | C, D | 4-Nitrophenol | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | 4-Nitroquinoline-1-oxide | NELAP | PA | 07/03/2007 |
| EPA 8270 | C, D | 5-Nitro-o-toluidine | NELAP | PA | 04/04/2005 |
| EPA 8270 | C, D | 6-Methylchrysene | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | 7,12-Dimethylbenz(a)anthracene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Acenaphthene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Acenaphthylene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Acetophenone | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Acrylamide | NELAP | PA | 01/21/2009 |
| EPA 8270 | C, D | Aniline | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Anthracene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Aramite | NELAP | PA | 05/17/2005 |
| EPA 8270 | C, D | Atrazine | NELAP | PA | 01/12/2007 |
| EPA 8270 | C, D | Benzaldehyde | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | Benzenethiol | NELAP | PA | 12/04/2007 |

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**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8270 | C, D | Benzidine | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Benzo[a]anthracene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Benzo[a]pyrene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Benzo[b]fluoranthene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Benzo[ghi]perylene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Benzo[k]fluoranthene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Benzoic acid | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Benzyl alcohol | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Butyl benzyl phthalate (Benzyl butyl phthalate) | NELAP | PA | 05/17/2005 |
| EPA 8270 | C, D | Caprolactam | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | Carbazole | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Chlorobenzilate | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | Chrysene (Benzo[a]phenanthrene) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Di-n-butyl phthalate | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Di-n-octyl phthalate | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Diallate (cis or trans) | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | Dibenz[a,h]acridine | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | Dibenz[a,j]acridine | NELAP | PA | 05/17/2005 |
| EPA 8270 | C, D | Dibenzo[a,h]anthracene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Dibenzofuran | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Diethyl phthalate | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Dimethoate | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | Dimethyl phthalate | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Diphenylamine | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | Disulfoton | NELAP | PA | 07/01/2007 |
| EPA 8270 | C, D | Ethyl methanesulfonate | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Famphur | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | Fluoranthene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Fluorene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Hexachlorobenzene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Hexachlorobutadiene (1,3-Hexachlorobutadiene) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Hexachlorocyclopentadiene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Hexachloroethane | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Hexachloropropene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Indene | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | Indeno(1,2,3-cd)pyrene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Isodrin | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | Isophorone | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Isosafrole | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Kepone | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | Malononitrile | NELAP | PA | 05/23/2013 |
| EPA 8270 | C, D | Methapyrilene | NELAP | PA | 01/19/2005 |

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**DEP Laboratory ID: 36-00037**
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**TNI Code: TNI02128**
**PADWIS ID: 36037**

### Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8270 | C, D | Methyl methanesulfonate | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Methyl parathion (Parathion, methyl) | NELAP | PA | 05/25/2007 |
| EPA 8270 | C, D | N,N-Dimethylacetamide | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | N,N-Dimethylformamide | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | N-Nitrosodi-n-butylamine | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | N-Nitrosodi-n-propylamine | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | N-Nitrosodiethylamine | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | N-Nitrosodimethylamine | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | N-Nitrosodiphenylamine | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | N-Nitrosomethylethylamine | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | N-Nitrosomorpholine | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | N-Nitrosopiperidine | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | N-Nitrosopyrrolidine | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Naphthalene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Nitrobenzene | NELAP | PA | 01/04/2006 |
| EPA 8270 | C, D | O,O,O-Triethyl phosphorothioate | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | Parathion, ethyl (Ethyl parathion, Parathion) | NELAP | PA | 05/25/2007 |
| EPA 8270 | C, D | Pentachlorobenzene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Pentachloronitrobenzene (PCNB) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Pentachlorophenol (PCP) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Phenacetin | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Phenanthrene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Phenol | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Phorate (Thimet) | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | Phthalic anhydride | NELAP | PA | 01/21/2009 |
| EPA 8270 | C, D | Pronamide (Kerb) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Pyrene | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Pyridine | NELAP | PA | 04/04/2005 |
| EPA 8270 | C, D | Quinoline | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | Safrole | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | Sulfotepp (Tetraethyl dithiopyrophosphate) | NELAP | PA | 12/04/2007 |
| EPA 8270 | C, D | Tetraethyl lead | NELAP | PA | 03/07/2012 |
| EPA 8270 | C, D | Thionazine (Thionazin, Zinophos) | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | a,a-Dimethylphenethylamine (Phentermine) | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | bis(2-Chloroethoxy)methane | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | bis(2-Chloroethyl) ether | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | bis(2-Chloromethyl) ether | NELAP | PA | 01/21/2009 |
| EPA 8270 | C, D | bis(2-Ethylhexyl) adipate (di(2-Ethylhexyl) adipate) | NELAP | PA | 01/21/2009 |
| EPA 8270 | C, D | bis(2-Ethylhexyl) phthalate (DEHP) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | o-Toluidine (2-Toluidine, 2-Methylaniline) | NELAP | PA | 01/19/2005 |
| EPA 8270 | C, D | p-(Dimethylamino)azobenzene | NELAP | PA | 05/02/2006 |
| EPA 8270 | C, D | p-Chloronitrobenzene | NELAP | PA | 01/21/2009 |

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**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8270 | C, D | tris-(2,3-Dibromopropyl) phosphate (tris-BP) | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | 1,4-Dioxane (1,4-Diethyleneoxide) | NELAP | PA | 05/14/2018 |
| EPA 8270 SIM | C, D | 1-Methylnaphthalene | NELAP | PA | 07/25/2011 |
| EPA 8270 SIM | C, D | 2-Methylnaphthalene | NELAP | PA | 05/23/2012 |
| EPA 8270 SIM | C, D | Acenaphthene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Acenaphthylene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Anthracene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Benzo[a]anthracene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Benzo[a]pyrene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Benzo[b]fluoranthene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Benzo[ghi]perylene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Benzo[k]fluoranthene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Chrysene (Benzo[a]phenanthrene) | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Dibenzo[a,h]anthracene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Fluoranthene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Fluorene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Indeno(1,2,3-cd)pyrene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Naphthalene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Phenanthrene | NELAP | PA | 12/04/2007 |
| EPA 8270 SIM | C, D | Pyrene | NELAP | PA | 12/04/2007 |
| EPA 8290 | A | PCDDs and PCDFs by HRGC-HRMS | NELAP | PA | 03/04/2015 |
| EPA 8290 | | PCDDs and PCDFs by HRGC-HRMS | NELAP | PA | 03/26/2012 |
| EPA 8290 | A | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-hpcdd) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-hpcdf) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-hpcdf) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 08/06/2010 |
| EPA 8290 | A | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 1,2,3,7,8-Pentachlorodibenzofuran (PeCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | 2,3,4,7,8-Pentachlorodibenzofuran (PeCDF) | NELAP | PA | 08/06/2010 |
| EPA 8290 | A | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)(Dioxin) | NELAP | PA | 06/30/2010 |

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**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8290 | A | 2,3,7,8-Tetrachlorodibenzofuran (TCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total TCDD | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total TCDF | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total heptachlorodibenzo-p-dioxin (HpCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total heptachlorodibenzofuran (HpCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total hexachlorodibenzo-p-dioxin (HxCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total hexachlorodibenzofuran (HxCDF) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total pentachlorodibenzo-p-dioxin (PeCDD) | NELAP | PA | 06/30/2010 |
| EPA 8290 | A | Total pentachlorodibenzofuran (PeCDF) | NELAP | PA | 06/30/2010 |
| EPA 8315 | A | Carbonyl compounds by HPLC | NELAP | PA | 03/26/2012 |
| EPA 8315 | A | 2,5-Dimethylbenzaldehyde | NELAP | PA | 01/21/2009 |
| EPA 8315 | A | Acetaldehyde | NELAP | PA | 01/21/2009 |
| EPA 8315 | A | Benzaldehyde | NELAP | PA | 01/21/2009 |
| EPA 8315 | A | Butanal (Butyraldehyde) | NELAP | PA | 01/21/2009 |
| EPA 8315 | A | Crotonaldehyde | NELAP | PA | 01/21/2009 |
| EPA 8315 | A | Formaldehyde | NELAP | PA | 01/19/2005 |
| EPA 8315 | A | Hexanal (Hexaldehyde) | NELAP | PA | 01/21/2009 |
| EPA 8315 | A | Isovaleraldehyde | NELAP | PA | 01/21/2009 |
| EPA 8315 | A | Pentanal (Valeraldehyde) | NELAP | PA | 01/21/2009 |
| EPA 8315 | A | Propanal (Propionaldehyde) | NELAP | PA | 01/21/2009 |
| EPA 8315 | A | m-Tolualdehyde (1,3-Tolualdehyde) | NELAP | PA | 01/21/2009 |
| EPA 8315 | A | o-Tolualdehyde (1,2-Tolualdehyde) | NELAP | PA | 01/21/2009 |
| EPA 8315 | A | p-Tolualdehyde (1,4-Tolualdehyde) | NELAP | PA | 01/21/2009 |
| EPA 8318 | A | 3-Hydroxycarbofuran | NELAP | PA | 04/04/2005 |
| EPA 8318 | A | Aldicarb (Temik) | NELAP | PA | 04/04/2005 |
| EPA 8318 | A | Aldicarb sulfone | NELAP | PA | 04/04/2005 |
| EPA 8318 | A | Aldicarb sulfoxide | NELAP | PA | 12/12/2005 |
| EPA 8318 | A | Carbaryl (Sevin) | NELAP | PA | 04/04/2005 |
| EPA 8318 | A | Carbofuran (Furaden) | NELAP | PA | 04/04/2005 |
| EPA 8318 | A | Methiocarb (Mesurol) | NELAP | PA | 04/04/2005 |
| EPA 8318 | A | Methomyl (Lannate) | NELAP | PA | 04/04/2005 |
| EPA 8318 | A | N-Methylcarbamates by HPLC | NELAP | PA | 10/15/2012 |
| EPA 8318 | A | Oxamyl (Vydate) | NELAP | PA | 12/12/2005 |
| EPA 8318 | A | Propoxur (Baygon) | NELAP | PA | 04/04/2005 |
| EPA 8330 | A | Nitroaromatics and nitramines by HPLC/UV | NELAP | PA | 03/26/2012 |
| EPA 8330 | B | Nitroaromatics and nitramines by HPLC/UV | NELAP | PA | 07/29/2015 |
| EPA 8330 | A, B | 1,3,5-Trinitrobenzene (1,3,5-TNB) | NELAP | PA | 01/19/2005 |
| EPA 8330 | A, B | 1,3-Dinitrobenzene (1,3-DNB) | NELAP | PA | 01/19/2005 |
| EPA 8330 | A, B | 2,4,6-Trinitrotoluene (2,4,6-TNT) | NELAP | PA | 01/19/2005 |
| EPA 8330 | A, B | 2,4-Diamino-6-nitrotoluene | NELAP | PA | 07/29/2015 |
| EPA 8330 | A, B | 2,4-Dinitrotoluene (2,4-DNT) | NELAP | PA | 01/19/2005 |
| EPA 8330 | A, B | 2,6-Diamino-4-nitrotoluene | NELAP | PA | 07/29/2015 |

Martina M Harvey

**Attached to Certificate of Accreditation 019-002 expiration date 01/31/2021. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.**

**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**

**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| EPA 8330 | A, B | 2,6-Dinitrotoluene (2,6-DNT) | NELAP | PA | 01/19/2005 |
| EPA 8330 | A, B | 2-Amino-4,6-dinitrotoluene (2-Am-DNT) | NELAP | PA | 01/19/2005 |
| EPA 8330 | A, B | 2-Nitrotoluene | NELAP | PA | 01/19/2005 |
| EPA 8330 | A, B | 3,5-Dinitroaniline | NELAP | PA | 07/29/2015 |
| EPA 8330 | A, B | 3-Nitrotoluene | NELAP | PA | 01/19/2005 |
| EPA 8330 | A, B | 4-Amino-2,6-dinitrotoluene (4-Am-DNT) | NELAP | PA | 01/19/2005 |
| EPA 8330 | A, B | 4-Nitrotoluene | NELAP | PA | 01/19/2005 |
| EPA 8330 | A, B | Methyl-2,4,6-trinitrophenylnitramine (Tetryl) | NELAP | PA | 01/19/2005 |
| EPA 8330 | A, B | Nitrobenzene | NELAP | PA | 01/19/2005 |
| EPA 8330 | A, B | Nitroglycerin | NELAP | PA | 10/09/2013 |
| EPA 8330 | A, B | Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) | NELAP | PA | 01/24/2006 |
| EPA 8330 | A, B | Pentaerythritol tetranitrate (PETN) | NELAP | PA | 11/21/2005 |
| EPA 8330 | A, B | RDX (Hexahydro-1,3,5-trinitro-1,3,5-triazine) | NELAP | PA | 01/19/2005 |
| EPA 9012 | A, B | Total cyanide | NELAP | PA | 05/24/2011 |
| EPA 9045 | C, D | pH | NELAP | PA | 11/19/2008 |
| EPA 9050 | A | Conductivity | NELAP | PA | 01/27/2014 |
| EPA 9050 | | Conductivity | NELAP | PA | 05/17/2005 |
| EPA 9056 | A | Anions by IC | NELAP | PA | 07/05/2018 |
| EPA 9056 | A | Bromide | NELAP | PA | 07/05/2018 |
| EPA 9056 | A | Chloride | NELAP | PA | 11/27/2019 |
| EPA 9056 | A | Fluoride | NELAP | PA | 07/05/2018 |
| EPA 9056 | A | Nitrate as N | NELAP | PA | 11/27/2019 |
| EPA 9056 | A | Nitrite as N | NELAP | PA | 07/05/2018 |
| EPA 9056 | A | Sulfate | NELAP | PA | 07/05/2018 |
| EPA 9060 | A | Total organic carbon (TOC) | NELAP | PA | 01/19/2005 |
| EPA 9066 | | Total phenolics | NELAP | PA | 04/04/2005 |
| EPA 9071 | B | Oil and grease | NELAP | PA | 01/19/2005 |
| EPA 9071 | B | Total petroleum hydrocarbons (TPH) | NELAP | PA | 11/19/2015 |
| EPA 9095 | A | Paint filter liquids test | NELAP | PA | 01/24/2007 |
| EPA 9095 | B | Paint filter liquids test | NELAP | PA | 11/19/2015 |
| EPA Lloyd Kahn Method | | Total organic carbon (TOC) | NELAP | PA | 10/09/2013 |
| MA DEP EPH | 1.1 | C11-C22 Aromatics | NELAP | PA | 07/15/2013 |
| MA DEP EPH | 1.1 | C19-C36 Aliphatics | NELAP | PA | 07/15/2013 |
| MA DEP EPH | 1.1 | C9-C18 Aliphatics | NELAP | PA | 07/15/2013 |
| MA DEP VPH | 1.1 | C5-C8 Aliphatics | NELAP | PA | 07/15/2013 |
| MA DEP VPH | 1.1 | C9-C10 Aromatics | NELAP | PA | 07/15/2013 |
| MA DEP VPH | 1.1 | C9-C12 Aliphatics | NELAP | PA | 07/15/2013 |
| MA DEP VPH | 2.1 | C5-C8 Aliphatics | NELAP | PA | 07/16/2018 |
| MA DEP VPH | 2.1 | C9-C10 Aromatics | NELAP | PA | 07/16/2018 |
| MA DEP VPH | 2.1 | C9-C12 Aliphatics | NELAP | PA | 07/16/2018 |

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

# Laboratory Scope of Accreditation

**Attached to Certificate of Accreditation 019-002 expiration date 01/31/2021. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.**


**Eurofins Lancaster Laboratories Environmental LLC**
**2425 New Holland Pike**
**Lancaster, PA 17601-5994**
**(717) 656-2300**


**DEP Laboratory ID: 36-00037**
**EPA Lab Code: PA00009**
**TNI Code: TNI02128**
**PADWIS ID: 36037**

## Matrix: Solid and Chemical Materials

| Method | Revision | Analyte | Accreditation Type | Primary State | Effective Date |
|---|---|---|---|---|---|
| NWTPH-Dx | | Diesel-range organics (DRO) | NELAP | PA | 12/12/2005 |
| NWTPH-Gx | | Gasoline-range organics (GRO) | NELAP | PA | 12/12/2005 |
| SM 2540 E | | Fixed suspended solids | NELAP | PA | 01/19/2016 |
| SM 2540 E | | Residue, volatile | NELAP | PA | 01/19/2016 |
| SM 2540 E | | Volatile dissolved solids | NELAP | PA | 01/19/2016 |
| SM 2540 E | | Volatile suspended solids | NELAP | PA | 01/19/2016 |
| SM 2540 G | | Percent moisture in soil | NELAP | PA | 11/19/2015 |
| SM 2540 G | | Residue, total | NELAP | PA | 02/25/2014 |
| SM 2540 G | | Residue, volatile | NELAP | PA | 11/19/2015 |
| SM 2540 G | | Total, fixed, and volatile residue | NELAP | PA | 03/19/2015 |
| SM 4500-NH3 B | | Ammonia distillation | NELAP | PA | 08/30/2019 |
| SM 4500-NH3 C | | Ammonia as N | NELAP | PA | 08/30/2019 |
| SM 5310 B | | Total organic carbon (TOC) | NELAP | PA | 10/09/2013 |
| TX1005 (TNRCC) | | Total petroleum hydrocarbons (TPH) | NELAP | PA | 12/12/2005 |
| TX1006 (TNRCC) | | Total petroleum hydrocarbons (TPH) | NELAP | PA | 12/12/2005 |
| WA-EPH | | Diesel-range organics (DRO) | NELAP | PA | 12/12/2005 |
| WA-VPH | | Gasoline-range organics (GRO) | NELAP | PA | 12/12/2005 |

Martina M. Harvey

# Appendix D

# National Functional Guidelines for Organic Superfund Methods Data Review (SOM02.3, OLEM 9355.0-136, EPA-540-R-2017-002), January 2017*

** - in portable document format (PDF) on the USB Drive attached to the hard copy of this report*

# NATIONAL FUNCTIONAL GUIDELINES

## for Organic Superfund Methods Data Review

Office of Superfund Remediation and Technology Innovation (OSRTI)
United States Environmental Protection Agency (EPA)
Washington, DC 20460

OLEM 9355.0-136
EPA-540-R-2017-002
**January 2017**

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**NOTICE**

The policies and procedures set forth here are intended as guidance to the United States Environmental Protection Agency (EPA) and other governmental employees. They do not constitute rule-making by the EPA, and may not be relied upon to create a substantive or procedural right enforceable by any other person. The Government may take action that is at a variance with the policies and procedures in this manual.

This document can be obtained from the EPA's Superfund Analytical Services and Contract Laboratory Program website at:

https://www.epa.gov/clp/contract-laboratory-program-national-functional-guidelines-data-review

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## TABLE OF CONTENTS

## LIST OF TABLES

# ACRONYMS AND ABBREVIATIONS

## I. Terminology

The following acronyms and abbreviations may be found throughout this document. For definitions, see Appendix A: Glossary at the end of the document.

| | |
|---|---|
| **ARO** | Aroclors |
| **BFB** | Bromofluorobenzene |
| **CAS** | Chemical Abstracts Service |
| **CCS** | Contract Compliance Screening |
| **CCV** | Continuing Calibration Verification |
| **CF** | Calibration Factor |
| $\overline{\textbf{CF}}$ | Mean Calibration Factor |
| **CLP** | Contract Laboratory Program |
| **COR** | Contracting Officer's Representative |
| **CRQL** | Contract Required Quantitation Limit |
| **CS3** | Mid-point Calibration Standard |
| **CSF** | Complete SDG File |
| **DCB** | Decachlorobiphenyl |
| **DFTPP** | Decafluorotriphenylphosphine |
| **DMC** | Deuterated Monitoring Compound |
| **DQA** | Data Quality Assessment |
| **DQO** | Data Quality Objective |
| **EDM** | EXES Data Manager |
| **EPA** | United States Environmental Protection Agency |
| **EXES** | Electronic Data Exchange and Evaluation System |
| **GC** | Gas Chromatograph or Gas Chromatography |
| **GC/ECD** | Gas Chromatograph/Electron Capture Detector |
| **GC/MS** | Gas Chromatograph/Mass Spectrometer or Gas Chromatography/Mass Spectrometry |
| **GPC** | Gel Permeation Chromatography |
| **ICAL** | Initial Calibration |
| **ICV** | Initial Calibration Verification |
| **INDA** | Individual Standard Mixture A |
| **INDB** | Individual Standard Mixture B |
| **INDC** | Individual Standard Mixture C |
| **IUPAC** | International Union of Pure and Applied Chemistry |
| **LCS** | Laboratory Control Sample |
| **LEB** | Leachate Extraction Blank |

| | |
|---|---|
| **MS** | Mass Spectrometer or Mass Spectrometry |
| **MS** | Matrix Spike |
| **MSD** | Matrix Spike Duplicate |
| **NFG** | National Functional Guidelines |
| **NIH** | National Institutes of Health |
| **NIST** | National Institute of Standards and Technology |
| **OSRTI** | Office of Superfund Remediation and Technology Innovation |
| **%Breakdown** | Percent Breakdown |
| **%D** | Percent Difference |
| **%R** | Percent Recovery |
| **%Resolution** | Percent Resolution |
| **%RSD** | Percent Relative Standard Deviation |
| **%Solids** | Percent Solids |
| **PAH** | Polycyclic Aromatic Hydrocarbon |
| **PCP** | Pentachlorophenol |
| **PCBs** | Polychlorinated Biphenyls |
| **PE** | Performance Evaluation |
| **PEM** | Performance Evaluation Mixture |
| **PEST** | Pesticides |
| **P/T** | Purge-and-trap |
| **QA** | Quality Assurance |
| **QAPP** | Quality Assurance Project Plan |
| **QC** | Quality Control |
| **RESC** | Resolution Check Mixture |
| **RFQ** | Request for Quote |
| **RIC** | Reconstructed Ion Chromatogram |
| **RPD** | Relative Percent Difference |
| **RRF** | Relative Response Factor |
| $\overline{\textbf{RRF}}$ | Mean Relative Response Factor |
| **RRT** | Relative Retention Time |
| **RT** | Retention Time |
| $\overline{\textbf{RT}}$ | Mean Retention Time |
| **SAP** | Sampling and Analysis Plan |
| **SDG** | Sample Delivery Group |
| **SEDD** | Staged Electronic Data Deliverable |
| **SIM** | Selected Ion Monitoring |
| **SMO** | Sample Management Office |

| | |
|---|---|
| **SOP** | Standard Operating Procedure |
| **SOW** | Statement of Work |
| **SPLP** | Synthetic Precipitation Leaching Procedure |
| **SVOA** | Semivolatiles |
| **TAL** | Target Analyte List |
| **TCLP** | Toxicity Characteristic Leaching Procedure |
| **TCX** | Tetrachloro-m-xylene |
| **TIC** | Tentatively Identified Compound |
| **TR/COC** | Traffic Report/Chain of Custody |
| **UV** | Ultraviolet |
| **VOA** | Volatiles |
| **ZHE** | Zero Headspace Extraction |

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# INTRODUCTION

## I. Purpose of Document

This document contains guidance to aid the data reviewer in determining the usability of analytical data generated using the United States Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) Statement of Work (SOW) for Organic Superfund Methods (Multi-Media, Multi-Concentration) SOM02.4. The SOW includes analytical methods for Trace Volatiles (Trace VOA), Low-Medium Volatiles (Low/Med VOA), Semivolatiles (SVOA), Pesticides (PEST), and Aroclors (ARO).

The guidelines presented in this document are designed to assist the data reviewer in evaluating: (a) whether the analytical data meet the technical and Quality Control (QC) criteria specified in the SOW, and (b) the usability and extent of bias of any data not meeting these criteria. This document contains definitive guidance in areas such as blanks, calibration standards, QC audit samples, and instrument performance checks, in which performance is fully under a laboratory's control. General guidance is provided to aid the reviewer in making subjective judgments regarding the use of data that are affected by site conditions (e.g., sample matrix effects) and do not meet SOW-specific requirements.

## II. Limitations of Use

This guidance is specific to the review of analytical data generated using CLP SOW SOM02.4. It applies to the current version of the SOW, as well as future versions that contain editorial changes. To use this document effectively, the reviewer should have an understanding of the analytical methods and a general overview of the Sample Delivery Group (SDG) or Case at hand. This guidance is not appropriate for use in conducting contract compliance reviews and should be used with caution in reviewing data generated using methods other than the CLP SOW SOM02.4, although the general types of QC checks, the evaluation procedures, and the decisions made after consideration of the evaluation criteria may be applicable to data from any similar method.

While this document is a valuable aid in the data review process, other sources of guidance and information, along with professional judgment, are useful in determining the ultimate usability of the data. This is particularly critical in those cases where all data do not meet SOW-specific technical and QC criteria. To make the appropriate judgments, the reviewer needs to gain a complete understanding of the intended use of the data, and is strongly encouraged to establish a dialogue with the data user prior to and following the data review, to discuss usability issues and resolve questions regarding the review.

## III. Document Organization

Following this introduction, the document is presented in two major parts: Part A – General Data Review, which applies to all methods; and Part B – Method-Specific Data Review. In Part B, each method is addressed individually in a stand-alone format. A complete list of acronyms used in this document appears preceding this Introduction, and a Glossary is appended as Appendix A.

## IV. For Additional Information

For additional information regarding the CLP and the services it provides, refer to EPA's Superfund Analytical Services and Contract Laboratory Program website at https://www.epa.gov/clp.

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# PART A: GENERAL DATA REVIEW

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## I. Preliminary Review

A preliminary review should be performed on the data, prior to embarking on the method-specific review (see Part B). During this process, the reviewer should compile the necessary data package elements to ensure that all of the information needed to determine data usability is available. The preliminary review also allows the reviewer to obtain an overview of the Case or Sample Delivery Group (SDG) under review.

This initial review should include, but is not limited to, verification of the exact number of samples, their assigned number and matrices, and the Contractor laboratory name. It should take into consideration all the documentation specific to the sample data package, which may include Modified Analysis requests, the Traffic Report/Chain of Custody (TR/COC) Record, the SDG Narrative, and other applicable documents.

The reviewer should be aware that minor modifications to the Statement of Work (SOW) that have been made through a Modified Analysis request, to meet site-specific requirements, could affect certain validation criteria such as the Contract Required Quantitation Limits (CRQLs), initial calibration (ICAL) levels, and Target Analyte Lists (TALs). Therefore, these modifications should be applied during the method-specific review (Part B) process.

The Cases or SDGs routinely have unique field quality control (QC) samples that may affect the outcome of the review. These include field and trip blanks, field duplicates, and Performance Evaluation (PE) samples which must be identified in the sampling records. The reviewer should verify that the following information is identified in the sampling records (e.g., TR/COC Records, field logs, and/or Contractor tables):

1. The United States Environmental Protection Agency (EPA) Region where the samples were collected; and
2. The complete list of samples with information on:
    a. Sample matrix
    b. Field blanks and trip blanks (if applicable)
    c. Field duplicates (if applicable)
    d. Field spikes (if applicable)
    e. PE samples (if applicable)
    f. Sampling dates
    g. Sampling times
    h. Shipping dates
    i. Preservatives
    j. Types of analysis
    k. Contractor laboratory

The laboratory's SDG Narrative is another source of general information, which includes notable problems with matrices; insufficient sample volume for analysis or reanalysis; samples received in broken containers; preservation information; and unusual events. The reviewer should also inspect any email or telephone/communication logs in the data package detailing any discussion of sample logistics, preparation, and/or analysis issues between the laboratory, the Contract Laboratory Program (CLP) Sample Management Office (SMO), and the EPA Region.

The reviewer should also have a copy of the Quality Assurance Project Plan (QAPP), or similar document, for the project for which samples were analyzed, to assist in the determination of final usability of the analytical data. The reviewer should contact the appropriate EPA Regional CLP Contracting Officer's Representative (EPA Regional CLP COR) to obtain copies of the QAPP and relevant site information.

For data obtained through the CLP, the Staged Electronic Data Deliverable (SEDD) generated by the CLP laboratories is subjected to the following reviews via the Electronic Data Exchange and Evaluation System (EXES): 1) automated data assessment for Contract Compliance Screening (CCS) based on the technical and QC criteria in CLP SOW SOM02.4, and 2) automated data validation based on the criteria in the *EPA CLP National Functional Guidelines for Organic Superfund Methods Data Review*. In addition, completeness checks are manually performed on the hardcopy data. The automated CCS results and hardcopy data issues are subsequently included in a CCS defect report that is provided to the laboratory. The laboratory may then submit a reconciliation package for any missing items or to correct noncompliant data identified in the report. The automated data validation results are summarized in criteria-based National Functional Guidelines (NFG) reports that are provided to the EPA Regions. The data reviewer can access the CCS and NFG reports through the EXES Data Manager (EDM) via the Superfund Analytical Services SMO Portal and may use them in determining data usability.

For access to the Superfund Analytical Services SMO Portal, refer to the following EPA Superfund Analytical Services and Contract Laboratory Program web page to contact the EPA Regional CLP COR from the EPA Region where the data review is being performed and obtain the necessary username and password information:

https://www.epa.gov/clp/forms/contact-us-about-superfund-analytical-services-or-contract-laboratory-program#tab-3

For concerns or questions regarding the data package, contact the EPA Regional CLP COR from the EPA Region where the samples were collected.

## II. Data Qualifier Definitions

The following definitions provide brief explanations of the national qualifiers assigned to results during the data review process. The reviewer should use these qualifiers as applicable. If the reviewer chooses to use additional qualifiers, a complete explanation of those qualifiers should accompany the data review.

**Table 1. Data Qualifiers and Definitions**

| Data Qualifier | Definition |
|---|---|
| **U** | The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit. |
| **J** | The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample. |
| **J+** | The result is an estimated quantity, but the result may be biased high. |
| **J-** | The result is an estimated quantity, but the result may be biased low. |
| **NJ** | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value is the estimated concentration in the sample. |
| **UJ** | The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise. |

| Data Qualifier | Definition |
|---|---|
| **R** | The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample. |
| **C** | The target Pesticide or Aroclor analyte identification has been confirmed by Gas Chromatography/Mass Spectrometry (GC/MS). |
| **X** | The target Pesticide or Aroclor analyte identification was not confirmed when GC/MS analysis was performed. |

## III. Data Review Narrative

The reviewer should complete a Data Review Narrative that includes comments that address the problems identified during the review process and state the limitations of the data associated with a Case or SDG. The EPA CLP sample numbers, analytical methods, extent of the problem(s), and assigned qualifiers should also be listed in the document.

The Data Review Narrative, including the Organic Data Review Summary form (see Appendix B), should be provided together with the laboratory data to the appropriate data recipient(s). A copy of the Data Review Narrative should also be submitted to the EPA Regional CLP COR assigned oversight responsibility for the Contractor laboratory.

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# PART B: METHOD-SPECIFIC DATA REVIEW

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# TRACE VOLATILE DATA REVIEW

The Trace Volatile organic data requirements to be reviewed during validation are listed below:

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# I. Preservation and Holding Times

## A. Review Items

Form 1A-OR, Form 1B-OR, Traffic Report/Chain of Custody (TR/COC) Record documentation, Form DC-1, raw data, and the Sample Delivery Group (SDG) Narrative checking for: pH, shipping container temperature, holding time, and other sample conditions. (SOW SOM02.4 – Exhibit B, Section 3.4; Exhibit D/Introduction, Section 5.0; Exhibit D/General, Sections 8.0 and 10.1.2.1; and Exhibit D/Trace VOA, Section 8.0)

## B. Objective

The objective is to determine the validity of the analytical results based on the sample conditions and the holding time of the sample.

## C. Criteria

1. Technical holding time is determined from the date of field sample collection to the date of sample analysis.
2. Samples should be in proper condition with shipping container temperatures at ≤ 6°C upon receipt at the laboratory. The samples shall be protected from light and refrigerated at ≤ 6°C (but not frozen) from the time of receipt at the laboratory until sample analysis.
3. The technical holding time criteria for aqueous samples that are properly cooled at ≤ 6°C without any indications of being preserved is 7 days.
4. The technical holding time criteria for aqueous samples that are properly cooled at ≤ 6°C and acid-preserved with HCl to a pH of ≤ 2 is 14 days.

## D. Evaluation

1. Review the SDG Narrative to determine if the samples were properly preserved and arrived at the laboratory in proper condition (e.g., received intact, appropriate sample temperature at receipt, pH, and absence of air bubbles or detectable headspace). If there is an indication of problems with the samples, the sample integrity may be compromised.
2. Verify that the analysis dates on Form 1A-OR, Form 1B-OR, and the raw data are identical.
3. Establish technical holding times by comparing the sample collection dates on the TR/COC Record documentation with the dates of analysis on Form 1A-OR, Form 1B-OR, and the raw data. Also consider information contained in the Complete SDG File (CSF), as it may be helpful in the assessment.
    a. These evaluation guidelines are intended to address the integrity of data for <u>all</u> analytes listed in SOW SOM02.4 Exhibit C, Table 1 – Trace Volatiles Target Analyte List and Contract Required Quantitation Limits. If the data user is interested in only a subset of the analytes and <u>has data</u> supporting analyte stability over longer holding times, then those longer times may be applied prior to data qualification under Section E, below. This information should be made part of the Data Review Narrative for evidentiary purposes.

## E. Action

1. If samples are received with shipping container temperatures > 6°C but ≤ 10°C, use professional judgment to qualify detects and non-detects.
2. If samples are received with shipping container temperatures > 10°C, use professional judgment to determine the reliability of the data, or qualify detects as estimated (J) and non-detects as estimated (UJ).
3. If a discrepancy is found between the sample analysis date on Form 1A-OR, Form 1B-OR, and the raw data, perform a more comprehensive review to determine the correct date to be used for establishing the holding time.

4. If samples are not properly preserved but are analyzed within the technical holding time of 7 days, detects and non-detects should not be qualified.
5. If samples are not properly preserved and are analyzed outside of the technical holding time of 7 days, qualify detects as estimated (J) and non-detects as unusable (R).
6. If samples are properly preserved and are analyzed within the technical holding time of 14 days, detects and non-detects should not be qualified.
7. If samples are properly preserved, but are analyzed outside of the technical holding time of 14 days, qualify detects as estimated (J) and non-detects as unusable (R).
8. When the holding times are exceeded, annotate in the Data Review Narrative any possible consequences for the analytical results.
9. If holding times are grossly exceeded, qualify detects as estimated (J) and non-detects as unusable (R). Note this for United States Environmental Protection Agency Regional Contract Laboratory Program Contracting Officer's Representative (EPA Regional CLP COR) action. Annotate the effect of the holding time exceedance on the resulting data in the Data Review Narrative, whenever possible.

**Table 2. Preservation and Holding Time Actions for Trace Volatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| Sample temperature > 6°C but ≤ 10°C upon receipt at the laboratory | Use professional judgment | Use professional judgment |
| Sample temperature > 10°C upon receipt at the laboratory | Use professional judgment<br>J* | Use professional judgment<br>UJ |
| Sample not preserved but analyzed within the 7-day technical holding time | No qualification | No qualification |
| Samples not preserved and analyzed outside the 7-day technical holding time | J* | R |
| Sample properly preserved and analyzed within the 14-day technical holding time | No qualification | No qualification |
| Sample properly preserved but analyzed outside the 14-day technical holding time | J* | R |
| Holding time grossly exceeded | J* | R |

* The true direction of any bias may be unknown in this case. Use caution in determining whether some detected analytes should be qualified as estimated low (J-) or as estimated high (J+), based on knowledge of individual analyte stability or interactions (i.e., dehydrohalogenation).

## II. Gas Chromatograph/Mass Spectrometer Instrument Performance Check

### A. Review Items

Form 5-OR, bromofluorobenzene (BFB) mass spectra, and mass listing. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Trace VOA, Section 9.2)

### B. Objective

The objective of performing Gas Chromatograph/Mass Spectrometer (GC/MS) instrument performance checks is to ensure adequate mass resolution, identification, and to some degree, sensitivity, and to document this level of performance prior to analyzing any sequence of standards or samples.

### C. Criteria

1. A sufficient amount of the BFB instrument performance check solution (up to 50 ng BFB on-column) must be injected once at the beginning of each 12-hour period, during which samples, blanks, or standards are to be analyzed. The 12-hour period begins with the injection of BFB; however, in cases where a closing Continuing Calibration Verification (CCV) can be used as an opening CCV, the 12-hour period begins with the injection of the opening CCV.

   Listed below are examples of acceptable analytical sequences incorporating the use of the opening and/or closing CCV. Use these examples as a guide for the possible analytical sequences that can be expected.

| Conditions for When Example Sequence is Appropriate: | Acceptable Criteria That Must Be Met: | Notes: |
|---|---|---|
| *Use Example 1* if time remains on the 12-hour clock after the initial calibration sequence. | • BFB tunes meet instrument performance criteria.<br>• The five Initial Calibration standards meet initial calibration criteria.<br>• Initial Calibration Verification (ICV) meets ICV criteria.<br>• CCV A meets both opening and closing CCV criteria.<br>• CCV B meets closing CCV criteria. | The requirement of starting the new 12-hour clock for Analytical Sequence 2 with a new BFB tune is waived if CCV A meets opening CCV criteria. If CCV B meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B. |
| *Use Example 2* if time remains on the 12-hour clock after the initial calibration sequence. | • BFB tunes meet instrument performance criteria.<br>• The five Initial Calibration standards meet initial calibration criteria.<br>• ICV meets ICV criteria.<br>• CCV A meets closing CCV criteria (but does not meet opening CCV criteria).<br>• CCV B meets opening CCV criteria.<br>• CCV C meets closing CCV criteria. | CCV A does not meet opening CCV criteria. Therefore, a new BFB tune must be performed, immediately followed by CCV B, before a method blank and any samples may be analyzed. In this case, the new 12-hour clock and Analytical Sequence 2 begins with the injection of the new BFB tune. |

| Conditions for When Example Sequence is Appropriate: | Acceptable Criteria That Must Be Met: | Notes: |
|---|---|---|
| *Use Example 3* if more than 12 hours have elapsed since the most recent initial calibration or closing CCV,<br>OR<br>if the most recent closing CCV was not or could not be used as an opening CCV. | • BFB tunes meet instrument performance criteria.<br>• CCV A meets opening CCV criteria.<br>• CCV B meets both opening and closing CCV criteria.<br>• CCV C meets both opening and closing CCV criteria. | The requirement of starting the new 12-hour clock for Analytical Sequence 2 with a new BFB tune is waived if CCV B meets opening CCV criteria. If CCV C meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B. |
| *Use Example 4* if more than 12 hours have elapsed since the most recent initial calibration or closing CCV,<br>OR<br>if the most recent closing CCV was not or could not be used as an opening CCV. | • BFB tunes meet instrument performance criteria.<br>• CCV A meets opening CCV criteria.<br>• CCV B meets closing CCV criteria (but does not meet opening CCV criteria).<br>• CCV C meets opening CCV criteria.<br>• CCV D meets both opening and closing CCV criteria. | CCV B does not meet opening CCV criteria. Therefore, a new BFB tune must be performed, immediately followed by CCV C, before a method blank and any samples may be analyzed. In this case, the new 12-hour clock and Analytical Sequence 2 begins with the injection of the new BFB tune. The requirement of starting the new 12-hour clock for Analytical Sequence 3 with a new BFB tune is waived if CCV D meets opening CCV criteria. If CCV D meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV D. |

**Example 1:**

| Example 1: | Time | Material Injected | Analytical Sequence # |
|---|---|---|---|
| Start of 12-hour clock for Analytical Sequence 1 | 0 hr | BFB | 1 |
| | | Initial Calibration 0.5 | 1 |
| | | Initial Calibration 1.0 | 1 |
| | | Initial Calibration 5.0 | 1 |
| | | Initial Calibration 10 | 1 |
| | | Initial Calibration 20 | 1 |
| | | ICV | 1 |
| | | Method Blank | 1 |
| | | Subsequent Samples | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| End of 12-hour clock for Analytical Sequence 1/ Beginning of 12-hour clock for Analytical Sequence 2 | 12 hr | CCV A (meets opening CCV criteria) | 1/2 |
| | | Method Blank | 2 |
| | | Subsequent Samples | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| End of 12-hour clock for Analytical Sequence 2/ Beginning of 12-hour clock for Analytical Sequence 3 | 24 hr | CCV B (meets opening CCV criteria) | 2/3 |

**Example 2:**

| **Example 2:** | **Time** | **Material Injected** | **Analytical Sequence #** |
|---|---|---|---|
| Start of 12-hour clock for Analytical Sequence 1 | 0 hr | BFB | 1 |
| | | Initial Calibration 0.5 | 1 |
| | | Initial Calibration 1.0 | 1 |
| | | Initial Calibration 5.0 | 1 |
| | | Initial Calibration 10 | 1 |
| | | Initial Calibration 20 | 1 |
| | | ICV | 1 |
| | | Method Blank | 1 |
| | | Subsequent Samples | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| End of 12-hour clock for Analytical Sequence 1 | 12 hr | CCV A (meets closing CCV criteria; fails opening CCV criteria) | 1 |
| Beginning of 12-hour clock for Analytical Sequence 2 | 13 hr | BFB | 2 |
| | | CCV B (meets opening CCV criteria) | 2 |
| | | Method Blank | 2 |
| | | Subsequent Samples | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| End of 12-hour clock for Analytical Sequence 2 | 25 hr | CCV C (meets closing CCV criteria) | 2 |

**Example 3:**

| Example 3: | Time | Material Injected | Analytical Sequence # |
|---|---|---|---|
| Start of 12-hour clock for Analytical Sequence 1 | 0 hr | BFB | 1 |
| | | CCV A (meets opening CCV criteria) | 1 |
| | | Method Blank | 1 |
| | | Subsequent Samples | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| End of 12-hour clock for Analytical Sequence 1/ Beginning of 12-hour clock for Analytical Sequence 2 | 12 hr | CCV B (meets opening CCV criteria) | 1/2 |
| | | Method Blank | 2 |
| | | Subsequent Samples | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | |
| End of 12-hour clock for Analytical Sequence 2/ Beginning of 12-hour clock for Analytical Sequence 3 | 24 hr | CCV C (meets opening CCV criteria) | 2/3 |

**Example 4:**

| Example 4: | Time | Material Injected | Analytical Sequence # |
|---|---|---|---|
| Start of 12-hour clock for Analytical Sequence 1 | 0 hr | BFB | 1 |
| | | CCV A (meets opening CCV criteria) | 1 |
| | | Method Blank | 1 |
| | | Subsequent Samples | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | |
| End of 12-hour clock for Analytical Sequence 1 | 12 hr | CCV B (meets closing CCV criteria; fails opening CCV criteria) | 1 |
| Beginning of 12-hour clock for Analytical Sequence 2 | 13 hr | BFB | 2 |
| | | CCV C (meets opening CCV criteria) | 2 |
| | | Method Blank | 2 |
| | | Subsequent Samples | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | |
| End of 12-hour clock for Analytical Sequence 2/ Beginning of 12-hour clock for Analytical Sequence 3 | 25 hr | CCV D (meets opening CCV criteria) | 2/3 |

2. The BFB instrument performance check must meet the ion abundance criteria listed in Table 3.

**Table 3. Ion Abundance Criteria for BFB**

| Mass | Ion Abundance Criteria |
|---|---|
| 50 | 15.0 - 40.0% of mass 95 |
| 75 | 30.0 - 80.0% of mass 95 |
| 95 | Base peak, 100% relative abundance |
| 96 | 5.0 - 9.0% of mass 95* |
| 173 | Less than 2.0% of mass 174 |
| 174 | 50.0% - 120% of mass 95 |
| 175 | 5.0 - 9.0% of mass 174 |
| 176 | 95.0 - 101% of mass 174 |
| 177 | 5.0 - 9.0% of mass 176 |

* All ion abundances must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

## D. Evaluation

1. Verify that the BFB Instrument Performance Check is analyzed at the specified frequency and sequence.
2. Compare the data presented on Form 5-OR for each Instrument Performance Check with each mass listing submitted to ensure the following:
   a. Form 5-OR is present and completed for each required BFB at the specified frequency.
   b. The laboratory has not made transcription errors between the data and the form. If there are major differences between the mass listing and Form 5-OR, a more in-depth review of the data is required. This may include obtaining and reviewing additional information from the laboratory.
   c. The appropriate number of significant figures has been reported (number of significant figures given for each ion in the Ion Abundance Criteria column) and that rounding is correct.
   d. The laboratory has not made any calculation errors.
3. Verify from the raw data (mass listing) that the mass assignment is correct and that the mass listing is normalized to the specified m/z of 95, 174, and 176, respectively.
4. Verify that the ion abundance criteria are met. The ion abundance for m/z 173, 175, 176, and 177 are calculated by normalizing to the specified m/z. The critical ion abundance criteria for BFB are the relative abundance ratios of m/z 95/96, 174/175, 174/176, and 176/177. The relative abundance ratios of m/z 50 and 75 are of lower importance for target analytes than for Tentatively Identified Compounds (TICs).
5. If possible, verify that spectra are generated using appropriate background subtraction techniques. Since the BFB spectrum is obtained from chromatographic peaks that should be free from co-elution problems, background subtraction should be performed in accordance with the following procedure:
   a. Three scans (the peak apex scan and the scans immediately preceding and following the apex) are acquired and averaged.

b. Background subtraction must be accomplished using a single scan acquired within 20 scans of the elution of BFB, but the BFB peak must not be subtracted as part of the background.

**NOTE:** All mass spectrometer instrument conditions must be identical to those used for sample analysis. Background subtraction actions resulting in spectral distortions for the sole purpose of meeting the method specifications are contrary to the Quality Assurance (QA) objectives, and are therefore unacceptable.

**NOTE:** For data obtained from the CLP, information regarding noncompliant BFB instrument performance checks can be obtained from the National Functional Guidelines (NFG) reports and may be used as part of the evaluation process.

## E. Action

1. If the instrument performance check is not analyzed at the specified frequency and sequence, qualify detects and non-detects in the associated samples as unusable (R). The EPA Regional CLP COR should be contacted to arrange for reanalysis of all affected samples.

   a. In the event that samples cannot be reanalyzed, examine all calibrations associated with the sequence to evaluate whether proper qualitative criteria were achievable. If so, it may be possible to salvage usable data from the sequence. Otherwise, qualify the data as unusable (R).

2. If minor transcription errors are found to be insignificant to data quality and can be corrected on a copy of the form, no further action is required.

3. If the laboratory failed to provide the correct forms, or if significant transcription or calculation errors are found, notify the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data, and notify the EPA Regional CLP COR.

4. If the mass assignment is in error (e.g., m/z 96 is indicated as the base peak rather than m/z 95), qualify detects and non-detects in the associated samples as unusable (R).

5. If the ion abundance criteria in Table 3 are not met, use professional judgment to qualify detects and non-detects in the associated samples.

6. Annotate decisions to use analytical data associated with noncompliant BFB instrument performance checks in the Data Review Narrative.

7. If the instrument performance check criteria are achieved using techniques other than those described in Section II.D.5, obtain additional information to evaluate the performance and procedures. Note any concerns (e.g., use of inappropriate technique for background subtraction) or questions for EPA Regional CLP COR action.

## III. Initial Calibration

### A. Review Items

Form 6A-OR, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Trace VOA, Sections 7.2.2.1 and 9.3)

### B. Objective

The objective of initial calibration (ICAL) is to ensure that the instrument is capable of producing acceptable qualitative and quantitative data.

### C. Criteria

1. ICAL should be performed at the specified frequency and sequence. Each GC/MS system must be calibrated with a minimum of five concentrations to determine instrument sensitivity and the linearity of GC/MS response for the purgeable target analytes and Deuterated Monitoring Compounds (DMCs).
   a. ICAL standards must be analyzed prior to any analysis of the ICV, samples, and required blanks and within 12 hours of the associated instrument performance check at the beginning of each analytical sequence, or as necessary if the CCV acceptance criteria are not met.
   b. ICAL standards must contain all required target analytes and DMCs at concentrations of 0.50, 1.0, 5.0, 10, and 20 µg/L for non-ketones, and 5.0, 10, 50, 100, and 200 µg/L for ketones.
   c. All three xylene isomers (o-, m-, and p-xylene) must be present in calibration standards.
   d. Concentrations for o-xylene must be at 0.50, 1.0, 5.0, 10, and 20 µg/L, while the total concentrations of the m- plus the p-xylene isomers must be at 0.50, 1.0, 5.0, 10, and 20 µg/L.
2. The Relative Response Factor (RRF), Mean RRF ($\overline{RRF}$), and Percent Relative Standard Deviation (%RSD) must be calculated for each target analyte and DMC according to the SOW.
3. The RRF for each target analyte and DMC in each ICAL standard must be ≥ Minimum RRF value in Table 4.
4. The %RSD of the ICAL RRF for each target analyte and DMC must be ≤ Maximum %RSD value in Table 4.

**NOTE:** The technical acceptance criteria specified in a "Request for Quote (RFQ) for Solicitation" of a Modified Analysis may impact some of the preceding evaluation criteria. A copy of this document should be present in the CSF, when applicable.

### D. Evaluation

1. Verify that the ICAL is performed at the specified frequency and sequence.
2. Verify that the correct concentrations of the target analytes and DMCs are used in each ICAL standard.
3. Verify that the RRF, $\overline{RRF}$, and %RSD for each target analyte and DMC are reported on Form 6A-OR. Recalculate the RRFs, $\overline{RRF}$s, and %RSDs for at least one target analyte and DMC associated with each internal standard, and verify that the recalculated values agree with the laboratory reported values on Form 6A-OR.
4. Verify that the RRF is ≥ Minimum RRF value in Table 4 for each target analyte and DMC.
5. Verify that the %RSD is ≤ Maximum %RSD value in Table 4 for each target analyte and DMC.

**NOTE:** For data obtained from the CLP, information regarding noncompliant ICALs can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the ICAL is not performed at the specified frequency and sequence, use professional judgment to qualify detects and non-detects in the associated samples as unusable (R).
2. If the ICAL is not performed at the specified concentrations, qualify detects in the associated samples as estimated (J) and non-detects in the associated samples as estimated (UJ).
3. If errors are detected in the calculations of the RRFs, $\overline{RRF}$s, or %RSDs, perform a more comprehensive recalculation.
4. If the RRF is < Minimum RRF value in Table 4 for any target analyte, use professional judgment to qualify detects in the associated samples as estimated high (J+) or unusable (R), and non-detects in the associated samples as unusable (R).
5. If the RRF is ≥ Minimum RRF value in Table 4 for any target analyte, detects and non-detects in the associated samples should not be qualified.
6. If the %RSD is > Maximum %RSD value in Table 4 for any target analyte, qualify detects in the associated samples as estimated (J). Use professional judgment to qualify non-detects in the associated samples.
7. If the %RSD is ≤ Maximum %RSD value in Table 4 for any target analyte, detects and non-detects in the associated samples should not be qualified.
8. No qualification of the data is necessary based on the DMC RRF, $\overline{RRF}$, and %RSD data alone. Use professional judgment to evaluate the DMC RRF, $\overline{RRF}$, and %RSD data in conjunction with the DMC recoveries to determine the need for data qualification.
9. Based on the project-specific Data Quality Objectives (DQOs), a more in-depth review may be necessary. The following guidelines are recommended:
    a. If the %RSD criteria of any target analyte are not met and the %RSD criteria are still not satisfied after eliminating either the high or the low-point of the ICAL:
        i. Qualify detects in the associated samples as estimated (J).
        ii. Use professional judgment to qualify non-detects in the associated samples.
    b. If the high-point of the ICAL curve is outside of the %RSD criteria (e.g., due to saturation):
        i. Qualify detects in the associated samples with analyte concentrations greater than the high-point concentration as estimated (J).
        ii. Detects in the associated samples with analyte concentrations within the calibration range should not be qualified.
        iii. Non-detects in the associated samples should not be qualified.
    c. If the low-point of the ICAL curve is outside of the %RSD criteria:
        i. Qualify detects in the associated samples with analyte concentrations in the non-linear range as estimated (J).
        ii. Detects in the associated samples with analyte concentrations within the calibration range should not be qualified.
        iii. For non-detects in the associated samples, use the lowest point of the linear portion of the ICAL curve to determine the new quantitation limit.
10. If the laboratory failed to provide adequate calibration information, notify the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data.

11. Annotate the potential effects on the reported data due to exceeding the ICAL criteria in the Data Review Narrative.
12. If the ICAL criteria are grossly exceeded, note this for EPA Regional CLP COR action.

**Table 4. RRF, %RSD, and %D Acceptance Criteria in Initial Calibration, ICV, and CCV for Trace Volatile Analysis**

| Analyte | Minimum RRF | Maximum %RSD | ICV/Opening CCV Maximum %D[1] | Closing CCV Maximum %D |
|---|---|---|---|---|
| Dichlorodifluoromethane | 0.010 | 30.0 | ±40.0 | ±50.0 |
| Chloromethane | 0.010 | 30.0 | ±30.0 | ±50.0 |
| Vinyl chloride | 0.010 | 30.0 | ±30.0 | ±50.0 |
| Bromomethane | 0.010 | 40.0 | ±30.0 | ±50.0 |
| Chloroethane | 0.010 | 30.0 | ±30.0 | ±50.0 |
| Trichlorofluoromethane | 0.010 | 30.0 | ±30.0 | ±50.0 |
| 1,1-Dichloroethene | 0.020 | 30.0 | ±20.0 | ±25.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 0.010 | 30.0 | ±30.0 | ±50.0 |
| Acetone | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Carbon disulfide | 0.010 | 20.0 | ±25.0 | ±25.0 |
| Methyl acetate | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Methylene chloride | 0.010 | 40.0 | ±30.0 | ±50.0 |
| trans-1,2-Dichloroethene | 0.070 | 20.0 | ±20.0 | ±25.0 |
| Methyl tert-butyl ether | 0.010 | 30.0 | ±30.0 | ±50.0 |
| 1,1-Dichloroethane | 0.100 | 20.0 | ±20.0 | ±25.0 |
| cis-1,2-Dichloroethene | 0.100 | 20.0 | ±20.0 | ±25.0 |
| 2-Butanone | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Bromochloromethane | 0.020 | 20.0 | ±20.0 | ±25.0 |
| Chloroform | 0.040 | 20.0 | ±20.0 | ±25.0 |
| 1,1,1-Trichloroethane | 0.050 | 30.0 | ±20.0 | ±25.0 |
| Cyclohexane | 0.100 | 30.0 | ±25.0 | ±50.0 |
| Carbon tetrachloride | 0.020 | 20.0 | ±25.0 | ±50.0 |
| Benzene | 0.300 | 20.0 | ±20.0 | ±25.0 |
| 1,2-Dichloroethane | 0.010 | 20.0 | ±25.0 | ±50.0 |
| Trichloroethene | 0.100 | 20.0 | ±20.0 | ±25.0 |
| Methylcyclohexane | 0.200 | 30.0 | ±25.0 | ±50.0 |
| 1,2-Dichloropropane | 0.100 | 20.0 | ±20.0 | ±25.0 |
| Bromodichloromethane | 0.090 | 20.0 | ±20.0 | ±25.0 |

| Analyte | Minimum RRF | Maximum %RSD | ICV/Opening CCV Maximum %D[1] | Closing CCV Maximum %D |
|---|---|---|---|---|
| cis-1,3-Dichloropropene | 0.100 | 20.0 | ±20.0 | ±25.0 |
| 4-Methyl-2-pentanone | 0.010 | 30.0 | ±30.0 | ±50.0 |
| Toluene | 0.400 | 20.0 | ±20.0 | ±25.0 |
| trans-1,3-Dichloropropene | 0.010 | 30.0 | ±20.0 | ±25.0 |
| 1,1,2-Trichloroethane | 0.040 | 20.0 | ±20.0 | ±25.0 |
| Tetrachloroethene | 0.100 | 20.0 | ±20.0 | ±25.0 |
| 2-Hexanone | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Dibromochloromethane | 0.050 | 20.0 | ±20.0 | ±25.0 |
| 1,2-Dibromoethane | 0.010 | 20.0 | ±20.0 | ±25.0 |
| Chlorobenzene | 0.400 | 20.0 | ±20.0 | ±25.0 |
| Ethylbenzene | 0.500 | 20.0 | ±20.0 | ±25.0 |
| m,p-Xylene | 0.200 | 20.0 | ±20.0 | ±25.0 |
| o-Xylene | 0.300 | 30.0 | ±20.0 | ±25.0 |
| Styrene | 0.200 | 30.0 | ±20.0 | ±25.0 |
| Bromoform | 0.010 | 30.0 | ±30.0 | ±50.0 |
| Isopropylbenzene | 0.700 | 30.0 | ±25.0 | ±25.0 |
| 1,1,2,2-Tetrachloroethane | 0.050 | 20.0 | ±25.0 | ±25.0 |
| 1,3-Dichlorobenzene | 0.500 | 20.0 | ±20.0 | ±25.0 |
| 1,4-Dichlorobenzene | 0.700 | 20.0 | ±20.0 | ±25.0 |
| 1,2-Dichlorobenzene | 0.400 | 20.0 | ±20.0 | ±25.0 |
| 1,2-Dibromo-3-chloropropane | 0.010 | 40.0 | ±40.0 | ±50.0 |
| 1,2,4-Trichlorobenzene | 0.300 | 30.0 | ±30.0 | ±50.0 |
| 1,2,3-Trichlorobenzene | 0.200 | 30.0 | ±40.0 | ±50.0 |
| **Deuterated Monitoring Compounds** | | | | |
| Vinyl chloride-$d_3$ | 0.010 | 30.0 | ±30.0 | ±50.0 |
| Chloroethane-$d_5$ | 0.010 | 30.0 | ±30.0 | ±50.0 |
| 1,1-Dichloroethene-$d_2$ | 0.010 | 30.0 | ±25.0 | ±25.0 |
| 2-Butanone-$d_5$ | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Chloroform-d | 0.010 | 20.0 | ±20.0 | ±25.0 |
| 1,2-Dichloroethane-$d_4$ | 0.010 | 20.0 | ±25.0 | ±25.0 |
| Benzene-$d_6$ | 0.030 | 20.0 | ±20.0 | ±25.0 |
| 1,2-Dichloropropane-$d_6$ | 0.100 | 20.0 | ±20.0 | ±25.0 |

| Analyte | Minimum RRF | Maximum %RSD | ICV/Opening CCV Maximum %D[1] | Closing CCV Maximum %D |
|---|---|---|---|---|
| Toluene-$d_8$ | 0.200 | 20.0 | ±20.0 | ±25.0 |
| trans-1,3-Dichloropropene-$d_4$ | 0.010 | 30.0 | ±25.0 | ±25.0 |
| 2-Hexanone-$d_5$ | 0.010 | 40.0 | ±40.0 | ±50.0 |
| 1,1,2,2- Tetrachloroethane-$d_2$ | 0.010 | 20.0 | ±25.0 | ±25.0 |
| 1,2-Dichlorobenzene-$d_4$ | 0.060 | 20.0 | ±20.0 | ±25.0 |

[1] If a closing CCV is acting as an opening CCV, all target analytes must meet the requirements for an opening CCV.

**Table 5. Initial Calibration Actions for Trace Volatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| Initial Calibration not performed at the specified frequency and sequence | Use professional judgment<br>R | Use professional judgment<br>R |
| Initial Calibration not performed at the specified concentrations | J | UJ |
| RRF < Minimum RRF in Table 4 for target analyte | Use professional judgment<br>J+ or R | R |
| RRF ≥ Minimum RRF in Table 4 for target analyte | No qualification | No qualification |
| %RSD > Maximum %RSD in Table 4 for target analyte | J | Use professional judgment |
| %RSD ≤ Maximum %RSD in Table 4 for target analyte | No qualification | No qualification |

## IV. Initial Calibration Verification

### A. Review Items

Form 7A-OR, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Trace VOA, Sections 7.2.2.2 and 9.4)

### B. Objective

The objective is to ensure that the instrument is calibrated accurately to produce acceptable qualitative and quantitative data throughout each analytical sequence by the use of a second-source check standard.

### C. Criteria

1. The accuracy of the calibration for each GC/MS system used for analysis must be verified at the frequency of one ICV standard analysis per initial calibration analytical sequence. The ICV is analyzed after the last ICAL standard analysis and prior to a blank, sample, or an applicable CCV analysis.
2. The ICV standard must contain all required target analytes, from an alternate source or a different lot than that used for the ICAL standards and the DMCs, at or near the mid-point concentration (CS3) of the ICAL.
3. For an ICV, the RRF for each target analyte and DMC must be ≥ the Minimum RRF value in Table 4.
4. The Percent Difference (%D) between the ICAL $\overline{RRF}$ and the ICV RRF must be within the ICV/Opening CCV Maximum %D limits in Table 4 for each target analyte and DMC.

### D. Evaluation

1. Verify that the ICV standard is analyzed at the specified frequency and sequence, and that it is associated with the correct ICAL. Also verify that the correct ICAL is represented in the data package and meets SOW criteria, as described in Section III.
2. Verify that the concentrations of the target analytes and the DMCs in the ICV are at or near the mid-point standard CS3 from the ICAL.
3. Verify that the RRF and %D for each target analyte and DMC are reported on Form 7A-OR. Recalculate the RRF and %D for at least one target analyte and DMC associated with each internal standard, and verify that the recalculated values agree with the laboratory reported values on Form 7A-OR.
4. Verify that the RRFs for each target analyte and DMC in the ICV are ≥ Minimum RRF values in Table 4.
5. Verify that the %Ds are within the ICV/Opening CCV Maximum %D limits in Table 4 for each target analyte and DMC.

**NOTE:** For data obtained from the CLP, information regarding a noncompliant ICV can be obtained from the NFG reports and may be used as part of the evaluation process.

### E. Action

1. If the ICV is not performed at the specified frequency, use professional judgment to qualify detects and non-detects. Contact the EPA Regional CLP COR to request that the laboratory repeat the analysis, if holding times have not expired and there are remaining sample vials. If reanalysis is not possible, carefully evaluate all other available information, including the quality of analyte peak shapes and mass spectral matches, the stability of internal standard Retention Times (RTs) and areas in each affected sample, and compare to the most recent calibration performed on the same instrument under the same conditions. Using this information and professional judgment, the reviewer may be able to justify unqualified acceptance of qualitative results.

2. If the ICV is not performed at the specified concentration, use professional judgment to qualify detects and non-detects. Special consideration should be given to sample results at the opposite extreme of the calibration range if this defect is noted.
3. If errors are detected in the calculations of either the RRF or the %D, perform a more comprehensive recalculation.
4. If the RRF in an ICV is < Minimum RRF value in Table 4 for any target analyte, carefully evaluate the qualitative data associated with positively identified analytes and use professional judgment to qualify detects as estimated (J) or unusable (R), and qualify non-detects as unusable (R).
    a. Take special note of any extreme deviation in the RRF and evaluate RT data, peak shapes, and areas of the target analytes and associated internal standards for inconsistencies that may indicate a chromatographic co-elution. If this is suspected, the contaminant may also be present in samples and blanks. Also review the documentation of the preparation of the ICV standard. Use professional judgment to qualify affected data appropriately.
5. If the RRF in an ICV is ≥ Minimum RRF value in Table 4 for any target analyte, detects and non-detects should not be qualified.
6. If the %D in an ICV is outside the ICV/Opening CCV Maximum %D limits in Table 4 for any target analyte, qualify detects as estimated (J) and non-detects as estimated (UJ).
7. If the %D in an ICV is within the inclusive range of the ICV/Opening CCV Maximum %D limits in Table 4 for any target analyte, detects and non-detects should not be qualified.
8. No qualification of the data is necessary based on the DMC RRF and/or %D alone. Use professional judgment to evaluate the DMC RRF and %D data in conjunction with the DMC recoveries to determine the need for data qualification.
9. If the laboratory has failed to provide adequate calibration information, contact the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data. Refer to E.1, above, for additional steps.
10. Note the potential effects on the data due to ICV criteria exceedance in the Data Review Narrative.
11. If the ICV criteria are grossly exceeded, note this for EPA Regional CLP COR action.

**Table 6. ICV Actions for Trace Volatile Analysis**

| Criteria for ICV | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| ICV not performed at the specified frequency and sequence | Use professional judgment | Use professional judgment |
| ICV not performed at the specified concentration | Use professional judgment | Use professional judgment |
| RRF < Minimum RRF in Table 4 for target analyte | Use professional judgment<br>J or R | R |
| RRF ≥ Minimum RRF in Table 4 for target analyte | No qualification | No qualification |
| %D outside the ICV/Opening CCV Maximum %D limits in Table 4 for target analyte | J | UJ |
| %D within the inclusive ICV/Opening CCV Maximum %D limits in Table 4 for target analyte | No qualification | No qualification |

## V. Continuing Calibration Verification

### A. Review Items

Form 7A-OR, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Trace VOA, Sections 7.2.2.1 and 9.5)

### B. Objective

The objective is to ensure that the instrument continues to meet the sensitivity and linearity criteria to produce acceptable qualitative and quantitative data throughout each analytical sequence.

### C. Criteria

1. The calibration for each GC/MS system used for analysis must be verified at the beginning and end of every 12-hour period of operation. The 12-hour period begins with the injection of BFB, followed by the injection of the opening CCV solution. After the injection of all samples and required blanks, and before the end of the 12-hour period, injection of the closing CCV is required. The closing CCV used to bracket the end of a 12-hour analytical sequence may be used as the opening CCV for a new 12-hour analytical sequence, provided that all technical acceptance criteria for an opening CCV are met.
2. The CCV standards must contain all required target analytes and DMCs at or near the mid-point concentration (CS3) of the ICAL.
3. For an opening or a closing CCV, the RRF for each target analyte and DMC must be ≥ the Minimum RRF value in Table 4.
4. The %D between the ICAL $\overline{RRF}$ and the opening CCV RRF must be within the ICV/Opening CCV Maximum %D limits in Table 4 for each target analyte and DMC.
5. For a closing CCV, the %D between the ICAL $\overline{RRF}$ and the CCV RRF must be within the Closing CCV Maximum %D limits in Table 4 for each target analyte and DMC.

### D. Evaluation

1. Verify that the CCV is analyzed at the specified frequency and sequence, and that it is associated with the correct ICAL. Also verify that the correct ICAL is represented in the data package and meets SOW criteria, as described in Section III.
2. Verify that the mid-point standard CS3 from the ICAL is used as an opening or closing CCV.
3. Verify that the RRF and %D for each target analyte and DMC are reported on Form 7A-OR. Recalculate the RRF and %D for at least one target analyte and DMC associated with each internal standard, and verify that the recalculated values agree with the laboratory reported values on Form 7A-OR.
4. For an opening or a closing CCV, verify that the RRFs for each target analyte and DMC are ≥ Minimum RRF values in Table 4.
5. For an opening CCV, verify that the %Ds are within the ICV/Opening CCV Maximum %D limits in Table 4 for each target analyte and DMC.
6. For a closing CCV, verify that the %Ds are within the Closing CCV Maximum %D limits in Table 4 for each target analyte and DMC.

**NOTE:** For data obtained from the CLP, information regarding noncompliant CCVs can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the CCV is not performed at the specified frequency, qualify detects and non-detects as unusable (R). Contact the EPA Regional CLP COR to request that the laboratory repeat the analysis, if holding times have not expired and there are remaining sample vials. If reanalysis is not possible, carefully evaluate all other available information, including the quality of analyte peak shapes and mass spectral matches, the stability of internal standard RTs and areas in each affected sample, and compare to the most recent calibration performed on the same instrument under the same conditions. Using this information and professional judgment, the reviewer may be able to justify unqualified acceptance of qualitative results and qualification of all quantitative results as estimated (J). Otherwise, qualify all detects and non-detects as unusable (R).
2. If the CCV is not performed at the specified concentration, use professional judgment to qualify detects and non-detects. Special consideration should be given to sample results at the opposite extreme of the calibration range if this defect is noted.
3. If errors are detected in the calculations of either the RRF or the %D, perform a more comprehensive recalculation.
4. For an opening or a closing CCV, if the RRF is < Minimum RRF value in Table 4 for any target analyte, carefully evaluate the qualitative data associated with positively identified analytes and use professional judgment to qualify detects as estimated (J) or unusable (R), and qualify non-detects as unusable (R).
    a. Take special note of any extreme deviation in the RRF and evaluate RT data, peak shapes, and areas of the target analytes and associated internal standards for inconsistencies that may indicate a chromatographic co-elution. If this is suspected, the contaminant may also be present in samples and blanks. Also review the documentation of the preparation of the CCV standard. Use professional judgment to qualify affected data appropriately.
5. For an opening or a closing CCV, if the RRF is ≥ Minimum RRF value in Table 4 for any target analyte, detects and non-detects should not be qualified.
6. For an opening CCV, if the %D is outside the ICV/Opening CCV Maximum %D limits in Table 4 for any target analyte, qualify detects as estimated (J) and non-detects as estimated (UJ).
7. For a closing CCV, if the %D is outside the Closing CCV Maximum %D limits in Table 4 for any target analyte, qualify detects as estimated (J) and non-detects as estimated (UJ).
8. For an opening CCV, if the %D is within the inclusive range of the ICV/Opening CCV Maximum %D limits in Table 4 for any target analyte, detects and non-detects should not be qualified.
9. For a closing CCV, if the %D is within the inclusive range of the Closing CCV Maximum %D limits in Table 4 for any target analyte, detects and non-detects should not be qualified.
10. No qualification of the data is necessary based on the DMC RRF and/or %D alone. Use professional judgment to evaluate the DMC RRF and %D data in conjunction with the DMC recoveries to determine the need for data qualification.
11. If the laboratory has failed to provide adequate calibration information, contact the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data. Refer to E.1, above, for additional steps.
12. Note the potential effects on the data due to CCV criteria exceedance in the Data Review Narrative.
13. If the CCV criteria are grossly exceeded, note this for EPA Regional CLP COR action.

**Table 7. CCV Actions for Trace Volatile Analysis**

| Criteria for Opening CCV | Criteria for Closing CCV | Action | |
|---|---|---|---|
| | | **Detect** | **Non-detect** |
| CCV not performed at the specified frequency and sequence | CCV not performed at the specified frequency | Use professional judgment<br>J or R | Use professional judgment<br>UJ or R |
| CCV not performed at the specified concentration | CCV not performed at the specified concentration | Use professional judgment | Use professional judgment |
| RRF < Minimum RRF in Table 4 for target analyte | RRF < Minimum RRF in Table 4 for target analyte | Use professional judgment<br>J or R | R |
| RRF ≥ Minimum RRF in Table 4 for target analyte | RRF ≥ Minimum RRF in Table 4 for target analyte | No qualification | No qualification |
| %D outside the ICV/Opening CCV Maximum %D limits in Table 4 for target analyte | %D outside the Closing CCV Maximum %D limits in Table 4 for target analyte | J | UJ |
| %D within the inclusive ICV/Opening CCV Maximum %D limits in Table 4 for target analyte | %D within the inclusive Closing CCV Maximum %D limits in Table 4 for target analyte | No qualification | No qualification |

# VI. Blanks

## A. Review Items

Form 1A-OR, Form 1B-OR, Form 4-OR, chromatograms, and quantitation reports. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Trace VOA, Section 12.1)

## B. Objective

The objective of a blank analysis results assessment is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities.

## C. Criteria

The criteria for evaluation of blanks should apply to any blank associated with the samples (e.g., method blanks, storage blank, field blanks, etc.). If problems with any blank exist, all associated data must be carefully evaluated to determine whether or not there is an inherent variability in the data or if the problem is an isolated occurrence not affecting other data.

1. Method blank analyses must be performed at the specified frequency and sequence. A method blank must be analyzed once every 12-hour period and prior to any sample analysis, and after all ICAL standards, the ICV, or the opening CCV. The method blank must be analyzed on each GC/MS system used for sample analysis within an entire analytical sequence.
2. The method blank, like any other sample in the SDG, must meet the technical acceptance criteria for sample analysis.
3. A storage blank analysis must be performed at the specified frequency and sequence. A storage blank must be prepared upon receipt of the first samples from an SDG, and stored with the samples until analysis. The storage blank must be analyzed once per SDG after all sample analyses within an SDG are completed.
4. An instrument blank must be analyzed immediately after any sample that has target analytes exceeding the calibration range or non-target compounds exceeding 100 µg/L.
5. The concentration of a target analyte in any blank must not exceed its Contract Required Quantitation Limit (CRQL) (2x CRQLs for Methylene chloride, Acetone, and 2-Butanone). TIC concentration in any blank must be $\leq$ 0.5 µg/L.

## D. Evaluation

1. Verify that method blanks are analyzed at the specified frequency and sequence. The Method Blank Summary (Form 4-OR) may be used to identify the samples associated with each method blank.
2. Verify that a storage blank has been analyzed at the specified frequency and sequence.
3. Verify that the instrument blank analysis has been performed following any sample analysis where a target analyte(s) is/are reported at high concentration(s).
4. Review the results of all associated blanks on the forms and raw data (chromatograms and quantitation reports) to evaluate the presence of target analytes and non-target compounds in the blanks.
5. Data concerning the field blanks are not evaluated as part of the Contract Compliance Screening (CCS) process. Evaluate field or trip blanks in a manner similar to that used for the method blanks.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant blank can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the appropriate blanks are not analyzed at the correct frequency, use professional judgment to determine if the associated sample data should be qualified. Obtain additional information from the laboratory, if necessary. Record the situation in the Data Review Narrative and note it for EPA Regional CLP COR action.
2. Action regarding unsuitable blank results depends on the circumstances and origin of the blank. Verify that data qualification decisions based on field quality control (QC) are supported by the project Quality Assurance Project Plan (QAPP) or EPA Regional Standard Operating Procedure (SOP). At a minimum, contamination found in field blanks should be documented in the Data Review Narrative. In instances where more than one blank is associated with a given sample, qualification should be based upon a comparison with the associated blank having the highest concentration of a contaminant. Do not correct the results by subtracting any blank value.
3. For any blank (including method blank), if a target analyte is detected, but is not detected in the sample, non-detects should not be qualified.
4. For any method blank reported with results < CRQLs, report sample results that are < CRQLs at the CRQLs and qualify as non-detect (U). For any method blank reported with results that are < CRQLs, use professional judgment to qualify sample results that are ≥ CRQLs (≥ 2x result in method blank for Methylene chloride, Acetone, and 2-Butanone). Positive results in samples, especially those near but above the CRQL, may be biased high by low level contamination in the method blank, and should be considered as estimated (J+).
5. For any method blank reported with results ≥ CRQLs, report sample results that are < CRQLs at the CRQLs and qualify as non-detect (U).
6. For any method blank reported with results ≥ CRQLs, report sample results that are ≥ CRQLs but < Blank Results at sample results and qualify as non-detect (U) or as unusable (R). Use professional judgment to qualify sample results that are ≥ CRQLs and ≥ Blank Results or ≥ 2x result in method blank for Methylene chloride, Acetone, and 2-Butanone.
7. If an instrument blank is not analyzed following a sample analysis which contains analyte(s) at high concentration(s) exceeding the calibration range, evaluate the analyte(s) concentration(s) in the samples analyzed immediately after the sample with high analyte(s) concentration(s) for carryover. Use professional judgment to determine if instrument cross-contamination has affected any positive target analyte identification(s). If instrument cross-contamination is suggested and suspected of having an effect on the sample results or calibration performance, note it for EPA Regional CLP COR action.
8. If any analytes are detected in the storage, field, or trip blanks, the following is recommended:
    a. Review the associated method blank data to determine if the same analytes are also detected in the method blank.
        i. If the analytes are detected at comparable levels in the method blank, the source of the contamination may be in the analytical system. Apply the recommended actions for the method blank.
        ii. If the analytes are not detected in the method blank, the source of contamination may be in the storage area or in the field, or contamination may have occurred during sample transport. Consider all associated samples for possible cross-contamination.
        iii. For storage, field, or trip blanks, the sample result qualifications listed in Table 8 should apply.
9. If gross contamination exists with blank results that are > ICAL CS5 concentrations, qualify detects as unusable (R). If the contamination is suspected of having an effect on the sample results, note it for EPA Regional CLP COR action.

10. For any blank (including method blank) reported with TICs (non-target compounds) concentrations that are > 0.5 µg/L, use professional judgment to qualify sample results.
11. There may be instances where little or no contamination is present in the associated blanks, but qualification of the sample is deemed necessary. If it is determined that the contamination is from a source other than the sample, the data should be qualified or, in the case of field QC, should at least be documented in the Data Review Narrative. Contamination introduced through dilution water is one example. Although it is not always possible to determine, instances of this occurrence can be detected when contaminants are found in the diluted sample result, but are absent in the undiluted sample.

**Table 8. Blank Actions for Trace Volatile Analysis**

| Blank Type | Blank Result | Sample Result | Action |
|---|---|---|---|
| Method, Storage, Field, Trip, Instrument* | Detect | Non-detect | No qualification |
| | < CRQL | < CRQL | Report at CRQL and qualify as non-detect (U) |
| | | ≥ CRQL or ≥ 2x Blank Result for Methylene chloride, Acetone, and 2-Butanone | Use professional judgment |
| | ≥ CRQL | < CRQL | Report at CRQL and qualify as non-detect (U) |
| | | ≥ CRQL but < Blank Result | Report at sample result and qualify as non-detect (U) or unusable (R) |
| | | ≥ CRQL and ≥ Blank Result or ≥ 2x Blank Result for Methylene chloride, Acetone, and 2-Butanone | Use professional judgment |
| | Gross contamination | Detect | Report at sample result and qualify as unusable (R) |
| | TIC > 0.5 µg/L | Detect | Use professional judgment |

* Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target analyte concentration exceeding the calibration range (ICAL CS5 concentration) or TICs concentration exceeding 100 µg/L.

## VII. Deuterated Monitoring Compound

### A. Review Items

Form 2A-OR, Form 2B-OR quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Trace VOA, Sections 7.2.2.4 and 11.2.5)

### B. Objective

The objective is to evaluate the DMC Percent Recovery (%R) to ensure that the analytical method is efficient.

### C. Criteria

1. All samples and blanks are spiked with the DMCs listed in Table 9, just prior to sample purging, to measure the DMC %R.
2. The %R for each DMC should be calculated correctly according to the method.
3. The %R for each DMC in samples and blanks must be within the limits in Table 9.

**Table 9. Trace Volatile DMCs and Recovery Limits**

| DMC | Recovery Limits (%) |
|---|---|
| Vinyl chloride-$d_3$ | 40 - 130 |
| Chloroethane-$d_5$ | 65 - 130 |
| 1,1-Dichloroethene-$d_2$ | 60 - 125 |
| 2-Butanone-$d_5$ | 40 - 130 |
| Chloroform-d | 70 - 125 |
| 1,2-Dichloroethane-$d_4$ | 70 - 130 |
| Benzene-$d_6$ | 70 - 125 |
| 1,2-Dichloropropane-$d_6$ | 60 - 140 |
| Toluene-$d_8$ | 70 - 130 |
| trans-1,3-Dichloropropene-$d_4$ | 55 - 130 |
| 2-Hexanone-$d_5$ | 45 - 130 |
| 1,1,2,2-Tetrachloroethane-$d_2$ | 65 - 120 |
| 1,2-Dichlorobenzene-$d_4$ | 80 - 120 |

**NOTE:** The recovery limits for any of the compounds listed in Table 9 may be expanded at any time during the period of performance if the EPA determines that the limits are too restrictive.

### D. Evaluation

1. Check the raw data (e.g., chromatograms and quantitation reports) to verify the recoveries on the Deuterated Monitoring Compound Recovery Form 2A-OR and Form 2B-OR.
2. Check for any calculation or transcription errors. Verify that the DMC recoveries were calculated correctly using the equation in the method and that the recalculated values agree with the laboratory reported values on Form 2A-OR and Form 2B-OR.

3. Whenever there are two or more analyses for a particular sample, use professional judgment to determine which analysis has the most acceptable data to report. Considerations include, but are not limited to:

   a. DMC recovery (marginal versus gross deviation).

   b. Technical holding times.

   c. Comparison of the target analyte results reported in each sample analysis.

   d. Other QC information, such as performance of internal standards.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant DMC %Rs can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If a DMC was not added to the samples and blanks, or the concentrations of DMCs in the samples and blanks are not as specified, use professional judgment to qualify detects and non-detects. The EPA Regional CLP COR should be contacted to arrange for reanalysis, if possible.

2. If errors are detected in the calculations of %R, perform a more comprehensive recalculation. It may be necessary to have the laboratory resubmit the data after making corrections.

3. If any DMC %R is outside the limits (Table 9) in samples, qualify the associated target analytes listed in Table 11 considering the existence of interference in the raw data. Considerations include, but are not limited to:

   a. If the DMC %R is < 10%, qualify detects as estimated low (J-) and non-detects as unusable (R).

   b. If the DMC %R is ≥ 10% and < lower acceptance limit, qualify detects as estimated low (J-) and non-detects as estimated (UJ).

   c. If the DMC %R is ≥ lower acceptance limit and ≤ upper acceptance limit, detects and non-detects should not be qualified.

   d. If the DMC %R is > upper acceptance limit, qualify detects as estimated high (J+). Non-detects should not be qualified.

4. If any DMC %R is outside the limits (Table 9) in a blank, special consideration should be taken to evaluate the validity of the associated sample data. The basic concern is whether the blank problems represent an isolated problem with the blank alone, or whether there is a fundamental problem with the analytical process.

   For example, if one or more samples in the analytical sequence show acceptable DMC %Rs, the blank problem may be considered as an isolated occurrence. However, even if this judgment allows some use of the affected data, note analytical problems for EPA Regional CLP COR action.

**Table 10. DMC Actions for Trace Volatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| %R < 10% | J- | R |
| 10% ≤ %R < Lower Acceptance Limit | J- | UJ |
| Lower Acceptance Limit ≤ %R ≤ Upper Acceptance Limit | No qualification | No qualification |
| %R > Upper Acceptance Limit | J+ | No qualification |

**Table 11. Trace Volatile DMCs and the Associated Target Analytes**

| **Vinyl chloride-$d_3$ (DMC-1)** | **Chloroethane-$d_5$ (DMC-2)** | **1,1-Dichloroethene-$d_2$ (DMC-3)** |
|---|---|---|
| Vinyl chloride | Dichlorodifluoromethane<br>Chloromethane<br>Bromomethane<br>Chloroethane<br>Carbon disulfide | trans-1,2-Dichloroethene<br>cis-1,2-Dichloroethene<br>1,1-Dichloroethene |
| **2-Butanone-$d_5$ (DMC-4)** | **Chloroform-d (DMC-5)** | **1,2-Dichloroethane-$d_4$ (DMC-6)** |
| Acetone<br>2-Butanone | 1,1-Dichloroethane<br>Bromochloromethane<br>Chloroform<br>Dibromochloromethane<br>Bromoform | Trichlorofluoromethane<br>1,1,2-Trichloro-1,2,2-trifluoroethane<br>Methyl acetate<br>Methylene chloride<br>Methyl-tert-butyl ether<br>1,1,1-Trichloroethane<br>Carbon tetrachloride<br>1,2-Dibromoethane<br>1,2-Dichloroethane |
| **Benzene-$d_6$ (DMC-7)** | **1,2-Dichloropropane-$d_6$ (DMC-8)** | **Toluene-$d_8$ (DMC-9)** |
| Benzene | Cyclohexane<br>Methylcyclohexane<br>1,2-Dichloropropane<br>Bromodichloromethane | Trichloroethene<br>Toluene<br>Tetrachloroethene<br>Ethylbenzene<br>o-Xylene<br>m,p-Xylene<br>Styrene<br>Isopropylbenzene |
| **trans-1,3-Dichloropropene-$d_4$ (DMC-10)** | **2-Hexanone-$d_5$ (DMC-11)** | **1,1,2,2-Tetrachloroethane-$d_2$ (DMC-12)** |
| cis-1,3-Dichloropropene<br>trans-1,3-Dichloropropene<br>1,1,2-Trichloroethane | 4-Methyl-2-pentanone<br>2-Hexanone | 1,1,2,2,-Tetrachloroethane<br>1,2-Dibromo-3-chloropropane |
| **1,2-Dichlorobenzene-$d_4$ (DMC-13)** | | |
| Chlorobenzene<br>1,3-Dichlorobenzene<br>1,4-Dichlorobenzene<br>1,2-Dichlorobenzene<br>1,2,4-Trichlorobenzene<br>1,2,3-Trichlorobenzene | | |

## VIII. Matrix Spike/Matrix Spike Duplicate

### A. Review Items

SDG Cover Page, Form 3A-OR, chromatograms, and quantitation reports. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Trace VOA, Sections 7.2.2.5 and 12.2)

### B. Objective

The objective of the Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analysis is to evaluate the effect of each sample matrix on the sample preparation procedures and the measurement methodology.

### C. Criteria

1. If requested, MS/MSD samples shall be prepared and analyzed at the specified frequency. One pair of MS/MSD samples should be analyzed per matrix or per SDG.

**NOTE:** Data for MS and MSDs will not be present unless requested by the EPA Region.

2. Samples identified as field blanks or Performance Evaluation (PE) samples cannot be used for spiked sample analysis.
3. The MS/MSD %R and the Relative Percent Difference (RPD) between MS and MSD results should be calculated according to the method.
4. The MS/MSD %R and RPD should be within the acceptance limits in Table 12.

### D. Evaluation

1. Verify that the requested MS/MSD samples were analyzed at the required frequency.
2. Verify that a field blank or PE sample was not used for MS/MSD analysis.
3. Verify that the recalculated MS/MSD %R and RPD values agree with the laboratory reported values on Form 3A-OR.
4. Inspect the MS/MSD %R and RPD on Form 3A-OR and verify that they are within the limits listed in Table 12.

**NOTE:** For data obtained from the CLP, the preceding criteria, including the requested MS/MSD spiking analytes and spiking levels specified in Exhibit D – Trace Concentrations of Volatile Organic Compounds Analysis, Section 7.2.2.5, of the SOW, are evaluated as part of the CCS process. Information regarding the noncompliant MS/MSD %Rs or RPDs can be obtained from the NFG reports and may be used as part of the evaluation process.

### E. Action

1. If requested MS/MSD samples were not analyzed at the specified frequency, use professional judgment to determine the impact on sample data, if any. Obtain additional information from the laboratory, if necessary. Record the situation in the Data Review Narrative and note it for EPA Regional CLP COR action. It is not likely that data qualification will be warranted if the frequency requirements are not met. Carefully consider all factors, known and unknown, about method performance on the matrix at hand, in lieu of MS/MSD data.
2. If a field blank or PE sample was used for the MS/MSD analysis, note this for EPA Regional CLP COR action. All of the other QC data must then be carefully checked. Use professional judgment when evaluating the data.
3. If errors are detected in the calculations of the MS/MSD %R or RPD, perform a more comprehensive recalculation.
4. If the MS/MSD %R or RPD is outside the acceptance limits in Table 12, qualify the detects and non-detects in the original sample to include consideration of the existence of interference in the raw data. Considerations include, but are not limited to:

a. If the MS/MSD %R is < 20%, qualify detects as estimated (J) and non-detects as unusable (R).

b. If the MS/MSD %R is ≥ 20% and < lower acceptance limit, qualify detects as estimated (J) and non-detects as estimated (UJ).

c. If the MS/MSD %R or RPD is ≥ lower acceptance limit and ≤ upper acceptance limit, detects and non-detects should not be qualified.

d. If the MS/MSD %R or RPD is > upper acceptance limit, qualify detects as estimated (J). Non-detects should not be qualified.

**Table 12. MS/MSD %R and RPD Limits for Trace Volatile Analysis**

| Analyte | %R | RPD |
|---|---|---|
| 1,1-Dichloroethene | 61 - 145 | 0 - 14 |
| Benzene | 76 - 127 | 0 - 11 |
| Trichloroethene | 71 - 120 | 0 - 14 |
| Toluene | 76 - 125 | 0 - 13 |
| Chlorobenzene | 75 - 130 | 0 - 13 |

**Table 13. MS/MSD Actions for Trace Volatile Analysis**

| Criteria | Action | |
|---|---|---|
| | Detect | Non-detect |
| %R < 20% | J | R |
| 20% ≤ %R< Lower Acceptance Limit | J | UJ |
| Lower Acceptance Limit ≤ %R or RPD ≤ Upper Acceptance Limit | No qualification | No qualification |
| %R or RPD > Upper Acceptance Limit | J | No qualification |

# IX. Internal Standard

## A. Review Items

Form 8A-OR, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Trace VOA, Sections 7.2.2.6, 11.3.5, and 11.3.6)

## B. Objective

The objective is to evaluate the internal standard performance to ensure that GC/MS sensitivity and response are stable during each analysis.

## C. Criteria

1. The internal standard solution must be added to all samples and blanks at the specified concentration. The internal standard solution must contain all internal standard compounds specified in the method.
2. The area response of each internal standard compound in all samples and blanks must be within the inclusive ranges of 50-200% of the area response of the same internal standard compound from the associated opening CCV or the mid-point standard CS3 from the associated ICAL.
3. The RT of the internal standard compound in the sample or blank must not vary more than ±10.0 seconds from the RT of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL.

## D. Evaluation

1. Verify that all required internal standard compounds were added to sample and blank analyses at the specified concentrations.
2. Check the raw data (e.g., chromatograms and quantitation reports) to verify that the RT and area response of each internal standard compound in a sample or blank are reported on Form 8A-OR.
3. Verify that the RTs and area responses for all internal standard compounds are within the specified criteria. If internal standard RTs are significantly different from the associated CCV or ICAL midpoint (i.e., more than 10 seconds), the internal standard peak may have been misidentified, but most likely a change in the chromatographic system should be suspected. This could be an improper desorb/injection cycle, a leak in the purge/trap/GC system, or the effect of a highly contaminated matrix. Normally, the area counts will also suffer in this situation, but even if they appear unaffected, both quantitative and qualitative results should be considered highly suspect.
4. If there is a reanalysis for a particular sample, determine which analysis is the best data to report. Considerations include, but are not limited to:
    a. Magnitude and direction of the internal standard area response shift.
    b. Magnitude and direction of the internal standard RT shift.
    c. Technical holding times.
    d. Comparison of the values of the target analytes reported in each method.
    e. Other QC information.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant internal standard area response or RT can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

**NOTE:** Apply the action to the target analytes in the samples or blanks that are associated to the noncompliant internal standard compound in Table 14. The internal standard and the associated target analytes are in Exhibit D – Trace Concentrations of Volatile Organic Compounds Analysis, Table 9, of the SOW.

1. If the required internal standard compounds were not added to a sample or blank, qualify detects and non-detects as unusable (R).
2. If the required internal standard compound was not analyzed at the specified concentration in a sample or blank, use professional judgment to qualify detects and non-detects.
3. If the area response of an internal standard compound in a sample or blank is < 20% of the area response of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL, qualify detects as estimated high (J+) and non-detects as unusable (R).
4. If the area response of an internal standard compound in a sample or blank is ≥ 20 % and < 50% of the area response of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL, qualify detects as estimated high (J+) and non-detects as estimated (UJ).
5. If the area response of an internal standard compound in a sample or blank is within the inclusive range of 50-200% of the area response of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL, detects and non-detects should not be qualified.
6. If the area response of an internal standard compound in a sample or blank is > 200% of the area response of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL, qualify detects as estimated low (J-). Non-detects should not be qualified.
7. If the RT shift between sample/blank and the associated opening CCV or mid-point standard CS3 from the associated ICAL of an internal standard compound is > 10.0 seconds, qualify detects and non-detects as unusable (R). The EPA Regional CLP COR should be contacted to arrange for reanalysis.
8. If the RT shift between sample/blank and the associated opening CCV or mid-point standard CS3 from the associated ICAL of an internal standard compound is < 10.0 seconds, detects and non-detects should not be qualified.
9. If the internal standard performance criteria are grossly exceeded, annotate the potential effects on the data in the Data Review Narrative and note it for EPA Regional CLP COR action.

**Table 14. Internal Standard Actions for Trace Volatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| Area response < 20% of the opening CCV or mid-point standard CS3 from ICAL | J+ | R |
| 20% ≤ Area response < 50% of the opening CCV or mid-point standard CS3 from ICAL | J+ | UJ |
| 50% ≤ Area response ≤ 200% of the opening CCV or mid-point standard CS3 from ICAL | No qualification | No qualification |
| Area response > 200% of the opening CCV or mid-point standard CS3 from ICAL | J- | No qualification |
| RT shift between sample/blank and opening CCV or mid-point standard CS3 from ICAL > 10.0 seconds | R | R |
| RT shift between sample/blank and opening CCV or mid-point standard CS3 from ICAL < 10.0 seconds | No qualification | No qualification |

# X. Target Analyte Identification

## A. Review Items

Form 1A-OR, quantitation reports, mass spectra, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Trace VOA, Section 11.1.1)

## B. Objective

The objective is to provide acceptable GC/MS qualitative analysis to minimize the number of erroneous analyte identifications.

## C. Criteria

1. The mass spectrum of the analyte from the sample analysis must match that of the same analyte in the associated opening CCV or mid-point standard CS3 from the associated ICAL according to the following criteria:
   a. All ions present in the calibration standard mass spectrum must be present in the sample spectrum at a relative intensity > 10%.
   b. The relative intensities of these ions must agree within ±20% between the standard and sample spectra (e.g., for an ion with an abundance of 50% in the standard spectrum, the corresponding sample ion abundance must be between 30-70%).
   c. Ions present at > 10% in the sample mass spectrum, but not present in the standard spectrum, must be evaluated by a reviewer experienced in mass spectral interpretation.
2. The Relative Retention Time (RRT) for a positively identified target analyte must be within ±0.06 RRT units of the RRT for the same analyte in the associated opening CCV or mid-point standard CS3 from the associated ICAL.

## D. Evaluation

1. Verify that the positively identified target analyte mass spectrum meets the specified criteria. If not, examine the sample target analyte spectra for the presence of interference at one or more mass fragment peaks. Although the presence of a co-eluting interferent may preclude positive identification of the analyte, the presumptive evidence of its presence may be useful information to include in the Data Review Narrative.
2. Verify that the RRT of the positively identified target analyte is within ±0.06 RRT units of the RRT for the same analyte in the associated opening CCV or mid-point standard CS3 from the associated ICAL.
3. Be aware of situations when sample carryover is a possibility and use professional judgment to determine if instrument cross-contamination has affected any positive analyte identification. An instrument blank must be analyzed after a sample containing target analytes with concentrations exceeding the ICAL range (20 µg/L for non-ketones, 200 µg/L for ketones), non-target compounds at concentrations > 100 µg/L, or saturated ions from an analyte (excluding the analyte peaks in the solvent front).
4. Verify that peaks are correctly identified as target analytes, TICs, DMCs, or internal standards on the chromatogram for samples and blanks.
5. Verify that there is no erroneous analyte identification, either false positive or false negative, for each target analyte. The positively identified target analytes can be more easily detected for false positives than false negatives. More information is available for false positives due to the requirement for submittal of data supporting positive identifications. Non-detected target analytes, on the other hand, are more difficult to assess. One example of the detection of false negatives is reporting a target analyte as a TIC.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant TICs can be obtained from the CCS report and may be used as part of the evaluation process.

**NOTE:** A target analyte reported as a false negative may not have the best match in a TIC search of a contaminated sample, but its mass spectrum may be present under that of a reported TIC.

## E. Action

1. If the positively identified target analyte mass spectrum does not meet the specified criteria, qualify detect as unusable (R), or report the result at the CRQL and qualify as non-detect (U).
2. If the RRT for a positively identified target analyte is outside the specified RRT windows, qualify detect as unusable (R), or report the result at the CRQL and qualify as non-detect (U).
3. If it is determined that cross-contamination has occurred, use professional judgment to qualify detects. Annotate any changes made to the reported analytes due to either false positive or negative identifications, or concerns regarding target analyte identifications, in the Data Review Narrative. Note the necessity for numerous or significant changes for EPA Regional CLP COR action.

## XI. Target Analyte Quantitation and Reported Contract Required Quantitation Limit

### A. Review Items

Form 1A-OR, sample preparation sheets, SDG Narrative, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Trace VOA, Sections 11.2.1, 11.2.2, and 11.2.4)

### B. Objective

The objective is to ensure that the reported results and CRQLs for target analytes are accurate.

### C. Criteria

1. Target analyte results and sample-specific CRQLs must be calculated according to the correct equations.
2. Target analyte RRF must be calculated using the correct associated internal standard, as listed in the method. Quantitation must be based on the quantitation ion (m/z) specified in the method for both the internal standards and target analytes. Target analyte result must be calculated using the $\overline{RRF}$ from the associated ICAL.

### D. Evaluation

1. Verify that the results for all positively identified analytes are calculated and reported by the laboratory.
2. Verify that the CRQLs are calculated for the non-detects and reported accordingly.
3. Verify that the correct internal standard, quantitation ion, and $\overline{RRF}$ are used to calculate the reported results.
4. Verify that the same internal standard, quantitation ion, and $\overline{RRF}$ are used consistently.
5. Verify that the sample-specific CRQLs have been calculated and adjusted to reflect original sample mass/volume and any applicable dilutions.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant results or CRQLs can be obtained from the CCS report and may be used as part of the evaluation process.

### E. Action

1. If any discrepancies are found, contact the EPA Regional CLP COR, who may contact the laboratory to obtain additional information that could resolve any differences. If a discrepancy remains unresolved, use professional judgment to decide which value is the most accurate and to determine whether qualification of the data is warranted. Annotate the reasons for any data qualification in the Data Review Narrative.
2. If errors are detected in results and CRQL calculations, perform a more comprehensive recalculation.
3. If sample results are < CRQLs and ≥ MDLs, qualify as estimated (J).
4. Note numerous or significant failures to accurately quantify the target analytes, or to properly evaluate and adjust CRQLs, for EPA Regional CLP COR action.

## XII. Tentatively Identified Compounds

### A. Review Items

Form 1B-OR, chromatograms, library search printouts, and spectra for the TIC candidates. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Trace VOA, Sections 11.1.2 and 11.2.3)

### B. Objective

The objective is to provide tentative identifications to chromatographic peaks that are not identified as target analytes, DMCs, or internal standards.

### C. Criteria

For each sample, the laboratory must conduct a mass spectral search of the National Institute of Standards and Technology (NIST) (2011 release or later), Wiley (2011 release or later), or equivalent mass spectral library, and report the possible identity for up to 30 of the largest peaks that are not DMCs, internal standards, or target analytes. The peak for a TIC should have an area or height > 10% of the area or height of the nearest internal standard. The estimated concentration for a TIC is calculated similarly to that for a target analyte, using total ion areas for the TIC and the internal standard, and assuming an RRF of 1.0.

1. Guidelines for tentative identification are as follows:

   a. Major ions (> 10% Relative Intensity) in the reference spectrum should be present in the sample spectrum.

   b. The relative intensities of the major ions should agree within ±20% between the sample and the reference spectra.

   c. Molecular ions present in the reference spectrum should be present in the sample spectrum.

   d. Non-target compounds receiving a library search match of 85% or higher are considered a "probable match". The compound should be reported unless the mass spectral interpretation specialist feels there is evidence not to report the compound as identified by the library search program. The laboratory should include the justification for not reporting a compound as listed by the search program in the SDG Narrative.

   e. If the library search produces more than one compound ≥ 85%, the compound with the highest percent match (report first compound if percent match is the same for two or more compounds) should be reported, unless the mass spectral interpretation specialist feels that the highest match compound should not be reported, or another compound with a lower match should be reported. The laboratory should include the justification for not reporting the compound with the highest spectral match within the SDG Narrative. DMCs, internal standards, and target analytes should not be reported as TICs.

   f. If the library search produces a series of obvious isomer compounds with library search matches ≥ 85%, the compound with the highest library search percent match (or the first compound if the library search matches are the same) should be reported. The laboratory should note in the SDG Narrative that the exact isomer configuration, as reported, may not be accurate.

   g. If the library search produces no match ≥ 85%, and in the technical judgment of the mass spectral interpretation specialist no valid tentative identification can be made, the compound should be reported as "unknown". The mass spectral specialist should give additional classification of the unknown compound, if possible (e.g., "unknown aromatic", "unknown hydrocarbon", "unknown acid type", "unknown chlorinated compound"). If probable molecular weights can be distinguished, they should be included.

h. The Chemical Abstracts Service (CAS) registry number is the unique identifier for each chemical compound. As the rules of chemical nomenclature have changed over time, each chemical substance is liable to have several names or synonyms [i.e., trade or brand name(s); generic or common name(s); trivial or systematic; or International Union of Pure and Applied Chemistry (IUPAC) name(s)]. Whether synonyms or other names are created for this compound, the CAS registry number will remain unchanged. The CAS registry number is simply an identifier which has no structural significance. Regardless of RTs, if the library search produces two or more compounds at or above 85% with the same CAS Number, the compound with the highest percent match (report first compound if the percent match is the same for two or more compounds) should be reported unless the mass spectral interpretation specialist feels there is just evidence not to report the compound with the highest match.

i. If the library search produces only one and the same compound (i.e., the same CAS registry number) with the match at or above 85% at two different RTs, the compound having the highest percent match should be reported as TIC and the other one could be reported as unknown. If both TICs have the same percent match for the same compound, one of the TICs could be reported as unknown. Such justifications should be included in the SDG Narrative.

j. Alkanes are not to be reported as TICs on Form 1B-OR. An alkane is defined as any hydrocarbon with the generic formula $C_nH_{2n+2}$ (straight-chain or branched) or $C_nH_{2n}$ (cyclic) that contains only C-H and C-C single bonds. When the preceding alkanes are tentatively identified, the concentration(s) should be estimated and the analytes reported as alkanes by class (i.e., straight-chain, branched, cyclic, as a series, or as applicable) in the SDG Narrative. Total alkanes concentration should be reported on Form 1B-OR.

## D. Evaluation

1. Verify that the laboratory has generated a library search for all required peaks in the chromatograms for samples and blanks.
2. Verify that TIC peaks present in samples are not found in blanks. When a low-level, non-target compound that is a common artifact or laboratory contaminant is detected in a sample, a thorough check of blank chromatograms may require looking for peaks which are < 10% of the internal standard height, but present in the blank chromatogram at a similar RRT.
3. Verify that mass spectra for all reported TICs are present for every sample and blank.
4. Review ions present in the sample spectrum, but not in the reference spectrum, for possible background contamination, interference, or presence of coeluting compounds.
5. Review ions present in the reference spectrum, but not in the sample spectrum, for possible subtraction from the sample spectrum because of background contamination or coeluting compounds. Data system library reduction programs can sometimes create these discrepancies.
6. Consider all reasonable choices since TIC library searches often yield several candidate compounds having a close matching score.
7. Be aware of common laboratory artifacts/contaminants and their sources (e.g., Aldol condensation products, solvent preservatives, and reagent contaminants). These may be present in blanks and not reported as sample TICs, such as:

   a. Common laboratory contaminants include $CO_2$ (m/z 44), siloxanes (m/z 73), diethyl ether, hexane, certain freons, and phthalates at levels < 100 µg/L.

   b. Solvent preservatives include cyclohexene (a methylene chloride preservative). Related by-products include cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenol, chlorocyclohexene, and chlorocyclohexanol.

   c. Aldol condensation reaction products of acetone include 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten-2-one, and 5,5-dimethyl-2(5H)-furanone.

8. A target analyte may be identified by non-target library search procedures, even though it is not identified as a target analyte (false negative). If the total area quantitation method is used, request that the laboratory recalculate the result using the proper quantitation ion and RRF.

    a. A non-target compound may be incorrectly identified by the instrument's target analyte data processor as a target analyte (false positive). When this happens, the non-target library search procedure will not detect the false positive as a TIC. In this case, request that the laboratory properly identify the analyte as a TIC and recalculate the result using the total area quantitation method and an RRF of 1.0.

    b. Evaluate other sample chromatograms and check for both false negatives and false positives to determine if the occurrence is isolated or systematic.

9. Verify that the TIC concentration is calculated using an RRF of 1.0.

## E. Action

1. If the library search match for a TIC is ≥ 85%, qualify the TIC as tentatively identified with estimated concentration (NJ).
2. If the library search match for a TIC is < 85%, qualify the TIC as unknown with estimated concentration (J).
3. General actions related to the review of TIC results are as follows:

    a. If it is determined that a tentative identification of a non-target compound is unacceptable, change the tentative identification to "unknown" or another appropriate identification, and qualify the result as estimated (J).

    b. If a library search or proper calculation was not performed for all contractually-required peaks, the EPA Regional CLP COR may request the data from the laboratory.

    c. Use professional judgment to determine whether a library search result for a TIC represents a reasonable identification. If there is more than one possible match, report the result as "either compound X or compound Y". If there is a lack of isomer specificity, change the TIC result to a non-specific isomer result (e.g., 1,3,5-trimethyl benzene to trimethyl benzene isomer) or to a compound class (e.g., 2-methyl, 3-ethyl benzene to a substituted aromatic compound).

    d. Other Case factors may influence TIC judgments. If a sample TIC match is poor, but other samples have a TIC with a valid library match, similar RRT, and the same ions, infer identification information from the other sample TIC results.

4. Note any changes made to the reported data or any concerns regarding TIC identifications in the Data Review Narrative.
5. Note any failure to properly evaluate and report TICs for EPA Regional CLP COR action.

## XIII. System Performance

### A. Review Items

Form 8A-OR and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Trace VOA, Section 11.1)

### B. Objective

The objective is to ensure that the system is stable during the analytical sequence to produce quality data.

### C. Criteria

There are no specific criteria for system performance.

### D. Evaluation

1. Abrupt discrete shifts in the Reconstructed Ion Chromatogram (RIC) baseline may indicate a change in the instrument's sensitivity or in the zero setting. A baseline "shift" could indicate a decrease in sensitivity in the instrument or an increase in the instrument zero, possibly causing target compounds at or near the detection limit to miss detection. A baseline "rise" could indicate problems such as a change in the instrument zero, a leak, or degradation of the column.
2. Poor chromatographic performance affects both qualitative and quantitative results. Indications of substandard performance include:
    a. High RIC background levels or shifts in absolute RTs of internal standards.
    b. Excessive baseline rise at elevated temperature.
    c. Extraneous peaks.
    d. Loss of resolution.
    e. Peak tailing or peak splitting that may result in inaccurate quantitation.
3. A drift in instrument sensitivity may occur during the 12-hour period and may be an indication of possible internal standard spiking problems. This could be discerned by examination of the internal standard area on Form 8A-OR for trends such as a continuous or near-continuous increase or decrease in the internal standard area over time.

### E. Action

1. Use professional judgment to qualify the data if it is determined that system performance has degraded during sample analyses.
2. Note any degradation of system performance which significantly affected the data for EPA Regional CLP COR action.

## XIV. Performance Evaluation Sample

### A. Review Items

Form 1A-OR, TR/COC Record documentation, preparation logs, instrument printouts, and raw data. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit F, Section 4.1)

### B. Objective

The objective is to determine the validity of the analytical results based on the recovery of the PE sample(s).

### C. Criteria

1. Matrix-specific PE samples shall be analyzed utilizing the same analytical methods and Quality Assurance/Quality Control (QA/QC) procedures as employed for the samples, at a frequency to be determined by each EPA Region for each site. PE samples must be analyzed in an SDG containing field samples for the Case, using the same procedures, reagents, and instrumentation.

### D. Evaluation

1. Verify, using Form 1A-OR, preparation logs, and raw data, that the PE samples were analyzed with the field samples and field blanks in the SDG.
2. Verify, using Form 1A-OR, that the PE sample results are within the warning limits (95% confidence interval) and action limits (99% confidence interval).
3. If a significant number (i.e., half or more) of the analytes in the PE samples fall outside of the 95% warning or 99% action criteria, or a number of false positive results are reported, evaluate the overall impact on the data.

### E. Action

**NOTE:** If the PE sample criteria are not met, the laboratory performance and method accuracy are in question. Use professional judgment to determine if the data should be qualified or rejected. The following guidance is suggested for qualifying sample data associated with a PE sample that does not meet the required criteria.

For a PE sample that does not meet the technical criteria, apply the action to all samples in the same preparation batch. If the concentration of any analyte in a PE sample is not comparable to the analyte's concentration in the field samples or field blanks (i.e., it is much higher or much lower than the concentration in these samples), the action may be applied to only those samples in which the analyte's concentration is comparable to the PE sample concentration.

1. If the PE sample was not analyzed with the field samples and field blanks, use professional judgment to determine if the associated sample results should be qualified. Obtain additional information from the laboratory, if necessary. If a laboratory fails to analyze the PE sample(s) provided with field samples and field blanks, or if a laboratory consistently fails to generate acceptable PE sample results, record the situation in the Data Review Narrative, and note it for EPA Regional CLP COR action.
2. If the PE sample results are outside the lower warning limits but inside the lower action limits, qualify detects as estimated low (J-) and non-detects as estimated (UJ).
3. If the PE sample results are outside the lower action limits, qualify detects as estimated low (J-) and non-detects as unusable (R).
4. If the PE sample results are within the limits, detects and non-detects should not be qualified.
5. If the PE sample results are outside the upper warning limits but inside the upper action limits, qualify detects as estimated high (J+). Non-detects should not be qualified.

6. If the PE sample results are outside the upper action limits, qualify detects as estimated high (J+). Non-detects should not be qualified.
7. Annotate the potential effects on the data due to out-of-control PE sample results in the Data Review Narrative.

**Table 15. PE Sample Actions for Trace Volatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| PE sample results outside lower warning limits but inside lower action limits | J- | UJ |
| PE sample results outside lower action limits | J- | R |
| PE sample results within limits | No qualification | No qualification |
| PE sample results outside upper warning limits but inside upper action limits | J+ | No qualification |
| PE sample results outside upper action limits | J+ | No qualification |

## XV. Regional Quality Assurance and Quality Control

### A. Review Items

Form 1A-OR, chromatograms, TR/COC Record documentation, quantitation reports, and other raw data from QA/QC samples. (SOW SOM02.4 – Exhibit B, Sections 2.4 and 3.4)

### B. Objective

The objective is to use results from the analysis of EPA Regional QA/QC samples such as field duplicates, blind spikes, and blind blanks to determine the validity of the analytical results.

### C. Criteria

Criteria are determined by each EPA Region.

1. The frequency of EPA Regional QA/QC samples should be defined in the project QAPP.
2. Performance criteria for EPA Regional QA/QC samples should also be defined in the project QAPP.
3. The EPA Region may provide the laboratory with PE samples to be analyzed with each SDG. These samples may include blind spikes and/or blind blanks. The laboratory must analyze a PE sample when provided by the EPA Region. Refer to Section VI, above, for blanks criteria. Refer to Section XIV, above, for PE samples criteria.
4. The RPD between field duplicates shall fall within the specific limits in the EPA Region's SOP or project QAPP.

### D. Evaluation

1. Evaluation procedures must follow the EPA Region's SOP for data review.
2. Determine whether the results of EPA Regional QA/QC samples impact all samples in the project or only those directly associated (i.e., in the same SDG, collected on the same day, prepared together, or contained in the same analytical sequence).
3. Calculate the RPD between field duplicates and provide this information in the Data Review Narrative. Also verify that the value falls within the specific limits in the EPA Region's SOP or project QAPP.
4. Determine whether poor precision is the fault of the laboratory, or a result of sample non-homogeneity in the field. Laboratory observations of sample appearance may become important in these situations.

### E. Action

1. Any action must be in accordance with EPA Regional specifications and the criteria for acceptable field duplicate sample results.
2. Note unacceptable results for field duplicate samples for EPA Regional CLP COR action.
3. In general, for EPA Regional QA/QC performance not within QAPP specification, qualify detects as estimated (J) and non-detects as estimated (UJ). The impact on overall data quality should be assessed after consultation with the data user and/or field personnel. Contact the EPA Regional CLP COR if reanalysis of samples is required.

# XVI. Overall Assessment of Data

## A. Review Items

Entire data package, data review results, and (if available) the QAPP and Sampling and Analysis Plan (SAP).

## B. Objective

The objective is to provide the overall assessment on data quality and usability.

## C. Criteria

1. Review all available materials to assess the overall quality of the data, keeping in mind the additive nature of analytical problems.
2. Reported analyte concentrations must be quantitated according to the appropriate equations, as listed in the method. All sample results must be within the linear calibration ranges per the methods.

## D. Evaluation

Examine the raw data to verify that the correct calculation of the sample results was reported by the laboratory. Analysis logs, instrument printouts, etc., should be compared to the reported sample results recorded on the appropriate Organic Data Reporting Forms (Form 1A-OR through Form 8A-OR).

1. Evaluate any technical problems which have not been previously addressed.
2. Examine the raw data for any anomalies (e.g., baseline shift).
3. Verify that the appropriate method is used in sample analysis.
4. Verify that there are no transcription or reduction errors.
5. Verify that target analyte results fall within the calibrated ranges.
6. If appropriate information is available, use professional judgment to assess the usability of the data in order to assist the data user in avoiding inappropriate use of the data. Review all available information, including the QAPP (specifically the acceptance and performance criteria), SAP, and communication with the data user that concerns the intended use and desired quality of these data.

## E. Action

1. Use professional judgment to determine if there is any need to qualify data which were not qualified based on the QC criteria previously discussed.
2. Use professional judgment to qualify sample results and non-detects if the MDL exceeds the CRQL.
3. If a sample is not diluted properly when sample results exceed the upper limit of the calibration range, qualify sample results as estimated (J).
4. Write a brief Data Review Narrative to give the user an indication of the limitations of the analytical data.
5. Note any inconsistency of the data with the SDG Narrative for EPA Regional CLP COR action. If sufficient information on the intended use and required quality of the data is available, include an assessment of the usability of the data within the given context. This may be used as part of a formal Data Quality Assessment (DQA).

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## LOW/MEDIUM VOLATILE DATA REVIEW

The Low/Medium Volatile organic data requirements to be reviewed during validation are listed below:

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# I. Preservation and Holding Times

## A. Review Items

Form 1A-OR, Form 1B-OR, Traffic Report/Chain of Custody (TR/COC) Record documentation, Form DC-1, preparation sheet, raw data, and the Sample Delivery Group (SDG) Narrative checking for: pH, shipping container temperature, holding time, and other sample conditions. (SOW SOM02.4 – Exhibit B, Section 3.4; Exhibit D/Introduction, Section 5.0; Exhibit D/General, Sections 8.0, 10.1.2.1, and 10.2.2.4.4; and Exhibit D/Low/Med VOA, Section 8.0)

## B. Objective

The objective is to determine the validity of the analytical results based on the sample conditions and the holding time of the sample.

## C. Criteria

1. Technical holding time is determined from the date of sample collection to the date of sample analysis for aqueous and non-aqueous (soil and sediment) samples that are not designated for Toxicity Characteristic Leaching Procedure (TCLP)/Synthetic Precipitation Leaching Procedure (SPLP) Zero Headspace Extraction (ZHE) procedures. The extraction technical holding time for samples designated for TCLP/SPLP is determined from the date of sample collection to the date of sample extraction.
2. For TCLP/SPLP leachate samples, technical holding time is determined from the date of TCLP/SPLP ZHE completion to the date of TCLP/SPLP leachate sample analysis.
3. Samples should be in proper condition with shipping container temperatures at ≤ 6°C upon receipt at the laboratory. Aqueous samples, TCLP/SPLP aqueous and aqueous filtrate samples, TCLP/SPLP leachate samples, and preserved non-aqueous samples shall be protected from light and refrigerated at ≤ 6°C (but not frozen) from the time of receipt at the laboratory. Unpreserved soil samples and samples received in field core sampling/storage containers (Encore™ or equivalent) shall be protected from light and stored at < -7ºC from the time of receipt at the laboratory.
4. The extraction technical holding time criteria for samples designated for TCLP/SPLP is 14 days.
5. The technical holding time criteria for aqueous samples that are properly cooled at ≤ 6°C, but without any indications of being preserved, is 7 days.
6. The technical holding time criteria for TCLP/SPLP aqueous filtrate samples and TCLP/SPLP leachate samples that are properly cooled at ≤ 6°C is 7 days.
7. The technical holding time criteria for aqueous samples that are properly cooled at ≤ 6°C, and acid-preserved with HCl to a pH of ≤ 2, is 14 days.
8. Samples received in field core sampling/storage containers should be transferred, immediately upon receipt, to a pre-prepared closed-system purge-and-trap (P/T) vial and either be analyzed within 24 hours of sample receipt, or stored at < -7°C and analyzed within 14 days.
9. The technical holding time criteria for non-aqueous samples that are frozen at < -7°C, but not preserved with NaHSO, is 14 days.
10. The technical holding time criteria for non-aqueous samples that are properly cooled at ≤ 6°C (but not frozen), and preserved with NaHSO, is 14 days.
11. The technical holding time criteria for non-aqueous samples that are properly cooled at ≤ 6°C (but not frozen), and preserved with methanol, is 14 days.
12. Samples received in field core sampling/storage containers should be transferred, immediately upon receipt, to a pre-prepared closed system P/T vial and analyzed or frozen within 24 hours of receipt.

## D. Evaluation

1. Review the SDG Narrative to determine if the samples were properly preserved and arrived at the laboratory in proper condition (e.g., received intact, appropriate sample temperature at receipt, pH, and absence of air bubbles or detectable headspace). If there is an indication of problems with the samples, the sample integrity may be compromised.
2. Establish the TCLP/SPLP ZHE procedure technical holding times by comparing the sample collection dates on the TR/COC Record documentation with the dates of extraction in the preparation sheet. Also consider information contained in the Complete SDG File (CSF), as it may be helpful in the assessment.
3. Verify that the analysis dates on Form 1A-OR, Form 1B-OR, and the raw data are identical.
4. Establish technical holding times for TCLP/SPLP leachate samples by comparing the dates on the extraction sheet with the dates of analysis on Form 1A-OR and Form 1B-OR.
5. Establish technical holding times by comparing the sample collection dates on the TR/COC Record documentation with the dates of analysis on Form 1A-OR, Form 1B-OR, and the raw data. Also consider information contained in the CSF, as it may be helpful in the assessment.
    a. These evaluation guidelines are intended to address the integrity of data for all analytes listed in SOW SOM02.4 Exhibit C, Table 2 – Low/Medium Volatiles Target Analyte List and Contract Required Quantitation Limits. If the data user is interested in only a subset of the analytes and has data supporting analyte stability over longer holding times, then those longer times may be applied prior to data qualification under Section E, below. This information should be made part of the Data Review Narrative for evidentiary purposes.

## E. Action

1. If samples are received with shipping container temperatures > 6°C but ≤ 10°C, use professional judgment to qualify detects and non-detects.
2. If samples are received with shipping container temperatures > 10°C, use professional judgment to determine the reliability of the data, or qualify detects as estimated (J) and non-detects as estimated (UJ).
3. If the TCLP/SPLP ZHE procedure is performed within the extraction technical holding time of 14 days, detects and non-detects should not be qualified.
4. If the TCLP/SPLP ZHE procedure is performed outside the extraction technical holding time of 14 days, qualify detects as estimated (J) and non-detects as unusable (R).
5. If a discrepancy is found between the sample analysis date on Form 1A-OR, Form 1B-OR, and the raw data, perform a more comprehensive review to determine the correct date for establishing the holding time.
6. If aqueous samples are not properly preserved, but the samples are analyzed within the technical holding time of 7 days, detects and non-detects should not be qualified.
7. If TCLP/SPLP aqueous filtrate samples and TCLP/SPLP leachate samples are analyzed within the technical holding time of 7 days, detects and non-detects should not be qualified.
8. If aqueous samples are not properly preserved and are analyzed outside of the technical holding time of 7 days, qualify detects as estimated (J) and non-detects as unusable (R).
9. If TCLP/SPLP aqueous filtrate samples and TCLP/SPLP leachate samples are analyzed outside of the technical holding time of 7 days, qualify detects as estimated (J) and non-detects as unusable (R).
10. If aqueous samples are properly preserved and are analyzed within the technical holding time of 14 days, detects and non-detects should not be qualified.

11. If aqueous samples are properly preserved, but are analyzed outside of the technical holding time of 14 days, qualify detects as estimated (J) and non-detects as unusable (R).
12. If non-aqueous samples are not properly preserved, and the samples are analyzed within the technical holding time of 14 days, detects and non-detects should not be qualified.
13. If non-aqueous samples are not properly preserved, and the samples are analyzed outside the technical holding time of 14 days, qualify detects as estimated (J) and non-detects as unusable (R).
14. If non-aqueous samples are properly preserved, and the samples are analyzed within the technical holding time of 14 days, detects and non-detects should not be qualified.
15. If non-aqueous samples are properly preserved, and the samples are analyzed outside the technical holding time of 14 days, qualify detects as estimated (J) and non-detects as unusable (R).
16. When the holding times are exceeded, annotate in the Data Review Narrative any possible consequences for the analytical results.
17. If holding times are grossly exceeded, qualify detects as estimated (J) and non-detects as unusable (R). Note this for United States Environmental Protection Agency Regional Contract Laboratory Program Contracting Officer's Representative (EPA Regional CLP COR) action. Annotate the effect of the holding time exceedance on the resulting data in the Data Review Narrative, whenever possible.

**Table 16. Preservation and Holding Time Actions for Low/Medium Volatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| Sample temperature > 6°C but ≤ 10°C upon receipt at the laboratory | Use professional judgment | Use professional judgment |
| Sample temperature > 10°C upon receipt at the laboratory | Use professional judgment<br>J* | Use professional judgment<br>UJ |
| TCLP/SPLP ZHE procedure performed within the 14-day technical holding time | No qualification | No qualification |
| TCLP/SPLP ZHE procedure performed outside the 14-day technical holding time | J* | R |
| Aqueous sample not preserved but analyzed within the 7-day technical holding time | No qualification | No qualification |
| TCLP/SPLP aqueous filtrate sample and TCLP/SPLP leachate sample analyzed within 7-day technical holding time | No qualification | No qualification |
| Aqueous sample not preserved and analyzed outside the 7-day technical holding time | J* | R |
| TCLP/SPLP aqueous filtrate sample and TCLP/SPLP leachate sample analyzed outside 7-day technical holding time | J* | R |
| Aqueous sample properly preserved and analyzed within the 14-day technical holding time | No qualification | No qualification |
| Aqueous sample properly preserved but analyzed outside the 14-day technical holding time | J* | R |
| Non-aqueous sample preserved and analyzed within the 14-day technical holding time | No qualification | No qualification |
| Non-aqueous sample properly preserved but analyzed outside the 14-day technical holding time | J* | R |
| Non-aqueous sample not properly preserved but analyzed within the 14-day technical holding time | No qualification | No qualification |
| Non-aqueous sample not properly preserved and analyzed outside the 14-day technical holding time | J* | R |
| Holding time grossly exceeded | J* | R |

* The true direction of any bias may be unknown in this case. Use caution in determining whether some detected analytes should be qualified as estimated low (J-) or as estimated high (J+), based on knowledge of individual analyte stability or interactions (i.e., dehydrohalogenation).

## II. Gas Chromatograph/Mass Spectrometer Instrument Performance Check

### A. Review Items

Form 5-OR, bromofluorobenzene (BFB) mass spectra, and mass listing. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Low/Med VOA, Section 9.2)

### B. Objective

The objective of performing Gas Chromatograph/Mass Spectrometer (GC/MS) instrument performance checks is to ensure adequate mass resolution, identification, and to some degree, sensitivity, and to document this level of performance prior to analyzing any sequence of standards or samples.

### C. Criteria

1. A sufficient amount of the BFB instrument performance check solution (up to 50 ng BFB on-column) must be injected once at the beginning of each 12-hour period, during which samples, blanks, or standards are to be analyzed. The 12-hour period begins with the injection of BFB; however, in cases where a closing Continuing Calibration Verification (CCV) can be used as an opening CCV, the 12-hour clock begins with the injection of the opening CCV.

   Listed below are examples of acceptable analytical sequences incorporating the use of the opening and/or closing CCV. Use these examples as a guide for the possible analytical sequences that can be expected.

| Conditions for When Example Sequence is Appropriate: | Acceptable Criteria That Must Be Met: | Notes: |
|---|---|---|
| *Use Example 1* if time remains on the 12-hour clock after the initial calibration sequence. | • BFB tunes meet instrument performance criteria.<br>• The five Initial Calibration standards meet initial calibration criteria.<br>• Initial Calibration Verification (ICV) meets ICV criteria.<br>• CCV A meets both opening and closing CCV criteria.<br>• CCV B meets closing CCV criteria. | The requirement of starting the new 12-hour clock for Analytical Sequence 2 with a new BFB tune is waived if CCV A meets opening CCV criteria. If CCV B meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B. |
| *Use Example 2* if time remains on the 12-hour clock after the initial calibration sequence. | • BFB tunes meet instrument performance criteria.<br>• The five Initial Calibration standards meet initial calibration criteria.<br>• ICV meets ICV criteria.<br>• CCV A meets closing CCV criteria (but does not meet opening CCV criteria).<br>• CCV B meets opening CCV criteria.<br>• CCV C meets closing CCV criteria. | CCV A does not meet opening CCV criteria. Therefore, a new BFB tune must be performed, immediately followed by CCV B, before the method blank and any samples may be analyzed. In this case, the new 12-hour clock and Analytical Sequence 2 begins with the injection of the new BFB tune. |

| Conditions for When Example Sequence is Appropriate: | Acceptable Criteria That Must Be Met: | Notes: |
|---|---|---|
| *Use Example 3* if more than 12 hours have elapsed since the most recent initial calibration or closing CCV,<br>OR<br>if the most recent closing CCV was not or could not be used as an opening CCV. | • BFB tunes meet instrument performance criteria.<br>• CCV A meets opening CCV criteria.<br>• CCV B meets both opening and closing CCV criteria.<br>• CCV C meets both opening and closing CCV criteria. | The requirement of starting the new 12-hour clock for Analytical Sequence 2 with a new BFB tune is waived if CCV B meets opening CCV criteria. If CCV C meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B. |
| *Use Example 4* if more than 12 hours have elapsed since the most recent initial calibration or closing CCV,<br>OR<br>if the most recent closing CCV was not or could not be used as an opening CCV. | • BFB tunes meet instrument performance criteria.<br>• CCV A meets opening CCV criteria.<br>• CCV B meets closing CCV criteria (but does not meet opening CCV criteria).<br>• CCV C meets opening CCV criteria.<br>• CCV D meets both opening and closing CCV criteria. | CCV B does not meet opening CCV criteria. Therefore, a new BFB tune must be performed, immediately followed by CCV C, before the method blank and any samples may be analyzed. In this case, the new 12-hour clock and Analytical Sequence 2 begins with the injection of the new BFB tune. The requirement of starting the new 12-hour clock for Analytical Sequence 3 with a new BFB tune is waived if CCV D meets opening CCV criteria. If CCV D meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV D. |

**Example 1:**

| **Example 1:** | **Time** | **Material Injected** | **Analytical Sequence #** |
|---|---|---|---|
| Start of 12-hour clock for Analytical Sequence 1 | 0 hr | BFB | 1 |
| | | Initial Calibration 5.0 | 1 |
| | | Initial Calibration 10 | 1 |
| | | Initial Calibration 50 | 1 |
| | | Initial Calibration 100 | 1 |
| | | Initial Calibration 200 | 1 |
| | | ICV | 1 |
| | | Method Blank | 1 |
| | | Subsequent Samples | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| End of 12-hour clock for Analytical Sequence 1/ Beginning of 12-hour clock for Analytical Sequence 2 | 12 hr | CCV A (meets opening CCV criteria) | 1/2 |
| | | Method Blank | 2 |
| | | Subsequent Samples | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| End of 12-hour clock for Analytical Sequence 2/ Beginning of 12-hour clock for Analytical Sequence 3 | 24 hr | CCV B (meets opening CCV criteria) | 2/3 |

**Example 2:**

| **Example 2:** | **Time** | **Material Injected** | **Analytical Sequence #** |
|---|---|---|---|
| Start of 12-hour clock for Analytical Sequence 1 | 0 hr | BFB | 1 |
| | | Initial Calibration 5.0 | 1 |
| | | Initial Calibration 10 | 1 |
| | | Initial Calibration 50 | 1 |
| | | Initial Calibration 100 | 1 |
| | | Initial Calibration 200 | 1 |
| | | ICV | 1 |
| | | Method Blank | 1 |
| | | Subsequent Samples | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| End of 12-hour clock for Analytical Sequence 1 | 12 hr | CCV A (meets closing CCV criteria, fails opening CCV criteria) | 1 |
| Beginning of 12-hour clock for Analytical Sequence 2 | 13 hr | BFB | 2 |
| | | CCV B (meets opening CCV criteria) | 2 |
| | | Method Blank | 2 |
| | | Subsequent Samples | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| End of 12-hour clock for Analytical Sequence 2 | 25 hr | CCV C (meets closing CCV criteria) | 2 |

**Example 3:**

| **Example 3:** | **Time** | **Material Injected** | **Analytical Sequence #** |
|---|---|---|---|
| Start of 12-hour clock for Analytical Sequence 1 | 0 hr | BFB | 1 |
| | | CCV A (meets opening CCV criteria) | 1 |
| | | Method Blank | 1 |
| | | Subsequent Samples | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| End of 12-hour clock for Analytical Sequence 1/ Beginning of 12-hour clock for Analytical Sequence 2 | 12 hr | CCV B (meets opening CCV criteria) | 1/2 |
| | | Method Blank | 2 |
| | | Subsequent Samples | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | |
| End of 12-hour clock for Analytical Sequence 2/ Beginning of 12-hour clock for Analytical Sequence 3 | 24 hr | CCV C (meets opening CCV criteria) | 2/3 |

**Example 4:**

| **Example 4:** | **Time** | **Material Injected** | **Analytical Sequence #** |
|---|---|---|---|
| Start of 12-hour clock for Analytical Sequence 1 | 0 hr | BFB | 1 |
| | | CCV A (meets opening CCV criteria) | 1 |
| | | Method Blank | 1 |
| | | Subsequent Samples | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| End of 12-hour clock for Analytical Sequence 1 | 12 hr | CCV B (meets closing CCV criteria, fails opening CCV criteria) | 1 |
| Beginning of 12-hour clock for Analytical Sequence 2 | 13 hr | BFB | 2 |
| | | CCV C (meets opening CCV criteria) | 2 |
| | | Method Blank | 2 |
| | | Subsequent Samples | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | |
| End of 12-hour clock for Analytical Sequence 2/ Beginning of 12-hour clock for Analytical Sequence 3 | 25 hr | CCV D (meets opening CCV criteria) | 2/3 |

2. The BFB instrument performance check must meet the ion abundance criteria listed in Table 17.

**Table 17. Ion Abundance Criteria for BFB**

| Mass | Ion Abundance Criteria |
|---|---|
| 50 | 15.0 - 40.0% of mass 95 |
| 75 | 30.0 - 80.0% of mass 95 |
| 95 | Base peak, 100% relative abundance |
| 96 | 5.0 - 9.0% of mass 95* |
| 173 | Less than 2.0% of mass 174 |
| 174 | 50.0% - 120% of mass 95 |
| 175 | 5.0 - 9.0% of mass 174 |
| 176 | 95.0 - 101% of mass 174 |
| 177 | 5.0 - 9.0% of mass 176 |

* All ion abundances must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

## D. Evaluation

1. Verify that the BFB Instrument Performance Check is analyzed at the specified frequency and sequence.
2. Compare the data presented on Form 5-OR for each Instrument Performance Check with each mass listing submitted to ensure the following:
   a. Form 5-OR is present and completed for each required BFB at the specified frequency.
   b. The laboratory has not made transcription errors between the data and the form. If there are major differences between the mass listing and Form 5-OR, a more in-depth review of the data is required. This may include obtaining and reviewing additional information from the laboratory.
   c. The appropriate number of significant figures has been reported (number of significant figures given for each ion in the Ion Abundance Criteria column) and that rounding is correct.
   d. The laboratory has not made any calculation errors.
3. Verify from the raw data (mass listing) that the mass assignment is correct and that the mass listing is normalized to the specified m/z of 95, 174, and 176, respectively.
4. Verify that the ion abundance criteria are met. The ion abundance for m/z 173, 175, 176, and 177 are calculated by normalizing to the specified m/z. The critical ion abundance criteria for BFB are the relative abundance ratios of m/z 95/96, 174/175, 174/176, and 176/177. The relative abundance ratios of m/z 50 and 75 are of lower importance for target analytes than for Tentatively Identified Compounds (TICs).
5. If possible, verify that spectra are generated using appropriate background subtraction techniques. Since the BFB spectrum is obtained from chromatographic peaks that should be free from co-elution problems, background subtraction should be performed in accordance with the following procedure:
   a. Three scans (the peak apex scan and the scans immediately preceding and following the apex) are acquired and averaged.

b. Background subtraction must be accomplished using a single scan acquired within 20 scans of the elution of BFB, but the BFB peak must not be subtracted as part of the background.

**NOTE:** All mass spectrometer instrument conditions must be identical to those used for sample analysis. Background subtraction actions resulting in spectral distortions for the sole purpose of meeting the method specifications are contrary to the Quality Assurance (QA) objectives, and are therefore unacceptable.

**NOTE:** For data obtained from the CLP, information regarding noncompliant BFB instrument performance check can be obtained from the National Functional Guidelines (NFG) reports and may be used as part of the evaluation process.

## E. Action

1. If the instrument performance check is not analyzed at the specified frequency and sequence, qualify detects and non-detects in the associated samples as unusable (R). The EPA Regional CLP COR should be contacted to arrange for reanalysis of all affected samples.

   a. In the event the samples cannot be reanalyzed, examine all calibrations associated with the sequence to evaluate whether proper qualitative criteria were achievable. If so, it may be possible to salvage usable data from the sequence. Otherwise, qualify the data as unusable (R).

2. If minor transcription errors are found to be insignificant to data quality and can be corrected on a copy of the form, no further action is required.

3. If the laboratory failed to provide the correct forms, or if significant transcription or calculation errors are found, notify the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data, and notify the EPA Regional CLP COR.

4. If the mass assignment is in error (e.g., m/z 96 is indicated as the base peak rather than m/z 95), qualify detects and non-detects in the associated samples as unusable (R).

5. If the ion abundance criteria in Table 17 are not met, use professional judgment to qualify detects and non-detects in the associated samples.

6. Annotate decisions to use analytical data associated with noncompliant BFB instrument performance checks in the Data Review Narrative.

7. If the instrument performance check criteria are achieved using techniques other than those described in Section II.D.5, obtain additional information to evaluate the performance and procedures. Note any concerns (e.g., use of inappropriate technique for background subtraction) or questions for EPA Regional CLP COR action.

## III. Initial Calibration

### A. Review Items

Form 6A-OR, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Low/Med VOA, Sections 7.2.2.1 and 9.3)

### B. Objective

The objective of initial calibration (ICAL) is to ensure that the instrument is capable of producing acceptable qualitative and quantitative data.

### C. Criteria

1. ICAL should be performed at the specified frequency and sequence. Each GC/MS system must be calibrated with a minimum of five concentrations to determine instrument sensitivity and the linearity of GC/MS response for the purgeable target analytes and Deuterated Monitoring Compounds (DMCs).
   a. ICAL standards must be analyzed prior to any analysis of the ICV, samples, and required blanks, and within 12 hours of the associated instrument performance check at the beginning of each analytical sequence, or as necessary if the CCV acceptance criteria are not met.
   b. ICAL standards must contain all required target analytes and DMCs at concentrations of 5.0, 10, 50, 100, and 200 µg/L for non-ketones, and 10, 50, 100, 200, and 400 µg/L for ketones.
   c. All three xylene isomers (o-, m-, and p-xylene) must be present in calibration standards.
   d. Concentrations for o-xylene must be at 5.0, 10, 50, 100, and 200 µg/L, while the total concentrations of the m- plus the p-xylene isomers must be at 5.0, 10, 50, 100, and 200 µg/L.
2. The Relative Response Factor (RRF), Mean RRF ($\overline{RRF}$), and Percent Relative Standard Deviation (%RSD) must be calculated for each target analyte and DMC accordingly.
3. The RRF for each target analyte and DMC in each ICAL standard must be ≥ Minimum RRF value in Table 18.
4. The %RSD of the ICAL RRF for each target analyte and DMC must be ≤ Maximum %RSD value in Table 18.

**NOTE:** The technical acceptance criteria specified in a "Request for Quote (RFQ) for Solicitation" of a Modified Analysis may impact some of the preceding evaluation criteria. A copy of this document should be present in the CSF, when applicable.

### D. Evaluation

1. Verify that the ICAL is performed at the specified frequency and sequence.
2. Verify that the correct concentrations of the target analytes and DMCs are used in each ICAL standard.
3. Verify that the RRF, $\overline{RRF}$, and %RSD for each target analyte and DMC are reported on Form 6A-OR. Recalculate the RRFs, $\overline{RRF}$s, and %RSDs for at least one target analyte and DMC associated with each internal standard, and verify that the recalculated values agree with the laboratory reported values on Form 6A-OR.
4. Verify that the RRF is ≥ Minimum RRF value in Table 18 for each target analyte and DMC.
5. Verify that the %RSD is ≤ Maximum %RSD value in Table 18 for each target analyte and DMC.

**NOTE:** For data obtained from the CLP, information regarding noncompliant ICAL can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the ICAL is not performed at the specified frequency and sequence, use professional judgment to qualify detects and non-detects in the associated samples as unusable (R).
2. If the ICAL is not performed at the specified concentrations, qualify detects in the associated samples as estimated (J) and non-detects in the associated samples as estimated (UJ).
3. If errors are detected in the calculations of the RRFs, $\overline{RRF}$s, or %RSDs, perform a more comprehensive recalculation.
4. If the RRF is < Minimum RRF value in Table 18 for any target analyte, use professional judgment to qualify detects in the associated samples as estimated high (J+) or unusable (R), and non-detects in the associated samples as unusable (R).
5. If the RRF is ≥ Minimum RRF value in Table 18 for any target analyte, detects and non-detects in the associated samples should not be qualified.
6. If the %RSD is > Maximum %RSD value in Table 18 for any target analyte, qualify detects in the associated samples as estimated (J). Use professional judgment to qualify non-detects in the associated samples.
7. If the %RSD is ≤ Maximum %RSD value in Table 18 for any target analyte, detects and non-detects in the associated samples should not be qualified.
8. No qualification of the data is necessary based on the DMC RRF, $\overline{RRF}$, and %RSD data alone. Use professional judgment to evaluate the DMC RRF, $\overline{RRF}$, and %RSD data in conjunction with the DMC recoveries to determine the need for data qualification.
9. Based on the project-specific Data Quality Objectives (DQOs), a more in-depth review may be necessary. The following guidelines are recommended:
    a. If the %RSD criteria of any target analytes are not met and the %RSD criteria are still not satisfied after eliminating either the high or the low-point of the ICAL:
        i. Qualify detects in the associated samples as estimated (J).
        ii. Use professional judgment to qualify non-detects in the associated samples.
    b. If the high-point of the ICAL curve is outside of the %RSD criteria (e.g., due to saturation):
        i. Qualify detects in the associated samples with analyte concentrations greater than the high-point concentration as estimated (J).
        ii. Detects in the associated samples with analyte concentrations within the calibration range should not be qualified.
        iii. Non-detects in the associated samples should not be qualified.
    c. If the low-point of the ICAL curve is outside of the %RSD criteria:
        i. Qualify detects in the associated samples with analyte concentrations in the non-linear range as estimated (J).
        ii. Detects in the associated samples with analyte concentrations within the calibration range should not be qualified.
        iii. For non-detects in the associated samples, use the lowest point of the linear portion of the ICAL curve to determine the new quantitation limit.
10. If the laboratory failed to provide adequate calibration information, notify the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data.

11. Annotate the potential effects on the reported data due to exceeding the ICAL criteria in the Data Review Narrative.
12. If the ICAL criteria are grossly exceeded, note this for EPA Regional CLP COR action.

**Table 18. RRF, %RSD, and %D Acceptance Criteria in Initial Calibration, ICV, and CCV for Low/Medium Volatile Analysis**

| Analyte | Minimum RRF | Maximum %RSD | ICV/Opening CCV Maximum %D[1] | Closing CCV Maximum %D |
|---|---|---|---|---|
| Dichlorodifluoromethane | 0.010 | 25.0 | ±40.0 | ±50.0 |
| Chloromethane | 0.010 | 20.0 | ±30.0 | ±50.0 |
| Vinyl chloride | 0.010 | 20.0 | ±25.0 | ±50.0 |
| Bromomethane | 0.010 | 40.0 | ±30.0 | ±50.0 |
| Chloroethane | 0.010 | 40.0 | ±25.0 | ±50.0 |
| Trichlorofluoromethane | 0.010 | 40.0 | ±30.0 | ±50.0 |
| 1,1-Dichloroethene | 0.060 | 20.0 | ±20.0 | ±25.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 0.050 | 25.0 | ±25.0 | ±50.0 |
| Acetone | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Carbon disulfide | 0.100 | 20.0 | ±25.0 | ±25.0 |
| Methyl acetate | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Methylene chloride | 0.010 | 40.0 | ±30.0 | ±50.0 |
| trans-1,2-Dichloroethene | 0.100 | 20.0 | ±20.0 | ±25.0 |
| Methyl tert-butyl ether | 0.100 | 40.0 | ±25.0 | ±50.0 |
| 1,1-Dichloroethane | 0.300 | 20.0 | ±20.0 | ±25.0 |
| cis-1,2-Dichloroethene | 0.200 | 20.0 | ±20.0 | ±25.0 |
| 2-Butanone | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Bromochloromethane | 0.100 | 20.0 | ±20.0 | ±25.0 |
| Chloroform | 0.300 | 20.0 | ±20.0 | ±25.0 |
| 1,1,1-Trichloroethane | 0.050 | 20.0 | ±25.0 | ±25.0 |
| Cyclohexane | 0.010 | 40.0 | ±25.0 | ±50.0 |
| Carbon tetrachloride | 0.100 | 20.0 | ±25.0 | ±25.0 |
| Benzene | 0.200 | 20.0 | ±20.0 | ±25.0 |
| 1,2-Dichloroethane | 0.070 | 20.0 | ±20.0 | ±25.0 |
| Trichloroethene | 0.200 | 20.0 | ±20.0 | ±25.0 |
| Methylcyclohexane | 0.050 | 40.0 | ±25.0 | ±50.0 |
| 1,2-Dichloropropane | 0.200 | 20.0 | ±20.0 | ±25.0 |
| Bromodichloromethane | 0.300 | 20.0 | ±20.0 | ±25.0 |

| Analyte | Minimum RRF | Maximum %RSD | ICV/Opening CCV Maximum %D[1] | Closing CCV Maximum %D |
|---|---|---|---|---|
| cis-1,3-Dichloropropene | 0.300 | 20.0 | ±20.0 | ±25.0 |
| 4-Methyl-2-pentanone | 0.030 | 25.0 | ±30.0 | ±50.0 |
| Toluene | 0.300 | 20.0 | ±20.0 | ±25.0 |
| trans-1,3-Dichloropropene | 0.200 | 20.0 | ±20.0 | ±25.0 |
| 1,1,2-Trichloroethane | 0.200 | 20.0 | ±20.0 | ±25.0 |
| Tetrachloroethene | 0.100 | 20.0 | ±20.0 | ±25.0 |
| 2-Hexanone | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Dibromochloromethane | 0.200 | 20.0 | ±20.0 | ±25.0 |
| 1,2-Dibromoethane | 0.200 | 20.0 | ±20.0 | ±25.0 |
| Chlorobenzene | 0.400 | 20.0 | ±20.0 | ±25.0 |
| Ethylbenzene | 0.400 | 20.0 | ±20.0 | ±25.0 |
| m,p-Xylene | 0.200 | 20.0 | ±20.0 | ±25.0 |
| o-Xylene | 0.200 | 20.0 | ±20.0 | ±25.0 |
| Styrene | 0.200 | 20.0 | ±20.0 | ±25.0 |
| Bromoform | 0.100 | 20.0 | ±25.0 | ±50.0 |
| Isopropylbenzene | 0.400 | 20.0 | ±25.0 | ±25.0 |
| 1,1,2,2-Tetrachloroethane | 0.200 | 20.0 | ±25.0 | ±25.0 |
| 1,3-Dichlorobenzene | 0.500 | 20.0 | ±20.0 | ±25.0 |
| 1,4-Dichlorobenzene | 0.600 | 20.0 | ±20.0 | ±25.0 |
| 1,2-Dichlorobenzene | 0.600 | 20.0 | ±20.0 | ±25.0 |
| 1,2-Dibromo-3-chloropropane | 0.010 | 25.0 | ±30.0 | ±50.0 |
| 1,2,4-Trichlorobenzene | 0.400 | 20.0 | ±30.0 | ±50.0 |
| 1,2,3-Trichlorobenzene | 0.400 | 25.0 | ±30.0 | ±50.0 |
| **Deuterated Monitoring Compounds** | | | | |
| Vinyl chloride-$d_3$ | 0.010 | 20.0 | ±30.0 | ±50.0 |
| Chloroethane-$d_5$ | 0.010 | 40.0 | ±30.0 | ±50.0 |
| 1,1-Dichloroethene-$d_2$ | 0.050 | 20.0 | ±25.0 | ±25.0 |
| 2-Butanone-$d_5$ | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Chloroform-d | 0.300 | 20.0 | ±20.0 | ±25.0 |
| 1,2-Dichloroethane-$d_4$ | 0.060 | 20.0 | ±25.0 | ±25.0 |
| Benzene-$d_6$ | 0.300 | 20.0 | ±20.0 | ±25.0 |
| 1,2-Dichloropropane-$d_6$ | 0.200 | 20.0 | ±20.0 | ±25.0 |

| Analyte | Minimum RRF | Maximum %RSD | ICV/Opening CCV Maximum %D[1] | Closing CCV Maximum %D |
|---|---|---|---|---|
| Toluene-$d_8$ | 0.300 | 20.0 | ±20.0 | ±25.0 |
| trans-1,3-Dichloropropene-$d_4$ | 0.200 | 20.0 | ±20.0 | ±25.0 |
| 2-Hexanone-$d_5$ | 0.010 | 40.0 | ±40.0 | ±50.0 |
| 1,1,2,2-Tetrachloroethane-$d_2$ | 0.200 | 20.0 | ±25.0 | ±25.0 |
| 1,2-Dichlorobenzene-$d_4$ | 0.400 | 20.0 | ±20.0 | ±25.0 |

[1] If a closing CCV is acting as an opening CCV, all target analytes and DMCs must meet the requirements for an opening CCV.

**Table 19. Initial Calibration Actions for Low/Medium Volatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| Initial Calibration not performed at the specified frequency and sequence | Use professional judgment<br>R | Use professional judgment<br>R |
| Initial Calibration not performed at the specified concentrations | J | UJ |
| RRF < Minimum RRF in Table 18 for target analyte | Use professional judgment<br>J+ or R | R |
| RRF ≥ Minimum RRF in Table 18 for target analyte | No qualification | No qualification |
| %RSD > Maximum %RSD in Table 18 for target analyte | J | Use professional judgment |
| %RSD ≤ Maximum %RSD in Table 18 for target analyte | No qualification | No qualification |

## IV. Initial Calibration Verification

### A. Review Items

Form 7A-OR, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Low/Med VOA, Sections 7.2.2.2 and 9.4)

### B. Objective

The objective is to ensure that the instrument is calibrated accurately to produce acceptable qualitative and quantitative data throughout each analytical sequence by the use of a second-source check standard.

### C. Criteria

1. The accuracy of the calibration for each GC/MS system used for analysis must be verified at the frequency of one ICV standard analysis per initial calibration analytical sequence. The ICV is analyzed after the last ICAL standard analysis and prior to a blank, sample, or an applicable CCV analysis.
2. The ICV standard must contain all required target analytes, from an alternate source or a different lot than that used for the ICAL standards and DMCs, at or near the mid-point concentration (CS3) of the ICAL.
3. For an ICV, the RRF for each target analyte and DMC must be ≥ the Minimum RRF values in Table 18.
4. The Percent Difference (%D) between the ICAL $\overline{RRF}$ and the ICV RRF must be within the ICV/Opening CCV Maximum %D limits in Table 18 for each target analyte and DMC.

### D. Evaluation

1. Verify that the ICV standard is analyzed at the specified frequency and sequence, and that it is associated with the correct ICAL. Also verify that the correct ICAL is represented in the data package and meets SOW criteria, as described in Section III.
2. Verify that the concentrations of the target analytes and the DMCs in the ICV are at or near the mid-point standard CS3 from the ICAL.
3. Verify that the RRF and %D for each target analyte and DMC are reported on Form 7A-OR. Recalculate the RRF and %D for at least one target analyte and DMC associated with each internal standard, and verify that the recalculated values agree with the laboratory reported values on Form 7A-OR.
4. Verify that the RRFs for each target analyte and DMC in the ICV are ≥ Minimum RRF values in Table 18.
5. Verify that the %Ds are within the ICV/Opening CCV Maximum %D limits in Table 18 for each target analyte and DMC.

**NOTE:** For data obtained from the CLP, information regarding the noncompliant ICV can be obtained from the NFG reports and may be used as part of the evaluation process.

### E. Action

1. If the ICV is not performed at the specified frequency, use professional judgment to qualify detects and non-detects. Contact the EPA Regional CLP COR to request that the laboratory repeat the analysis, if holding times have not expired and there are remaining sample vials. If reanalysis is not possible, carefully evaluate all other available information, including the quality of analyte peak shapes and mass spectral matches, the stability of internal standard Retention Times (RTs) and areas in each affected sample, and compare to the most recent calibration performed on the same instrument under the same conditions. Using this information and professional judgment, the reviewer may be able to justify unqualified acceptance of qualitative results.

2. If the ICV is not performed at the specified concentration, use professional judgment to qualify detects and non-detects. Special consideration should be given to sample results at the opposite extreme of the calibration range if this defect is noted.
3. If errors are detected in the calculations of either the RRF or the %D, perform a more comprehensive recalculation.
4. If the RRF in an ICV is < Minimum RRF value in Table 18 for any target analyte, carefully evaluate the qualitative data associated with positively identified analytes and use professional judgment to qualify detects as estimated (J) or unusable (R), and qualify non-detects as unusable (R).
    a. Take special note of any extreme deviation in the RRF and evaluate RT data, peak shapes, and areas of the target analytes and associated internal standards for inconsistencies that may indicate a chromatographic co-elution. If this is suspected, the contaminant may also be present in samples and blanks. Also review the documentation of the preparation of the ICV standard. Use professional judgment to qualify affected data appropriately.
5. If the RRF in an ICV is ≥ Minimum RRF value in Table 18 for any target analyte, detects and non-detects should not be qualified.
6. If the %D in an ICV is outside the ICV/Opening CCV Maximum %D limits in Table 18 for any target analyte, qualify detects as estimated (J) and non-detects as estimated (UJ).
7. If the %D in an ICV is within the inclusive range of the ICV/Opening CCV Maximum %D limits in Table 18 for any target analyte, detects and non-detects should not be qualified.
8. No qualification of the data is necessary based on the DMC RRF and/or %D alone. Use professional judgment to evaluate the DMC RRF and %D data in conjunction with the DMC recoveries to determine the need for data qualification.
9. If the laboratory has failed to provide adequate calibration information, contact the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data. Refer to E.1, above, for additional steps.
10. Note the potential effects on the data due to ICV criteria exceedance in the Data Review Narrative.
11. If the ICV criteria are grossly exceeded, note this for EPA Regional CLP COR action.

**Table 20. ICV Actions for Low/Medium Volatile Analysis**

| Criteria for ICV | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| ICV not performed at the specified frequency and sequence | Use professional judgment | Use professional judgment |
| ICV not performed at the specified concentration | Use professional judgment | Use professional judgment |
| RRF < Minimum RRF in Table 18 for target analyte | Use professional judgment<br>J or R | R |
| RRF ≥ Minimum RRF in Table 18 for target analyte | No qualification | No qualification |
| %D outside the ICV/Opening CCV Maximum %D limits in Table 18 for target analyte | J | UJ |
| %D within the inclusive ICV/Opening CV Maximum %D limits in Table 18 for target analyte | No qualification | No qualification |

## V. Continuing Calibration Verification

### A. Review Items

Form 7A-OR, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Low/Med VOA, Sections 7.2.2.1 and 9.5)

### B. Objective

The objective is to ensure that the instrument continues to meet the sensitivity and linearity criteria to produce acceptable qualitative and quantitative data throughout each analytical sequence.

### C. Criteria

1. The calibration for each GC/MS system used for analysis must be verified at the beginning and end of every 12-hour period of operation. The 12-hour period begins with the injection of BFB, followed by the injection of the opening CCV solution. After the injection of all samples and required blanks, and before the end of the 12-hour period, injection of the closing CCV is required. The closing CCV used to bracket the end of a 12-hour analytical sequence may be used as the opening CCV for a new 12-hour analytical sequence, provided that all technical acceptance criteria of an opening CCV are met.
2. The CCV standards must contain all required target analytes and DMCs at or near the mid-point concentration (CS3) of the ICAL.
3. For an opening or a closing CCV, the RRF for each target analyte and DMC must be ≥ the Minimum RRF values in Table 18.
4. The %D between the ICAL $\overline{RRF}$ and the opening CCV RRF must be within the ICV/Opening CCV Maximum %D limits in Table 18 for each target analyte and DMC.
5. For a closing CCV, the %D between the ICAL $\overline{RRF}$ and the CCV RRF must be within the Closing CCV Maximum %D limits in Table 18 for each target analyte and DMC.

### D. Evaluation

1. Verify that the CCV is analyzed at the specified frequency and sequence, and that it is associated with the correct ICAL. Also verify that the correct ICAL is represented in the data package and meets SOW criteria, as described in Section III.
2. Verify that the mid-point standard CS3 from the ICAL is used as an opening or a closing CCV.
3. Verify that the RRF and %D for each target analyte and DMC are reported on Form 7A-OR. Recalculate the RRF and %D for at least one target analyte and DMC associated with each internal standard, and verify that the recalculated values agree with the laboratory reported values on Form 7A-OR.
4. For an opening or a closing CCV, verify that the RRFs for each target analyte and DMC are ≥ Minimum RRF values in Table 18.
5. For an opening CCV, verify that the %Ds are within the ICV/Opening CCV Maximum %D limits in Table 18 for each target analyte and DMC.
6. For a closing CCV, verify that the %Ds are within the Closing CCV Maximum %D limits in Table 18 for each target analyte and DMC.

**NOTE:** For data obtained from the CLP, information regarding the noncompliant CCV can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the CCV is not performed at the specified frequency, qualify detects and non-detects as unusable (R). Contact the EPA Regional CLP COR to request that the laboratory repeat the analysis, if holding times have not expired and there are remaining sample vials. If reanalysis is not possible, carefully evaluate all other available information, including the quality of analyte peak shapes and mass spectral matches, the stability of internal standard RTs and areas in each affected sample, and compare to the most recent calibration performed on the same instrument under the same conditions. Using this information and professional judgment, the reviewer may be able to justify unqualified acceptance of qualitative results and qualification of all quantitative results as estimated (J). Otherwise, qualify all detects and non-detects as unusable (R).
2. If the CCV is not performed at the specified concentration, use professional judgment to qualify detects and non-detects. Special consideration should be given to sample results at the opposite extreme of the calibration range if this defect is noted.
3. If errors are detected in the calculations of either the RRF or the %D, perform a more comprehensive recalculation.
4. For an opening or a closing CCV, if the RRF is < Minimum RRF value in Table 18 for any target analyte, carefully evaluate the qualitative data associated with positively identified analytes and use professional judgment to qualify detects as estimated (J) or unusable (R), and qualify non-detects as unusable (R).
    a. Take special note of any extreme deviation in the RRF and evaluate RT data, peak shapes, and areas of the target analytes and associated internal standards for inconsistencies that may indicate a chromatographic co-elution. If this is suspected, the contaminant may also be present in samples and blanks. Also review the documentation of the preparation of the CCV standard. Use professional judgment to qualify affected data appropriately.
5. For an opening or a closing CCV, if the RRF is ≥ Minimum RRF value in Table 18 for any target analyte, detects and non-detects should not be qualified.
6. For an opening CCV, if the %D is outside the ICV/Opening CCV Maximum %D limits in Table 18 for any target analyte, qualify detects as estimated (J) and non-detects as estimated (UJ).
7. For a closing CCV, if the %D is outside the Closing CCV Maximum %D limits in Table 18 for any target analyte, qualify detects as estimated (J) and non-detects as estimated (UJ).
8. For an opening CCV, if the %D is within the inclusive range of the ICV/Opening CCV Maximum %D limits in Table 18 for any target analyte, detects and non-detects should not be qualified.
9. For closing CCV, if the %D is within the inclusive range of the Closing CCV Maximum %D limits in Table 18 for any target analyte, detects and non-detects should not be qualified.
10. No qualification of the data is necessary based on the DMC RRF and/or %D alone. Use professional judgment to evaluate the DMC RRF and %D data in conjunction with the DMC recoveries to determine the need for data qualification.
11. If the laboratory has failed to provide adequate calibration information, contact the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data. Refer to E.1, above, for additional steps.
12. Note the potential effects on the data due to CCV criteria exceedance in the Data Review Narrative.
13. If the CCV criteria are grossly exceeded, note this for EPA Regional CLP COR action.

**Table 21. CCV Actions for Low/Medium Volatile Analysis**

| Criteria for Opening CCV | Criteria for Closing CCV | Action | |
|---|---|---|---|
| | | **Detect** | **Non-detect** |
| CCV not performed at the specified frequency and sequence | CCV not performed at the specified frequency | Use professional judgment J or R | Use professional judgment UJ or R |
| CCV not performed at the specified concentration | CCV not performed at the specified concentration | Use professional judgment | Use professional judgment |
| RRF < Minimum RRF in Table 18 for target analyte | RRF < Minimum RRF in Table 18 for target analyte | Use professional judgment J or R | R |
| RRF ≥ Minimum RRF in Table 18 for target analyte | RRF ≥ Minimum RRF in Table 18 for target analyte | No qualification | No qualification |
| %D outside the ICV/Opening CCV Maximum %D limits in Table 18 for target analyte | %D outside the Closing CCV Maximum %D limits in Table 18 for target analyte | J | UJ |
| %D within the inclusive ICV/Opening CCV Maximum %D limits in Table 18 for target analyte | %D within the inclusive Closing CCV Maximum %D limits in Table 18 for target analyte | No qualification | No qualification |

# VI. Blanks

## A. Review Items

Form 1A-OR, Form 1B-OR, Form 4-OR, chromatograms, and quantitation reports. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Low/Med VOA, Section 12.1)

## B. Objective

The objective of a blank analysis results assessment is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities.

## C. Criteria

The criteria for evaluation of blanks should apply to any blank associated with the samples (e.g., method blanks, storage blanks, field blanks, etc.). If problems with any blank exist, all associated data must be carefully evaluated to determine whether or not there is an inherent variability in the data or if the problem is an isolated occurrence not affecting other data.

1. Method blank analyses must be performed at the specified frequency and sequence. A method blank must be analyzed once every 12-hour period and prior to any sample analysis and after all ICAL standards, the ICV, or the opening CCV. The method blank must be analyzed on each GC/MS system used for sample analysis within an entire analytical sequence.
2. The method blank, like any other sample in the SDG, must meet the technical acceptance criteria for sample analysis.
3. The TCLP/SPLP ZHE Leachate Extraction Blank (LEB) must be prepared and analyzed at the specified frequency and sequence.
4. A storage blank analysis must be performed at the specified frequency and sequence. A storage blank must be prepared upon receipt of the first samples from an SDG, and stored with the samples until analysis. The storage blank must be analyzed once per SDG after all sample analyses within an SDG are complete.
5. An instrument blank must be analyzed immediately after any sample that has target analytes exceeding the calibration range or non-target compounds exceeding 200 µg/L.
6. The concentration of a target analyte in any blank must not exceed its Contract Required Quantitation Limit (CRQL) (2x CRQLs for Methylene chloride, Acetone, and 2-Butanone). TIC concentration in any blank must be $\leq$ 5.0 µg/L for water (0.0050 mg/L for TCLP leachate) and $\leq$ 5.0 µg/kg for soil/sediment matrices.

## D. Evaluation

1. Verify that method blanks are analyzed at the specified frequency and sequence. The Method Blank Summary (Form 4-OR) may be used to identify the samples associated with each method blank.
2. Verify that applicable TCLP/SPLP LEBs are analyzed at the specified frequency and sequence. The Method Blank Summary (Form 4-OR) may be used to identify the samples associated with each TCLP/SPLP LEB.
3. Verify that a storage blank has been analyzed at the specified frequency and sequence.
4. Verify that the instrument blank analysis has been performed following any sample analysis where a target analyte(s) is/are reported at high concentration(s).
5. Review the results of all associated blanks on the forms and raw data (chromatograms and quantitation reports) to evaluate the presence of target analytes and non-target compounds in the blanks.

6. Data concerning the field blanks are not evaluated as part of the Contract Compliance Screening (CCS) process. Evaluate field or trip blanks in the manner similar to that used for the method blanks.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant blank can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the appropriate blanks are not analyzed at the correct frequency, use professional judgment to determine if the associated sample data should be qualified. Obtain additional information from the laboratory, if necessary. Record the situation in the Data Review Narrative and note it for EPA Regional CLP COR action.
2. Action regarding unsuitable blank results depends on the circumstances and origin of the blank. Verify that data qualification decisions based on field quality control (QC) are supported by the project Quality Assurance Project Plan (QAPP) or EPA Regional Standard Operating Procedure (SOP). At a minimum, contamination found in field blanks should be documented in the Data Review Narrative. In instances where more than one of blank is associated with a given sample, qualification should be based upon a comparison with the associated blank having the highest concentration of a contaminant. Do not correct the results by subtracting any blank value.
3. For any blank (including method blank), if a target analyte is detected, but it is not detected in the sample, non-detects should not be qualified.
4. For any method blank reported with results < CRQLs, report sample results that are < CRQLs at the CRQLs and qualify as non-detect (U). For any method blank reported with results that are < CRQLs, use professional judgment to qualify sample results that are ≥ CRQLs (≥ 2x result in method blank for Methylene chloride, Acetone, and 2-Butanone). Positive results in samples, especially those near but above the CRQL, may be biased high by low level contamination in the method blank, and should be considered as estimated (J+).
5. For any method blank reported with results ≥ CRQLs, report sample results that are < CRQLs at the CRQLs and qualify as non-detect (U).
6. For any method blank reported with results ≥ CRQLs, report sample results that are ≥ CRQLs but < Blank Results at sample results and qualify as non-detect (U) or as unusable (R). Use professional judgment to qualify sample results that are ≥ CRQLs and ≥ Blank Results or ≥ 2x results in method blank for Methylene chloride, Acetone, and 2-Butanone.
7. If an instrument blank is not analyzed following a sample analysis which contains analyte(s) at high concentration(s) exceeding the calibration range, evaluate the analyte(s) concentration(s) in the samples analyzed immediately after the sample with high analyte(s) concentration(s) for carryover. Use professional judgment to determine if instrument cross-contamination has affected any positive target analyte identification(s). If instrument cross-contamination is suggested and suspected of having an effect on the sample results or calibration performance, note it for EPA Regional CLP COR action.
8. If any analytes are detected in the storage, field, or trip blanks, the following is recommended:
    a. Review the associated method blank data to determine if the same analytes are also detected in the method blank.
        i. If the analytes are detected at comparable levels in the method blank, the source of the contamination may be in the analytical system. Apply the recommended actions for the method blank.

ii. If the analytes are not detected in the method blank, the source of contamination may be in the storage area or in the field, or contamination may have occurred during sample transport. Consider all associated samples for possible cross-contamination.

iii. For TCLP/SPLP LEBs and storage, field, or trip blanks, the sample result qualifications listed in Table 22 should apply if supported by the project QAPP.

9. If gross contamination exists with blank results that are > ICAL CS5 concentrations, qualify detects as unusable (R). If the contamination is suspected of having an effect on the sample results, note it for EPA Regional CLP COR action.

10. For any blank (including method blank) reported with TICs (non-target compounds) concentrations that are > 5.0 µg/L for water (0.0050 mg/L for TCLP leachate) or > 5.0 µg/kg for soil/sediment matrices, use professional judgment to qualify sample results.

11. There may be instances where little or no contamination is present in the associated blanks, but qualification of the sample is deemed necessary. If it is determined that the contamination is from a source other than the sample, the data should be qualified or, in the case of field QC, should at least be documented in the Data Review Narrative. Contamination introduced through dilution water is one example. Although it is not always possible to determine, instances of this occurring can be detected when contaminants are found in the diluted sample result, but are absent in the undiluted sample.

**Table 22. Blank and TCLP/SPLP LEB Actions for Low/Medium Volatile Analysis**

| Blank Type | Blank Result | Sample Result | Action |
|---|---|---|---|
| Method, TCLP/SPLP LEB, Storage, Field, Trip, Instrument* | Detect | Non-detect | No qualification |
| | < CRQL | < CRQL | Report at CRQL and qualify as non-detect (U) |
| | | ≥ CRQL or ≥ 2x Blank Result for Methylene chloride, Acetone, and 2-Butanone | Use professional judgment |
| | ≥ CRQL | < CRQL | Report at CRQL and qualify as non-detect (U) |
| | | ≥ CRQL but < Blank Result | Report at sample result and qualify as non-detect (U) or unusable (R) |
| | | ≥ CRQL and ≥ Blank Result or ≥ 2x Blank Result for Methylene chloride, Acetone, and 2-Butanone | Use professional judgment |
| | Gross contamination | Detect | Report at sample result and qualify as unusable (R) |
| | TIC > 5.0 µg/L (water) or 0.0050 mg/L (TCLP leachate) or TIC > 5.0 µg/kg (soil/sediment) | Detect | Use professional judgment |

* Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target analyte concentration exceeding the calibration range (ICAL CS5 concentration) or TIC exceeding 200 µg/L.

## VII. Deuterated Monitoring Compound

### A. Review Items

Form 2A-OR, Form 2B-OR quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Low/Med VOA, Sections 7.2.2.4 and 11.2.5)

### B. Objective

The objective is to evaluate the DMC Percent Recovery (%R) to ensure that the analytical method is efficient.

### C. Criteria

1. All samples and blanks are spiked with the DMCs listed in Table 23, just prior to sample purging, to measure the DMC %R.
2. The %R for each DMC should be calculated correctly according to the method.
3. The %R for each DMC in samples and blanks must be within the limits in Table 23.

**Table 23. Low/Medium Volatile DMC Recovery Limits**

| DMC | %R for Water Sample | %R for Soil/Sediment Sample |
|---|---|---|
| Vinyl chloride-$d_3$ | 60 - 135 | 30 - 150 |
| Chloroethane-$d_5$ | 70 - 130 | 30 - 150 |
| 1,1-Dichloroethene-$d_2$ | 60 - 125 | 45 - 110 |
| 2-Butanone-$d_5$ | 40 - 130 | 20 - 135 |
| Chloroform-d | 70 - 125 | 40 - 150 |
| 1,2-Dichloroethane-$d_4$ | 70 - 125 | 70 - 130 |
| Benzene-$d_6$ | 70 - 125 | 20 - 135 |
| 1,2-Dichloropropane-$d_6$ | 70 - 120 | 70 - 120 |
| Toluene-$d_8$ | 80 - 120 | 30 - 130 |
| trans-1,3-Dichloropropene-$d_4$ | 60 - 125 | 30 - 135 |
| 2-Hexanone-$d_5$ | 45 - 130 | 20 - 135 |
| 1,1,2,2-Tetrachloroethane-$d_2$ | 65 - 120 | 45 - 120 |
| 1,2-Dichlorobenzene-$d_4$ | 80 - 120 | 75 - 120 |

**NOTE:** The recovery limits for any of the compounds listed in Table 23 may be expanded at any time during the period of performance if the EPA determines that the limits are too restrictive.

### D. Evaluation

1. Check the raw data (e.g., chromatograms and quantitation reports) to verify the recoveries on the Deuterated Monitoring Compound Recovery Form 2A-OR and Form 2B-OR.
2. Check for any calculation or transcription errors. Verify that the DMC recoveries were calculated correctly using the equation in the method and that the recalculated values agree with the laboratory reported values on Form 2A-OR and Form 2B-OR.

3. Whenever there are two or more analyses for a particular sample, use professional judgment to determine which analysis has the most acceptable data to report. Considerations include, but are not limited to:

   a. DMC recovery (marginal versus gross deviation).

   b. Technical holding times.

   c. Comparison of the target analyte results reported in each sample analysis.

   d. Other QC information, such as performance of internal standards.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant DMC %R can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If a DMC was not added to the samples and blanks or the concentrations of DMCs in the samples and blanks are not as specified, use professional judgment to qualify detects and non-detects. The EPA Regional CLP COR should be contacted to arrange for reanalysis, if possible.
2. If errors are detected in the calculations of %R, perform a more comprehensive recalculation. It may be necessary to have the laboratory resubmit the data after making corrections.
3. If any DMC %R is outside the limits (Table 23) in samples, qualify the associated target analytes listed in Table 25 considering the existence of interference in the raw data. Considerations include, but are not limited to:

   a. If the DMC %R is < 10%, qualify detects as estimated low (J-) and non-detects as unusable (R).

   b. If the DMC %R is ≥ 10% and < lower acceptance limit, qualify detects as estimated low (J-) and non-detects as estimated (UJ).

   c. If the DMC %R is ≥ lower acceptance limit and ≤ upper acceptance limit, detects and non-detects should not be qualified.

   d. If the DMC %R is > upper acceptance limit, qualify detects as estimated high (J+). Non-detects should not be qualified.

4. If any DMC %R is outside the limits (Table 23) in a blank, special consideration should be taken to determine the validity of the associated sample data. The basic concern is whether the blank problems represent an isolated problem with the blank alone, or whether there is a fundamental problem with the analytical process.

   For example, if one or more samples in the analytical sequence show acceptable DMC %Rs, the blank problem may be considered as an isolated occurrence. However, even if this judgment allows some use of the affected data, note analytical problems for EPA Regional CLP COR action.

**Table 24. DMC Actions for Low/Medium Volatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| %R < 10% | J- | R |
| 10% ≤ %R < Lower Acceptance Limit | J- | UJ |
| Lower Acceptance Limit ≤ %R ≤ Upper Acceptance Limit | No qualification | No qualification |
| %R > Upper Acceptance Limit | J+ | No qualification |

**Table 25. Low/Medium Volatile DMCs and the Associated Target Analytes**

| **Vinyl chloride-$d_3$ (DMC-1)** | **Chloroethane-$d_5$ (DMC-2)** | **1,1-Dichloroethene-$d_2$ (DMC-3)** |
|---|---|---|
| Vinyl chloride | Dichlorodifluoromethane<br>Chloromethane<br>Bromomethane<br>Chloroethane<br>Carbon disulfide | trans-1,2-Dichloroethene<br>cis-1,2-Dichloroethene<br>1,1-Dichloroethene |
| **2-Butanone-$d_5$ (DMC-4)** | **Chloroform-d (DMC-5)** | **1,2-Dichloroethane-$d_4$ (DMC-6)** |
| Acetone<br>2-Butanone | 1,1-Dichloroethane<br>Bromochloromethane<br>Chloroform<br>Dibromochloromethane<br>Bromoform | Trichlorofluoromethane<br>1,1,2-Trichloro-1,2,2-trifluoroethane<br>Methyl acetate<br>Methylene chloride<br>Methyl-tert-butyl ether<br>1,1,1-Trichloroethane<br>Carbon tetrachloride<br>1,2-Dibromoethane<br>1,2-Dichloroethane |
| **Benzene-$d_6$ (DMC-7)** | **1,2-Dichloropropane-$d_6$ (DMC-8)** | **Toluene-$d_8$ (DMC-9)** |
| Benzene | Cyclohexane<br>Methylcyclohexane<br>1,2-Dichloropropane<br>Bromodichloromethane | Trichloroethene<br>Toluene<br>Tetrachloroethene<br>Ethylbenzene<br>o-Xylene<br>m,p-Xylene<br>Styrene<br>Isopropylbenzene |
| **trans-1,3-Dichloropropene-$d_4$ (DMC-10)** | **2-Hexanone-$d_5$ (DMC-11)** | **1,1,2,2-Tetrachloroethane-$d_2$ (DMC-12)** |
| cis-1,3-Dichloropropene<br>trans-1,3-Dichloropropene<br>1,1,2-Trichloroethane | 4-Methyl-2-pentanone<br>2-Hexanone | 1,1,2,2,-Tetrachloroethane<br>1,2-Dibromo-3-chloropropane |
| **1,2-Dichlorobenzene-$d_4$ (DMC-13)** | | |
| Chlorobenzene<br>1,3-Dichlorobenzene<br>1,4-Dichlorobenzene<br>1,2-Dichlorobenzene<br>1,2,4-Trichlorobenzene<br>1,2,3-Trichlorobenzene | | |

## VIII. Matrix Spike/Matrix Spike Duplicate

### A. Review Items

SDG Cover Page, Form 3A-OR, chromatograms, and quantitation reports. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Low/Med VOA, Sections 7.2.2.5 and 12.2)

### B. Objective

The objective of the Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analysis is to evaluate the effect of each sample matrix on the sample preparation procedures and the measurement methodology.

### C. Criteria

1. If requested, MS/MSD samples shall be prepared and analyzed at the specified frequency. One pair of MS/MSD samples should be analyzed per matrix or per SDG.

**NOTE:** Data for MS and MSDs will not be present unless requested by the EPA Region.

2. Samples identified as field blanks or Performance Evaluation (PE) samples cannot be used for spiked sample analysis.
3. The MS/MSD %R and the Relative Percent Difference (RPD) between MS and MSD results should be calculated according to the method.
4. The MS/MSD %R and RPD should be within the acceptance limits in Table 26.

### D. Evaluation

1. Verify that requested MS/MSD samples were analyzed at the required frequency.
2. Verify that a field blank or PE sample was not used for MS/MSD analysis.
3. Verify that the recalculated MS/MSD %R and RPD values agree with the laboratory reported values on Form 3A-OR.
4. Inspect the MS/MSD %R and RPD on Form 3A-OR and verify that they are within the limits listed in Table 26.

**NOTE:** For data obtained from the CLP, the preceding criteria, including the requested MS/MSD spiking analytes and spiking levels specified in Exhibit D – Low/Medium Concentrations of Volatile Organic Compounds Analysis, Section 7.2.2.5, of the SOW, are evaluated as part of the CCS process. Information regarding the noncompliant MS/MSD %R or RPD can be obtained from the NFG reports and may be used as part of the evaluation process.

### E. Action

1. If requested MS/MSD samples were not analyzed at the specified frequency, use professional judgment to determine the impact on sample data, if any. Obtain additional information from the laboratory, if necessary. Record the situation in the Data Review Narrative and note it for EPA Regional CLP COR action. It is not likely that data qualification will be warranted if the frequency requirements are not met. Carefully consider all factors, known and unknown, about method performance on the matrix at hand, in lieu of MS/MSD data.
2. If a field blank or PE sample was used for the MS/MSD analysis, note this for EPA Regional CLP COR action. All of the other QC data must then be carefully checked. Use professional judgment when evaluating the data.
3. If errors are detected in the calculations of the MS/MSD %R or RPD, perform a more comprehensive recalculation.
4. If the MS/MSD %R or RPD is outside the acceptance limits in Table 26, qualify the detects and non-detects in the original sample to include the consideration of the existence of interference in the raw data. Considerations include, but are not limited to:

a. If the MS/MSD %R is < 20%, qualify detects as estimated (J) and non-detects as unusable (R).

b. If the MS/MSD %R is ≥ 20% and < lower acceptance limit, qualify detects as estimated (J) and non-detects as estimated (UJ).

c. If the MS/MSD %R or RPD is ≥ lower acceptance limit and ≤ upper acceptance limit, detects and non-detects should not be qualified.

d. If the MS/MSD %R or RPD is > upper acceptance limit, qualify detects as estimated (J). Non-detects should not be qualified.

**Table 26. MS/MSD %R and RPD Limits for Low/Medium Volatile Analysis**

| Analyte | %R for Water Sample | RPD for Water Sample | %R for Soil/Sediment Sample | RPD for Soil/Sediment Sample |
|---|---|---|---|---|
| 1,1-Dichloroethene | 61 - 145 | 0 - 14 | 59 - 172 | 0 - 22 |
| Trichloroethene | 71 - 120 | 0 - 14 | 62 - 137 | 0 - 24 |
| Benzene | 76 - 127 | 0 - 11 | 66 - 142 | 0 - 21 |
| Toluene | 76 - 125 | 0 - 13 | 59 - 139 | 0 - 21 |
| Chlorobenzene | 75 - 130 | 0 - 13 | 60 - 133 | 0 - 21 |

**Table 27. MS/MSD Actions for Low/Medium Volatile Analysis**

| Criteria | Action | |
|---|---|---|
| | Detect | Non-detect |
| %R < 20% | J | R |
| 20% < %R < Lower Acceptance Limit | J | UJ |
| Lower Acceptance Limit ≤ %R or RPD ≤ Upper Acceptance Limit | No qualification | No qualification |
| %R or RPD > Upper Acceptance Limit | J | No qualification |

# IX. Internal Standard

## A. Review Items

Form 8A-OR, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Low/Med VOA, Sections 7.2.2.6, 11.3.5, and 11.3.6)

## B. Objective

The objective is to evaluate the internal standard performance to ensure that GC/MS sensitivity and response are stable during each analysis.

## C. Criteria

1. The internal standard solution must be added to all samples and blanks at the specified concentration. The internal standard solution must contain all internal standard compounds specified in the method.
2. The area response of each internal standard compound in all samples and blanks must be within the inclusive ranges of 50-200% of the area response of the same internal standard compound from the associated opening CCV or the mid-point standard CS3 from the associated ICAL.
3. The RT of the internal standard compound in the sample or blank must not vary more than ±10.0 seconds from the RT of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL.

## D. Evaluation

1. Verify that all required internal standard compounds were added to sample and blank analyses at the specified concentrations.
2. Check the raw data (e.g., chromatograms and quantitation reports) to verify that the RT and area response of each internal standard compound in a sample or blank are reported on Form 8A-OR.
3. Verify that the RTs and area responses for all internal standard compounds are within the specified criteria. If internal standard RTs are significantly different from the associated CCV or ICAL midpoint (i.e., more than 10 seconds), the internal standard peak may have been misidentified, but most likely a change in the chromatographic system should be suspected. This could be an improper desorb/injection cycle, a leak in the purge/trap/GC system, or the effect of a highly contaminated matrix. Normally, the area counts will also suffer in this situation, but even if they appear unaffected, both quantitative and qualitative results should be considered highly suspect.
4. If there is a reanalysis for a particular sample, determine which analysis is the best data to report. Considerations include, but are not limited to:
    a. Magnitude and direction of the internal standard area response shift.
    b. Magnitude and direction of the internal standard RT shift.
    c. Technical holding times.
    d. Comparison of the values of the target analytes reported in each method.
    e. Other QC information.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant internal standard area response or RT can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

**NOTE:** Apply the action to the target analytes in samples or blanks that are associated to the noncompliant internal standard compound in Table 28. The internal standard and the associated target analytes are in Exhibit D – Low/Medium Concentrations of Volatile Organic Compounds Analysis, Table 9, of the SOW.

1. If the required internal standard compounds were not added to a sample or blank, qualify detects and non-detects as unusable (R).
2. If the required internal standard compound was not analyzed at the specified concentration in a sample or blank, use professional judgment to qualify detects and non-detects.
3. If the area response of an internal standard compound in a sample or blank is < 20% of the area response of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL, qualify detects as estimated high (J+) and non-detects as unusable (R).
4. If the area response of an internal standard compound in a sample or blank is ≥ 20% and < 50% of the area response of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL, qualify detects as estimated high (J+) and non-detects as unusable (UJ).
5. If the area response of an internal standard compound in a sample or blank is within the inclusive range of 50-200% of the area response of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL, detects and non-detects should not be qualified.
6. If the area response of an internal standard compound in a sample or blank is > 200% of the area response of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL, qualify detects as estimated low (J-). Non-detects should not be qualified.
7. If the RT shift between sample/blank and the associated opening CCV or mid-point standard CS3 from the associated ICAL of an internal standard compound is > 10.0 seconds, qualify detects and non-detects as unusable (R). The EPA Regional CLP COR should be contacted to arrange for reanalysis.
8. If the RT shift between sample/blank and the associated opening CCV or mid-point standard CS3 from the associated ICAL of an internal standard compound is < 10.0 seconds, detects and non-detects should not be qualified.
9. If the internal standard performance criteria are grossly exceeded, annotate the potential effects on the data in the Data Review Narrative and note it for EPA Regional CLP COR action.

**Table 28. Internal Standard Actions for Low/Medium Volatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| Area response < 20% of the opening CCV or mid-point standard CS3 from ICAL | J+ | R |
| 20% ≤ Area response < 50% of the opening CCV or mid-point standard CS3 from ICAL | J+ | UJ |
| 50% ≤ Area response ≤ 200% of the opening CCV or mid-point standard CS3 from initial calibration | No qualification | No qualification |
| Area response > 200% of the opening CCV or mid-point standard CS3 from ICAL | J- | No qualification |
| RT shift between sample/blank and opening CCV or mid-point standard CS3 from ICAL > 10.0 seconds | R | R |
| RT shift between sample/blank and opening CCV or mid-point standard CS3 from ICAL < 10.0 seconds | No qualification | No qualification |

# X. Target Analyte Identification

## A. Review Items

Form 1A-OR, quantitation reports, mass spectra, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Low/Med VOA, Section 11.1.1)

## B. Objective

The objective is to provide acceptable GC/MS qualitative analysis to minimize the number of erroneous analyte identifications.

## C. Criteria

1. The mass spectrum of the analyte from the sample analysis must match that of the same analyte in the associated opening CCV or mid-point standard CS3 from the associated ICAL according to the following criteria:
   a. All ions present in the calibration standard mass spectrum must be present in the sample spectrum at relative intensity > 10%.
   b. The relative intensities of these ions must agree within ±20% between the standard and sample spectra (e.g., for an ion with an abundance of 50% in the standard spectrum, the corresponding sample ion abundance must be between 30-70%).
   c. Ions present at > 10% in the sample mass spectrum, but not present in the standard spectrum, must be evaluated by a reviewer experienced in mass spectral interpretation.
2. The Relative Retention Time (RRT) for a positively identified target analyte must be within ±0.06 RRT units of the RRT for the same analyte in the associated opening CCV or mid-point standard CS3 from the associated ICAL.

## D. Evaluation

1. Verify that the positively identified target analyte mass spectrum meets the specified criteria. If not, examine the sample target analyte spectra for the presence of interference at one or more mass fragment peaks. Although the presence of a co-eluting interferent may preclude positive identification of the analyte, the presumptive evidence of its presence may be useful information to include in the Data Review Narrative.
2. Verify that the RRT of the positively identified target analyte is within ±0.06 RRT units of the RRT for the same analyte in the associated opening CCV or mid-point standard CS3 from the associated ICAL.
3. Be aware of situations when sample carryover is a possibility and use professional judgment to determine if instrument cross-contamination has affected any positive analyte identification. An instrument blank must be analyzed after a sample containing target analytes with concentrations exceeding the ICAL range (200 µg/L for non-ketones, 400 µg/L for ketones), non-target compounds at concentrations > 200 µg/L, or saturated ions from an analyte (excluding the analyte peaks in the solvent front).
4. Verify that peaks are correctly identified as target analytes, TICs, DMCs, or internal standards on the chromatogram for samples and blanks.
5. Verify that there is no erroneous analyte identification, either false positive or false negative, for each target analyte. The positively identified target analytes can be more easily detected for false positives than false negatives. More information is available for false positives due to the requirement for submittal of data supporting positive identifications. Non-detected target analytes, on the other hand, are more difficult to assess. One example of the detection of false negatives is reporting a target analyte as a TIC.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant TICs can be obtained from the CCS report and may be used as part of the evaluation process.

**NOTE:** A target analyte reported as a false negative may not have the best match in a TIC search of a contaminated sample, but its mass spectrum may be present under that of a reported TIC.

## E. Action

1. If the positively identified target analyte mass spectrum does not meet the specified criteria, qualify detect as unusable (R), or report the result at the CRQL and qualify as non-detect (U).
2. If the RRT for a positively identified target analyte is outside the specified RRT windows, qualify detects as unusable (R), or report the result at the CRQL and qualify as non-detect (U).
3. If it is determined that cross-contamination has occurred, use professional judgment to qualify detects. Annotate any changes made to the reported analytes due to either false positive or negative identifications, or concerns regarding target analyte identifications, in the Data Review Narrative. Note the necessity for numerous or significant changes for EPA Regional CLP COR action.

## XI. Target Analyte Quantitation and Reported Contract Required Quantitation Limit

### A. Review Items

Form 1A-OR, sample preparation sheets, SDG Narrative, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Low/Med VOA, Sections 11.2.1, 11.2,2, and 11.2.4)

### B. Objective

The objective is to ensure that the reported results and CRQLs for target analytes are accurate.

### C. Criteria

1. Target analyte results and sample-specific CRQLs must be calculated according to the correct equations.
2. Target analyte RRF must be calculated using the correct associated internal standard, as listed in the method. Quantitation must be based on the quantitation ion (m/z) specified in the method for both the internal standards and target analytes. Target analyte result must be calculated using the $\overline{RRF}$ from the associated ICAL.

### D. Evaluation

1. Verify that the results for all positively identified analytes are calculated and reported by the laboratory.
2. Verify that the CRQLs are calculated for the non-detects and reported accordingly.
3. Verify that the correct internal standard, quantitation ion, and $\overline{RRF}$ are used to calculate the reported results.
4. Verify that the same internal standard, quantitation ion, and $\overline{RRF}$ are used consistently.
5. Verify that the sample-specific CRQLs have been calculated and adjusted to reflect Percent Solids (%Solids), original sample mass/volume, and any applicable dilutions.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant results or CRQLs can be obtained from the CCS report and may be used as part of the evaluation process.

### E. Action

1. If any discrepancies are found, contact the EPA Regional CLP COR, who may contact the laboratory to obtain additional information that could resolve any differences. If a discrepancy remains unresolved, use professional judgment to decide which value is the most accurate and to determine whether qualification of data is warranted. Annotate the reasons for any data qualification in the Data Review Narrative.
2. If errors are detected in results and CRQL calculations, perform a more comprehensive recalculation.
3. If the %Solids for a soil/sediment sample is < 10.0%, use professional judgment to qualify detects and non-detects.
4. If the %Solids for a soil/sediment sample is ≥ 10.0% and < 30.0%, use professional judgment to qualify detects and non-detects.
5. If the %Solids for a soil/sediment sample is ≥ 30.0%, detects and non-detects should not be qualified.
6. If sample results are < CRQLs and ≥ MDLs, qualify as estimated (J).
7. Note numerous or significant failures to accurately quantify the target analytes, or to properly evaluate and adjust CRQLs, for EPA Regional CLP COR action.

**Table 29. Percent Solids Actions for Low/Medium Volatile Analysis for Non-Aqueous Samples**

| Criteria | Action | |
|---|---|---|
| | **Detects** | **Non-detects** |
| %Solids < 10.0% | Use professional judgment | Use professional judgment |
| 10.0% ≤ %Solids < 30.0% | Use professional judgment | Use professional judgment |
| %Solids ≥ 30.0% | No qualification | No qualification |

## XII. Tentatively Identified Compounds

### A. Review Items

Form 1B-OR, chromatograms, library search printouts, and spectra for the TIC candidates. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Low/Med VOA, Sections 11.1.2 and 11.2.3)

### B. Objective

The objective is to provide tentative identifications to chromatographic peaks that are not identified as target analytes, DMCs, or internal standards.

### C. Criteria

For each sample, the laboratory must conduct a mass spectral search of the National Institute of Standards and Technology (NIST) (2011 release or later), Wiley (2011 release or later), or equivalent mass spectral library, and report the possible identity for up to 30 of the largest peaks that are not DMCs, internal standards, or target analytes. The peak for a TIC should have an area or height > 10% of the area or height of the nearest internal standard. The estimated concentration for a TIC is calculated similarly to that for a target analyte, using total ion areas for the TIC and the internal standard, and assuming an RRF of 1.0.

1. Guidelines for tentative identification are as follows:
    a. Major ions (> 10% Relative Intensity) in the reference spectrum should be present in the sample spectrum.
    b. The relative intensities of the major ions should agree within ±20% between the sample and the reference spectra.
    c. Molecular ions present in the reference spectrum should be present in the sample spectrum.
    d. Non-target compounds receiving a library search match of 85% or higher are considered a "probable match". The compound should be reported unless the mass spectral interpretation specialist feels there is evidence not to report the compound as identified by the library search program. The laboratory should include the justification for not reporting a compound as listed by the search program in the SDG Narrative.
    e. If the library search produces more than one compound ≥ 85%, the compound with the highest percent match (report first compound if percent match is the same for two or more compounds) should be reported, unless the mass spectral interpretation specialist feels that the highest match compound should not be reported or another compound with a lower match should be reported. The laboratory should include the justification for not reporting the compound with the highest spectral match within the SDG Narrative. DMCs, internal standards, and target analytes should not be reported as TICs.
    f. If the library search produces a series of obvious isomer compounds with library search matches ≥ 85%, the compound with the highest library search percent match (or the first compound if the library search matches are the same) should be reported. The laboratory should note in the SDG Narrative that the exact isomer configuration, as reported, may not be accurate.
    g. If the library search produces no matches ≥ 85%, and in the technical judgment of the mass spectral interpretation specialist no valid tentative identification can be made, the compound should be reported as "unknown". The mass spectral specialist should give additional classification of the unknown compound, if possible (e.g., "unknown aromatic", "unknown hydrocarbon", "unknown acid type", "unknown chlorinated compound"). If probable molecular weights can be distinguished, they should be included.

h. The Chemical Abstracts Service (CAS) registry number is the unique identifier for each chemical compound. As the rules of chemical nomenclature have changed over time, each chemical substance is liable to have several names or synonyms [i.e., trade or brand name(s); generic or common name(s); trivial or systematic; or International Union of Pure and Applied Chemistry (IUPAC) name(s)]. Whether synonyms or other names are created for this compound, the CAS registry number will remain unchanged. The CAS registry number is simply an identifier which has no structural significance. Regardless of RTs, if the library search produces two or more compounds at or above 85% with the same CAS number, the compound with the highest percent match (report first compound if the percent match is the same for two or more compounds) should be reported unless the mass spectral interpretation specialist feels there is just evidence not to report the compound with the highest match.

i. If the library search produces only one and the same compound (i.e., the same CAS registry number) with the match at or above 85% at two different RTs, the compound having the highest percent match should be reported as TIC and the other one could be reported as unknown. If both TICs have the same percent match for the same compound, one of the TICs could be reported as unknown. Such justifications should be included in the SDG Narrative.

j. Alkanes are not to be reported as TICs on Form 1B-OR. An alkane is defined as any hydrocarbon with the generic formula $C_nH_{2n+2}$ (straight-chain or branched) or $C_nH_{2n}$ (cyclic) that contains only C-H and C-C single bonds. When the preceding alkanes are tentatively identified, the concentration(s) should be estimated and the analytes reported as alkanes by class (i.e., straight-chain, branched, cyclic, as a series, or as applicable) in the SDG Narrative. Total alkanes concentration should be reported on Form 1B-OR.

## D. Evaluation

1. Verify that the laboratory has generated a library search for all required peaks in the chromatograms for samples and blanks.
2. Verify that TIC peaks present in samples are not found in blanks. When a low-level, non-target compound that is a common artifact or laboratory contaminant is detected in a sample, a thorough check of blank chromatograms may require looking for peaks which are < 10% of the internal standard height, but present in the blank chromatogram at a similar RRT.
3. Verify that mass spectra for all reported TICs are present for every sample and blank.
4. Review ions present in the sample spectrum, but not in the reference spectrum, for possible background contamination, interference, or presence of coeluting compounds.
5. Review ions present in the reference spectrum, but not in the sample spectrum, for possible subtraction from the sample spectrum because of background contamination or coeluting compounds. Data system library reduction programs can sometimes create these discrepancies.
6. Consider all reasonable choices since TIC library searches often yield several candidate compounds having a close matching score.
7. Be aware of common laboratory artifacts/contaminants and their sources (e.g., Aldol condensation products, solvent preservatives, and reagent contaminants). These may be present in blanks and not reported as sample TICs, such as:

   a. Common laboratory contaminants include $CO_2$ (m/z 44), siloxanes (m/z 73), diethyl ether, hexane, certain freons, and phthalates at levels < 100 µg/L.

   b. Solvent preservatives include cyclohexene (a methylene chloride preservative). Related by-products include cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenol, chlorocyclohexene, and chlorocyclohexanol.

   c. Aldol condensation reaction products of acetone include 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten-2-one, and 5,5-dimethyl-2(5H)-furanone.

8. A target analyte may be identified by non-target library search procedures, even though it is not identified as a target analyte (false negative). If the total area quantitation method is used, request that the laboratory recalculate the result using the proper quantitation ion and RRF.

    a. A non-target compound may be incorrectly identified by the instrument's target analyte data processor as a target analyte (false positive). When this happens, the non-target library search procedure will not detect the false positive as a TIC. In this case, request that the laboratory properly identify the analyte as a TIC and recalculate the result using the total area quantitation method and an RRF of 1.0.

    b. Evaluate other sample chromatograms and check for both false negatives and false positives to determine if the occurrence is isolated or systematic.

9. Verify that the TIC concentration is calculated using an RRF of 1.0.

## E. Action

1. If the library search match for a TIC is ≥ 85%, qualify the TIC as tentatively identified with estimated concentration (NJ).
2. If the library search match for a TIC is < 85%, qualify the TIC as unknown with estimated concentration (J).
3. General actions related to the review of TIC results are as follows:

    a. If it is determined that a tentative identification of a non-target compound is unacceptable, change the tentative identification to "unknown" or another appropriate identification, and qualify the result as estimated (J).

    b. If a library search or proper calculation is not performed for all contractually-required peaks, the EPA Regional CLP COR may request the data from the laboratory.

    c. Use professional judgment to determine whether a library search result for a TIC represents a reasonable identification. If there is more than one possible match, report the result as "either compound X or compound Y". If there is a lack of isomer specificity, change the TIC result to a non-specific isomer result (e.g., 1,3,5-trimethyl benzene to trimethyl benzene isomer) or to a compound class (e.g., 2-methyl, 3-ethyl benzene to a substituted aromatic compound).

    d. Other Case factors may influence TIC judgments. If a sample TIC match is poor, but other samples have a TIC with a valid library match, similar RRT, and the same ions, infer identification information from the other sample TIC results.

4. Note any changes made to the reported data or any concerns regarding TIC identifications in the Data Review Narrative.
5. Note any failure to properly evaluate and report TICs for EPA Regional CLP COR action.

## XIII. System Performance

### A. Review Items

Form 8A-OR and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/Low/Med VOA, Section 11.1)

### B. Objective

The objective is to ensure that the system is stable during the analytical sequence to produce quality data.

### C. Criteria

There are no specific criteria for system performance.

### D. Evaluation

1. Abrupt discrete shifts in the Reconstructed Ion Chromatogram (RIC) baseline may indicate a change in the instrument's sensitivity or the zero setting. A baseline "shift" could indicate a decrease in sensitivity in the instrument or an increase in the instrument zero, possibly causing target compounds at or near the detection limit to miss detection. A baseline "rise" could indicate problems such as a change in the instrument zero, a leak, or degradation of the column.
2. Poor chromatographic performance affects both qualitative and quantitative results. Indications of substandard performance include:
    a. High RIC background levels or shifts in absolute RTs of internal standards.
    b. Excessive baseline rise at elevated temperature.
    c. Extraneous peaks.
    d. Loss of resolution.
    e. Peak tailing or peak splitting that may result in inaccurate quantitation.
3. A drift in instrument sensitivity may occur during the 12-hour period and may be an indication of possible internal standard spiking problems. This could be discerned by examination of the internal standard area on Form 8A-OR for trends such as a continuous or near-continuous increase or decrease in the internal standard area over time.

### E. Action

1. Use professional judgment to qualify the data if it is determined that system performance has degraded during sample analyses.
2. Note any degradation of system performance which significantly affected the data for EPA Regional CLP COR action.

## XIV. Performance Evaluation Sample

### A. Review Items

Form 1A-OR, TR/COC Record documentation, preparation logs, instrument printouts, and raw data. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit F, Section 4.1)

### B. Objective

The objective is to determine the validity of the analytical results based on the recovery of the PE sample(s).

### C. Criteria

1. Matrix-specific PE samples shall be analyzed utilizing the same analytical methods and Quality Assurance/Quality Control (QA/QC) procedures as employed for the samples, at a frequency to be determined by each EPA Region for each site. PE samples must be analyzed in an SDG containing field samples for the Case, using the same procedures, reagents, and instrumentation.

### D. Evaluation

1. Verify, using Form 1A-OR, preparation logs, and raw data, that the PE samples were analyzed with the field samples and field blanks in the SDG.
2. Verify, using Form 1A-OR, that the PE sample results are within the warning limits (95% confidence interval) and action limits (99% confidence interval).
3. If a significant number (i.e., half or more) of the analytes in the PE samples fall outside of the 95% warning or 99% action criteria, or a number of false positive results are reported, evaluate the overall impact on the data.

### E. Action

**NOTE:** If the PE sample criteria are not met, the laboratory performance and method accuracy are in question. Use professional judgment to determine if the data should be qualified or rejected. The following guidance is suggested for qualifying sample data associated with a PE sample that does not meet the required criteria.

For a PE sample that does not meet the technical criteria, apply the action to all samples in the same preparation batch. If the concentration of any analyte in a PE sample is not comparable to the analyte's concentration in the field samples or field blanks (i.e., it is much higher or much lower than the concentration in these samples), the action may be applied to only those samples in which the analyte's concentration is comparable to the PE sample concentration.

1. If the PE sample was not analyzed with the field samples and field blanks, use professional judgment to determine if the associated sample results should be qualified. Obtain additional information from the laboratory, if necessary. If a laboratory fails to analyze the PE sample(s) provided with field samples and field blanks, or if a laboratory consistently fails to generate acceptable PE sample results, record the situation in the Data Review Narrative, and note it for EPA Regional CLP COR action.
2. If the PE sample results are outside the lower warning limits but inside the lower action limits, qualify detects as estimated low (J-) and non-detects as estimated (UJ).
3. If the PE sample results are outside the lower action limits, qualify detects as estimated low (J-) and non-detects as unusable (R).
4. If the PE sample results are within the limits, detects and non-detects should not be qualified.
5. If the PE sample results are outside the upper warning limits but inside the upper action limits, qualify detects as estimated high (J+). Non-detects should not be qualified.

6. If the PE sample results are outside the upper action limits, qualify detects as estimated high (J+). Non-detects should not be qualified.
7. Annotate the potential effects on the data due to out-of-control PE sample results in the Data Review Narrative.

**Table 30. PE Sample Actions for Low/Medium Volatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| PE sample results outside lower warning limits but inside lower action limits | J- | UJ |
| PE sample results outside lower action limits | J- | R |
| PE sample results within limits | No qualification | No qualification |
| PE sample results outside upper warning limits but inside upper action limits | J+ | No qualification |
| PE sample results outside upper action limits | J+ | No qualification |

## XV. Regional Quality Assurance and Quality Control

### A. Review Items

Form 1A-OR, chromatograms, TR/COC Record documentation, quantitation reports, and other raw data from QA/QC samples. (SOW SOM02.4 – Exhibit B, Sections 2.4 and 3.4)

### B. Objective

The objective is to use results from the analysis of EPA Regional QA/QC samples such as field duplicates, blind spikes, and blind blanks to determine the validity of the analytical results.

### C. Criteria

Criteria are determined by each EPA Region.

1. The frequency of EPA Regional QA/QC samples should be defined in the project QAPP.
2. Performance criteria for EPA Regional QA/QC samples should also be defined in the project QAPP.
3. The EPA Region may provide the laboratory with PE samples to be analyzed with each SDG. These samples may include blind spikes and/or blind blanks. The laboratory must analyze a PE sample when provided by the EPA Region. Refer to Section VI, above, for blanks criteria. Refer to Section XIV, above, for PE samples criteria.
4. The RPD between field duplicates shall fall with the specific limits in the EPA Region's SOP or project QAPP.

### D. Evaluation

1. Evaluation procedures must follow the EPA Region's SOP for data review.
2. Determine whether the results of EPA Regional QA/QC samples impact all samples in the project or only those directly associated (i.e., in the same SDG, collected on the same day, prepared together, or contained in the same analytical sequence).
3. Calculate the RPD between field duplicates and provide this information in the Data Review Narrative. Also verify that the value falls within the specific limits in the EPA Region's SOP or project QAPP.
4. Determine whether poor precision is the fault of the laboratory, or a result of sample non-homogeneity in the field. Laboratory observations of sample appearance may become important in these situations.

### E. Action

1. Any action must be in accordance with EPA Regional specifications and the criteria for acceptable field duplicate sample results.
2. Note unacceptable results for field duplicate samples for EPA Regional CLP COR action.
3. In general, for EPA Regional QA/QC performance not within QAPP specification, qualify detects as estimated (J) and non-detects as estimated (UJ). The impact on overall data quality should be assessed after consultation with the data user and/or field personnel. Contact the EPA Regional CLP COR if reanalysis of samples is required.

## XVI. Overall Assessment of Data

### A. Review Items

Entire data package, data review results, and (if available) the QAPP and Sampling and Analysis Plan (SAP).

### B. Objective

The objective is to provide the overall assessment on data quality and usability.

### C. Criteria

1. Review all available materials to assess the overall quality of the data, keeping in mind the additive nature of analytical problems.
2. Reported analyte concentrations must be quantitated according to the appropriate equations, as listed in the method. All sample results must be within the linear calibration ranges per the methods.

### D. Evaluation

Examine the raw data to verify that the correct calculation of the sample results was reported by the laboratory. Analysis logs, instrument printouts, etc., should be compared to the reported sample results recorded on the appropriate Organic Data Reporting Forms (Form 1A-OR through Form 8A-OR).

1. Evaluate any technical problems which have not been previously addressed.
2. Examine the raw data for any anomalies (e.g., baseline shift).
3. Verify that the appropriate method is used in sample analysis.
4. Verify that there are no transcription or reduction errors.
5. Verify that target analyte results fall within the calibrated ranges.
6. If appropriate information is available, use professional judgment to assess the usability of the data in order to assist the data user in avoiding inappropriate use of the data. Review all available information, including the QAPP (specifically the acceptance and performance criteria), SAP, and communication with the data user that concerns the intended use and desired quality of these data.

### E. Action

1. Use professional judgment to determine if there is any need to qualify data which were not qualified based on the QC criteria previously discussed.
2. Use professional judgment to qualify sample results and non-detects if the MDL exceeds the CRQL.
3. If a sample is not diluted properly when sample results exceed the upper limit of the calibration range, qualify sample results as estimated (J).
4. Write a brief Data Review Narrative to give the user an indication of the limitations of the analytical data.
5. Note any inconsistency of the data with the SDG Narrative for EPA Regional CLP COR action. If sufficient information on the intended use and required quality of the data is available, include an assessment of the usability of the data within the given context. This may be used as part of a formal Data Quality Assessment (DQA).

## SEMIVOLATILE DATA REVIEW

The Semivolatile (SVOA) organic data requirements to be reviewed during validation are listed below:

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# I. Preservation and Holding Times

## A. Review Items

Form 1A-OR, Form 1B-OR, Traffic Report/Chain of Custody (TR/COC) Record documentation, Form DC-1, raw data, sample extraction sheets, and the Sample Delivery Group (SDG) Narrative checking for: pH, shipping container temperature, holding time, and other sample conditions. (SOW SOM02.4 – Exhibit B, Section 3.4; Exhibit D/Introduction, Section 5.0; Exhibit D/General, Sections 8.0, 10.1.2.1, and 10.2.2.4.4; and Exhibit D/SVOA, Section 8.0)

## B. Objective

The objective is to determine the validity of the analytical results based on the sample conditions and the holding time of the sample.

## C. Criteria

1. The extraction technical holding time is determined from the date of sample collection to the date of sample extraction for aqueous and non-aqueous (soil and sediment) samples that are not designated for Toxicity Characteristic Leaching Procedure (TCLP)/Synthetic Precipitation Leachate Procedure (SPLP) procedures. The extraction technical holding time for samples designated for TCLP/SPLP is determined from the date of sample collection to the date of TCLP/SPLP extraction.
2. For TCLP/SPLP leachate samples, extraction technical holding time is determined from the date of TCLP/SPLP procedure completion to the date of the leachate sample extraction by the specified preparation methods for aqueous samples. The analysis technical holding time is determined from the date of sample extraction completion to the date of sample analysis.
3. Samples should be in proper condition with shipping container temperatures at $\leq 6^{o}C$ upon receipt at the laboratory. All aqueous and non-aqueous samples shall be protected from light and refrigerated at $\leq 6^{o}C$ (but not frozen) from the time of receipt at the laboratory. Sample extracts shall be stored at $\leq 6^{o}C$ (but not frozen) from the time of the extraction completion until analysis.
4. The extraction technical holding time criteria for aqueous samples, TCLP/SPLP aqueous filtrate samples, and TCLP/SPLP leachate samples that are properly preserved is 7 days.
5. The extraction technical holding time criteria for soil/sediment samples designated for TCLP/SPLP is 14 days.
6. The extraction technical holding time criteria for non-aqueous samples that are properly preserved is 14 days.
7. The analysis technical holding time criteria for extracts, including TCLP/SPLP leachate and aqueous filtrate sample extracts, is 40 days.

## D. Evaluation

1. Review the SDG Narrative and the TR/COC Record documentation to determine if the samples are received intact and iced. If there is an indication of problems with the samples, the sample integrity may be compromised.
2. Verify that the extraction dates and the analysis dates for samples on Form 1A-OR, Form 1B-OR, and the raw data are identical.
3. Establish extraction technical holding times for samples, excluding TCLP/SPLP leachate samples, by comparing the sample collection dates on the TR/COC Record documentation with the dates of extraction on Form 1A-OR, Form 1B-OR, and the sample extraction sheets.
4. Establish extraction technical holding times for TCLP/SPLP leachate samples by comparing the sample collection dates on the TR/COC Record documentation with the dates of extraction on sample extraction sheets.

5. Establish extraction technical holding times for TCLP/SPLP leachate samples by comparing the dates of TCLP/SPLP extraction on the extraction sheets with the dates of extraction on Form 1A-OR, Form 1B-OR, and the preparation extraction log.
6. Determine the analysis technical holding times for samples after the completion of extraction by comparing the dates of extraction with the dates of analysis on Form 1A-OR and Form 1B-OR, as well as from the analytical run logs.

## E. Action

1. If samples are received with shipping container temperatures > 6°C, use professional judgment to qualify detects and non-detects.
2. If TCLP/SPLP extraction is performed within the 14-day extraction technical holding time for preserved and not properly preserved soil/sediment samples designated for TCLP/SPLP, detects and non-detects should not be qualified.
3. If TCLP/SPLP extraction is performed outside the 14-day extraction technical holding time for preserved and not properly preserved soil/sediment samples designated for TCLP/SPLP, qualify detects as estimated low (J-) and non-detects as unusable (R). Use caution in determining whether some detected analytes should be qualified as estimated low (J-) or as estimated high (J+), based on knowledge of individual analyte stability or interactions.
4. If discrepancies are found between the sample extraction date or analysis date and the date on the raw data, perform a more comprehensive review, contacting the laboratory if necessary through the United States Environmental Protection Agency Regional Contract Laboratory Program Contracting Officer's Representative (EPA Regional CLP COR), to determine the correct dates for establishing the technical holding time.
5. If an aqueous sample, TCLP/SPLP aqueous filtrate sample, or TCLP/SPLP leachate sample is not properly preserved, but extraction is performed within the 7-day technical holding time, and the extract is analyzed within the 40-day technical holding time, consider the extent of temperature excursion in addition to overall sample integrity, and use professional judgment to qualify detects and non-detects.
6. If an aqueous sample, TCLP/SPLP aqueous filtrate sample, or TCLP/SPLP leachate sample is not properly preserved, extraction is performed outside the 7-day technical holding time, and/or the extract is analyzed outside the 40-day technical holding time, qualify detects as estimated (J) and non-detects as unusable (R). Use caution in determining whether some detected analytes should be qualified as estimated low (J-) or as estimated high (J+), based on knowledge of individual analyte stability or interactions.
7. If an aqueous sample, TCLP/SPLP aqueous filtrate sample, or TCLP/SPLP leachate sample is properly preserved, extraction is performed within the 7-day technical holding time, and the extract is analyzed within the 40-day technical holding time, detects and non-detects should not be qualified.
8. If an aqueous sample, TCLP/SPLP aqueous filtrate sample, or TCLP/SPLP leachate sample is properly preserved, extraction is performed outside the 7-day technical holding time, and/or the extract is analyzed outside the 40-day technical holding time, consider all evidence of compromised extract integrity (such as evaporation or refrigeration) in addition to overall sample integrity, and use professional judgment to qualify the data, in particular the direction of the bias.
9. If a non-aqueous sample is not properly preserved, extraction is performed within the 14-day technical holding time, and the extract is analyzed within the 40-day technical holding time, use professional judgment to qualify detects and non-detects.
10. If a non-aqueous sample is not properly preserved, extraction is performed outside the 14-day technical holding time, and/or the extract is analyzed outside the 40-day technical holding time, use professional judgment to qualify detects and non-detects.

11. If a non-aqueous sample is properly preserved, extraction is performed within the 14-day technical holding time, and the extract is analyzed within the 40-day technical holding time, detects and non-detects should not be qualified.
12. If a non-aqueous sample is properly preserved, extraction is performed outside the 14-day technical holding time, and/or the extract is analyzed outside the 40-day technical holding time, qualify detects as estimated low (J-) and non-detects as unusable (R). Use caution in determining whether some detected analytes should be qualified as estimated low (J-) or as estimated high (J+), based on knowledge of individual analyte stability or interactions.
13. Note the effect of exceeding the holding time on the resulting data in the Data Review Narrative, whenever possible.
14. If technical holding times are grossly exceeded, qualify detects as estimated low (J-) and use professional judgment to qualify non-detects as unusable (R). Note this for EPA Regional CLP COR action. Annotate the effect of the holding time exceedance on the resulting data in the Data Review Narrative, whenever possible.

**Table 31. Preservation and Holding Time Actions for Semivolatile Analysis**

| Matrix | Preserved | Criteria | Action | |
|---|---|---|---|---|
| | | | Detect | Non-detect |
| Aqueous | No | ≤ 7 days (for extraction) and ≤ 40 days (for analysis) | Use professional judgment | Use professional judgment |
| | | TCLP/SPLP aqueous filtrate sample and TCLP/SPLP leachate sample extracted within the 7-day technical holding time | | |
| | No | > 7 days (for extraction) and/or > 40 days (for analysis) | J | R |
| | | TCLP/SPLP aqueous filtrate sample and TCLP/SPLP leachate sample not extracted within the 7-day technical holding time | | |
| | Yes | ≤ 7 days (for extraction) and ≤ 40 days (for analysis) | No qualification | No qualification |
| | | TCLP/SPLP aqueous filtrate sample and TCLP/SPLP leachate sample extracted within the 7-day technical holding time | | |

| Matrix | Preserved | Criteria | Action | |
|---|---|---|---|---|
| | | | **Detect** | **Non-detect** |
| Aqueous | Yes | > 7 days (for extraction) and/or > 40 days (for analysis) | Use professional judgment | Use professional judgment |
| | | TCLP/SPLP aqueous filtrate sample and TCLP/SPLP leachate sample not extracted within the 7-day technical holding time | | |
| | Yes/No | Holding time grossly exceeded | J- | Use professional judgment<br>R |
| Non-aqueous | No | ≤ 14 days (for extraction) and ≤ 40 days (for analysis) | Use professional judgment | Use professional judgment |
| | No | > 14 days (for extraction) and/or > 40 days (for analysis) | Use professional judgment | Use professional judgment |
| | Yes | ≤ 14 days (for extraction) and ≤ 40 days (for analysis) | No qualification | No qualification |
| | Yes | > 14 days (for extraction) and/or > 40 days (for analysis) | J- | R |
| | Yes/No | Holding time grossly exceeded | J- | Use professional judgment<br>R |

**Table 32. Holding Time Actions for Non-Aqueous Semivolatile TCLP/SPLP Sample Analysis**

| Preserved | Criteria | Action | |
|---|---|---|---|
| | | **Detect** | **Non-detect** |
| No | TCLP/SPLP extraction performed within the 14-day technical holding time | No qualification | No qualification |
| No | TCLP/SPLP extraction not performed within the 14-day technical holding time | J- | R |
| Yes | TCLP/SPLP extraction performed within the 14-day technical holding time | No qualification | No qualification |
| Yes | TCLP/SPLP extraction not performed within the 14-day technical holding time | J- | R |
| Yes/No | Holding time grossly exceeded | J- | Use professional judgment<br>R |

## II. Gas Chromatograph/Mass Spectrometer Instrument Performance Check

### A. Review Items

Form 5-OR, decafluorotriphenylphosphine (DFTPP) mass spectra, and mass listing. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/SVOA, Section 9.2)

### B. Objective

The objective of performing Gas Chromatograph/Mass Spectrometer (GC/MS) instrument performance checks is to ensure adequate mass resolution, identification, and to some degree, sensitivity, and to document this level of performance prior to analyzing any sequence of standards or samples.

### C. Criteria

**NOTE:** This requirement does not apply when samples are analyzed by the Selected Ion Monitoring (SIM) technique.

1. A sufficient amount of the instrument performance check solution (50 ng DFTPP on-column) must be analyzed at the specified frequency and sequence. It must be injected once at the beginning of each 12-hour period, during which samples, blanks, or standards are to be analyzed. The 12-hour period begins with the injection of DFTPP; however, in cases where a closing Continuing Calibration Verification (CCV) can be used as an opening CCV, the 12-hour period begins with the injection of the opening CCV.

   Listed below are examples of acceptable analytical sequences incorporating the use of the opening and/or closing CCV. Use these examples as a guide for the possible analytical sequences that can be expected.

| Conditions for When Example Sequence is Appropriate: | Acceptable Criteria That Must Be Met: | Notes: |
|---|---|---|
| *Use Example 1* if time remains on the 12-hour clock after the initial calibration sequence. | • DFTPP tunes meet instrument performance criteria.<br>• The five Initial Calibration standards meet initial calibration criteria.<br>• Initial Calibration Verification (ICV) meets ICV criteria.<br>• CCV A meets both opening and closing CCV criteria.<br>• CCV B meets closing CCV criteria. | The requirement of starting the new 12-hour clock for Analytical Sequence 2 with a new DFTPP tune is waived if CCV A meets opening CCV criteria. If CCV B meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B. |

| Conditions for When Example Sequence is Appropriate: | Acceptable Criteria That Must Be Met: | Notes: |
|---|---|---|
| *Use Example 2* if time remains on the 12-hour clock after the initial calibration sequence. | • DFTPP tunes meet instrument performance criteria.<br>• The five Initial Calibration standards meet initial calibration criteria.<br>• ICV meets ICV criteria.<br>• CCV A meets closing CCV criteria (but does not meet opening CCV criteria).<br>• CCV B meets opening CCV criteria.<br>• CCV C meets closing CCV criteria. | CCV A does not meet opening CCV criteria. Therefore, a new DFTPP tune must be performed, immediately followed by CCV B, before the method blank and any samples may be analyzed. In this case, the new 12-hour clock and Analytical Sequence 2 begins with the injection of the new DFTPP tune. |
| *Use Example 3* if more than 12 hours have elapsed since the most recent initial calibration or closing CCV,<br>OR<br>if the most recent closing CCV was not or could not be used as an opening CCV. | • DFTPP tunes meet instrument performance criteria.<br>• CCV A meets opening CCV criteria.<br>• CCV B meets both opening and closing CCV criteria.<br>• CCV C meets both opening and closing CCV criteria. | The requirement of starting the new 12-hour clock for Analytical Sequence 2 with a new DFTPP tune is waived if CCV B meets opening CCV criteria. If CCV C meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B. |
| *Use Example 4* if more than 12 hours have elapsed since the most recent initial calibration or closing CCV,<br>OR<br>if the most recent closing CCV was not or could not be used as an opening CCV. | • DFTPP tunes meet instrument performance criteria.<br>• CCV A meets opening CCV criteria.<br>• CCV B meets closing CCV criteria (but does not meet opening CCV criteria).<br>• CCV C meets opening CCV criteria.<br>• CCV D meets both opening and closing CCV criteria. | CCV B does not meet opening CCV criteria. Therefore, a new DFTPP tune must be performed, immediately followed by CCV C, before the method blank and any samples may be analyzed. In this case, the new 12-hour clock and Analytical Sequence 2 begins with the injection of the new DFTPP tune. The requirement of starting the new 12-hour clock for Analytical Sequence 3 with a new DFTPP tune is waived if CCV D meets opening CCV criteria. If CCV D meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV D. |

**Example 1:**

| **Example 1:** | **Time** | **Material Injected** | **Analytical Sequence #** |
|---|---|---|---|
| Start of 12-hour clock for Analytical Sequence 1 | 0 hr | DFTPP | 1 |
| | | Initial Calibration 5.0 | 1 |
| | | Initial Calibration 10 | 1 |
| | | Initial Calibration 20 | 1 |
| | | Initial Calibration 40 | 1 |
| | | Initial Calibration 80 | 1 |
| | | ICV | 1 |
| | | Method Blank | 1 |
| | | Subsequent Samples | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| End of 12-hour clock for Analytical Sequence 1/ Beginning of 12-hour clock for Analytical Sequence 2 | 12 hr | CCV A (meets opening CCV criteria) | 1/2 |
| | | Method Blank | 2 |
| | | Subsequent Samples | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| End of 12-hour clock for Analytical Sequence 2/ Beginning of 12-hour clock for Analytical Sequence 3 | 24 hr | CCV B (meets opening CCV criteria) | 2/3 |

**Example 2:**

| Example 2: | Time | Material Injected | Analytical Sequence # |
|---|---|---|---|
| Start of 12-hour clock for Analytical Sequence 1 | 0 hr | DFTPP | 1 |
| | | Initial Calibration 5.0 | 1 |
| | | Initial Calibration 10 | 1 |
| | | Initial Calibration 20 | 1 |
| | | Initial Calibration 40 | 1 |
| | | Initial Calibration 80 | 1 |
| | | ICV | 1 |
| | | Method Blank | 1 |
| | | Subsequent Samples | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| End of 12-hour clock for Analytical Sequence 1 | 12 hr | CCV A (meets closing CCV criteria, fails opening CCV criteria) | 1 |
| Beginning of 12-hour clock for Analytical Sequence 2 | 13 hr | DFTPP | 2 |
| | | CCV B (meets opening CCV criteria) | 2 |
| | | Method Blank | 2 |
| | | Subsequent Samples | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| End of 12-hour clock for Analytical Sequence 2 | 25 hr | CCV C (meets closing CCV criteria) | 2 |

**Example 3:**

| **Example 3:** | **Time** | **Material Injected** | **Analytical Sequence #** |
|---|---|---|---|
| Start of 12-hour clock for Analytical Sequence 1 | 0 hr | DFTPP | 1 |
| | | CCV A (meets opening CCV criteria) | 1 |
| | | Method Blank | 1 |
| | | Subsequent Samples | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| End of 12-hour clock for Analytical Sequence 1/ Beginning of 12-hour clock for Analytical Sequence 2 | 12 hr | CCV B (meets opening CCV criteria) | 1/2 |
| | | Method Blank | 2 |
| | | Subsequent Samples | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | |
| End of 12-hour clock for Analytical Sequence 2/ Beginning of 12-hour clock for Analytical Sequence 3 | 24 hr | CCV C (meets opening CCV criteria) | 2/3 |

**Example 4:**

| **Example 4:** | **Time** | **Material Injected** | **Analytical Sequence #** |
|---|---|---|---|
| Start of 12-hour clock for Analytical Sequence 1 | 0 hr | DFTPP | 1 |
| | | CCV A (meets opening CCV criteria) | 1 |
| | | Method Blank | 1 |
| | | Subsequent Samples | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | 1 |
| | | • | |
| End of 12-hour clock for Analytical Sequence 1 | 12 hr | CCV B (meets closing CCV criteria, fails opening CCV criteria) | 1 |
| Beginning of 12-hour clock for Analytical Sequence 2 | 13 hr | DFTPP | 2 |
| | | CCV C (meets opening CCV criteria) | 2 |
| | | Method Blank | 2 |
| | | Subsequent Samples | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | 2 |
| | | • | |
| End of 12-hour clock for Analytical Sequence 2/ Beginning of 12-hour clock for Analytical Sequence 3 | 25 hr | CCV D (meets opening CCV criteria) | 2/3 |

2. The DFTPP instrument performance check must meet the ion abundance criteria listed in Table 33.

**Table 33. Ion Abundance Criteria for DFTPP**

| Mass | Ion Abundance Criteria |
|---|---|
| 51 | 10.0 - 80.0% of mass 198 |
| 68 | Less than 2.0% of mass 69 |
| 69 | Present |
| 70 | Less than 2.0% of mass 69 |
| 127 | 10.0 - 80.0% of mass 198 |
| 197 | Less than 2.0% of mass 198 |
| 198 | Base peak, 100% relative abundance* |
| 199 | 5.0 - 9.0% of mass 198 |
| 275 | 10.0 - 60.0% of mass 198 |
| 365 | Greater than 1.0% of mass 198 |
| 441 | Present, but less than mass 443 |
| 442 | Greater than 50.0% of mass 198 |
| 443 | 15.0 - 24.0% of mass 442 |

* All ion abundances must be normalized to m/z 198, the nominal base peak, even though the ion abundance of m/z 442 may exceed that of m/z 198.

## D. Evaluation

1. Verify that the DFTPP Instrument Performance Check is analyzed at the specified frequency and sequence.
2. Compare the data presented on Form 5-OR for each Instrument Performance Check with each mass listing submitted to ensure the following:
   a. Form 5-OR is present and completed for each required DFTPP at the specified frequency.
   b. The laboratory has not made transcription errors between the data and the form. If there are major differences between the mass listing and Forms 5-OR, a more in-depth review of the data is required. This may include obtaining and reviewing additional information from the laboratory.
   c. The appropriate number of significant figures has been reported (number of significant figures given for each ion in the Ion Abundance Criteria column) and that rounding is correct.
   d. The laboratory has not made any calculation errors.
3. Verify from the raw data (mass listing) that the mass assignment is correct and that the mass listing is normalized to m/z 198.
4. Verify that the ion abundance criteria are met. The ion abundance for m/z 68, 70, 441, and 443 are calculated by normalizing to the specified m/z. The critical ion abundance criteria for DFTPP are the relative abundance ratios of m/z 198/199 and 442/443. For the ions at m/z 51, 127, and 275, the actual relative abundance is not as critical. The relative abundance of m/z 365 is present and > 1.0%.

5. If possible, verify that spectra are generated using appropriate background subtraction techniques. Since the DFTPP spectrum is obtained from chromatographic peaks that should be free from co-elution problems, background subtraction should be performed in accordance with the following procedure:

   a. Three scans (the peak apex scan and the scans immediately preceding and following the apex) are acquired and averaged.

   b. Background subtraction must be accomplished using a single scan acquired within 20 scans of the elution of DFTPP, but the DFTPP peak must not be subtracted as part of the background.

**NOTE:** All mass spectrometer instrument conditions must be identical to those used for sample analysis. Background subtraction actions resulting in spectral distortions for the sole purpose of meeting the method specifications are contrary to the Quality Assurance (QA) objectives, and are therefore unacceptable.

**NOTE:** For data obtained from the CLP, information regarding noncompliant DFTPP instrument performance check can be obtained from the National Functional Guidelines (NFG) reports and may be used as part of the evaluation process.

## E. Action

1. If the instrument performance check is not analyzed at the specified frequency and sequence, qualify detects and non-detects in the associated samples as unusable (R). The EPA Regional CLP COR should be contacted to arrange for reanalysis of all affected samples.

   a. In the event that samples cannot be reanalyzed, examine all calibrations associated with the sequence to evaluate whether proper qualitative criteria were achievable. If so, it may be possible to salvage usable data from the sequence. Otherwise, qualify the data as unusable (R).

2. If minor transcription errors are found to be insignificant to data quality and can be corrected on a copy of the form, no further action is required.

3. If the laboratory failed to provide the correct forms, or if significant transcription or calculation errors are found, notify the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data, and notify the EPA Regional CLP COR.

4. If the mass assignment is in error (e.g., m/z 197 is indicated as the base peak rather than m/z 198), qualify detects and non-detects in the associated samples as unusable (R).

5. If the ion abundance criteria in Table 33 are not met, use professional judgment to qualify detects and non-detects in the associated samples.

6. If the ion abundance criteria is not met for ions at m/z 51, 127, and 275, detects and non-detects should not be qualified.

7. If the ion abundance at m/z 365 is zero, minimum detection limits may be affected. On the other hand, if m/z 365 is present, but ion abundance is < 1.0%, detects and non-detects should not be qualified.

8. Annotate decisions to use analytical data associated with noncompliant DFTPP instrument performance checks in the Data Review Narrative.

9. If instrument performance check criteria are achieved using alternate techniques other than described in Section II.D.5, obtain additional information to evaluate the performance and procedures. Note any concerns or questions for EPA Regional CLP COR action.

   For example, the issue shall be noted for the EPA Regional CLP COR when an inappropriate technique such as background subtracting from the solvent front or from another region of the chromatogram rather than from the DFTPP peak is used to obtain background subtraction.

## III. Initial Calibration

### A. Review Items

Form 6A-OR, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/SVOA, Sections 7.2.2.1 and 9.3)

### B. Objective

The objective of initial calibration (ICAL) is to ensure that the instrument is capable of producing acceptable qualitative and quantitative data.

### C. Criteria

1. ICAL shall be performed at the specified frequency and sequence. Each GC/MS system must be calibrated with a minimum of five concentrations to determine instrument sensitivity and the linearity of GC/MS response for the purgeable target analytes and Deuterated Monitoring Compounds (DMCs).
   a. ICAL standards must be analyzed prior to any analysis of the ICV, samples, and required blanks, and within 12 hours of the associated instrument performance check at the beginning of each analytical sequence, or as necessary if the CCV acceptance criteria are not met.
   b. ICAL standards must contain all required target analytes and DMCs at specified concentrations. The calibration standards are to be prepared at 5.0, 10, 20, 40, and 80 ng/µL for each target analyte and associated DMCs, except 1,4-Dioxane, twenty-one target analytes and six DMCs listed in Section C.1.c, and DMC 1,4-Dioxane-$d_8$. For 1,4-Dioxane and 1,4-Dioxane-d8, the calibration standard concentrations are at 2.0, 4.0, 8.0, 16, and 32 ng/ µL.
   c. The ICAL standard concentrations are at 10, 20, 40, 80, and 160 ng/µL for twenty-one target analytes and six DMCs: Benzaldehyde, Phenol, Bis(2-chloroethyl) ether, 2-Methylphenol, 2,2'-Oxybis(1-chloropropane), Acetophenone, 4-Chloroaniline, Caprolactam, Hexachlorocyclopentadiene, Atrazine, Carbazole, Fluoranthene, 3,3'-Dichlorobenzidine, Di-n-octylphthalate, 2,4-Dinitrophenol, PCP, 4-Methylphenol, 4,6-Dinitro-2-methylphenol, 3-Nitroaniline, 4-Nitroaniline, 4-Nitrophenol, Phenol-$d_5$, Bis(2-chloroethyl) ether-$d_8$, 4-Methylphenol-$d_8$, 4-Chloroaniline-$d_4$, 4-Nitrophenol-$d_4$, and 4,6-Dinitro-2-methylphenol-$d_2$. For the optional analysis of Polycyclic Aromatic Hydrocarbons (PAHs) and PCP using the SIM technique, the calibration standard concentrations are at 0.10, 0.20, 0.40, 0.80, and 1.6 ng/µL for each target analyte of interest and the associated DMCs. PCP concentrations are at 0.20, 0.40, 0.80, 1.6, and 3.2 ng/µL.
2. The Relative Response Factor (RRF), Mean RRF ($\overline{RRF}$), and Percent Relative Standard Deviation (%RSD) must be calculated for each target analyte and DMC accordingly.
3. The RRF for each target analyte and DMC in each ICAL standard must be ≥ Minimum RRF value in Table 34.
4. The %RSD of the ICAL RRF for each target analyte and DMC must be ≤ Maximum %RSD value in Table 34.

**NOTE:** The technical acceptance criteria specified in a "Request for Quote (RFQ) for Solicitation" of a Modified Analysis may impact some of the preceding evaluation criteria. A copy of this document should be present in the Complete SDG File (CSF), when applicable.

### D. Evaluation

1. Verify that the ICAL is performed at the specified frequency and sequence.
2. Verify that the correct concentrations of the target analytes and DMCs are used in each ICAL standard.

3. Verify that the RRF, $\overline{RRF}$, and %RSD for each target analyte and DMC are reported on Form 6A-OR. Recalculate the RRFs, $\overline{RRF}$s, and %RSDs for at least one target analyte and DMC associated with each internal standard, and verify that the recalculated values agree with the laboratory reported values on Form 6A-OR.
4. Verify that the RRF is ≥ Minimum RRF value in Table 34 for each target analyte and DMC.
5. Verify that the %RSD is ≤ Maximum %RSD value in Table 34 for each target analyte and DMC.

**NOTE:** For data obtained from the CLP, information regarding noncompliant ICAL can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the ICAL is not performed at the specified frequency and sequence, use professional judgment to qualify detects and non-detects in the associated samples as unusable (R).
2. If the ICAL is not performed at the specified concentrations, qualify detects in the associated samples as estimated (J) and non-detects in the associated samples as estimated (UJ).
3. If errors are detected in the calculations of the RRFs, $\overline{RRF}$s, or %RSDs, perform a more comprehensive recalculation.
4. If the RRF is < Minimum RRF value in Table 34 for any target analyte, use professional judgment to qualify detects in the associated samples as estimated high (J+) or unusable (R), and non-detects in the associated samples as unusable (R).
5. If the RRF is ≥ Minimum RRF value in Table 34 for any target analyte, detects and non-detects in the associated samples should not be qualified.
6. If the %RSD is > Maximum %RSD value in Table 34 for any target analyte, qualify detects in the associated samples as estimated (J). Use professional judgment to qualify non-detects in the associated samples.
7. If the %RSD is ≤ Maximum %RSD value in Table 34 for any target analyte, detects and non-detects in the associated samples should not be qualified.
8. No qualification of the data is necessary based on the DMC RRF, $\overline{RRF}$, and %RSD data alone. Use professional judgment to evaluate the DMC RRF, $\overline{RRF}$, and %RSD data in conjunction with the DMC recoveries to determine the need for data qualification.
9. Based on the project-specific Data Quality Objectives (DQOs), a more in-depth review may be necessary. The following guidelines are recommended:
    a. If the %RSD criteria of any target analytes are not met and the %RSD criteria are still not satisfied after eliminating either the high or the low-point of the ICAL:
        i. Qualify detects in the associated samples as estimated (J).
        ii. Use professional judgment to qualify non-detects in the associated samples.
    b. If the high-point of the ICAL curve is outside of the %RSD criteria (e.g., due to saturation):
        i. Qualify detects in the associated samples with analyte concentrations greater than the high-point concentration as estimated (J).
        ii. Detects in the associated samples with analyte concentrations within the calibration range should not be qualified.
        iii. Non-detects in the associated samples should not be qualified.

c. If the low-point of the ICAL curve is outside of the %RSD criteria:

i. Qualify detects in the associated samples with analyte concentrations in the non-linear range as estimated (J).

ii. Detects in the associated samples with analyte concentrations within the calibration range should not be qualified.

iii. For non-detects in the associated samples, use the lowest point of the linear portion of the ICAL curve to determine the new quantitation limit.

10. If the laboratory failed to provide adequate calibration information, notify the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data.

11. Annotate the potential effects on the reported data due to exceeding the ICAL criteria in the Data Review Narrative.

12. If the ICAL criteria are grossly exceeded, note this for EPA Regional CLP COR action.

**Table 34. RRF, %RSD, and %D Acceptance Criteria in Initial Calibration, ICV, and CCV for Semivolatile Analysis**

| Analyte | Minimum RRF | Maximum %RSD | ICV/Opening CCV Maximum %D[1] | Closing CCV Maximum %D |
|---|---|---|---|---|
| 1,4-Dioxane | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Benzaldehyde | 0.100 | 40.0 | ±40.0 | ±50.0 |
| Phenol | 0.080 | 20.0 | ±20.0 | ±25.0 |
| Bis(2-chloroethyl) ether | 0.100 | 20.0 | ±20.0 | ±25.0 |
| 2-Chlorophenol | 0.200 | 20.0 | ±20.0 | ±25.0 |
| 2-Methylphenol | 0.010 | 20.0 | ±20.0 | ±25.0 |
| 3-Methylphenol | 0.010 | 20.0 | ±20.0 | ±25.0 |
| 2,2'-Oxybis-(1-chloropropane) | 0.010 | 20.0 | ±25.0 | ±50.0 |
| Acetophenone | 0.060 | 20.0 | ±20.0 | ±25.0 |
| 4-Methylphenol | 0.010 | 20.0 | ±20.0 | ±25.0 |
| N-Nitroso-di-n-propylamine | 0.080 | 20.0 | ±25.0 | ±25.0 |
| Hexachloroethane | 0.100 | 20.0 | ±20.0 | ±25.0 |
| Nitrobenzene | 0.090 | 20.0 | ±20.0 | ±25.0 |
| Isophorone | 0.100 | 20.0 | ±20.0 | ±25.0 |
| 2-Nitrophenol | 0.060 | 20.0 | ±20.0 | ±25.0 |
| 2,4-Dimethylphenol | 0.050 | 20.0 | ±25.0 | ±50.0 |
| Bis(2-chloroethoxy) methane | 0.080 | 20.0 | ±20.0 | ±25.0 |
| 2,4-Dichlorophenol | 0.060 | 20.0 | ±20.0 | ±25.0 |
| Naphthalene | 0.200 | 20.0 | ±20.0 | ±25.0 |
| 4-Chloroaniline | 0.010 | 40.0 | ±40.0 | ±50.0 |

| Analyte | Minimum RRF | Maximum %RSD | ICV/Opening CCV Maximum %D[1] | Closing CCV Maximum %D |
|---|---|---|---|---|
| Hexachlorobutadiene | 0.040 | 20.0 | ±20.0 | ±25.0 |
| Caprolactam | 0.010 | 40.0 | ±30.0 | ±50.0 |
| 4-Chloro-3-methylphenol | 0.040 | 20.0 | ±20.0 | ±25.0 |
| 2-Methylnaphthalene | 0.100 | 20.0 | ±20.0 | ±25.0 |
| Hexachlorocyclopentadiene | 0.010 | 40.0 | ±40.0 | ±50.0 |
| 2,4,6-Trichlorophenol | 0.090 | 20.0 | ±20.0 | ±25.0 |
| 2,4,5-Trichlorophenol | 0.100 | 20.0 | ±20.0 | ±25.0 |
| 1,1'-Biphenyl | 0.200 | 20.0 | ±20.0 | ±25.0 |
| 2-Chloronaphthalene | 0.300 | 20.0 | ±20.0 | ±25.0 |
| 2-Nitroaniline | 0.060 | 20.0 | ±25.0 | ±25.0 |
| Dimethylphthalate | 0.300 | 20.0 | ±20.0 | ±25.0 |
| 2,6-Dinitrotoluene | 0.080 | 20.0 | ±20.0 | ±25.0 |
| Acenaphthylene | 0.400 | 20.0 | ±20.0 | ±25.0 |
| 3-Nitroaniline | 0.010 | 20.0 | ±25.0 | ±50.0 |
| Acenaphthene | 0.200 | 20.0 | ±20.0 | ±25.0 |
| 2,4-Dinitrophenol | 0.010 | 40.0 | ±50.0 | ±50.0 |
| 4-Nitrophenol | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Dibenzofuran | 0.300 | 20.0 | ±20.0 | ±25.0 |
| 2,4-Dinitrotoluene | 0.070 | 20.0 | ±20.0 | ±25.0 |
| Diethylphthalate | 0.300 | 20.0 | ±20.0 | ±25.0 |
| 1,2,4,5-Tetrachlorobenzene | 0.100 | 20.0 | ±20.0 | ±25.0 |
| 4-Chlorophenyl-phenylether | 0.100 | 20.0 | ±20.0 | ±25.0 |
| Fluorene | 0.200 | 20.0 | ±20.0 | ±25.0 |
| 4-Nitroaniline | 0.010 | 40.0 | ±40.0 | ±50.0 |
| 4,6-Dinitro-2-methylphenol | 0.010 | 40.0 | ±30.0 | ±50.0 |
| 4-Bromophenyl-phenyl ether | 0.070 | 20.0 | ±20.0 | ±25.0 |
| N-Nitrosodiphenylamine | 0.100 | 20.0 | ±20.0 | ±25.0 |
| Hexachlorobenzene | 0.050 | 20.0 | ±20.0 | ±25.0 |
| Atrazine | 0.010 | 40.0 | ±25.0 | ±50.0 |
| Pentachlorophenol | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Phenanthrene | 0.200 | 20.0 | ±20.0 | ±25.0 |
| Anthracene | 0.200 | 20.0 | ±20.0 | ±25.0 |

| Analyte | Minimum RRF | Maximum %RSD | ICV/Opening CCV Maximum %D[1] | Closing CCV Maximum %D |
|---|---|---|---|---|
| Carbazole | 0.050 | 20.0 | ±20.0 | ±25.0 |
| Di-n-butylphthalate | 0.500 | 20.0 | ±20.0 | ±25.0 |
| Fluoranthene | 0.100 | 20.0 | ±20.0 | ±25.0 |
| Pyrene | 0.400 | 20.0 | ±25.0 | ±50.0 |
| Butylbenzylphthalate | 0.100 | 20.0 | ±25.0 | ±50.0 |
| 3,3'-Dichlorobenzidine | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Benzo(a)anthracene | 0.300 | 20.0 | ±20.0 | ±25.0 |
| Chrysene | 0.200 | 20.0 | ±20.0 | ±50.0 |
| Bis(2-ethylhexyl) phthalate | 0.200 | 20.0 | ±25.0 | ±50.0 |
| Di-n-octylphthalate | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Benzo(b)fluoranthene | 0.010 | 20.0 | ±25.0 | ±50.0 |
| Benzo(k)fluoranthene | 0.010 | 20.0 | ±25.0 | ±50.0 |
| Benzo(a)pyrene | 0.010 | 20.0 | ±20.0 | ±50.0 |
| Indeno(1,2,3-cd)pyrene | 0.010 | 20.0 | ±25.0 | ±50.0 |
| Dibenzo(a,h)anthracene | 0.010 | 20.0 | ±25.0 | ±50.0 |
| Benzo(g,h,i)perylene | 0.010 | 20.0 | ±30.0 | ±50.0 |
| 2,3,4,6-Tetrachlorophenol | 0.040 | 20.0 | ±20.0 | ±50.0 |
| **Selective Ion Monitoring** | | | | |
| Naphthalene | 0.600 | 20.0 | ±25.0 | ±25.0 |
| 2-Methylnaphthalene | 0.300 | 20.0 | ±20.0 | ±25.0 |
| Acenaphthylene | 0.900 | 20.0 | ±20.0 | ±25.0 |
| Acenaphthene | 0.500 | 20.0 | ±20.0 | ±25.0 |
| Fluorene | 0.700 | 20.0 | ±25.0 | ±50.0 |
| Phenanthrene | 0.300 | 20.0 | ±25.0 | ±50.0 |
| Anthracene | 0.400 | 20.0 | ±25.0 | ±50.0 |
| Fluoranthene | 0.400 | 20.0 | ±25.0 | ±50.0 |
| Pyrene | 0.500 | 20.0 | ±30.0 | ±50.0 |
| Benzo(a)anthracene | 0.400 | 20.0 | ±25.0 | ±50.0 |
| Chrysene | 0.400 | 20.0 | ±25.0 | ±50.0 |
| Benzo(b)fluoranthene | 0.100 | 20.0 | ±30.0 | ±50.0 |
| Benzo(k)fluoranthene | 0.100 | 20.0 | ±30.0 | ±50.0 |
| Benzo(a)pyrene | 0.100 | 20.0 | ±25.0 | ±50.0 |

| Analyte | Minimum RRF | Maximum %RSD | ICV/Opening CCV Maximum %D[1] | Closing CCV Maximum %D |
|---|---|---|---|---|
| Indeno(1,2,3-cd)pyrene | 0.100 | 20.0 | ±40.0 | ±50.0 |
| Dibenzo(a,h)anthracene | 0.010 | 25.0 | ±40.0 | ±50.0 |
| Benzo(g,h,i)perylene | 0.020 | 25.0 | ±40.0 | ±50.0 |
| Pentachlorophenol | 0.010 | 40.0 | ±50.0 | ±50.0 |
| **Deuterated Monitoring Compounds** | | | | |
| 1,4-Dioxane-$d_8$ | 0.010 | 20.0 | ±25.0 | ±50.0 |
| Phenol-$d_5$ | 0.010 | 20.0 | ±25.0 | ±25.0 |
| Bis-(2-chloroethyl) ether-$d_8$ | 0.100 | 20.0 | ±20.0 | ±25.0 |
| 2-Chlorophenol-$d_4$ | 0.200 | 20.0 | ±20.0 | ±25.0 |
| 4-Methylphenol-$d_8$ | 0.010 | 20.0 | ±20.0 | ±25.0 |
| 4-Chloroaniline-$d_4$ | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Nitrobenzene-$d_5$ | 0.050 | 20.0 | ±20.0 | ±25.0 |
| 2-Nitrophenol-$d_4$ | 0.050 | 20.0 | ±20.0 | ±25.0 |
| 2,4-Dichlorophenol-$d_3$ | 0.060 | 20.0 | ±20.0 | ±25.0 |
| Dimethylphthalate-$d_6$ | 0.300 | 20.0 | ±20.0 | ±25.0 |
| Acenaphthylene-$d_8$ | 0.400 | 20.0 | ±20.0 | ±25.0 |
| 4-Nitrophenol-$d_4$ | 0.010 | 40.0 | ±40.0 | ±50.0 |
| Fluorene-$d_{10}$ | 0.100 | 20.0 | ±20.0 | ±25.0 |
| 4,6-Dinitro-2-methylphenol-$d_2$ | 0.010 | 40.0 | ±30.0 | ±50.0 |
| Anthracene-$d_{10}$ | 0.300 | 20.0 | ±20.0 | ±25.0 |
| Pyrene-$d_{10}$ | 0.300 | 20.0 | ±25.0 | ±50.0 |
| Benzo(a)pyrene-$d_{12}$ | 0.010 | 20.0 | ±20.0 | ±50.0 |
| Fluoranthene-$d_{10}$ (SIM) | 0.400 | 20.0 | ±25.0 | ±50.0 |
| 2-Methylnaphthalene-$d_{10}$ (SIM) | 0.300 | 20.0 | ±20.0 | ±25.0 |

[1] If a closing CCV is acting as an opening CCV, all target analytes must meet the requirements for an opening CCV.

**Table 35. Initial Calibration Actions for Semivolatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| Initial Calibration not performed at the specified frequency and sequence | Use professional judgment<br>R | Use professional judgment<br>R |
| Initial Calibration not performed at the specified concentrations | J | UJ |
| RRF < Minimum RRF in Table 34 for target analyte | Use professional judgment<br>J+ or R | R |
| RRF ≥ Minimum RRF in Table 34 for target analyte | No qualification | No qualification |
| %RSD > Maximum %RSD in Table 34 for target analyte | J | Use professional judgment |
| %RSD ≤ Maximum %RSD in Table 34 for target analyte | No qualification | No qualification |

## IV. Initial Calibration Verification

### A. Review Items

Form 7A-OR, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/SVOA, Sections 7.2.2.2 and 9.4)

### B. Objective

The objective is to ensure that the instrument is calibrated accurately to produce acceptable qualitative and quantitative data throughout each analytical sequence by the use of a second-source check standard.

### C. Criteria

1. The accuracy of the calibration for each GC/MS system used for analysis must be verified at the frequency of one ICV standard analysis per initial calibration analytical sequence. The ICV is analyzed after the last ICAL standard analysis and prior to a blank, sample, or an applicable CCV analysis.
2. The ICV standard must contain all required target analytes, from an alternate source or a different lot than that used for the ICAL standards and DMCs, at or near the mid-point concentration (CS3) of the ICAL.
3. For an ICV, the RRFs for each target analyte and DMC must be ≥ the Minimum RRF values in Table 34.
4. The Percent Difference (%D) between the ICAL $\overline{RRF}$ and the ICV RRF must be within the ICV/Opening CCV Maximum %D limits in Table 34 for each target analyte and DMC.

### D. Evaluation

1. Verify that the ICV standard is analyzed at the specified frequency and sequence, and that it is associated with the correct ICAL. Also verify that the correct ICAL is represented in the data package and meets SOW criteria, as described in Section III.
2. Verify that the concentrations of the target analytes and the DMCs in the ICV are at or near the mid-point standard CS3 from the ICAL.
3. Verify that the RRF and %D for each target analyte and DMC are reported on Form 7A-OR. Recalculate the RRF and %D for at least one target analyte and DMC associated with each internal standard, and verify that the recalculated values agree with the laboratory reported values on Form 7A-OR.
4. Verify that the RRFs for each target analyte and DMC in the ICV are ≥ Minimum RRF values in Table 34.
5. Verify that the %Ds are within the ICV/Opening CCV Maximum %D limits in Table 34 for each target analyte and DMC.

**NOTE:** For data obtained from the CLP, information regarding the noncompliant ICV can be obtained from the NFG reports and may be used as part of the evaluation process.

### E. Action

1. If the ICV is not performed at the specified frequency, use professional judgment to qualify detects and non-detects. Contact the EPA Regional CLP COR to request that the laboratory repeat the analysis, if holding times have not expired and there are remaining sample vials. If reanalysis is not possible, carefully evaluate all other available information, including the quality of analyte peak shapes and mass spectral matches, the stability of internal standard Retention Times (RTs) and areas in each affected sample, and compare to the most recent calibration performed on the same instrument under the same conditions. Using this information and professional judgment, the reviewer may be able to justify unqualified acceptance of qualitative results.

2. If the ICV is not performed at the specified concentration, use professional judgment to qualify detects and non-detects. Special consideration should be given to sample results at the opposite extreme of the calibration range if this defect is noted.
3. If errors are detected in the calculations of either the RRF or the %D, perform a more comprehensive recalculation.
4. If the RRF in an ICV is < Minimum RRF value in Table 34 for any target analyte, carefully evaluate the qualitative data associated with positively identified analytes and use professional judgment to qualify detects as estimated (J) or unusable (R), and qualify non-detects as unusable (R).
    a. Take special note of any extreme deviation in the RRF and evaluate RT data, peak shapes, and areas of the target analytes and associated internal standards for inconsistencies that may indicate a chromatographic co-elution. If this is suspected, the contaminant may also be present in samples and blanks. Also review the documentation of the preparation of the ICV standard. Use professional judgment to qualify affected data appropriately.
5. If the RRF in an ICV is ≥ Minimum RRF value in Table 34 for any target analyte, detects and non-detects should not be qualified.
6. If the %D in an ICV is outside the ICV/Opening CCV Maximum %D limits in Table 34 for any target analyte, qualify detects as estimated (J) and non-detects as estimated (UJ).
7. If the %D in an ICV is within the inclusive range of the ICV/Opening CCV Maximum %D limits in Table 34 for any target analyte, detects and non-detects should not be qualified.
8. No qualification of the data is necessary based on the DMC RRF and/or %D alone. Use professional judgment to evaluate the DMC RRF and %D data in conjunction with the DMC recoveries to determine the need for data qualification.
9. If the laboratory has failed to provide adequate calibration information, contact the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data. Refer to E.1, above, for additional steps.
10. Note the potential effects on the data due to ICV criteria exceedance in the Data Review Narrative.
11. If the ICV criteria are grossly exceeded, note this for EPA Regional CLP COR action.

**Table 36. ICV Actions for Semivolatile Analysis**

| Criteria for ICV | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| ICV not performed at the specified frequency and sequence | Use professional judgment | Use professional judgment |
| ICV not performed at the specified concentration | Use professional judgment | Use professional judgment |
| RRF < Minimum RRF in Table 34 for target analyte | Use professional judgment<br>J or R | R |
| RRF ≥ Minimum RRF in Table 34 for target analyte | No qualification | No qualification |
| %D outside the ICV/Opening CCV Maximum %D limits in Table 34 for target analyte | J | UJ |
| %D within the inclusive ICV/Opening CCV Maximum %D limits in Table 34 for target analyte | No qualification | No qualification |

## V. Continuing Calibration Verification

### A. Review Items

Form 7A-OR, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/SVOA, Sections 7.2.2.1 and 9.5)

### B. Objective

The objective is to ensure that the instrument continues to meet the sensitivity and linearity criteria to produce acceptable qualitative and quantitative data throughout each analytical sequence.

### C. Criteria

1. The calibration for each GC/MS system used for analysis must be verified at the beginning and end of every 12-hour period of operation. The 12-hour period begins with the injection of DFTPP, followed by the injection of the opening CCV solution. After the injection of all samples and required blanks, and before the end of the 12-hour period, injection of the closing CCV is required. The closing CCV used to bracket the end of a 12-hour analytical sequence may be used as the opening CCV for a new 12-hour analytical sequence, provided that all technical acceptance criteria are met for an opening CCV.
2. The CCV standards must contain all required target analytes and DMCs at or near the mid-point concentration (CS3) of the ICAL.
3. For an opening or a closing CCV, the RRFs for the target analytes and DMCs must be ≥ the Minimum RRF values in Table 34.
4. The %D between the ICAL $\overline{RRF}$ and the opening CCV RRF must be within the ICV/Opening CCV Maximum %D limits in Table 34 for each target analyte and DMC.
5. For a closing CCV, the %D between the ICAL $\overline{RRF}$ and the CCV RRF must be within the Closing CCV Maximum %D limits in Table 34 for each target analyte and DMC.

### D. Evaluation

1. Verify that the CCV is analyzed at the specified frequency (an opening and closing CCV must be analyzed within a 12-hour period) and sequence, and that it is associated with the correct ICAL. Also verify that the correct ICAL is represented in the data package and meets SOW criteria, as described in Section III.
2. Verify that the mid-point standard CS3 from the ICAL is used as an opening or a closing CCV.
3. Verify that the RRF and %D for each target analyte and DMC are reported on Form 7A-OR. Recalculate the RRF and %D for at least one target analyte and DMC associated with each internal standard, and verify that the recalculated values agree with the laboratory reported values on Form 7A-OR.
4. For an opening or a closing CCV, verify that the RRFs for each target analyte and DMC are ≥ Minimum RRF values in Table 34.
5. For an opening CCV, verify that the %Ds are within the ICV/Opening CCV Maximum %D limits in Table 34 for each target analyte and DMC.
6. For a closing CCV, verify that the %Ds are within the Closing CCV Maximum %D limits in Table 34 for each target analyte and DMC.

**NOTE:** For data obtained from the CLP, information regarding the noncompliant CCV can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the CCV is not performed at the specified frequency, qualify detects and non-detects as unusable (R). Contact the EPA Regional CLP COR to request that the laboratory repeat the analysis, if holding times have not expired and there are remaining sample vials. If reanalysis is not possible, carefully evaluate all other available information, including the quality of analyte peak shapes and mass spectral matches, the stability of internal standard RTs and areas in each affected sample, and compare to the most recent calibration performed on the same instrument under the same conditions. Using this information and professional judgment, the reviewer may be able to justify unqualified acceptance of qualitative results and qualification of all quantitative results as estimated (J). Otherwise, qualify all detects and non-detects as unusable (R).
2. If the CCV is not performed at the specified concentration, use professional judgment to qualify detects and non-detects. Special consideration should be given to sample results at the opposite extreme of the calibration range if this defect is noted.
3. If errors are detected in the calculations of either the RRF or the %D, perform a more comprehensive recalculation.
4. For an opening or a closing CCV, if the RRF is < Minimum RRF value in Table 34 for any target analyte, carefully evaluate the qualitative data associated with positively identified analytes and use professional judgment to qualify detects as estimated (J) or unusable (R), and qualify non-detects as unusable (R).
    a. Take special note of any extreme deviation in the RRF and evaluate RT data, peak shapes, and areas of the target analytes and associated internal standards for inconsistencies that may indicate a chromatographic co-elution. If this is suspected, the contaminant may also be present in samples and blanks. Also review the documentation of the preparation of the CCV standard. Use professional judgment to qualify affected data appropriately.
5. For opening or a closing CCV, if the RRF is ≥ Minimum RRF value in Table 34 for any target analyte, detects and non-detects should not be qualified.
6. For an opening CCV, if the %D is outside the ICV/Opening CCV Maximum %D limits in Table 34 for any target analyte, qualify detects as estimated (J) and non-detects as estimated (UJ).
7. For a closing CCV, if the %D is outside the Closing CCV Maximum %D limits in Table 34 for any target analyte, qualify detects as estimated (J) and non-detects as estimated (UJ).
8. For an opening CCV, if the %D is within the inclusive range of the ICV/Opening CCV Maximum %D limits in Table 34 for any target analyte, detects and non-detects should not be qualified.
9. For closing CCV, if the %D is within the inclusive range of the Closing CCV Maximum %D limits in Table 34 for any target analyte, detects and non-detects should not be qualified.
10. No qualification of the data is necessary based on the DMC RRF and/or %D alone. Use professional judgment to evaluate the DMC RRF and %D data in conjunction with the DMC recoveries to determine the need for data qualification.
11. If the laboratory has failed to provide adequate calibration information, contact the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data. Refer to E.1, above, for additional steps.
12. Note the potential effects on the data due to CCV criteria exceedance in the Data Review Narrative.
13. If the CCV criteria are grossly exceeded, note this for EPA Regional CLP COR action.

**Table 37. CCV Actions for Semivolatile Analysis**

| Criteria for Opening CCV | Criteria for Closing CCV | Action | |
|---|---|---|---|
| | | **Detect** | **Non-detect** |
| CCV not performed at the specified frequency and sequence | CCV not performed at the specified frequency | Use professional judgment J or R | Use professional judgment UJ or R |
| CCV not performed at the specified concentration | CCV not performed at the specified concentration | Use professional judgment | Use professional judgment |
| RRF < Minimum RRF in Table 34 for target analyte | RRF < Minimum RRF in Table 34 for target analyte | Use professional judgment J or R | R |
| RRF ≥ Minimum RRF in Table 34 for target analyte | RRF ≥ Minimum RRF in Table 34 for target analyte | No qualification | No qualification |
| %D outside the ICV/Opening CCV Maximum %D limits in Table 34 for target analyte | %D outside the Closing CCV Maximum %D limits in Table 34 for target analyte | J | UJ |
| %D within the inclusive ICV/Opening CCV Maximum %D limits in Table 34 for target analyte | %D within the inclusive Closing CCV Maximum %D limits in Table 34 for target analyte | No qualification | No qualification |

# VI. Blanks

## A. Review Items

Form 1A-OR, Form 1B-OR, Form 4-OR, chromatograms, and quantitation reports. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/SVOA, Section 12.1)

## B. Objective

The objective of a blank analysis results assessment is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities.

## C. Criteria

The criteria for evaluation of blanks should apply to any blank associated with the samples (e.g., method blanks, field blanks, etc.). If problems with any blank exist, all associated data must be carefully evaluated to determine whether or not there is an inherent variability in the data or if the problem is an isolated occurrence not affecting other data. Whereas previous guidelines recommended special criteria to discount possible false positives of common semivolatile laboratory contaminants (phthalate esters), recent CLP data have shown less than a 1% probability that levels of these contaminants from a contaminating source will exceed the Contract Required Quantitation Limit (CRQL).

1. Method blank analyses must be performed at the specified frequency and sequence. A method blank must be extracted per matrix each time samples are extracted. The number of samples extracted with each method blank shall not exceed 20 field samples. The method blank must be extracted by the same procedure used to extract samples and analyzed on each GC/MS system under the same conditions used to analyze associated samples.
2. The method blank, like any other sample in the SDG, must meet the technical acceptance criteria for sample analysis.
3. The TCLP/SPLP Leachate Extraction Blank (LEB) must be prepared and analyzed at the specified frequency and sequence.
4. The concentration of a target analyte in any blank must not exceed its CRQL. Tentatively Identified Compound (TIC) concentration in any blanks must be < 5.0 ug/L for water (0.0050 mg/L for TCLP leachate) or 170 ug/kg for soil/sediment matrices.

## D. Evaluation

1. Verify that method blanks are extracted at the specified frequency and analyzed at the required sequence. The Method Blank Summary (Form 4-OR) may be used to identify the samples associated with each method blank.
2. Verify that applicable TCLP/SPLP LEBs are analyzed at the specified frequency and sequence. The Method Blank Summary (Form 4-OR) may be used to identify the samples associated with each TCLP/SPLP LEB.
3. Data concerning the field blanks are not evaluated as part of the Contract Compliance Screening (CCS) process. Evaluations on field or trip blanks should be similar to the method blanks.
4. Review the results of all associated blanks on the forms and raw data (chromatograms and quantitation reports) to evaluate the presence of target analytes and non-target compounds in the blanks.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant blank can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the appropriate blanks are not extracted at the correct frequency and/or analyzed at the correct sequence, use professional judgment to determine if the associated sample data should be qualified. Obtain additional information from the laboratory, if necessary. Record the situation in the Data Review Narrative and note it for EPA Regional CLP COR action.
2. Action regarding unsuitable blank results depends on the circumstances and origin of the blank. Verify that the data qualification decisions based on field quality control (QC) are supported by the project Quality Assurance Project Plan (QAPP) or EPA Regional Standard Operating Procedure (SOP). At a minimum, contamination found in field blanks should be documented in the Data Review Narrative. In instances where more than one blank is associated with a given sample, qualification should be based upon a comparison with the associated blank having the highest concentration of a contaminant. Do not correct the results by subtracting any blank value.
3. For any blank (including method blank), if a target analyte is detected, but it is not detected in the sample, non-detects should not be qualified.
4. For any method blank reported with results < CRQLs, report sample results that are < CRQLs at the CRQLs and qualify as non-detect (U). For any method blank reported with results that are < CRQLs, use professional judgment to qualify sample results that are ≥ CRQLs. Positive results in samples, especially those near but above the CRQL, may be biased high by low level contamination in the method blanks, and should be considered as estimated (J+).
5. For any method blank reported with results ≥ CRQLs, report sample results that are < CRQLs at the CRQLs and qualify as non-detect (U). For any method blank reported with results ≥ CRQLs, report at sample results that are ≥ CRQLs but < Blank Results at sample results and qualify as non-detect (U) or unusable (R). Use professional judgment to qualify sample results that are ≥ CRQLs and ≥ Blank Results.
6. For TCLP/SPLP LEBs and field blanks, sample result qualifications listed in Table 38 should apply if supported by the project QAPP.
7. If gross contamination exists with blank results that are > ICAL CS5 concentrations, qualify detects as unusable (R). If the contamination is suspected of having an effect on the sample results, note it for EPA Regional CLP COR action.
8. For any blank (including method blank) reported with TICs (non-target compounds) concentrations that are > 5.0 ug/L for water (0.0050 mg/L for TCLP leachate) and 170 ug/kg for soil/sediment matrices, use professional judgment to qualify sample results.
9. There may be instances where little or no contamination is present in the associated blanks, but qualification of the sample is deemed necessary. If it is determined that the contamination is from a source other than the sample, the data should be qualified, or in the case of field QC, should at least be documented in the Data Review Narrative. Contamination introduced through dilution water is one example. Although it is not always possible to determine, instances of this occurring can be detected when contaminants are found in the diluted sample result, but are absent in the undiluted sample.

**Table 38. Blank and TCLP/SPLP LEB Actions for Semivolatile Analysis**

| Blank Type | Blank Result | Sample Result | Action |
|---|---|---|---|
| Method, TCLP/SPLP LEB, Field | Detect | Non-detect | No qualification |
| | < CRQL | < CRQL | Report at CRQL and qualify as non-detect (U) |
| | | ≥ CRQL | Use professional judgment |
| | ≥ CRQL | < CRQL | Report at CRQL and qualify as non-detect (U) |
| | | ≥ CRQL but < Blank Result | Report at sample result and qualify as non-detect (U) or as unusable (R) |
| | | ≥ CRQL and ≥ Blank Result | Use professional judgment |
| | Gross contamination | Detect | Report at sample result and qualify as unusable (R) |
| | TIC > 5.0 ug/L (water) or 0.0050 mg/L (TCLP leachate)<br>or<br>TIC > 170 ug/kg (soil/sediment) | Detect | Use professional judgment |

## VII. Deuterated Monitoring Compound

### A. Review Items

Form 2A-OR, Form 2B-OR quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/SVOA, Sections 7.2.2.5 and 11.2.4)

### B. Objective

The objective is to evaluate DMC percent recovery (%R) to ensure that the analytical method is efficient.

### C. Criteria

1. All samples and blanks are spiked with DMCs listed in Table 39, prior to the sample extraction procedure, to measure DMC %R.
2. The %R for each DMC shall be calculated correctly according to the method.
3. The %R for each DMC in samples and blanks must be within the limits in Table 39.

**Table 39. Semivolatile DMC Recovery Limits**

| DMC | %R For Water Sample | %R For Soil/Sediment Sample |
|---|---|---|
| 1,4-Dioxane-$d_8$ | 40 - 110 | 40 - 110 |
| Phenol-$d_5$ | 10 - 130 | 10 - 130 |
| Bis(2-chloroethyl) ether-$d_8$ | 25 - 120 | 10 - 150 |
| 2-Chlorophenol-$d_4$ | 20 - 130 | 15 - 120 |
| 4-Methylphenol-$d_8$ | 25 - 125 | 10 - 140 |
| 4-Chloroaniline-$d_4$ | 1 - 146* | 1 - 145* |
| Nitrobenzene-$d_5$ | 20 - 125 | 10 - 135 |
| 2-Nitrophenol-$d_4$ | 20 - 130 | 10 - 120 |
| 2,4-Dichlorophenol-$d_3$ | 20 - 120 | 10 - 140 |
| Dimethylphthalate-$d_6$ | 25 - 130 | 10 - 145 |
| Acenaphthylene-$d_8$ | 10 - 130 | 15 - 120 |
| 4-Nitrophenol-$d_4$ | 10 - 150 | 10 - 150 |
| Fluorene-$d_{10}$ | 25 - 125 | 20 - 140 |
| 4,6-Dinitro-2-methylphenol-$d_2$ | 10 - 130 | 10 - 130 |
| Anthracene-$d_{10}$ | 25 - 130 | 10 - 150 |
| Pyrene-$d_{10}$ | 15 - 130 | 10 - 130 |
| Benzo(a)pyrene-$d_{12}$ | 20 - 130 | 10 - 140 |
| Fluoranthene-$d_{10}$ (SIM) | 30 - 130 | 30 - 130 |
| 2-Methylnaphthalene-$d_{10}$ (SIM) | 30 - 130 | 20 - 140 |

* Limits are advisory.

## D. Evaluation

1. Check the raw data (e.g., chromatograms and quantitation reports) to verify the recoveries on the Deuterated Monitoring Compound Recovery Form 2A-OR and Form 2B-OR.
2. Check for any calculation or transcription errors. Verify that the DMC recoveries were calculated correctly using the equation in the method and that the recalculated values agree with the laboratory reported values on Form 2A-OR and Form 2B-OR.
3. Whenever there are two or more analyses for a particular sample, use professional judgment to determine which analysis has the most acceptable data to report. Considerations include, but are not limited to:
   a. DMC recovery (marginal versus gross deviation).
   b. Technical holding times.
   c. Comparison of the target analyte results reported in each sample analysis.
   d. Other QC information, such as performance of internal standards.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant DMC %R can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If a DMC was not added to the samples and blanks or the concentrations of DMCs in the samples and blanks are not as specified, use professional judgment to qualify detects and non-detects. The EPA Regional CLP COR should be contacted to arrange for reanalysis, if possible.
2. If errors are detected in the calculations of %R, perform a more comprehensive recalculation. It may be necessary to have the laboratory resubmit the data after making corrections.
3. If any DMC %R is outside the limits (Table 39) in samples, qualify the associated target analytes listed in Table 41 and SIM target analytes in Table 42 considering the existence of interference in the raw data. Considerations include, but are not limited to:
   a. If the DMC %R in the undiluted sample analysis is < 10% (excluding DMCs with 10% as a lower acceptance limits), qualify detects as estimated low (J-) and non-detects as unusable (R).
   b. If the DMC %R in the undiluted sample analysis is ≥ 10% (excluding DMCs with 10% as a lower acceptance limits) and < lower acceptance limit, qualify detects as estimated low (J-) and non-detects as estimated (UJ).
   c. If the DMC %R in the diluted sample analysis is < lower acceptance limit, use professional judgment to qualify detects and non-detects.
   d. If the DMC %R is ≥ lower acceptance limit and ≤ upper acceptance limit, detects and non-detects should not be qualified.
   e. If the DMC %R is > upper acceptance limit, qualify detects as estimated high (J+). Non-detects should not be qualified.
4. If any DMC %R is outside the limits (Table 39) in a blank, special consideration should be taken to determine the validity of the associated sample data. The basic concern is whether the blank problems represent an isolated problem with the blank alone, or whether there is a fundamental problem with the analytical process.

   For example, if one or more samples in the analytical sequence show acceptable DMC %Rs, the blank problem may be considered as an isolated occurrence. However, even if this judgment allows some use of the affected data, note analytical problems for EPA Regional CLP COR action.

**Table 40. DMC Actions for Semivolatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| %R < 10% (excluding DMCs with 10% as a lower acceptance limit, undiluted sample analysis) | J- | R |
| 10% ≤ %R (excluding DMCs with 10% as a lower acceptance limit, undiluted sample analysis) < Lower Acceptance Limit | J- | UJ |
| %R < Lower Acceptance Limit (diluted sample analysis) | Use professional judgment | Use professional judgment |
| Lower Acceptance limit ≤ %R ≤ Upper Acceptance Limit | No qualification | No qualification |
| %R > Upper Acceptance Limit | J+ | No qualification |

**Table 41. Semivolatile DMCs and the Associated Target Analytes**

| **1,4-Dioxane-$d_8$ (DMC-1)** | **Phenol-$d_5$ (DMC-2)** | **Bis(2-Chloroethyl) ether-$d_8$ (DMC-3)** |
|---|---|---|
| 1,4-Dioxane | Benzaldehyde<br>Phenol | Bis(2-chloroethyl) ether<br>2,2'-Oxybis(1-chloropropane)<br>Bis(2-chloroethoxy) methane |
| **2-Chlorophenol-$d_4$ (DMC-4)** | **4-Methylphenol-$d_8$ (DMC-5)** | **4-Chloroaniline-$d_4$ (DMC-6)** |
| 2-Chlorophenol | 2-Methylphenol<br>3-Methylphenol<br>4-Methylphenol<br>2,4-Dimethylphenol | 4-Chloroaniline |
| **Nitrobenzene-$d_5$ (DMC-7)** | **2-Nitrophenol-$d_4$ (DMC-8)** | **2,4-Dichlorophenol-$d_3$ (DMC-9)** |
| Acetophenone<br>N-Nitroso-di-n-propylamine<br>Hexachloroethane<br>Hexachlorocyclopentadiene<br>Nitrobenzene<br>2,6-Dinitrotoluene<br>2,4-Dinitrotoluene<br>N-Nitrosodiphenylamine<br>3,3'-Dichlorobenzidine | Isophorone<br>2-Nitrophenol | 2,4-Dichlorophenol<br>Hexachlorobutadiene<br>4-Chloro-3-methylphenol<br>2,4,6-Trichlorophenol<br>2,4,5-Trichlorophenol<br>1,2,4,5-Tetrachlorobenzene<br>*Pentachlorophenol<br>2,3,4,6-Tetrachlorophenol |

| **Dimethylphthalate-$d_6$ (DMC-10)** | **Acenaphthylene-$d_8$ (DMC-11)** | **4-Nitrophenol-$d_4$ (DMC-12)** |
|---|---|---|
| Caprolactam<br>1,1'-Biphenyl<br>Dimethylphthalate<br>Diethylphthalate<br>Di-n-butylphthalate<br>Butylbenzylphthalate<br>Bis(2-ethylhexyl) phthalate<br>Di-n-octylphthalate | *Naphthalene<br>*2-Methylnaphthalene<br>2-Chloronaphthalene<br>*Acenaphthylene<br>*Acenaphthene | 2-Nitroaniline<br>3-Nitroaniline<br>2,4-Dinitrophenol<br>4-Nitrophenol<br>4-Nitroaniline |
| **Fluorene-$d_{10}$ (DMC-13)** | **4,6-Dinitro-2-methylphenol-$d_2$ (DMC-14)** | **Anthracene-$d_{10}$ (DMC-15)** |
| Dibenzofuran<br>*Fluorene<br>4-Chlorophenyl-phenylether<br>4-Bromophenyl-phenylether<br>Carbazole | 4,6-Dinitro-2-methylphenol | Hexachlorobenzene<br>Atrazine<br>*Phenanthrene<br>*Anthracene |
| **Pyrene-$d_{10}$ (DMC-16)** | **Benzo(a)pyrene-$d_{12}$ (DMC-17)** | |
| *Fluoranthene<br>*Pyrene<br>*Benzo(a)anthracene<br>*Chrysene | *Benzo(b)fluoranthene<br>*Benzo(k)fluoranthene<br>*Benzo(a)pyrene<br>*Indeno(1,2,3-cd)pyrene<br>*Dibenzo(a,h)anthracene<br>*Benzo(g,h,i)perylene | |

* Included in optional Target Analyte List (TAL) of PAHs and PCP only.

**Table 42. Semivolatile SIM DMCs and the Associated Target Analytes**

| **Fluoranthene-$d_{10}$ (DMC-1)** | **2-Methylnaphthalene-$d_{10}$ (DMC-2)** |
|---|---|
| Fluoranthene | Naphthalene |
| Pyrene | 2-Methylnaphthalene |
| Benzo(a)anthracene | Acenaphthylene |
| Chrysene | Acenaphthene |
| Benzo(b)fluoranthene | Fluorene |
| Benzo(k)fluoranthene | Pentachlorophenol |
| Benzo(a)pyrene | Phenanthrene |
| Indeno(1,2,3-cd)pyrene | Anthracene |
| Dibenzo(a,h)anthracene | |
| Benzo(g,h,i)perylene | |

## VIII. Matrix Spike/Matrix Spike Duplicate

### A. Review Items

SDG Cover Page, Form 3A-OR, chromatograms, and quantitation reports. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/SVOA, Sections 7.2.2.6 and 12.2)

### B. Objective

The objective of the Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analysis is to evaluate the effect of each sample matrix on the sample preparation procedures and the measurement methodology.

### C. Criteria

1. If requested, MS/MSD samples shall be prepared and analyzed at the specified frequency. One pair of MS/MSD samples should be analyzed per matrix or per SDG.

**NOTE:** Data for MS and MSDs will not be present unless requested by the EPA Region.

2. Samples identified as field blanks or Performance Evaluation (PE) samples cannot be used for spiked sample analysis.
3. The MS/MSD %R and the Relative Percent Difference (RPD) between MS and MSD results should be calculated according to the method.
4. The MS/MSD %R and RPD shall be within the acceptance limits in Table 43.

### D. Evaluation

1. Verify that requested MS/MSD samples were analyzed at the required frequency.
2. Verify that a field blank or PE sample was not used for MS/MSD analysis.
3. Verify that the recalculated MS/MSD %R and RPD values agree with the laboratory reported values on Form 3A-OR.
4. Inspect the MS/MSD %R and RPD on Form 3A-OR and verify that they are within the limits listed in Table 43.

**NOTE:** For data obtained from the CLP, the preceding criteria, including the requested MS/MSD spiking analytes and spiking levels specified in Exhibit D – Semivolatile Organic Compounds Analysis, Section 7.2.2.6.1, of the SOW, are evaluated as part of the CCS process. Information regarding the noncompliant MS/MSD %R or RPD can be obtained from the NFG reports and may be used as part of the evaluation process.

### E. Action

1. If requested MS/MSD samples were not analyzed at the specified frequency, use professional judgment to determine the impact on sample data, if any. Obtain additional information from the laboratory, if necessary. Record the situation in the Data Review Narrative and note it for EPA Regional CLP COR action. It is not likely that data qualification will be warranted if the frequency requirements are not met. Carefully consider all factors, known and unknown, about method performance on the matrix at hand, in lieu of MS/MSD data.
2. If a field blank or PE sample was used for the MS/MSD analysis, note this for EPA Regional CLP COR action. All of the other QC data must then be carefully checked. Use professional judgment when evaluating the data.
3. If errors are detected in the calculations of the MS/MSD %R or RPD, perform a more comprehensive recalculation.
4. If the MS/MSD %R or RPD is outside the acceptance limits in Table 43, qualify the detects and non-detects in the original sample to include the consideration of the existence of interference in the raw data. Considerations include, but are not limited to:

a. If the MS/MSD %R is < 10% (excluding spiked analyte with %R lower limit of 10% or less), qualify detects as estimated (J) and non-detects as unusable (R).

b. If the MS/MSD %R is ≥ 10% (excluding spiked analyte with %R lower limit of 10% or less) and < the lower acceptance limit, qualify detects as estimated (J) and non-detects as estimated (UJ).

c. If the MS/MSD %R or RPD is ≥ lower acceptance limit and ≤ upper acceptance limit, detects and non-detects should not be qualified.

d. If the MS/MSD %R or RPD is > upper acceptance limit, qualify detects as estimated (J). Non-detects should not be qualified.

**Table 43. MS/MSD %R and RPD Limits for Semivolatile Analysis**

| Compound | %R for Water Sample | RPD for Water Sample | %R for Soil/Sediment Sample | RPD for Soil/Sediment Sample |
|---|---|---|---|---|
| Phenol | 12 - 110 | 0 - 42 | 26 - 90 | 0 - 35 |
| 2-Chlorophenol | 27 - 123 | 0 - 40 | 25 - 102 | 0 - 50 |
| N-Nitroso-di-n-propylamine | 41 - 116 | 0 - 38 | 41 - 126 | 0 - 38 |
| 4-Chloro-3-methylphenol | 23 - 97 | 0 - 42 | 26 - 103 | 0 - 33 |
| Acenaphthene | 46 - 118 | 0 - 31 | 31 - 137 | 0 - 19 |
| 4-Nitrophenol | 10 - 80 | 0 - 50 | 11 - 114 | 0 - 50 |
| 2,4-Dinitrotoluene | 24 - 96 | 0 - 38 | 28 - 89 | 0 - 47 |
| Pentachlorophenol | 9 - 103 | 0 - 50 | 17 - 109 | 0 - 47 |
| Pyrene | 26 - 127 | 0 - 31 | 35 - 142 | 0 - 36 |

**Table 44. MS/MSD Actions for Semivolatile Analysis**

| Criteria | Action | |
|---|---|---|
| | Detect | Non-detect |
| %R < 10% (excluding spiked analyte with %R lower limit of 10% or less) | J | R |
| 10% ≤ %R (excluding spiked analyte with %R lower limit of 10% or less) < Lower Acceptance Limit | J | UJ |
| Lower Acceptance Limit ≤ %R or RPD ≤ Upper Acceptance Limit | No qualification | No qualification |
| %R or RPD > Upper Acceptance Limit | J | No qualification |

## IX. Gel Permeation Chromatography Performance Check

### A. Review Items

Form 9B-OR, two ultraviolet (UV) traces, Gel Permeation Chromatography (GPC) cleanup blank quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/SVOA, Section 10.3)

### B. Objective

The objective is to evaluate GPC cleanup efficiency.

### C. Criteria

1. GPC is used for the cleanup of all non-aqueous sample extracts and for aqueous sample extracts that contain high molecular weight components that interfere with the analysis of the target analytes.
2. Each GPC system must be calibrated prior to processing samples for GPC cleanup, when the GPC calibration verification solution fails to meet criteria, when the column is changed or channeling occurs, and once every 7 days when in use.
3. The GPC calibration is acceptable if the two UV traces meet the following requirements:
   a. Peaks must be observed and symmetrical for all compounds in the calibration solution.
   b. Corn oil and the phthalate peaks exhibit > 85% resolution.
   c. Phthalate and methoxychlor peaks exhibit > 85% resolution.
   d. Methoxychlor and perylene peaks exhibit > 85% resolution.
   e. Perylene and sulfur peaks must not be saturated and should exhibit > 90% baseline resolution.
   f. The RT shift is < 5% between UV traces for bis(2-ethylhexyl) phthalate and perylene.
4. A GPC blank must be analyzed after each GPC calibration. The concentration for any target analyte in the GPC blank must not exceed the CRQL.
5. The calibration verification must be performed at least once every 7 days according to the specifications.

### D. Evaluation

1. Verify that the GPC calibration is performed at the specified frequency.
2. Verify that there are two UV traces present and that the RT shift for bis(2-ethylhexyl) phthalate and perylene is < 5%.
3. Verify that the analytes in the GPC calibration standard are present and the peaks are symmetrical in both UV traces meeting the minimum resolution requirements.
4. Verify that no target analyte in the GPC blank exceeds the CRQL.
5. Verify that the GPC calibration verification is performed at the specified frequency.

### E. Action

1. If GPC calibration and calibration verification criteria are not met, examine the raw data for the presence of high molecular weight contaminants; and examine subsequent sample data for unusual peaks. Use professional judgment to qualify the data. If the laboratory chooses to analyze samples under unacceptable GPC criteria, notify the EPA Regional CLP COR.

a. If the RT shift of bis(2-ethylhexyl) phthalate and perylene is > 5%, the GPC unit may be in an unstable temperature environment and subject to erratic performance. The expected result may be an unknown bias in the data. Contact the EPA Regional CLP COR to arrange for sample reanalysis.

2. Annotate the potential effects on the sample data resulting from the GPC cleanup analyses not yielding acceptable results in the Data Review Narrative.

# X. Internal Standard

## A. Review Items

Form 8A-OR, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/SVOA, Sections 7.2.2.7, 11.3.5, and 11.3.6 )

## B. Objective

The objective is to evaluate the internal standard performance to ensure that GC/MS sensitivity and response are stable during each analysis.

## C. Criteria

1. The internal standard solution must be added to all samples and blanks at the specified concentration. The internal standard solution must contain all internal standard compounds specified in the method.
2. The area response of each internal standard compound in all samples and blanks must be within the inclusive ranges of 50-200% of the area response of the same internal standard compound from the associated opening CCV or the mid-point standard CS3 from the associated ICAL.
3. The RT of the internal standard compound in the sample or blank must not vary more than ±30.0 seconds from the RT of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL.

## D. Evaluation

1. Verify that all required internal standard compounds were added to sample and blank analyses at the specified concentrations.
2. Check the raw data (e.g., chromatograms and quantitation reports) to verify that the RT and area response of each internal standard compound in a sample or blank are reported on Form 8A-OR.
3. Verify that the RTs and area responses for all internal standard compounds are within the specified criteria. If internal standard RTs are significantly different from the associated CCV or ICAL midpoint (i.e., more than 30 seconds), the internal standard peak may have been misidentified, but most likely a change in the chromatographic system should be suspected. This could be an improper injection, a leak in the GC system, or the effect of a highly contaminated matrix. Normally, the area counts will also suffer in this situation, but even if they appear unaffected, both quantitative and qualitative results should be considered highly suspect.
4. If there is a reanalysis for a particular sample, determine which analysis is the best data to report. Considerations include, but are not limited to:
    a. Magnitude and direction of the internal standard area response shift.
    b. Magnitude and direction of the internal standard RT shift.
    c. Technical holding times.
    d. Comparison of the values of the target analytes reported in each method.
    e. Other QC information.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant internal standard area response or RT can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

**NOTE:** Apply the action to the target analytes in samples or blanks that are associated to the noncompliant internal standard compound in Table 45. The internal standard and the associated target analytes are in Exhibit D – Semivolatile Organic Compounds Analysis, Tables 9 and 10, of the SOW.

1. If the required internal standard compounds were not added to a sample or blank, qualify detects and non-detects as unusable (R).
2. If the required internal standard compound was not analyzed at the specified concentration in a sample or blank, use professional judgment to qualify detects and non-detects.
3. If the area response of an internal standard compound in a sample or blank is < 20% of the area response of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL, qualify detects as estimated high (J+) and non-detects as unusable (R).
4. If the area response of an internal standard compound in a sample or blank is ≥ 20 % and < 50% of the area response of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL, qualify detects as estimated high (J+) and non-detects as estimated (UJ).
5. If the area response of an internal standard compound in a sample or blank is within the inclusive range of 50-200% of the area response of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL, detects and non-detects should not be qualified.
6. If the area response of an internal standard compound in a sample or blank is > 200% of the area response of the same internal standard compound in the associated opening CCV or mid-point standard CS3 from the associated ICAL, qualify detects as estimated low (J-). Non-detects should not be qualified.
7. If the RT shift between sample/blank and the associated opening CCV or mid-point standard CS3 from the associated ICAL of an internal standard compound is > 30.0 seconds, qualify detects and non-detects as unusable (R). The EPA Regional CLP COR should be contacted to arrange for reanalysis.
8. If the RT shift between sample/blank and the associated opening CCV or mid-point standard CS3 from the associated ICAL of an internal standard compound is < 30.0 seconds, detects and non-detects should not be qualified.
9. If the internal standard performance criteria are grossly exceeded, annotate the potential effects on the data in the Data Review Narrative and note it for EPA Regional CLP COR action.

**Table 45. Internal Standard Actions for Semivolatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| Area response < 20% of the opening CCV or mid-point standard CS3 from ICAL | J+ | R |
| 20% ≤ Area response < 50% of the opening CCV or mid-point standard CS3 from ICAL | J+ | UJ |
| 50% ≤ Area response ≤ 200% of the opening CCV or mid-point standard CS3 from ICAL | No qualification | No qualification |
| Area response > 200% of the opening CCV or mid-point standard CS3 from ICAL | J- | No qualification |
| RT shift between sample/blank and opening CCV or mid-point standard CS3 from ICAL > 30.0 seconds | R | R |
| RT shift between sample/blank and opening CCV or mid-point standard CS3 from ICAL < 30.0 seconds | No qualification | No qualification |

# XI. Target Analyte Identification

## A. Review Items

Form 1A-OR, quantitation reports, mass spectra, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/SVOA, Section 11.1.1)

## B. Objective

The objective is to provide acceptable GC/MS qualitative analysis to minimize the number of erroneous analyte identifications.

## C. Criteria

1. The mass spectrum of the analyte from the sample analysis must match that of the same analyte in the associated opening CCV or mid-point standard CS3 from the associated ICAL according to the following criteria:
   a. All ions present in the calibration standard mass spectrum must be present in the sample spectrum at relative intensity > 10%.
   b. The relative intensities of these ions must agree within ±20% between the standard and sample spectra (e.g., for an ion with an abundance of 50% in the standard spectrum, the corresponding sample ion abundance must be between 30-70%).
   c. Ions present at > 10% in the sample mass spectrum, but not present in the standard spectrum, must be evaluated by a reviewer experienced in mass spectral interpretation.
2. The Relative Retention Time (RRT) for a positively identified target analyte must be within ±0.06 RRT units of the RRT for the same analyte in the associated opening CCV or mid-point standard CS3 from the associated ICAL.

## D. Evaluation

1. Verify that the positively identified target analyte mass spectrum meets the specified criteria. If not, examine the sample target analyte spectra for the presence of interference at one or more mass fragment peaks. Although the presence of a co-eluting interferent may preclude positive identification of the analyte, the presumptive evidence of its presence may be useful information to include in the Data Review Narrative.
2. Verify that the RRT of the positively identified target analyte is within ±0.06 RRT units of the RRT for the same analyte in the associated opening CCV or mid-point standard CS3 from the associated ICAL.
3. Verify that peaks are correctly identified as target analytes, TICs, DMCs, or internal standards on the chromatogram for samples and blanks.
4. Verify that there is no erroneous analyte identification, either false positive or false negative, for each target analyte. The positively identified target analyte can be more easily detected for false positives than false negatives. More information is available for false positives due to the requirement for submittal of data supporting positive identifications. Non-detected target analytes, on the other hand, are more difficult to assess. One example of the detection of false negatives is reporting a target analyte as a TIC.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant TICs can be obtained from the CCS report and may be used as part of the evaluation process.

**NOTE:** A target analyte reported as a false negative may not have the best match in a TIC search of a contaminated sample, but its mass spectrum may be present under that of a reported TIC.

## E. Action

1. If the positively identified target analyte mass spectrum does not meet the specified criteria, qualify detect as unusable (R), or report the result at the CRQL and qualify as non-detect (U).
2. If the RRT for a positively identified target analyte is outside the specified RRT windows, qualify detects as unusable (R), or report the result at the CRQL and qualify as non-detect (U).
3. If it is determined that cross-contamination has occurred, use professional judgment to qualify detects. Annotate any changes made to the reported analytes due to either false positive or negative identifications, or concerns regarding target analyte identifications in the Data Review Narrative. Note the necessity for numerous or significant changes for EPA Regional CLP COR action.

## XII. Target Analyte Quantitation and Reported Contract Required Quantitation Limit

### A. Review Items

Form 1A-OR, sample preparation sheets, SDG Narrative, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/SVOA, Sections 11.2.1, 11.2.1.6, and 11.2 3)

### B. Objective

The objective is to ensure that the reported results and CRQLs for target analytes are accurate.

### C. Criteria

1. Target analyte results and the sample-specific CRQLs must be calculated according to the correct equations.
2. Target analyte RRF must be calculated using the correct associated internal standard, as listed in the method. Quantitation must be based on the quantitation ion (m/z) specified in the method for both the internal standards and target analytes. Target analyte result must be calculated using the $\overline{RRF}$ from the associated ICAL.

### D. Evaluation

1. Verify that the results for all positively identified analytes are calculated and reported by the laboratory.
2. Verify that the CRQLs are calculated for the non-detects and reported accordingly.
3. Verify that the correct internal standard, quantitation ion, and $\overline{RRF}$ are used to calculate the reported results.
4. Verify that the same internal standard, quantitation ion, and $\overline{RRF}$ are used consistently.
5. Verify that the sample-specific CRQLs have been calculated and adjusted to reflect Percent Solids (%Solids), original sample mass/volume, and any applicable dilutions.
    a. For soil/sediment samples that are high in moisture (i.e., < 30% solids), evaluation of the presence of each analyte depends on the anticipated interaction between the analyte and the total matrix, as well as how the sample was processed.
    b. If the phases of a sample were separated and processed separately, no particular qualification on the grounds of matrix distribution is warranted.
    c. If a soil/sediment sample was processed by eliminating most of the water, analytes that are highly water soluble under ambient conditions may be severely impacted such that their presence cannot be completely evaluated.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant results or CRQLs can be obtained from the CCS report and may be used as part of the evaluation process.

### E. Action

1. If any discrepancies are found, contact the EPA Regional CLP COR, who may contact the laboratory to obtain additional information that could resolve any differences. If a discrepancy remains unresolved, use professional judgment to decide which value is the most accurate and to determine whether qualification of data is warranted. Annotate the reasons for any data qualification in the Data Review Narrative.
2. If errors are detected in results and CRQL calculations, perform a more comprehensive recalculation.
3. If the %Solids for a soil/sediment sample is < 10.0%, use professional judgment to qualify detects and non-detects.

4. If the %Solids for a soil/sediment sample is ≥ 10.0% and < 30%, use professional judgment to qualify detects and non-detects.
5. If the %Solids for a soil/sediment sample is ≥ 30.0%, detects and non-detects should not be qualified.
6. If sample results are < CRQLs and ≥ MDLs, qualify as estimated (J).
7. Note numerous or significant failures to accurately quantify the target analytes, or to properly evaluate and adjust CRQLs, for EPA Regional CLP COR action.

**Table 46. Percent Solids Actions for Semivolatile Analysis for Non-Aqueous Samples**

| Criteria | Action | |
|---|---|---|
| | Detects | Non-detects |
| %Solids < 10.0% | Use professional judgment | Use professional judgment |
| 10.0% ≤ %Solids < 30.0% | Use professional judgment | Use professional judgment |
| %Solids ≥ 30.0% | No qualification | No qualification |

## XIII. Tentatively Identified Compounds

### A. Review Items

Form 1B-OR, chromatograms, library search printouts, and spectra for the TIC candidates. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/SVOA, Sections 11.1.2 and 11.2.2)

### B. Objective

The objective is to provide tentative identifications to chromatographic peaks that are not identified as target analytes, DMCs, or internal standards.

### C. Criteria

For each sample, the laboratory must conduct a mass spectral search of the National Institute of Standards and Technology (NIST) (2011 release or later), Wiley (2011 release or later), or equivalent mass spectral library, and report the possible identity for up to 30 of the largest peaks which are not DMCs, internal standards, or target analytes. The peak for a TIC should have an area or height > 10% of the area or height of the nearest internal standard. The estimated concentration for a TIC is calculated similarly to that for a target analyte, using total ion areas for the TIC and the internal standard, and assuming an RRF of 1.0.

1. Guidelines for tentative identification are as follows:
    a. Major ions (> 10% Relative Intensity) in the reference spectrum should be present in the sample spectrum.
    b. The relative intensities of the major ions should agree within ±20% between the sample and the reference spectra.
    c. Molecular ions present in the reference spectrum should be present in the sample spectrum.
    d. Non-target compounds receiving a library search match of 85% or higher are considered a "probable match". The compound should be reported unless the mass spectral interpretation specialist feels there is evidence not to report the compound as identified by the library search program. The laboratory should include the justification for not reporting a compound as listed by the search program in the SDG Narrative.
    e. If the library search produces more than one compound ≥ 85%, the compound with the highest percent match (report first compound if percent match is the same for two or more compounds) should be reported, unless the mass spectral interpretation specialist feels that the highest match compound should not be reported or another compound with a lower match should be reported. The laboratory should include the justification for not reporting the compound with the highest spectral match within the SDG Narrative. DMCs, internal standards, and target analytes should not be reported as TICs.
    f. If the library search produces a series of obvious isomer compounds with library search matches ≥ 85%, the compound with the highest library search percent match (or the first compound if the library search matches are the same) should be reported. The laboratory should note in the SDG Narrative that the exact isomer configuration, as reported, may not be accurate.
    g. If the library search produces no matches ≥ 85%, and in the technical judgment of the mass spectral interpretation specialist no valid tentative identification can be made, the compound should be reported as "unknown". The mass spectral specialist should give additional classification of the unknown compound, if possible (e.g., "unknown aromatic", "unknown hydrocarbon", "unknown acid type", "unknown chlorinated compound"). If probable molecular weights can be distinguished, they should be included.

h. The Chemical Abstracts Service (CAS) registry number is the unique identifier for each chemical compound. As the rules of chemical nomenclature have changed over time, each chemical substance is liable to have several names or synonyms [i.e., trade or brand name(s); generic or common name(s); trivial or systematic; or International Union of Pure and Applied Chemistry (IUPAC) name(s)]. Whether synonyms or other names are created for this compound, the CAS registry number will remain unchanged. The CAS registry number is simply an identifier which has no structural significance. Regardless of RTs, if the library search produces two or more compounds at or above 85% with the same CAS number, the compound with the highest percent match (report first compound if the percent match is the same for two or more compounds) should be reported unless the mass spectral interpretation specialist feels there is just evidence not to report the compound with the highest match.

i. If the library search produces only one and the same compound (i.e., the same CAS registry number) with the match at or above 85% at two different RTs, the compound having the highest percent match should be reported as TIC and the other one could be reported as unknown. If both TICs have the same percent match for the same compound, one of the TICs could be reported as unknown. Such justifications should be included in the SDG Narrative.

j. Alkanes are not to be reported as TICs on Form 1B-OR. An alkane is defined as any hydrocarbon with the generic formula $C_nH_{2n+2}$ (straight-chain or branched) or $C_nH_{2n}$ (cyclic) that contains only C-H and C-C single bonds. When the preceding alkanes are tentatively identified, the concentration(s) should be estimated and the analytes reported as alkanes by class (i.e., straight-chain, branched, cyclic, as a series, or as applicable) in the SDG Narrative. Total alkanes concentration should be reported on Form 1B-OR.

## D. Evaluation

1. Verify that the laboratory has generated a library search for all required peaks in the chromatograms for samples and blanks.
2. Verify that TIC peaks present in samples are not found in blanks. When a low-level, non-target compound that is a common artifact or laboratory contaminant is detected in a sample, a thorough check of blank chromatograms may require looking for peaks which are < 10% of the internal standard height, but present in the blank chromatogram at a similar RRT.
3. Verify that mass spectra for all reported TICs are present for every sample and blank.
4. Review ions present in the sample spectrum, but not in the reference spectrum, for possible background contamination, interference, or presence of coeluting compounds.
5. Review ions present in the reference spectrum, but not in the sample spectrum, for possible subtraction from the sample spectrum because of background contamination or coeluting compounds. Data system library reduction programs can sometimes create these discrepancies.
6. Consider all reasonable choices since TIC library searches often yield several candidate compounds having a close matching score.
7. Be aware of common laboratory artifacts/contaminants and their sources (e.g., Aldol condensation products, solvent preservatives, and reagent contaminants). These may be present in blanks and not reported as sample TICs, such as:

   a. Common laboratory contaminants include $CO_2$ (m/z 44), siloxanes (m/z 73), diethyl ether, hexane, certain freons, and phthalates at levels < 100 µg/L.

   b. Solvent preservatives include cyclohexene (a methylene chloride preservative). Related by-products include cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenol, chlorocyclohexene, and chlorocyclohexanol.

   c. Aldol condensation reaction products of acetone include 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten-2-one, and 5,5-dimethyl-2(5H)-furanone.

8. A target analyte may be identified by non-target library search procedures, even though it is not identified as a target analyte (false negative). If the total area quantitation method is used, request that the laboratory recalculate the result using the proper quantitation ion and RRF.

    a. A non-target compound may be incorrectly identified by the instrument's target analyte data processor as a target analyte (false positive). When this happens, the non-target library search procedure will not detect the false positive as a TIC. In this case, request that the laboratory properly identify the analyte as a TIC and recalculate the result using the total area quantitation method and an RRF of 1.0.

    b. Evaluate other sample chromatograms and check for both false negatives and false positives to determine if the occurrence is isolated or systematic.

9. Verify that the TIC concentration is calculated using an RRF of 1.0.

## E. Action

1. If the library search match for a TIC is ≥ 85%, qualify the TIC as tentatively identified with estimated concentration (NJ).
2. If the library search match for a TIC is < 85%, qualify the TIC as unknown with estimated concentration (J).
3. General actions related to the review of TIC results are as follows:

    a. If it is determined that a tentative identification of a non-target compound is unacceptable, change the tentative identification to "unknown" or another appropriate identification, and qualify the result as estimated (J).

    b. If a library search or proper calculation is not performed for all contractually-required peaks, the EPA Regional CLP COR may request the data from the laboratory.

    c. Use professional judgment to determine whether a library search result for a TIC represents a reasonable identification. If there is more than one possible match, report the result as "either compound X or compound Y". If there is a lack of isomer specificity, change the TIC result to a non-specific isomer result (e.g., 1,3,5-trimethyl benzene to trimethyl benzene isomer) or to a compound class (e.g., 2-methyl, 3-ethyl benzene to a substituted aromatic compound).

    d. Other Case factors may influence TIC judgments. If a sample TIC match is poor, but other samples have a TIC with a valid library match, similar RRT, and the same ions, infer identification information from the other sample TIC results.

4. Note any changes made to the reported data or any concerns regarding TIC identifications in the Data Review Narrative.
5. Note any failure to properly evaluate and report TICs for EPA Regional CLP COR action.

## XIV. System Performance

### A. Review Items

Form 8A-OR and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/SVOA, Section 11.1)

### B. Objective

The objective is to ensure that the system is stable during the analytical sequence to produce quality data.

### C. Criteria

There are no specific criteria for system performance.

### D. Evaluation

1. Abrupt discrete shifts in the Reconstructed Ion Chromatogram (RIC) baseline may indicate a change in the instrument's sensitivity or the zero setting. A baseline "shift" could indicate a decrease in sensitivity in the instrument or an increase in the instrument zero, possibly causing target compounds at or near the detection limit to miss detection. A baseline "rise" could indicate problems such as a change in the instrument zero, a leak, or degradation of the column.
2. Poor chromatographic performance affects both qualitative and quantitative results. Indications of substandard performance include:
    a. High RIC background levels or shifts in absolute RTs of internal standards.
    b. Excessive baseline rise at elevated temperature.
    c. Extraneous peaks.
    d. Loss of resolution.
    e. Peak tailing or peak splitting that may result in inaccurate quantitation.
3. A drift in instrument sensitivity may occur during the 12-hour period and may be an indication of possible internal standard spiking problems. This could be discerned by examination of the internal standard area on Form 8A-OR for trends such as a continuous or near-continuous increase or decrease in the internal standard area over time.

### E. Action

1. Use professional judgment to qualify the data if it is determined that system performance has degraded during sample analyses.
2. Note any degradation of system performance which significantly affected the data for EPA Regional CLP COR action.

## XV. Performance Evaluation Sample

### A. Review Items

Form 1A-OR, TR/COC Record documentation, preparation logs, instrument printouts, and raw data. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit F, Section 4.1)

### B. Objective

The objective is to determine the validity of the analytical results based on the recovery of the PE sample(s).

### C. Criteria

1. Matrix-specific PE samples shall be analyzed utilizing the same analytical methods and Quality Assurance/Quality Control (QA/QC) procedures as employed for the samples, at a frequency to be determined by each EPA Region for each site. PE samples must be analyzed in an SDG containing field samples for the Case, using the same procedures, reagents, and instrumentation.

### D. Evaluation

1. Verify, using Form 1A-OR, preparation logs, and raw data, that the PE samples were analyzed with the field samples and field blanks in the SDG.
2. Verify, using Form 1A-OR, that the PE sample results are within the warning limits (95% confidence interval) and action limits (99% confidence interval).
3. If a significant number (i.e., half or more) of the analytes in the PE samples fall outside of the 95% warning or 99% action criteria, or a number of false positive results are reported, evaluate the overall impact on the data.

### E. Action

**NOTE:** If the PE sample criteria are not met, the laboratory performance and method accuracy are in question. Use professional judgment to determine if the data should be qualified or rejected. The following guidance is suggested for qualifying sample data associated with a PE sample that does not meet the required criteria.

For a PE sample that does not meet the technical criteria, apply the action to all samples in the same preparation batch. If the concentration of any analyte in a PE sample is not comparable to the analyte's concentration in the field samples or field blanks (i.e., it is much higher or much lower than the concentration in these samples), the action may be applied to only those samples in which the analyte's concentration is comparable to the PE sample concentration.

1. If the PE sample was not analyzed with the field samples and field blanks, use professional judgment to determine if the associated sample results should be qualified. Obtain additional information from the laboratory, if necessary. If a laboratory fails to analyze the PE sample(s) provided with field samples and field blanks, or if a laboratory consistently fails to generate acceptable PE sample results, record the situation in the Data Review Narrative, and note it for EPA Regional CLP COR action.
2. If the PE sample results are outside the lower warning limits but inside the lower action limits, qualify detects as estimated low (J-) and non-detects as estimated (UJ).
3. If the PE sample results are outside the lower action limits, qualify detects as estimated low (J-) and non-detects as unusable (R).
4. If the PE sample results are within the limits, detects and non-detects should not be qualified.
5. If the PE sample results are outside the upper warning limits but inside the upper action limits, qualify detects as estimated high (J+). Non-detects should not be qualified.

6. If the PE sample results are outside the upper action limits, qualify detects as estimated high (J+). Non-detects should not be qualified.
7. Annotate the potential effects on the data due to out-of-control PE sample results in the Data Review Narrative.

**Table 47. PE Sample Actions for Semivolatile Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| PE sample results outside lower warning limits but inside lower action limits | J- | UJ |
| PE sample results outside lower action limits | J- | R |
| PE sample results within limits | No qualification | No qualification |
| PE sample results outside upper warning limits but inside upper action limits | J+ | No qualification |
| PE sample results outside upper action limits | J+ | No qualification |

## XVI. Regional Quality Assurance and Quality Control

### A. Review Items

Form 1A-OR, chromatograms, TR/COC Record documentation, quantitation reports, and other raw data from QA/QC samples. (SOW SOM02.4 – Exhibit B, Sections 2.4 and 3.4)

### B. Objective

The objective is to use results from the analysis of EPA Regional QA/QC samples such as field duplicates, blind spikes, and blind blanks to determine the validity of the analytical results.

### C. Criteria

Criteria are determined by each EPA Region.

1. The frequency of EPA Regional QA/QC samples should be defined in the project QAPP.
2. Performance criteria for EPA Regional QA/QC samples should also be defined in the project QAPP.
3. The EPA Region may provide the laboratory with PE samples to be analyzed with each SDG. These samples may include blind spikes and/or blind blanks. The laboratory must analyze a PE sample when provided by the EPA Region. Refer to Section VI, above, for blanks criteria. Refer to Section XV, above, for PE samples criteria.
4. The RPD between field duplicates shall fall with the specific limits in the EPA Region's SOP or project QAPP.

### D. Evaluation

1. Evaluation procedures must follow the EPA Region's SOP for data review.
2. Determine whether the results of EPA Regional QA/QC samples impact all samples in the project or only those directly associated (i.e., in the same SDG, collected on the same day, prepared together, or contained in the same analytical sequence).
3. Calculate the RPD between field duplicates and provide this information in the Data Review Narrative. Also verify that the value falls within the specific limits in the EPA Region's SOP or project QAPP.
4. Determine whether poor precision is the fault of the laboratory, or a result of sample non-homogeneity in the field. Laboratory observations of sample appearance may become important in these situations.

### E. Action

1. Any action must be in accordance with EPA Regional specifications and the criteria for acceptable field duplicate sample results.
2. Note unacceptable results for field duplicate samples for EPA Regional CLP COR action.
3. In general, for EPA Regional QA/QC performance not within QAPP specification, qualify detects as estimated (J) and non-detects as estimated (UJ). The impact on overall data quality should be assessed after consultation with the data user and/or field personnel. Contact the EPA Regional CLP COR if reanalysis of samples is required.

## XVII. Overall Assessment of Data

### A. Review Items

Entire data package, data review results, and (if available) the QAPP and Sampling and Analysis Plan (SAP).

### B. Objective

The objective is to provide the overall assessment on data quality and usability.

### C. Criteria

1. Review all available materials to assess the overall quality of the data, keeping in mind the additive nature of analytical problems.
2. Reported analyte concentrations must be quantitated according to the appropriate equations, as listed in the method. All sample results must be within the linear calibration ranges per the methods.

### D. Evaluation

Examine the raw data to verify that the correct calculation of the sample results was reported by the laboratory. Analysis logs, instrument printouts, etc., should be compared to the reported sample results recorded on the appropriate Organic Data Reporting Forms (Form 1A-OR through Form 9B-OR).

1. Evaluate any technical problems which have not been previously addressed.
2. Examine the raw data for any anomalies (e.g., baseline shift).
3. Verify that the appropriate method is used in sample analysis.
4. Verify that there are no transcription or reduction errors.
5. Verify that target analyte results fall within the calibrated ranges.
6. If appropriate information is available, use professional judgment to assess the usability of the data in order to assist the data user in avoiding inappropriate use of the data. Review all available information, including the QAPP (specifically the acceptance and performance criteria), SAP, and communication with the data user that concerns the intended use and desired quality of these data.

### E. Action

1. Use professional judgment to determine if there is any need to qualify data which were not qualified based on the QC criteria previously discussed.
2. Use professional judgment to qualify sample results and non-detects if the MDL exceeds the CRQL.
3. If a sample is not diluted properly when sample results exceed the upper limit of the calibration range, qualify sample results as estimated (J).
4. Write a brief Data Review Narrative to give the user an indication of the limitations of the analytical data.
5. Note any inconsistency of the data with the SDG Narrative for EPA Regional CLP COR action. If sufficient information on the intended use and required quality of the data is available, include an assessment of the usability of the data within the given context. This may be used as part of a formal Data Quality Assessment (DQA).

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## PESTICIDE DATA REVIEW

The Pesticide organic data requirements to be reviewed during validation are listed below:

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# I. Preservation and Holding Times

## A. Review Items

Form 1A-OR, Traffic Report/Chain of Custody (TR/COC) documentation, Form DC-1, raw data, sample extraction sheets, and the Sample Delivery Group (SDG) Narrative checking for: pH, shipping container temperature, holding time, and other sample conditions. (SOW SOM02.4 – Exhibit B, Section 3.4; Exhibit D/Introduction, Section 5.0; Exhibit D/General, Sections 8.0, 10.1.2.1, and 10.2.2.4.4; and Exhibit D/PEST, Section 8.0)

## B. Objective

The objective is to determine the validity of the analytical results based on the sample conditions and the holding time of the sample.

## C. Criteria

1. The extraction technical holding time is determined from the date of sample collection to the date of sample extraction for aqueous and non-aqueous (soil and sediment) samples that are not designated for Toxicity Characteristic Leachate Procedure (TCLP)/Synthetic Precipitation Leachate Procedure (SPLP) procedures. The extraction technical holding time for samples designated for TCLP/SPLP is determined from the date of sample collection to the date of TCLP/SPLP extraction.
2. For TCLP/SPLP leachate samples, extraction technical holding time is determined from the date of TCLP/SPLP procedure completion to the date of the leachate sample extraction by the specified preparation methods for aqueous samples. The analysis technical holding time is determined from the date of sample extraction completion to the date of sample analysis.
3. Samples should be in proper condition with shipping container temperatures at $\leq 6^{o}C$ upon receipt at the laboratory. All aqueous and non-aqueous samples shall be protected from light and refrigerated at $\leq 6^{o}C$ (but not frozen) from the time of receipt at the laboratory. Sample extracts shall be stored at $\leq 6^{o}C$ (but not frozen) from the time of the extraction completion until analysis.
4. The extraction technical holding time criteria for aqueous samples, TCLP/SPLP aqueous filtrate samples, and TCLP/SPLP leachate samples that are properly preserved is 7 days.
5. The extraction technical holding time criteria for soil/sediment samples designated for TCLP/SPLP is 14 days.
6. The extraction technical holding time criteria for non-aqueous samples that are properly preserved is 14 days.
7. The analysis technical holding time criteria for extracts, including TCLP/SPLP leachate and aqueous filtrate sample extracts, is 40 days.

## D. Evaluation

1. Review the SDG Narrative and the TR/COC Record documentation to determine if the samples are received intact and iced. If there is an indication of problems with the samples, the sample integrity may be compromised.
2. Verify that the extraction dates and the analysis dates for samples on Form 1A-OR and the raw data are identical.
3. Establish extraction technical holding times for samples excluding TCLP/SPLP leachate samples by comparing the sample collection dates on the TR/COC Record documentation with the dates of extraction on Form 1A-OR and the sample extraction sheets.
4. Establish extraction technical holding times for TCLP/SPLP leachate samples by comparing the sample collection dates on the TR/COC Record documentation with the dates of extraction on sample extraction sheets.

5. Establish extraction technical holding times for TCLP/SPLP leachate samples by comparing the dates of TCLP/SPLP extraction on the extraction sheets with the dates of extraction on Form 1A-OR and the preparation extraction log.
6. Determine the analysis technical holding times for samples after the completion of extraction by comparing the dates of extraction with the dates of analysis on Form 1A-OR, as well as from the analytical run logs.

## E. Action

1. If samples are received with shipping container temperatures > 6°C, use professional judgment to qualify detects and non-detects.
2. If TCLP/SPLP extraction is performed within the 14-day extraction technical holding time for preserved and not properly preserved soil/sediment samples designated for TCLP/SPLP, detects and non-detects should not be qualified.
3. If TCLP/SPLP extraction is performed outside the 14-day extraction technical holding time for preserved and not properly preserved soil/sediment samples designated for TCLP/SPLP, qualify detects as estimated low (J-) and non-detects as unusable (R). Use caution in determining whether some detected analytes should be qualified as estimated low (J-) or as estimated (J+), based on knowledge of individual analyte stability or interactions.
4. If discrepancies are found between the sample extraction date or analysis date and the date on the raw data, perform a more comprehensive review, contacting the laboratory if necessary through the United States Environmental Protection Agency Regional Contract Laboratory Program Contracting Officer's Representative (EPA Regional CLP COR), to determine the correct dates for establishing the technical holding time.
5. If an aqueous sample, TCLP/SPLP aqueous filtrate sample, or TCLP/SPLP leachate sample is not properly preserved, but extraction is performed within the 7-day technical holding time, and the extract is analyzed within the 40-day technical holding time, consider the extent of temperature excursion in addition to overall sample integrity, and use professional judgment to qualify detects and non-detects.
6. If an aqueous sample, TCLP/SPLP aqueous filtrate sample, or TCLP/SPLP leachate sample is not properly preserved, extraction is performed outside the 7-day technical holding time, and/or the extract is analyzed outside the 40-day technical holding time, qualify detects as estimated (J) and non-detects as unusable (R). Use caution in determining whether some detected analytes should be qualified as estimated low (J-) or estimated high (J+), based on knowledge of individual analyte stability or interactions.
7. If an aqueous sample, TCLP/SPLP aqueous filtrate sample, or TCLP/SPLP leachate sample is properly preserved, extraction is performed within the 7-day technical holding time, and the extract is analyzed within the 40-day technical holding time, detects and non-detects should not be qualified.
8. If an aqueous sample, TCLP/SPLP aqueous filtrate sample, or TCLP/SPLP leachate sample is properly preserved, extraction is performed outside the 7-day technical holding time, and/or the extract is analyzed outside the 40-day technical holding time, consider all evidence of compromised extract integrity (such as evaporation or refrigeration) in addition to overall sample integrity, and use professional judgment to qualify the data, in particular the direction of the bias.
9. If a non-aqueous sample is not properly preserved, but extraction is performed within the 14-day technical holding time, and the extract is analyzed within the 40-day technical holding time, use professional judgment to qualify detects and non-detects.
10. If a non-aqueous sample is not properly preserved, and extraction is performed outside the 14-day technical holding time, and/or the extract is analyzed outside the 40-day technical holding time, use professional judgment to qualify detects and non-detects.

11. If a non-aqueous sample is properly preserved, extraction is performed within the 14-day technical holding time, and the extract is analyzed within the 40-day technical holding time, detects and non-detects should not be qualified.
12. If a non-aqueous sample is properly preserved, extraction is performed outside the 14-day technical holding time, and/or the extract is analyzed outside the 40-day technical holding time, qualify detects as estimated low (J-) and non-detects as unusable (R). Use caution in determining whether some detected analytes should be qualified as estimated low (J-) or estimated high (J+), based on knowledge of individual analyte stability or interactions.
13. Note the effect of exceeding the holding time on the resulting data in the Data Review Narrative, whenever possible.
14. If technical holding times are grossly exceeded, qualify detects as estimated (J) and use professional judgment to qualify non-detects as unusable (R). Note this for EPA Regional CLP COR action. Annotate the effect of the holding time exceedance on the resulting data in the Data Review Narrative, wherever possible.

**Table 48. Preservation and Holding Time Actions for Pesticide Analysis**

| Matrix | Preserved | Criteria | Action | |
|---|---|---|---|---|
| | | | Detect | Non-detect |
| Aqueous | No | ≤ 7 days (for extraction) and ≤ 40 days (for analysis) | Use professional judgment | Use professional judgment |
| | | TCLP/SPLP aqueous filtrate sample and TCLP/SPLP leachate sample extracted within the 7-day technical holding time | | |
| | No | > 7 days (for extraction) and/or > 40 days (for analysis) | J | R |
| | | TCLP/SPLP aqueous filtrate sample and TCLP/SPLP leachate sample not extracted within the 7-day technical holding time | | |
| | Yes | ≤ 7 days (for extraction) and ≤ 40 days (for analysis) | No qualification | No qualification |
| | | TCLP/SPLP aqueous filtrate sample and TCLP/SPLP leachate sample extracted within the 7-day technical holding time | | |
| | Yes | > 7 days (for extraction) and/or > 40 days (for analysis) | Use professional judgment | Use professional judgment |
| | | TCLP/SPLP aqueous filtrate sample and TCLP/SPLP leachate sample not extracted within the 7-day technical holding time | | |
| | Yes/No | Holding time grossly exceeded | J | Use professional judgment<br>R |

| Matrix | Preserved | Criteria | Action | |
|---|---|---|---|---|
| | | | Detect | Non-detect |
| Non-aqueous | No | ≤ 14 days (for extraction) and ≤ 40 days (for analysis) | Use professional judgment | Use professional judgment |
| | No | > 14 days (for extraction) and/or > 40 days (for analysis) | Use professional judgment | Use professional judgment |
| | Yes | ≤ 14 days (for extraction) and ≤ 40 days (for analysis) | No qualification | No qualification |
| | Yes | > 14 days (for extraction) and/or > 40 days (for analysis) | J- | Use professional judgment R |
| | Yes/No | Holding time grossly exceeded | J | Use professional judgment R |

**Table 49. Holding Time Actions for Non-Aqueous Pesticide TCLP/SPLP Sample Analysis**

| Preserved | Criteria | Action | |
|---|---|---|---|
| | | Detect | Non-detect |
| No | TCLP/SPLP extraction performed within the 14-day technical holding time | No qualification | No qualification |
| No | TCLP/SPLP extraction not performed within the 14-day technical holding time | J- | |
| Yes | TCLP/SPLP extraction performed within the 14-day technical holding time | No qualification | No qualification |
| Yes | TCLP/SPLP extraction not performed within the 14-day technical holding time | J- | |
| Yes/No | Holding time grossly exceeded | J | Use professional judgment R |

## II. Gas Chromatograph with Electron Capture Detector Instrument Performance Check

### A. Review Items

Form 6G-OR, Form 7B-OR, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/PEST, Section 9.0)

### B. Objective

The objective of performing Gas Chromatograph/Electron Capture Detector (GC/ECD) instrument performance checks is to ensure adequate resolution and instrument sensitivity.

### C. Criteria

1. Resolution Check Mixture

   a. The Resolution Check Mixture (RESC) is analyzed at the beginning of every initial calibration (ICAL) sequence on each GC column and instrument used for analysis. The RESC contains the following target analytes and surrogates listed in Table 50:

**Table 50. Resolution Check Mixture**

| | |
|---|---|
| trans-Chlordane | Endrin ketone |
| Endosulfan I | Methoxychlor |
| 4,4'-DDE | Endosulfan II |
| Dieldrin | Heptachlor-epoxide |
| Endosulfan sulfate | cis-Chlordane |
| alpha-BHC | 4,4'-DDD |
| beta-BHC | 4,4'-DDT |
| delta-BHC | Endrin |
| gamma-BHC | Endrin aldehyde |
| Aldrin | Tetrachloro-m-xylene (surrogate) |
| Heptachlor | Decachlorobiphenyl (surrogate) |

   b. The resolution between two adjacent peaks in the RESC must be ≥ 80.0% for all analytes for the primary column and ≥ 50.0% for the confirmation column in order to use Individual Standard Mixture C (INDC). If Individual Standard Mixture A (INDA) and Individual Standard Mixture B (INDB) are used, the resolution between two adjacent peaks must be ≥ 60.0%.

2. Performance Evaluation Mixture

   a. The Performance Evaluation Mixture (PEM) is analyzed at the beginning (following the Resolution Check Standard) and at the end of the ICAL sequence. The PEM analysis must bracket one end of each 12-hour analytical period. The PEM contains the following target analytes and surrogates listed in Table 51:

**Table 51. Performance Evaluation Mixture (PEM)**

| | |
|---|---|
| gamma-BHC | Endrin |
| alpha-BHC | Methoxychlor |
| 4,4'-DDT | Tetrachloro-m-xylene (surrogate) |
| beta-BHC | Decachlorobiphenyl (surrogate) |

b. The resolution between any two adjacent peaks in the ICAL and Continuing Calibration Verification (CCV) PEMs must be ≥ 90% on each GC column.

c. The Percent Breakdown (%Breakdown) is the amount of decomposition that 4,4'-DDT and Endrin undergo when analyzed on the GC column. For Endrin, the %Breakdown is determined by the presence of Endrin aldehyde and/or Endrin ketone in the PEM. For 4,4'-DDT, the %Breakdown is determined by the presence of 4,4'-DDD and/or 4,4'-DDE in the PEM.

   i. The %Breakdown of 4,4'-DDT and Endrin in the PEMs must each be ≤ 20.0% on each GC column.

   ii. The combined %Breakdown for 4,4'-DDT and Endrin in the PEMs must be ≤ 30.0% on each GC column.

d. Mid-point Individual Standard Mixtures A and B or C

   i. The resolution capabilities of the GC/ECD system used will dictate whether INDA and INDB (see Table 52) or INDC (see Table 53) can be used. This is determined by the analysis of the RESC to see if the criteria in II.C.1.b are met. If Individual Standard Mixtures A and B are used, follow the procedure in 2e. If INDC is used, follow the procedure in 2f.

e. Mid-point Individual Standard Mixtures A and B

   i. The mid-point INDA/INDB are analyzed as part of the ICAL. The ICAL mid-point CS3 standards, INDA and INDB, must be analyzed to bracket one end of the subsequent 12-hour analytical sequence for the associated ICAL sequence containing INDA and INDB standards. The Individual Standard Mixtures contain the target analytes and surrogates listed in Table 52.

   ii. The Percent Resolution (%Resolution) between any two adjacent peaks in the mid-point concentration of INDA and INDB in the ICAL and the subsequent CCVs must be ≥ 90.0% on each column.

**Table 52. Individual Standard Mixtures A and B**

| Individual Standard Mixture A | Individual Standard Mixture B |
|---|---|
| alpha-BHC | beta-BHC |
| Heptachlor | delta-BHC |
| gamma-BHC | Aldrin |
| Endosulfan I | Heptachlor-epoxide |
| Dieldrin | cis-Chlordane |
| Endrin | trans-Chlordane |
| 4,4'-DDD | 4,4'-DDE |
| 4,4'-DDT | Endosulfan sulfate |
| Methoxychlor | Endrin aldehyde |
| Tetrachloro-m-xylene (surrogate) | Endrin ketone |
| Decachlorobiphenyl (surrogate) | Endosulfan II |
| | Tetrachloro-m-xylene (surrogate) |
| | Decachlorobiphenyl (surrogate) |

f. Mid-point Individual Standard Mixture C

i. The mid-point INDC is analyzed as part of the ICAL. The ICAL mid-point CS3 standard, INDC, must be analyzed to bracket one end of the subsequent 12-hour analytical sequence for the associated ICAL sequence containing INDC standards. The INDC contains target analytes and surrogates listed in Table 53.

ii. The %Resolution between any two adjacent peaks in the mid-point concentration of INDC in the ICAL and CCV must be ≥ 80.0% for the primary column and ≥ 50.0% for the secondary column.

**Table 53. Individual Standard Mixture C**

| | |
|---|---|
| alpha-BHC | 4,4'-DDD |
| beta-BHC | 4,4'-DDE |
| delta-BHC | 4,4'-DDT |
| gamma-BHC | Dieldrin |
| Aldrin | Endrin |
| Heptachlor | Endosulfan sulfate |
| Heptachlor-epoxide | Endrin ketone |
| cis-Chlordane | Endrin aldehyde |
| trans-Chlordane | Methoxychlor |
| Endosulfan I | Tetrachloro-m-xylene (surrogate) |
| Endosulfan II | Decachlorobiphenyl (surrogate) |

## D. Evaluation

1. Resolution Check Mixture

a. Verify that the RESC is analyzed at the specified frequency and sequence.

b. Check the RESC data and Form 6G-OR to verify that if INDA and INDB are used in the analytical sequence, and that the %Resolution between two adjacent peaks for the required target analytes and surrogates in RESC is ≥ 60.0% on both GC columns.

c. Verify that if INDC is used in the analytical sequence, the %Resolution between two adjacent peaks for the required analytes and surrogates in RESC is ≥ 80.0% on the primary column and ≥ 50.0% on the secondary column.

2. Performance Evaluation Mixture

a. Verify that the PEM is analyzed at the specified frequency and sequence.

b. Check the ICAL and CCV PEM data and Form 6G-OR to verify that the %Resolution between adjacent peaks is ≥ 90.0% on both GC columns.

c. Check Form 7B-OR to verify that the %Breakdown of 4,4'-DDT is ≤ 20.0%, the %Breakdown of Endrin is ≤ 20.0%, and the combined %Breakdown of 4,4'-DDT and Endrin is ≤ 30.0% in all PEMs on both GC columns.

3. Mid-point Individual Standard Mixtures A and B

a. Check the ICAL and CCV mid-point INDA and INDB data on Form 6G-OR to verify that the %Resolution between adjacent peaks is ≥ 90.0% on both GC columns.

4. Mid-point Individual Standard Mixture C

    a. Check the ICAL and CCV mid-point INDC data on Form 6G-OR to verify that the %Resolution between adjacent peaks is ≥ 80.0% for the primary column and ≥ 50.0% for the secondary column.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the Contract Compliant Screening (CCS) process. Information regarding the noncompliant %Resolution and %Breakdown can be obtained from the National Functional Guidelines (NFG) reports and may be used as part of the evaluation process.

## E. Action

1. Resolution Check Mixture

    a. If the RESC is not performed at the specified sequence or frequency, use professional judgment to qualify detects and non-detects.

    b. If the RESC %Resolution criteria are not met, qualify detects as presumptively present with estimated concentration (NJ) and non-detects as unusable (R).

2. Performance Evaluation Mixture

    a. If the PEM is not performed at the specified frequency and sequence, qualify detects and non-detects as unusable (R).

    b. If the PEM %Resolution criteria are not met, qualify detects as presumptively present with estimated concentration (NJ) and non-detects as unusable (R).

    c. If the 4,4'-DDT %Breakdown is > 20.0%, qualify detected 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE as estimated (J). When 4,4'-DDT is not detected, but 4,4'-DDD and 4,4'-DDE are detected, qualify non-detected 4,4'-DDT as unusable (R) and detected 4,4'-DDD and 4,4'-DDE as presumptively present with estimated concentration (NJ).

    d. If the Endrin %Breakdown > 20.0%, qualify detected Endrin, Endrin aldehyde, and Endrin ketone as estimated (J). When Endrin is not detected, but Endrin aldehyde and Endrin ketone are detected, qualify non-detected Endrin as unusable (R) and detected Endrin aldehyde and Endrin ketone as presumptively present with estimated concentration (NJ).

    e. If the combined %Breakdown for 4,4'-DDT and Endrin is > 30.0%, consider the degree of individual breakdown of 4,4'-DDT and Endrin and qualify as in Sections II.E.2.c and II.E.2.d accordingly.

3. Mid-point Individual Standard Mixtures (A and B) or (C)

    a. If the mid-point Individual Standard Mixture CS3 is not performed at the specified frequency, qualify detects and non-detects as unusable (R).

4. If the mid-point Individual Standard Mixture CS3 %Resolution criteria are not met, qualify detects as presumptively present with estimated concentration (NJ) and non-detects as unusable (R).

5. Annotate the potential effects on the sample data resulting from the instrument performance check criteria in the Data Review Narrative.

6. If the laboratory has repeatedly failed to comply with the requirements for linearity, %Resolution, or 4,4'-DDT/Endrin %Breakdown, notify the EPA Regional CLP COR.

**Table 54. GC/ECD Instrument Performance Check Actions**

| Criteria | | Action | |
|---|---|---|---|
| | | **Detect** | **Non-detect** |
| RESC not performed at the specified frequency and sequence | | Use professional judgment | Use professional judgment |
| RESC<br>% Resolution < 60.0% (INDA/INDB) | RESC<br>% Resolution < 80.0% (INDC, primary column)<br>% Resolution < 50.0% (INDC, secondary column) | NJ | R |
| PEM not performed at the specified frequency and sequence | | R | R |
| PEM %Resolution < 90.0% | | NJ | R |
| PEM: 4,4'-DDT %Breakdown > 20.0% and 4,4'-DDT is detected | | J for 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE | No qualification |
| PEM: 4,4'-DDT %Breakdown > 20.0% and 4,4'-DDT is not detected | | NJ for 4,4'-DDD and 4,4'-DDE | R for 4,4'- DDT |
| PEM: Endrin %Breakdown > 20.0% and Endrin is detected | | J for Endrin, Endrin aldehyde, and Endrin ketone | No qualification |
| PEM: Endrin %Breakdown > 20.0% and Endrin is not detected | | NJ for Endrin aldehyde and Endrin ketone | R for Endrin |
| PEM: Combined %Breakdown > 30% | | Apply qualifiers as described above considering degree of individual breakdown. | Apply qualifiers as described above considering degree of individual breakdown. |
| CS3 INDA/INDB or INDC not performed at the specified frequency | | R | R |
| %Resolution < 90.0% (CS3 INDA and INDB) | %Resolution < 80.0% (CS3 INDC, primary column)<br>%Resolution < 50.0% ( CS3 INDC, secondary column) | NJ | R |

## III. Initial Calibration

### A. Review Items

Form 6B-OR, Form 6C-OR, Form 6D-OR, Form 6E-OR, Form 6F-OR, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/PEST, Sections 7.2.2 and 9.3)

### B. Objective

The objective of initial calibration (ICAL) is to ensure that the instrument is capable of producing acceptable qualitative and quantitative data.

### C. Criteria

1. INDA/INDB or INDC must be analyzed at five concentration levels during the ICAL on each GC column and instrument used for analysis. The ICAL shall be performed following a specific sequence as in the recommended Sequence 1 or 2 in Tables 56 and 57.
2. The five concentration level standards containing all single component target analytes and surrogates shall be prepared in either Individual Standard Mixtures A and B or Individual Mixture C at the concentration levels listed in Table 55.
3. A single-point Toxaphene calibration at low standard should be included in the initial calibration at a minimum. Optionally, all five-point ICAL standards at Toxaphene concentration levels in Table 55 may be included in the ICAL as in Sequence 1 or 2 in Tables 56 and 57. When Toxaphene is identified in any sample analysis with a single-point ICAL, a 5-point calibration must be performed for Toxaphene qualitative and quantitative analysis in the sample reanalysis.
4. The Mean Retention Times ($\overline{RT}$s) of each single component target analyte and surrogates are determined from the five-point ICAL. For Toxaphene, Retention Times (RTs) are determined for five major peaks. The peaks chosen must not share the same RT window as any single component target analyte. The RT for the surrogates is measured from each INDA and INDB.
5. An RT window must be calculated for each single component target analyte, each Toxaphene peak, and each surrogate, accordingly.

**NOTE:** At least one chromatogram from each of the Individual Standard Mixtures (A and B) or (C) must yield peaks that give recorder deflections between 50-100% of full scale.

**Table 55. Concentration Levels of Calibration Standards**

| Analyte | Concentration (ng/mL) | | | | |
|---|---|---|---|---|---|
| | CS1 | CS2 | CS3 | CS4 | CS5 |
| alpha-BHC | 5.0 | 10 | 20 | 40 | 80 |
| gamma-BHC | 5.0 | 10 | 20 | 40 | 80 |
| Heptachlor | 5.0 | 10 | 20 | 40 | 80 |
| Endosulfan I | 5.0 | 10 | 20 | 40 | 80 |
| Dieldrin | 10 | 20 | 40 | 80 | 160 |
| Endrin | 10 | 20 | 40 | 80 | 160 |
| 4,4'-DDD | 10 | 20 | 40 | 80 | 160 |
| 4,4'-DDT | 10 | 20 | 40 | 80 | 160 |
| Methoxychlor | 50 | 100 | 200 | 400 | 800 |
| beta-BHC | 5.0 | 10 | 20 | 40 | 80 |

| Analyte | Concentration (ng/mL) | | | | |
|---|---|---|---|---|---|
| | **CS1** | **CS2** | **CS3** | **CS4** | **CS5** |
| delta-BHC | 5.0 | 10 | 20 | 40 | 80 |
| Aldrin | 5.0 | 10 | 20 | 40 | 80 |
| Heptachlor-epoxide | 5.0 | 10 | 20 | 40 | 80 |
| 4,4'-DDE | 10 | 20 | 40 | 80 | 160 |
| Endosulfan II | 10 | 20 | 40 | 80 | 160 |
| Endosulfan sulfate | 10 | 20 | 40 | 80 | 160 |
| Endrin ketone | 10 | 20 | 40 | 80 | 160 |
| Endrin aldehyde | 10 | 20 | 40 | 80 | 160 |
| cis-Chlordane | 5.0 | 10 | 20 | 40 | 80 |
| trans-Chlordane | 5.0 | 10 | 20 | 40 | 80 |
| Tetrachloro-m-xylene (surrogate) | 5.0 | 10 | 20 | 40 | 80 |
| Decachlorobiphenyl (surrogate) | 10 | 20 | 40 | 80 | 160 |
| Toxaphene | 500 | 1000 | 2000 | 4000 | 8000 |

6. Calibration Factors (CFs) must be calculated for each single component target analyte, each of the five major Toxaphene peaks, and each surrogate in the ICAL standard. Mean Calibration Factor ($\overline{CF}$) must be calculated accordingly for the 5-point ICAL.

7. The Percent Relative Standard Deviation (%RSD) of the CFs for each of the single component target analytes must be ≤ 20.0%, except for alpha-BHC and delta-BHC. The %RSD of the CFs for alpha-BHC and delta-BHC must be ≤ 25.0%. The %RSD of the CFs for each of the Toxaphene peaks must be ≤ 30.0% when a 5-point ICAL is performed. The %RSD of the CFs for the two surrogates [tetrachloro-m-xylene (TCX) and decachlorobiphenyl (DCB)] must be ≤ 30.0%.

**NOTE:** Either peak area or peak height may be used to calculate the CFs that are, in turn, used to calculate the %RSD. However, the type of peak measurement used to calculate each CF for a given compound must be consistent. For example, if peak area is used to calculate the low-point CF for Endrin, the mid-point and high-point CFs for Endrin must also be calculated using peak area.

**Table 56. Initial Calibration Sequence 1**

| Initial Calibration Sequence 1 | |
|---|---|
| 1. | Resolution Check |
| 2. | PEM |
| 3. | Toxaphene CS1 |
| 4. | Toxaphene CS2 |
| 5. | Toxaphene CS3 |
| 6. | Toxaphene CS4 |
| 7. | Toxaphene CS5 |
| 8. | CS1 Individual Standard Mixture C |
| 9. | CS2 Individual Standard Mixture C |
| 10. | CS3 Individual Standard Mixture C |
| 11. | CS4 Individual Standard Mixture C |
| 12. | CS5 Individual Standard Mixture C |
| 13. | Instrument Blank |
| 14. | PEM |

**Table 57. Initial Calibration Sequence 2**

| Initial Calibration Sequence 2 | |
|---|---|
| 1. | Resolution Check |
| 2. | PEM |
| 3. | Toxaphene CS1 |
| 4. | Toxaphene CS2 |
| 5. | Toxaphene CS3 |
| 6. | Toxaphene CS4 |
| 7. | Toxaphene CS5 |
| 8. | CS1 Individual Standard Mixture A |
| 9. | CS1 Individual Standard Mixture B |
| 10. | CS2 Individual Standard Mixture A |
| 11. | CS2 Individual Standard Mixture B |
| 12. | CS3 Individual Standard Mixture A |
| 13. | CS3 Individual Standard Mixture B |
| 14. | CS4 Individual Standard Mixture A |
| 15. | CS4 Individual Standard Mixture B |
| 16. | CS5 Individual Standard Mixture A |
| 17. | CS5 Individual Standard Mixture B |

| Initial Calibration Sequence 2 | |
|---|---|
| 18. | Instrument Blank |
| 19. | PEM |

**NOTE:** For ICAL Sequence 2, Individual Standards for Mixture B may be analyzed before corresponding Individual Standards for Mixture A.

## D. Evaluation

1. Verify that the ICAL is performed at the specified frequency and sequence. Verify that the proper ICAL sequence (1 or 2) is used depending on if INDC or INDA/INDB is used. Verify that a single-point Toxaphene calibration at low standard is included in the ICAL or a 5-point Toxaphene calibration is included in either one of the ICAL sequence 1 and 2.
2. Check the raw data for each standard in the ICAL to verify that the concentration for each single component target analyte, Toxaphene, and surrogate is at the specified concentration level.
3. Check the INDA/INDB data or INDC data and Form 6B-OR to review the calculated RT windows for calculation and transcription errors.
4. Check the Toxaphene ICAL standard data and Form 6D-OR to verify that five major peaks are used for identification, and RT windows are calculated as specified. Verify that the peaks chosen do not share the same RT window as any single component target analyte in any Individual Standard Mixture.
5. Check the chromatograms and verify that at least one chromatogram from each of the INDA/INDB, INDC, or Toxaphene standard yields peaks registering recorder deflections between 50-100% of full scale.
6. Check and recalculate the CFs, $\overline{CF}$s, and %RSDs for one or more single component target analytes in INDA/INDB, INDC, or Toxaphene standard. Verify that the recalculated values agree with the reported values on Form 6C-OR and Form 6E-OR. If errors are detected, perform a more comprehensive recalculation and review.
7. Verify that the %RSD for each single component target analyte, each of the five major Toxaphene peaks and each surrogate in the initial standard is within the acceptance limits.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant RT windows and %RSDs can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the ICAL is not performed at the specified frequency or sequence, use professional judgment to qualify detects and non-detects. Contact the EPA Regional CLP COR to arrange for reanalysis, if possible, or note in the Data Review Narrative for later EPA Regional CLP COR action.
2. If the ICAL is not performed at the specified concentrations, use professional judgment to qualify detects and non-detects. This is especially critical for the low-level standards and non-detects.
3. If errors are detected in the calculations of RT windows, CFs, $\overline{CF}$s, or %RSD, perform a more comprehensive recalculation.
4. If the chromatogram display criteria are not met, use professional judgment to qualify detects and non-detects. Contact the EPA Regional CLP COR to arrange for a revised report, or note in the Data Review Narrative for later EPA Regional CLP COR action.
5. If the %RSD for any target analyte or surrogate is outside the acceptance limits, qualify detects as estimated (J). Use professional judgment to qualify non-detects.

6. If the %RSD for all target analytes are within the acceptance limits, detects and non-detects should not be qualified.
7. Based on the project-specific Data Quality Objectives (DQOs), a more in-depth review may be necessary. The following guidelines are recommended:
    a. If the %RSD criteria of any target analytes are not met, and if the %RSD criteria are still not satisfied after eliminating either the high- or the low-point of the ICAL:
        i. Qualify detects in the associated samples as estimated (J).
        ii. Use professional judgment to qualify non-detects in the associated samples.
    b. If the high-point of the ICAL curve is outside of the %RSD criteria (e.g., due to saturation):
        i. Qualify detects in the associated samples with analyte concentrations greater than the high-point concentration as estimated (J).
        ii. Detects in the associated samples with analyte concentrations within the calibration range should not be qualified.
        iii. Non-detects in the associated samples should not be qualified.
    c. If the low-point of the ICAL curve is outside of the %RSD criteria:
        i. Qualify detects in the associated samples with analyte concentrations in the non-linear range as estimated (J).
        ii. Detects in the associated samples with analyte concentrations within the calibration range should not be qualified.
        iii. For non-detects in the associated samples, use the lowest point of the linear portion of the ICAL curve to determine the new quantitation limit.
8. If the laboratory failed to provide adequate calibration information, notify the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data.
9. Annotate the potential effects on the reported data due to exceeding the ICAL criteria in the Data Review Narrative.
10. If the ICAL criteria are grossly exceeded, contact the EPA Regional CLP COR to arrange for reanalysis, if possible, or note it in the Data Review Narrative for later EPA Regional CLP COR action.

**Table 58. Initial Calibration Action for Pesticide Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| Initial calibration not performed or not performed at specified frequency and sequence | Contact the EPA Regional CLP COR for reanalysis or use professional judgment | Contact the EPA Regional CLP COR for reanalysis or use professional judgment |
| Initial calibration not performed at the specified concentrations | Contact the EPA Regional CLP COR for reanalysis or use professional judgment | Contact the EPA Regional CLP COR for reanalysis or use professional judgment |
| RT windows incorrect<br>Or<br>Chromatogram criteria not met | Contact the EPA Regional CLP COR for reanalysis or use professional judgment | Contact the EPA Regional CLP COR for reanalysis or use professional judgment |
| %RSD outside acceptance limits* | J | Use professional judgment |
| %RSD within acceptance limits* | No qualification | No qualification |

* %RSD $\leq$ 20.0% for single component target analytes except alpha-BHC and delta-BHC.

%RSD $\leq$ 25.0% for alpha-BHC and delta-BHC.

%RSD $\leq$ 30.0% for Toxaphene peaks.

%RSD $\leq$ 20.0% for surrogates (TCX and DCB).

## IV. Continuing Calibration Verification

### A. Review Items

Form 7B-OR, Form 7C-OR, Form 7D-OR, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/PEST, Sections 7.2.2 and 9.4)

### B. Objective

The objective is to ensure that the instrument continues to meet the sensitivity and linearity criteria to produce acceptable qualitative and quantitative data throughout each analytical sequence.

### C. Criteria

1. The calibration for each GC/ECD system used for analysis must be verified at the beginning and end of every 12-hour period of operation. A CCV consisting of the analyses of instrument blanks, the PEM, and the mid-point ICAL standard CS3 for INDA and INDB or INDC is performed. The opening and closing CCVs consist of an injection of an instrument blank followed by either an injection of an PEM or mid-point concentration of INDA and INDB or INDC in an alternating fashion (i.e., if the PEM is part of the opening CCV, the mid-point ICAL standard CS3 for INDA and INDB or INDC must be part of the closing CCV). For Toxaphene analyses under a five-point calibration, the sequence must end with an instrument blank and a CS3 Toxaphene Standard.
2. The CCV PEM standard must contain the specified target analytes and surrogates at the specified concentration.
3. The CCV CS3 standards must contain all required target analytes and surrogates at or near the mid-point standard concentration of the ICAL.
4. The absolute RT for each single component target analyte and surrogate in the CCV PEM and CS3 of INDA and INDB or INDC must be within the RT windows determined from the ICAL. If the CCV CS3 of Toxaphene is required, the absolute RT for each Toxaphene peak must be within the RT windows determined from the ICAL.
5. The Percent Difference (%D) between the calculated amount and the nominal amount (amount added) for each single component target analyte and surrogate in the CCV PEM must be calculated. The %Breakdown of 4,4'-DDT, %Breakdown of Endrin, and combined %Breakdown of 4,4'-DDT and Endrin must be calculated accordingly for the CCV PEM.
6. The %D between the CF and $\overline{CF}$ from the associated ICAL for each target analyte and surrogate in CCV CS3 and the CF %D for each Toxaphene peak in the applicable CCV CS3 must be calculated accordingly.
7. The %D for each single component target analyte and surrogate in the CCV PEM must be in the inclusive range of ±25.0%.
8. The %Breakdown of 4,4'-DDT and %Breakdown of Endrin in the CCV PEM must be ≤ 20.0%, and the combined %Breakdown of 4,4'-DDT and Endrin in the CCV PEM must be ≤ 30.0%.
9. The %D for each target analyte and surrogate in the CCV CS3 must be in the inclusive range of ±25.0%.
10. The %D for each Toxaphene peak in the applicable the CCV CS3 must be in the inclusive range of ±25.0%.
11. Instrument blanks paired with either a PEM or CS3 standard must bracket the 12-hour analytical sequence. The concentration of each target analyte in the instrument blank must not exceed the Contract Required Quantitation Limit (CRQL).
12. No more than 14 hours may elapse from the injection of the instrument blank that begins an analytical sequence (opening CCV) and the injection of either a PEM or CS3 standard that ends an analytical sequence (closing CCV).

13. No more than 12 hours may elapse from the injection of the instrument blank that begins an analytical sequence (opening CCV) and the injection of the last sample or blank that is part of the same analytical sequence.

## D. Evaluation

1. Verify that the CCV PEM and CS3 standard (including Toxaphene CS3) are analyzed at the specified frequency and sequence, and that each CCV standard is associated to the correct ICAL.
2. Verify that specified target analytes and surrogates at the correct concentrations are included in the CCV PEM.
3. Verify that the mid-point standard CS3 from the ICAL is used for the CCV and the specified target analytes and surrogates are included in each CS3 standard.
4. Verify that the absolute RT for each single component target analyte and surrogate in the CCV PEM and CS3 standard of INDA and INDB or INDC are within the RT windows determined from the ICAL. Verify that the absolute RT for each Toxaphene peak in the applicable CS3 standard is within the RT window determined from the ICAL.
5. Verify that the %D for each single component target analyte and surrogate in the CCV PEM is calculated correctly; that the %Breakdown of 4,4'-DDT, %Breakdown of Endrin, and combined %Breakdown of 4,4'-DDT and Endrin in the CCV PEM are calculated correctly; and that the recalculated values agree with the laboratory reported values on Form 7B-OR. Recalculate the %D for at least one target analyte, surrogate, and all three %Breakdowns in each CCV PEM.
6. Verify that the %D for each target analyte and surrogate in the CCV CS3 and the CF %D for each Toxaphene peak in the applicable CCV CS3 are calculated correctly, and that the recalculated values agree with the laboratory reported values on Form 7C-OR and Form 7D-OR, respectively. Recalculate the %D for at least one target analyte, surrogate, and all five Toxaphene peaks in each CS3 standard.
7. Verify that the %D for each single component target analyte and surrogate in the CCV PEM are in the inclusive range of ±25.0%.
8. Verify that the %Breakdown of 4,4'-DDT and %Breakdown of Endrin in CCV PEM are ≤ 20.0% and that the combined %Breakdown of 4,4'-DDT and Endrin in CCV PEM is ≤ 30.0%.
9. Verify that the %D for each target analyte and surrogate in CCV CS3 are in the inclusive range of ±25.0%.
10. Verify that the %D for each Toxaphene peak in the applicable CCV CS3 is in the inclusive range of ±25.0%.
11. Verify that the instrument blanks paired with either the PEM or CS3 standard are analyzed at the specified frequency and sequence, and that the concentration of each target analyte in the instrument blank is not exceeding the CRQL.
12. Verify that the time elapsed between the injection of an instrument blank as opening CCV and the injection of either a PEM or CS3 as closing CCV is within 14 hours.
13. Verify that the time elapsed between the injection of an instrument blank as opening CCV and the injection of the last sample or blank in the same analytical sequence is within 12 hours.

**NOTE:** For data obtained from the CLP, information regarding the noncompliant CCV can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the CCV PEM or CS3 is not performed at the specified frequency and sequence, contact the EPA Regional CLP COR to request that the laboratory repeat the analysis if holding times have not expired and there is extract remaining. If reanalysis is not possible, carefully evaluate all other available information, including the quality of analyte peak shapes and RT match of surrogates on both columns, and compare to the most recent calibration performed on the same instrument under the same conditions. Using this information and professional judgment, the reviewer may be able to justify unqualified acceptance of qualitative results and qualification of all quantitative results as estimated (J). Otherwise, qualify all detects and non-detects as unusable (R).
2. If the CCV PEM is not performed at the specified concentration, use professional judgment to qualify detects and non-detects.
3. If the CCV CS3 is not performed at the specified concentration, use professional judgment to qualify detects and non-detects.
4. If the RT of any target analyte in the CCV PEM and CS3 standard is outside the RT window, carefully evaluate the associated sample results. All samples injected after the last in-control standard are potentially affected.
    a. For non-detected target analytes in the affected samples, check the sample chromatograms that may contain any peaks that are close to the expected RT window of the target analytes of interest.
        i. If no peaks are present, non-detects should not be qualified.
        ii. If any peaks are present close to the expected RT window of the analytes of interest, use professional judgment to qualify the non-detects as presumptively present with estimated concentration (NJ).
    b. For detected target analytes in the affected samples, check the sample chromatograms that may contain any peaks that are close to the expected RT window of the target analytes of interest.

        If the peaks are close to the expected RT window of the pesticide of interest, it may require additional effort to determine if sample peaks represent the target analytes of interest.

        For example, the data package may be examined for the presence of three or more standards containing the target analytes of interest that were run within the analytical sequence during which the sample was analyzed. If three or more such standards are present, the RT windows can be re-evaluated using the $\overline{RT}$s of the standards.
        i. If the peaks in the affected sample fall within the revised windows, qualify detects as presumptively present with estimated concentration (NJ).
        ii. If the problem of concern remains unresolved, qualify detects as unusable (R).
5. If errors are detected in the calculations of either the %D or %Breakdown in the CCV PEM, perform a more comprehensive recalculation.
6. If errors are detected in the calculations of the %D in any CS3 standard or %D for any Toxaphene peak in the applicable CCV CS3, perform a more comprehensive recalculation. Contact the EPA Regional CLP COR to arrange for data resubmittal and note it in the Data Review Narrative for later EPA Regional CLP COR action.
7. If the %D for any target analyte in the CCV PEM is outside the limits, qualify detects as estimated (J) and non-detects as estimated (UJ).
8. If the 4,4'-DDT %Breakdown is > 20.0%, qualify detected 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE as estimated (J). When 4,4'-DDT is not detected, but 4,4'-DDD and 4,4'-DDE are detected, qualify non-detected 4,4'-DDT as unusable (R) and detected 4,4'-DDD and 4,4'-DDE as presumptively present with estimated concentration (NJ).

9. If the Endrin %Breakdown > 20.0%, qualify detected Endrin, Endrin aldehyde, and Endrin ketone as estimated (J). When Endrin is not detected, but Endrin aldehyde and Endrin ketone are detected, qualify non-detected Endrin as unusable (R) and detected Endrin aldehyde and Endrin ketone as presumptively present with estimated concentration (NJ).
10. If the combined %Breakdown for 4,4'-DDT and Endrin is > 30.0%, consider the degree of individual breakdown of 4,4'-DDT and Endrin and qualify as in Sections IV.E.8 and IV.E.9 accordingly.
11. If the %D for any target analyte in CCV CS3 is outside the limits, qualify detects as estimated (J) and non-detects as estimated (UJ).
12. If the time elapsed between the injection of an instrument blank as opening CCV and the injection of either a PEM or CS3 as closing CCV exceeds 14 hours, carefully evaluate instrument stability during the entire sequence to decide whether degradation has occurred, including column bleed, RTs, peak shapes, and surrogate recovery. If system degradation has been found, qualify positive results as estimated (J). If any possibility exists for either false positives or false negatives, qualify non-detects as unusable (R).
13. If the time elapsed between the injection of an instrument blank as opening CCV and the injection of the last sample or blank in the same analytical sequence exceeds 12 hours, carefully evaluate instrument stability during the entire sequence to decide whether degradation has occurred, including column bleed, RTs, peak shapes, and surrogate recovery. If system degradation has been found, qualify positive results as estimated (J). If any possibility exists for either false positives or false negatives, qualify non-detects as unusable (R).
14. If the RT for each target analyte in PEM and CS3 standards are within the RT windows, and the %D for the specified target analyte and %Breakdown in PEM are within the respective limits, and the %D for each target analyte in CCV CS3 is within the limits, detects and non-detects should not be qualified.
15. No qualification of the data is necessary based on the surrogate %D alone. Use professional judgment to evaluate the surrogate %D data in conjunction with surrogate recoveries to determine the need for data qualification.
16. If an instrument blank as part of the CCV is not performed at the specified frequency and sequence, or instrument blank does not meet the concentration criteria, refer to Section V. Blanks for data qualifications.
17. If the laboratory has failed to provide adequate calibration information, contact the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data.
18. Note the potential effects on the data due to CCV criteria exceedance in the Data Review Narrative.
19. If the CCV criteria are grossly exceeded, note this for EPA Regional CLP COR action.

**Table 59. CCV Actions for Pesticide Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| CCV PEM and CS3 not performed at the correct frequency and sequence | Contact the EPA Regional CLP COR for reanalysis or use professional judgment | Contact the EPA Regional CLP COR for reanalysis or use professional judgment |
| CCV PEM not performed at the specified concentration | Contact the EPA Regional CLP COR for reanalysis or use professional judgment | Contact the EPA Regional CLP COR for reanalysis or use professional judgment |
| CCV CS3 not performed at the specified concentration | Contact the EPA Regional CLP COR for reanalysis or use professional judgment | Contact the EPA Regional CLP COR for reanalysis or use professional judgment |
| RT outside the RT window | Use professional judgment | Use professional judgment |
| PEM %D outside the limits | J | UJ |
| PEM: 4,4'-DDT %Breakdown >20.0% and 4,4'-DDT is detected | J for 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE | No qualification |
| PEM: 4,4'-DDT %Breakdown >20.0% and 4,4'-DDT is not detected | NJ for 4,4'-DDD and 4,4'-DDE | R for 4,4'-DDT |
| PEM: Endrin %Breakdown >20.0% and Endrin is detected | J for Endrin, Endrin aldehyde, and Endrin ketone | No qualification |
| PEM: Endrin %Breakdown >20.0% and Endrin is not detected | NJ for Endrin aldehyde and Endrin ketone | R for Endrin |
| PEM: Combined %Breakdown >30% | Apply qualifiers as described above considering degree of individual breakdown | Apply qualifiers as described above considering degree of individual breakdown |
| CS3 %D outside the limits | J | UJ |
| Time elapsed between opening CCV Pesticide Instrument Blank and closing CCV PEM or CS3 exceeds 14 hours | Use professional judgment | Use professional judgment |
| Time elapsed between opening CCV Pesticide Instrument Blank and last sample or blank exceeds 12 hours | Use professional judgment | Use professional judgment |
| RT, PEM %D, PEM %Breakdown, CS3 %D, and time elapsed within limits | No qualification | No qualification |

# V. Blanks

## A. Review Items

Form 1A-OR, Form 4-OR, chromatograms, and quantitation reports. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/PEST, Section 12.1)

## B. Objective

The objective of a blank analysis results assessment is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities.

## C. Criteria

The criteria for evaluation of blanks should apply to any blank associated with the samples (e.g., method blanks, instrument blanks, sulfur cleanup blank, field blanks, etc.). If problems with any blank exist, all associated data must be carefully evaluated to determine whether or not there is an inherent variability in the data or if the problem is an isolated occurrence not affecting other data.

1. Method blank analyses must be performed at the specified frequency and sequence. A method blank must be extracted per matrix each time when samples are extracted. The number of samples extracted with each method blank shall not exceed 20 field samples. The method blank must be extracted by the same procedure used to extract samples and analyzed on each GC system under the same conditions used to analyze associated samples.
2. The method blank, like any other sample in the SDG, must meet the technical acceptance criteria for sample analysis.
3. An acceptable instrument blank must be analyzed at the beginning and end of an analytical sequence in which samples are analyzed, immediately prior to the analysis of the PEM or mid-point INDA/INDB or INDC used as the CCV.
4. A sulfur cleanup blank must be analyzed whenever part of a set of the extracted samples requires sulfur cleanup. If the entire set of samples associated with a method blank requires sulfur cleanup, the method blank also serves the purpose of a sulfur cleanup blank and a separate sulfur cleanup blank is not required.
5. The TCLP/SPLP Leachate Extraction Blank (LEB) must be prepared and analyzed at the specified frequency and sequence.
6. The concentration of a target analyte in any blanks must not exceed its CRQL.

## D. Evaluation

1. Verify that method blanks are extracted at the specified frequency and analyzed at the required sequence. The Method Blank Summary (Form 4-OR) may be used to identify the samples associated with each method blank.
2. Verify that applicable TCLP/SPLP LEBs are analyzed at the specified frequency and sequence. The Method Blank Summary (Form 4-OR) may be used to identify the samples associated with each TCLP/SPLP LEB.
3. Verify that instrument blanks are analyzed at the specified frequency and sequence.
4. Verify that the sulfur cleanup blank is analyzed when part of a set of samples extracted together requires sulfur cleanup. The Method Blank Summary (Form 4-OR) may be used to identify the samples associated with the sulfur cleanup blank.
5. Data concerning the field blanks are not evaluated as part of the CCS process. Evaluations on field or trip blanks should be similar to the method blanks.
6. Review the results of all associated blanks on the forms and raw data (chromatograms and quantitation reports) to evaluate the presence of target analytes in the blanks.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant blank can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the appropriate blanks are not extracted at the correct frequency and/or analyzed at the correct sequence, use professional judgment to determine if the associated sample data should be qualified. Obtain additional information from the laboratory, if necessary. Record the situation in the Data Review Narrative and note it for EPA Regional CLP COR action.
2. Action regarding unsuitable blank results depends on the circumstances and origin of the blank. Verify that data qualification decisions based on field quality control (QC) are supported by the project Quality Assurance Project Plan (QAPP) or EPA Regional Standard Operating Procedure (SOP). At a minimum, contamination found in field blanks should be documented in the Data Review Narrative. In instances where more than one blank is associated with a given sample, qualification should be based upon a comparison with the associated blank having the highest concentration of a contaminant. Do not correct the results by subtracting any blank value.
3. For any blank (including method blank), if a target analyte is detected, but it is not detected in the sample, non-detects should not be qualified.
4. For any method blank reported with results < CRQLs, report sample results that are < CRQLs at the CRQLs and qualify as non-detect (U). For any method blank reported with results that are < CRQLs, use professional judgment to qualify sample results that are ≥ CRQLs. Positive results in samples, especially those near but above the CRQL, may be biased high by low level contamination in the method blank, and should be considered as estimated (J+).
5. For any method blank reported with results ≥ CRQLs, report sample results that are < CRQLs at the CRQLs and qualify as non-detect (U). For any method blank reported with results ≥ CRQLs, report sample results that are ≥ CRQLs but < Blank Results at sample results and qualify as non-detect (U) or as unusable (R). Use professional judgment to qualify sample results that ≥ CRQLs and ≥ Blank Results.
6. For TCLP/SPLP LEBs, sulfur cleanup blanks, instrument blanks, and field blanks, sample result qualifications listed in Table 60 should apply if supported by the project QAPP.
7. If gross contamination exists with blank results that are > ICAL CS5 concentrations, qualify detects as unusable (R). If the contamination is suspected of having an effect on the sample results, note it for EPA Regional CLP COR action.
8. There may be instances where little or no contamination is present in the associated blanks, but qualification of the sample is deemed necessary. If it is determined that the contamination is from a source other than the sample, the data should be qualified or, in the case of field QC, should at least be documented in the Data Review Narrative. Contamination introduced through dilution water is one example. Although it is not always possible to determine, instances of this occurring can be detected when contaminants are found in the diluted sample result, but are absent in the undiluted sample.

**Table 60. Blank and TCLP/SPLP LEB Actions for Pesticide Analysis**

| Blank Type | Blank Result | Sample Result | Action |
|---|---|---|---|
| Method, TCLP/SPLP LEB, Sulfur cleanup, Instrument, Field | Detects | Non-detect | No qualification |
| | < CRQL | < CRQL | Report at CRQL and qualify as non-detect (U) |
| | | ≥ CRQL | Use professional judgment |
| | ≥ CRQL | < CRQL | Report at CRQL and qualify as non-detect (U) |
| | | ≥ CRQL but < Blank Result | Report at sample result and qualify as non-detect (U) or as unusable (R) |
| | | ≥ CRQL and ≥ Blank Result | Use professional judgment |
| | Gross contamination | Detect | Report at sample result and qualify as unusable (R) |

## VI. Surrogate

### A. Review Items

Form 2C-OR, Form 8B-OR, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/PEST, Sections 7.2.2.7 and 11.2.6)

### B. Objective

The objective is to evaluate surrogate percent recovery (%R) to ensure that the analytical method is efficient.

### C. Criteria

1. Surrogate spiking solution containing two surrogates, TCX and DCB, is added to all samples, including Matrix Spike (MS)/Matrix Spike Duplicates (MSDs), Laboratory Control Samples (LCSs), and blanks to measure the surrogate recovery. The surrogates are also added to all the standards to monitor RTs.
2. The RTs of the surrogates in each PEM, mid-point Individual Standard Mixtures A and B or Individual Standard Mixture C used for the CCV, all samples (including MS/MSD and LCS), and all blanks must be within the calculated RT windows. TCX must be within ±0.05 minutes, and DCB must be within ±0.10 minutes of the $\overline{RT}$s determined from the ICAL.
3. The %R for the surrogates TCX and DCB in all samples, including MS/MSDs, LCSs, and all blanks, must be calculated accordingly.
4. The %R for each surrogate must be in the inclusive range of 30-150% for all samples, including MS/MSDs, LCSs, and all blanks.

### D. Evaluation

1. Check the raw data (e.g., chromatograms and data system printouts) to verify that the surrogates are added at the specified concentrations to all samples and blanks.
2. Check the raw data (e.g., chromatograms and data system printouts) to verify that the surrogate RTs on Form 8B-OR are within the RT windows.
3. Check the raw data (e.g., chromatograms and data system printouts) to verify that the surrogate %R for each sample and blank is on Form 2C-OR.
4. Check for any calculation or transcription errors. Verify that the surrogate recoveries are calculated correctly using the equation in the method.
5. Whenever there are two or more analyses for a particular sample, use professional judgment to determine which analyses is the most accurate data to report. Considerations include, but are not limited to:
   a. Surrogate recovery (marginal versus gross deviation).
   b. Technical holding times.
   c. Comparison of the results of the target compounds reported in each sample analysis.
   d. Other QC information, such as surrogate recoveries and/or RTs in blanks and standards.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant surrogate recovery can be obtained from the NFG reports and may be used as part of the evaluation process.

### E. Action

1. If surrogates are not added to any sample or blank, or surrogate concentration is incorrect in the sample or blank, use professional judgment to qualify detects and non-detects. Contact the EPA Regional CLP COR to arrange for reanalysis, if possible.

2. If surrogate RTs in the PEMs, Individual Standard Mixtures, samples, and blanks are outside of the RT windows, use professional judgment to qualify detects and non-detects.
3. If surrogate RTs are within RT windows, detects and non-detects should not be qualified.
4. If errors are detected in the calculations of the %R, perform a more comprehensive recalculation. It may be necessary to have the laboratory resubmit the data after making corrections.
5. If the %R for any surrogate is outside the acceptance limits, consider the existence of coelution and interference in the raw data. Use professional judgment to qualify data, as surrogate recovery problems may not directly apply to target analytes.
6. If the %R for any surrogate in undiluted sample is < 10%, qualify detects as estimated low (J-) and non-detects as unusable (R).
7. If the %R for any surrogate in diluted sample is < 10%, use professional judgment to qualify detects and non-detects.
8. If the %R for any surrogate is ≥ 10% and < 30%, qualify detects as estimated low (J-) and non-detects as estimated (UJ).
9. If the %R for both surrogates are ≥ 30% and ≤ 150%, detects and non-detects should not be qualified.
10. If the %R for any surrogate is > 150% but ≤ 200%, qualify detects as estimated high (J+). Non-detects should not be qualified.
11. If the %R for any surrogate is > 200%, qualify detects as estimated high (J+). Use professional judgment to qualify non-detects.
12. In the special case of a blank analysis with surrogate %R outside the acceptance limits, give special consideration to qualify the associated sample data. The basic concern is whether the blank problems represent an isolated problem with the blank alone, or whether there is a fundamental problem with the analytical process.

    For example, if one or more samples in the same extraction batch have surrogate %R within the acceptance limits, use professional judgment to determine if the blank problem is an isolated occurrence. Note analytical problems for EPA Regional CLP COR action even if this judgment allows some use of the affected data.

**Table 61. Surrogate Actions for Pesticide Analysis**

| Criteria | Action* | |
|---|---|---|
| | **Detect** | **Non-detect** |
| RT out of RT window | Use professional judgment | Use professional judgment |
| RT within RT window | No qualification | No qualification |
| %R < 10% (undiluted sample) | J- | R |
| %R < 10% (diluted sample) | Use professional judgment | Use professional judgment |
| 10% ≤ %R < 30% | J- | UJ |
| 30% ≤ %R ≤ 150% | No qualification | No qualification |
| 150% < %R ≤ 200% | J+ | No qualification |
| %R > 200% | J+ | Use professional judgment |

* Use professional judgment in qualifying data, as surrogate recovery problems may not directly apply to target analytes.

## VII. Matrix Spike/Matrix Spike Duplicate

### A. Review Items

SDG Cover Page, Form 3A-OR, chromatograms, and quantitation reports. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/PEST, Sections 7.2.2.8 and 12.2)

### B. Objective

The objective of MS/MSD analysis is to evaluate the effect of each sample matrix on the sample preparation procedures and the measurement methodology.

### C. Criteria

1. MS/MSD samples shall be prepared and analyzed at the specified frequency. One pair of MS/MSD samples should be analyzed per matrix or per SDG.
2. Samples identified as field blanks or Performance Evaluation (PE) samples cannot be used for MS/MSD sample analysis.
3. The MS/MSD %R and the Relative Percent Difference (RPD) between MS and MSD results should be calculated according to the method.
4. The MS/MSD %R and RPD shall be within the acceptance limits in Table 62.

### D. Evaluation

1. Verify that requested MS/MSD samples were analyzed at the required frequency.
2. Verify that a field blank or PE sample was not used for MS/MSD analysis.
3. Verify that the recalculated MS/MSD %R and RPD values agree with the laboratory reported values on Form 3A-OR.
4. Inspect the MS/MSD %R and RPD on Form 3A-OR and verify that they are within the limits listed in Table 62.

**NOTE:** For data obtained from the CLP, the preceding criteria, including the required MS/MSD spiking analytes and spiking levels specified in Exhibit D – Pesticides Analysis, Table 7, of the SOW, are evaluated as part of the CCS process. Information regarding the noncompliant MS/MSD %R or RPD can be obtained from the NFG reports and may be used as part of the evaluation process.

### E. Action

1. If MS/MSD samples were not analyzed at the specified frequency, or were spiked with the wrong analytes or at the wrong concentrations, use professional judgment to determine the impact on sample data, if any. Obtain additional information from the laboratory, if necessary. Record the situation in the Data Review Narrative and note it for EPA Regional CLP COR action. It is not likely that data qualification will be warranted if the frequency requirements are not met. Carefully consider all factors, known and unknown, about method performance on the matrix at hand, in lieu of MS/MSD data.
2. If a field blank or PE sample was used for the MS/MSD analysis, note this for EPA Regional CLP COR action. All of the other QC data must then be carefully checked. Use professional judgment when evaluating the data.
3. If errors are detected in the calculations of the MS/MSD %R or RPD, perform a more comprehensive recalculation.
4. If the MS/MSD %R or RPD is outside the acceptance limits in Table 62, qualify the detects and non-detects in the original sample to include the consideration of the existence of interference in the raw data. Considerations include, but are not limited to:

a. If the MS/MSD %R is < 20%, qualify detects as estimated (J) and non-detects as unusable (R).

b. If the MS/MSD %R is ≥ 20% and < lower acceptance limit, qualify detects as estimated (J) and non-detects as estimated (UJ).

c. If the MS/MSD %R or RPD is ≥ lower acceptance limit and ≤ upper acceptance limit, detects and non-detects should not be qualified.

d. If the MS/MSD %R or RPD is > upper acceptance limit, qualify detects as estimated (J). Non-detects should not be qualified.

**Table 62. MS/MSD %R and RPD Limits for Pesticide Analysis**

| Analyte | %R for Water Sample | RPD for Water Sample | %R for Soil Sample | RPD for Soil Sample |
|---|---|---|---|---|
| gamma-BHC (Lindane) | 56 - 123 | 0 - 15 | 46 - 127 | 0 - 50 |
| Heptachlor | 40 - 131 | 0 - 20 | 35 - 130 | 0 - 31 |
| Aldrin | 40 - 120 | 0 - 22 | 34 - 132 | 0 - 43 |
| Dieldrin | 52 - 126 | 0 - 18 | 31 - 134 | 0 - 38 |
| Endrin | 56 - 121 | 0 - 21 | 42 - 139 | 0 - 45 |
| 4,4'-DDT | 38 - 127 | 0 - 27 | 23 - 134 | 0 - 50 |

**Table 63. MS/MSD Actions for Pesticide Analysis**

| Criteria | Action | |
|---|---|---|
| | Detect | Non-detect |
| %R < 20% | J | R |
| 20% ≤ %R < Lower Acceptance Limit | J | UJ |
| Lower Acceptance Limit ≤ %R or RPD ≤ Upper Acceptance Limit | No qualification | No qualification |
| %R or RPD > Upper Acceptance Limit | J | No qualification |

## VIII. Laboratory Control Sample

### A. Review Items

Form 3B-OR, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/PEST, Sections 7.2.2.9 and 12.3)

### B. Objective

The objective is to evaluate the accuracy of the analytical method and laboratory performance.

### C. Criteria

1. An LCS must be prepared and analyzed at the specified frequency. The LCS should be extracted and analyzed per matrix or per SDG. The LCS should be extracted using the same procedures as the samples and method blank.
2. The requirements below apply independently to each GC column and to all instruments used for these analyses. Quantitation must be performed on each GC column.
3. The LCS must contain the target analytes in Table 64 and the surrogates at the specified concentrations in the method (Table 7 in the SOW).
4. The %R for each spiked analyte in the LCS must be calculated according to the method.
5. The %R for each spiked analyte must be within the acceptance limits in Table 64.

**Table 64. LCS %R Limits for Pesticide Analysis**

| Analyte | %R Limits |
|---|---|
| gamma-BHC | 50 - 120 |
| Heptachlor epoxide | 50 - 150 |
| Dieldrin | 30 - 130 |
| 4,4'-DDE | 50 - 150 |
| Endrin | 50 - 120 |
| Endosulfan sulfate | 50 - 120 |
| trans-Chlordane | 30 - 130 |

**NOTE:** The %R limits for any spiked analyte in the LCS may be expanded at any time during the period of performance if the EPA determines that the limits are too restrictive.

6. All samples prepared and analyzed with an LCS that does not meet the technical acceptance criteria in the method will require re-extraction and reanalysis.

### D. Evaluation

1. Verify that the LCS is prepared and analyzed at the specified frequency.
2. Check the raw data (e.g., chromatograms and data system printouts) to verify that the LCS is spiked with the specified target analytes at the method specified concentrations (Table 7 in the SOW).
3. Check the raw data (e.g., chromatograms and data system printouts) to verify that the %R of each target analyte in the LCS is calculated correctly and that the recalculated %R values agree with that reported on Form 3B-OR.
4. Verify that the %R of each target analyte in the LCS is within the specified acceptance limits.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant LCS %R can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the LCS is not performed at the specified frequency, use professional judgment to qualify detects and non-detects in the associated samples.

**NOTE:** If an LCS sample is not analyzed at the specified frequency, use professional judgment to determine the impact on sample data. Obtain additional information from the laboratory, if necessary. Record the situation in the Data Review Narrative and note it for EPA Regional CLP COR action. It is not likely that data qualification will be warranted if the frequency requirement is not met. Carefully consider all factors, known and unknown, about method performance, in lieu of LCS data.

2. If the LCS is not performed at the specified concentration, use professional judgment to qualify detects and non-detects in the associated samples.
3. If errors are detected in the calculations of the LCS %R, perform a more comprehensive recalculation.
4. If the LCS %R criteria are not met, qualify the specific target analyte in the associated samples.
   a. If the LCS %R is < lower acceptance limit, qualify detects as estimated low (J-) and non-detects as unusable (R).
   b. If the LCS %R is ≥ lower acceptance limit and ≤ upper acceptance limit, detects and non-detects should not be qualified.
   c. If the LCS %R is > upper acceptance limit, qualify detects as estimated high (J+). Non-detects should not be qualified.
   d. Use professional judgment to qualify analytes other than those included in the LCS.
   e. Take into account the analyte class, analyte recovery efficiency, analytical problems associated with each analyte, and comparability in the performance of the LCS analyte to the non-LCS analyte.

**Table 65. LCS Actions for Pesticide Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| LCS not performed at the specified frequency or concentration | Use professional judgment | Use professional judgment |
| %R < Lower Acceptance Limit | J- | R |
| Lower Acceptance Limit ≤ %R ≤ Upper Acceptance Limit | No qualification | No qualification |
| %R > Upper Acceptance Limit | J+ | No qualification |

## IX. Florisil Cartridge Performance Check

### A. Review Items

Form 9A-OR, Florisil raw data, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/PEST, Section 10.3.2)

### B. Objective

The objective is to evaluate the performance of the Florisil cartridge used for Florisil cleanup procedure on sample extracts.

### C. Criteria

1. The performance of each lot of Florisil cartridges used for sample cleanup must be evaluated at least once or every six months (whichever is most frequent).
2. The Florisil cartridge performance check standard solution must contain 2,4,5-trichlorophenol and the mid-point concentration of INDA or INDC as specified in the method.
3. The %R for each target analyte and surrogate in INDA must be calculated according to the method.
4. The %R limits for the target analytes and surrogates in the INDA are 80-120%, and < 5% for 2,4,5-trichlorophenol. If INDC is used, the %R limits for target analytes and surrogates in INDC shall be evaluated.

### D. Evaluation

1. Verify that the Florisil Cartridge Performance Check is performed at the specified frequency.
2. Check the raw data for the Florisil Cartridge Performance Check analysis to verify that the concentrations of analytes are correct.
3. Check the raw data for the Florisil Cartridge Performance Check results and verify that the %R for each analyte and surrogate are calculated correctly and agree with that on Form 9A-OR. Verify that there are no transcription errors.
4. Verify that the %R for the target analytes and surrogates in the Florisil Cartridge Performance Check solution are within 80-120%, and the recovery of 2,4,5-trichlorophenol is < 5%.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant %R in the Florisil Cartridge Performance Check can be obtained from the NFG reports and may be used as part of the evaluation process.

### E. Action

1. If the Florisil Cartridge Performance Check is not performed at the specified frequency, use professional judgment to qualify detects and non-detects.
2. If the Florisil Cartridge Performance Check is not performed at the specified concentrations, use professional judgment to qualify detects and non-detects.
3. If errors are detected in the calculations of the %R in the Florisil Cartridge Performance Check, perform a more comprehensive recalculation.
4. If the Florisil Cartridge Performance Check criteria are not met, examine the raw data for the presence of polar interferences and use professional judgment in qualifying the data as follows:
   a. If the %R is < 10% for any of target analyte in the Florisil Cartridge Performance Check, use professional judgment to qualify detects. Qualify non-detects as unusable (R).
   b. If the %R is ≥ 10% and < 80% for any target analyte in the Florisil Cartridge Performance Check, qualify detects as estimated (J) and non-detects as estimated (UJ).

c. If the %R is ≥ 80% and ≤ 120% for all target analytes in the Florisil Cartridge Performance Check, detects and non-detects should not be qualified.

d. If the %R is > 120% for any target analyte in the Florisil Cartridge Performance Check, use professional judgment to qualify detects. Non-detects should not be qualified.

e. If the %R of 2,4,5-trichlorophenol in the Florisil Cartridge Performance Check is ≥ 5%, use professional judgment to qualify detects and non-detects, considering interference on the sample chromatogram.

5. Annotate the potential effects on the sample data resulting from the Florisil Cartridge Performance Check analysis not yielding acceptable results in the Data Review Narrative.

**Table 66. Florisil Cartridge Performance Check Actions**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| Florisil Cartridge Performance Check not performed at specified frequency or concentration | Use professional judgment | Use professional judgment |
| %R < 10% (target analytes) | Use professional judgment | R |
| 10% ≤ %R < 80% (target analytes) | J | UJ |
| 80% ≤ %R ≤ 120% (target analytes) | No qualification | No qualification |
| %R > 120% (target analytes) | Use professional judgment | No qualification |
| %R ≥ 5% (2,4,5-trichlorophenol) | Use professional judgment | Use professional judgment |

## X. Gel Permeation Chromatography Performance Check

### A. Review Items

Form 9B-OR, two ultraviolet (UV) traces, Gel Permeation Chromatography (GPC) raw data, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/PEST, Section 10.3.1)

### B. Objective

The objective is to evaluate GPC cleanup efficiency.

### C. Criteria

1. GPC is used for the cleanup of all non-aqueous sample extracts and for aqueous sample extracts that contain high molecular weight components that interfere with the analysis of the target analytes.
2. Each GPC system must be calibrated prior to processing samples for GPC cleanup, when the GPC calibration verification solution fails to meet criteria, when the column is changed, when channeling occurs, and once every 7 days when in use.
3. The GPC calibration is acceptable if the two UV traces meet the following requirements:
   a. Peaks must be observed and symmetrical for all compounds in the calibration solution.
   b. Corn oil and the phthalate peaks exhibit > 85% resolution.
   c. Phthalate and methoxychlor peaks exhibit > 85% resolution.
   d. Methoxychlor and perylene peaks exhibit > 85% resolution.
   e. Perylene and sulfur peaks must not be saturated and should exhibit > 90% baseline resolution.
   f. The RT shift is < 5% between UV traces for bis(2-ethylhexyl) phthalate and perylene.
4. A GPC blank must be analyzed after each GPC calibration. The concentration for any target analyte in the GPC blank must not exceed the CRQL.
5. GPC calibration verification must be performed at least once every 7 days (immediately following the GPC calibration) whenever samples (including MS/MSDs, LCSs, and blanks) are cleaned up using the GPC.
6. The GPC calibration verification solution must contain the target analytes gamma-BHC (Lindane), Heptachlor, Aldrin, 4,4'-DDT, Endrin, and Dieldrin in Methylene chloride at the concentrations specified in the method (Table 7 in SOW).
7. The %R for each target analyte in the GPC calibration verification must be calculated according to the method.
8. The %R for each target analyte in the GPC calibration verification must be in the inclusive range of 80-120%.

### D. Evaluation

1. Verify that the GPC calibration is performed at the specified frequency.
2. Verify that there are two UV traces present and that the RT shift for bis(2-ethylhexyl) phthalate and perylene is < 5%.
3. Verify that the analytes in the GPC calibration standard are present and the peaks are symmetrical in both UV traces meeting the minimum resolution requirements.
4. Verify that no target analyte in the GPC blank exceeds the CRQL.
5. Verify that the GPC calibration verification is performed at the specified frequency and concentrations.

6. Verify that the %R for target analytes are calculated correctly and the %R values agree with that on Form 9B-OR.

7. Verify that the %R for target analytes are within the acceptance limits.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant %R in the GPC calibration verification can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If GPC calibration frequency, UV traces, and GPC blank criteria are not met, examine the raw data for the presence of high molecular weight contaminants, examine subsequent sample data for unusual peaks, and use professional judgment to qualify the data. If the laboratory chooses to analyze samples under unacceptable GPC criteria, notify the EPA Regional CLP COR.

   a. If the RT shift of bis(2-ethylhexyl) phthalate and perylene is > 5%, the GPC unit may be in an unstable temperature environment and subject to erratic performance. The expected result may be an unknown bias in the data. Contact the EPA Regional CLP COR to arrange for sample reanalysis.

2. If GPC calibration verification is not performed at the specified frequency, use professional judgment to qualify detects and non-detects.

3. If GPC calibration verification is not performed at the specified concentrations, use professional judgment to qualify detects and non-detects.

4. If errors are detected in the calculations of the %R in the GPC calibration verification, perform a more comprehensive recalculation.

5. If GPC calibration verification criteria are not met, examine the raw data and qualify data as follows:

   a. If the %R is < 10% for any target analytes and surrogates in the GPC calibration verification, use professional judgment to qualify detects. Qualify non-detects as unusable (R).

   b. If the %R is ≥ 10% and < 80% for any target analytes and surrogates in the GPC calibration verification, qualify detects as estimated (J) and non-detects as estimated (UJ).

   c. If the %R is ≥ 80% and ≤ 120% for all target analytes and surrogates in the GPC calibration verification, detects and non-detects should not be qualified.

   d. If the %R is > 120% for any target analytes and surrogates in the GPC calibration verification, use professional judgment to qualify detects. Non-detects should not be qualified.

6. Annotate the potential effects on the sample data resulting from the GPC cleanup analyses not yielding acceptable results in the Data Review Narrative.

**Table 67. GPC Performance Check Actions for Pesticide Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| GPC Performance Check not performed at the specified frequency or concentration | Use professional judgment | Use professional judgment |
| %R < 10% (target analytes) | Use professional judgment | R |
| 10% ≤ %R < 80% (target analytes) | J | UJ |
| 80% ≤ %R ≤ 120% (target analytes) | No qualification | No qualification |
| %R > 120% (target analytes) | Use professional judgment | No qualification |

# XI. Target Analyte Identification

## A. Review Items

Form 1A-OR, Form 10A-OR, Form 10B-OR, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/PEST, Section 11.1.1)

## B. Objective

The objective is to provide acceptable GC/ECD qualitative analysis to minimize the number of erroneous analyte identifications.

## C. Criteria

1. The RTs of both of the surrogates and reported target analytes in each sample must be within the calculated RT windows on both columns. TCX must be within ±0.05 minutes of the $\overline{RT}$ determined from the ICAL, and DCB must be within ±0.10 minutes of the $\overline{RT}$ determined from the ICAL.
2. For detected single component target analytes and Toxaphene, the %D between the concentrations on two GC columns must be calculated according to the method. The %D for any detected target analyte should be < 25.0% to have high confidence in the identification.
3. When no analytes are identified in a sample, the chromatograms from the analyses of the sample extract must use the same scaling factor as was used for the low-point standard of the ICAL associated with those analyses.
4. Chromatograms must display detected single component target analytes in the sample and the largest peak of Toxaphene detected in the sample at less than full scale.
5. If an extract must be diluted, chromatograms must display single component target analyte peaks between 10-100% of full scale, and the chosen five Toxaphene peaks between 25-100% of full scale.
6. For any sample, the baseline of the chromatogram must return to below 50% of full scale before the elution time of alpha-BHC, and also return to below 25% of full scale after the elution time of alpha-BHC and before the elution time of DCB.
7. If a chromatogram is replotted electronically to meet these requirements, the scaling factor used must be displayed on the chromatogram, and both the initial chromatogram and the replotted chromatogram must be submitted in the data package.

## D. Evaluation

1. Review Form 1A-OR, the associated raw data (chromatograms and data system printouts), Form 10A-OR, and Form 10B-OR.
    a. Verify that the reported target analytes as detects are identified correctly by comparing the sample chromatograms to the tabulated results and verifying peak measurements and RTs.
    b. Verify the non-detects by a review of the sample chromatograms.
    c. Check the associated blank data for potential interferences (to evaluate sample data for false positives) and check the calibration data for adequate RT windows (to evaluate sample data for false positives and false negatives).
    d. For Toxaphene, compare the RTs and relative peak height ratios of the five major peaks in the appropriate standard chromatograms.
    e. Compare the Toxaphene peaks identified in the sample to determine that the RTs do not overlap with the RTs of any other target analytes or with chromatographic interferences from the sample matrix.

2. Verify that the %D results were calculated correctly and that the recalculated %D agrees with that reported on Forms 10A-OR or 10B-OR, as appropriate.
3. Verify that the %D for any target analyte is < 25.0%. If the %D is > 25.0% for any target analyte, evaluate the impact of the presence of an interfering compound, and whether the interference precludes confirmation of the target analyte. Also, evaluate the possibility of poor precision or non-homogeneity as causes for the difference.

## E. Action

1. If the qualitative criteria for both columns are not met, all target analytes that are reported as detects should be qualified as non-detect (U). Use professional judgment to assign an appropriate quantitation limit using the following guidance:
    a. If the detected target analyte peak is sufficiently outside the RT window determined from the associated ICAL, the reported values may be a false positive and should be replaced with the sample CRQL value.
    b. If the detected target analyte peak poses an interference with the potential detection of another target peak, the reported value should be considered and qualified as unusable (R).
2. If a peak is identified in both GC column analyses that falls within the appropriate RT windows, but the analyte is reported as a non-detect, the analyte may be a false negative. Use professional judgment to decide if the analyte should be included and reported as detect. Annotate all conclusions made regarding target analyte identification in the Data Review Narrative.
3. If the Toxaphene peak RT windows determined from the calibration overlap with single component target analytes or chromatographic interferences, use professional judgment to qualify the data.
4. If Toxaphene exhibits a marginal pattern-matching quality, use professional judgment to determine if the differences are due to environmental “weathering” (i.e., degradation of the earlier eluting peaks relative to the later eluting peaks). If the presence of Toxaphene is strongly suggested, report results as presumptively present with estimated concentration (NJ).
5. If errors are detected in the calculations of the %D for any target analyte, perform a more comprehensive recalculation.
6. If an interfering compound is indicated, consider the potential for co-elution and use professional judgment to determine how best to report. It is recommended to either report the analyte as positive at the lower value, qualified as tentative (N), or as non-detect (U) at the CRQL.

## XII. Gas Chromatograph/Mass Spectrometer Confirmation

### A. Review Items

Form 1A-OR, Form 10A-OR, Form 10B-OR, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/PEST, Section 11.1.2)

### B. Objective

The objective is to ensure the accuracy of the positive identification of a target analyte.

### C. Criteria

1. Gas Chromatography/Mass Spectrometer (GC/MS) confirmation is required when a positively identified target analyte has on-column concentration meeting the specified criterion on both GC columns. For a single component target analyte, GC/MS shall be performed for analyte concentration ≥ 5.0 ng/µL. For Toxaphene, GC/MS shall be performed for at least one peak concentration ≥ 125 ng/µL.
2. GC/MS confirmation may be accomplished by one of three general means:
   a. Examination of the semivolatile GC/MS library search results [i.e., Tentatively Identified Compound (TIC) data];
   b. A second analysis of the semivolatile extract; or
   c. Analysis of the pesticide extract, following any solvent exchange and concentration steps that may be necessary.

### D. Evaluation

1. Review Form 1A-OR, the associated raw data (chromatograms and data system printouts), Form 10A-OR, and Form 10B-OR.
2. Check the quantitation report to verify that GC/MS confirmation is required by ensuring that the on-column concentration criteria are met (criteria indicated in Section C.1).
3. Verify that GC/MS confirmation is completed as specified in the method.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding noncompliant GC/MS can be obtained from the CCS report and may be used as part of the evaluation process.

### E. Action

1. If an analyte was confirmed by GC/MS, qualify as confirmed (C).
2. If a sufficient quantity of an analyte was indicated and GC/MS confirmation was attempted but was not confirmed, qualify with an X or as non-detect (U). Explain in the Data Review Narrative that the analyte should be considered non-detect because it could not be confirmed.

**Table 68. GC/MS Confirmation Actions**

| Criteria | Action for Detects |
|---|---|
| Analyte confirmed by GC/MS | C |
| Analyte indicated but not confirmed by GC/MS | X or U |

## XIII. Target Analyte Quantitation and Reported Contract Required Quantitation Limit

### A. Review Items

Form 1A-OR, sample preparation sheets, SDG Narrative, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/PEST, Sections 11.2.2 and 11.2.4)

### B. Objective

The objective is to ensure that the reported results and CRQLs for target analytes are accurate.

### C. Criteria

1. Target analyte results and sample-specific CRQLs must be calculated according to the correct equations.
2. Target analyte CF must be calculated using the correct associated ICAL. Target analyte result must be calculated using the $\overline{CF}$ from the associated ICAL.

### D. Evaluation

1. Verify that the results for all positively identified analytes are calculated and reported by the laboratory.
2. Verify that the CRQLs are calculated for the non-detects and reported accordingly.
3. Verify that the correct $\overline{CF}$ is used to calculate the reported results.
4. Verify that the same $\overline{CF}$ is used consistently for all sample result calculations.
5. Verify that the sample-specific CRQLs have been calculated and adjusted to reflect Percent Solids (%Solids), original sample mass/volume, and any applicable dilutions.
    a. For soil/sediment samples that are high in moisture (i.e., < 30% solids), evaluation of the presence of each analyte depends on the anticipated interaction between the analyte and the total matrix, as well as how the sample was processed.
    b. If the phases of a sample were separated and processed separately, the results may be mathematically recombined or reported separately. No particular qualification on the grounds of matrix distribution is warranted.
    c. If a soil/sediment sample was processed by eliminating most of the water, analytes that are highly water soluble under ambient conditions may be severely impacted such that their presence cannot be completely evaluated.
6. Verify that recalculated results and CRQLs agree with that reported by the laboratory.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant results or CRQLs can be obtained from the CCS report and may be used as part of the evaluation process.

### E. Action

1. If any discrepancies are found, contact the EPA Regional CLP COR, who may contact the laboratory to obtain additional information that could resolve any differences. If a discrepancy remains unresolved, use professional judgment to decide which value is the most accurate and to determine whether that qualification of data is warranted. Annotate the reasons for any data qualification in the Data Review Narrative.
2. If errors are detected in results and CRQL calculations, perform a more comprehensive recalculation.
3. If the %Solids for a soil/sediment sample is < 10.0%, use professional judgment to qualify detects and non-detects.

4. If the %Solids for a soil/sediment sample is ≥ 10.0% and < 30.0%, use professional judgment to qualify detects and non-detects.
5. If the %Solids for a soil/sediment sample is ≥ 30.0%, detects and non-detects should not be qualified.
6. If sample results are < CRQLs and ≥ MDLs, qualify as estimated (J).
7. Note numerous or significant failures to accurately quantify the target analytes, or to properly evaluate and adjust CRQLs, for EPA Regional CLP COR action.

**Table 69. Percent Solids Actions for Pesticide Analysis for Non-Aqueous Samples**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| %Solids < 10.0% | Use professional judgment | Use professional judgment |
| 10.0% ≤ %Solids < 30.0% | Use professional judgment | Use professional judgment |
| %Solids ≥ 30.0% | No qualification | No qualification |

## XIV. Performance Evaluation Sample

### A. Review Items

Form 1A-OR, TR/COC Record documentation, preparation logs, instrument printouts, and raw data. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit F, Section 4.1)

### B. Objective

The objective is to determine the validity of the analytical results based on the recovery of the PE sample(s).

### C. Criteria

1. Matrix-specific PE samples shall be analyzed utilizing the same analytical methods and Quality Assurance/Quality Control (QA/QC) procedures as employed for the samples, at a frequency to be determined by each EPA Region for each site. PE samples must be analyzed in an SDG containing field samples for the Case, using the same procedures, reagents, and instrumentation.

### D. Evaluation

1. Verify, using Form 1A-OR, preparation logs, and raw data, that the PE samples were analyzed with the field samples and field blanks in the SDG.
2. Verify, using Form 1A-OR, that the PE sample results are within the warning limits (95% confidence interval) and action limits (99% confidence interval).
3. If a significant number (i.e., half or more) of the analytes in the PE samples fall outside of the 95% warning or 99% action criteria, or a number of false positive results are reported, evaluate the overall impact on the data.

### E. Action

**NOTE:** If the PE sample criteria are not met, the laboratory performance and method accuracy are in question. Use professional judgment to determine if the data should be qualified or rejected. The following guidance is suggested for qualifying sample data associated with a PE sample that does not meet the required criteria.

For a PE sample that does not meet the technical criteria, apply the action to all samples in the same preparation batch. If the concentration of any analyte in a PE sample is not comparable to the analyte's concentration in the field samples or field blanks (i.e., it is much higher or much lower than the concentration in these samples), the action may be applied to only those samples in which the analyte's concentration is comparable to the PE sample concentration.

1. If the PE sample was not analyzed with the field samples and field blanks, use professional judgment to determine if the associated sample results should be qualified. Obtain additional information from the laboratory, if necessary. If a laboratory fails to analyze the PE sample(s) provided with field samples and field blanks, or if a laboratory consistently fails to generate acceptable PE sample results, record the situation in the Data Review Narrative, and note it for EPA Regional CLP COR action.
2. If the PE sample results are outside the lower warning limits but inside the lower action limits, qualify detects as estimated low (J-) and non-detects as estimated (UJ).
3. If the PE sample results are outside the lower action limits, qualify detects as estimated low (J-) and non-detects as unusable (R).
4. If the PE sample results are within the limits, detects and non-detects should not be qualified.
5. If the PE sample results are outside the upper warning limits but inside the upper action limits, qualify detects as estimated high (J+). Non-detects should not be qualified.

6. If the PE sample results are outside the upper action limits, qualify detects as estimated high (J+). Non-detects should not be qualified.
7. Annotate the potential effects on the data due to out-of-control PE sample results in the Data Review Narrative.

**Table 70. PE Sample Actions for Pesticide Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| PE sample results outside lower warning limits but inside lower action limits | J- | UJ |
| PE sample results outside lower action limits | J- | R |
| PE sample results within limits | No qualification | No qualification |
| PE sample results outside upper warning limits but inside upper action limits | J+ | No qualification |
| PE sample results outside upper action limits | J+ | No qualification |

## XV. Regional Quality Assurance and Quality Control

### A. Review Items

Form 1A-OR, chromatograms, TR/COC Record documentation, quantitation reports, and other raw data from QA/QC samples. (SOW SOM02.4 – Exhibit B, Sections 2.4 and 3.4)

### B. Objective

The objective is to use results from the analysis of EPA Regional QA/QC samples such as field duplicates, blind spikes, and blind blanks to determine the validity of the analytical results.

### C. Criteria

Criteria are determined by each EPA Region.

1. The frequency of EPA Regional QA/QC samples should be defined in the project QAPP.
2. Performance criteria for EPA Regional QA/QC samples should also be defined in the project QAPP.
3. The EPA Region may provide the laboratory with PE samples to be analyzed with each SDG. These samples may include blind spikes and/or blind blanks. The laboratory must analyze a PE sample when provided by the EPA Region. Refer to Section V, above, for blanks criteria. Refer to Section XIV, above, for PE samples criteria.
4. The RPD between field duplicates shall fall with the specific limits in the EPA Region's SOP or project QAPP.

### D. Evaluation

1. Evaluation procedures must follow the EPA Region's SOP for data review.
2. Determine whether the results of EPA Regional QA/QC samples impact all samples in the project or only those directly associated (i.e., in the same SDG, collected on the same day, prepared together, or contained in the same analytical sequence).
3. Calculate the RPD between field duplicates and provide this information in the Data Review Narrative. Also verify that the value falls within the specific limits in the EPA Region's SOP or project QAPP.
4. Determine whether poor precision is the fault of the laboratory, or a result of sample non-homogeneity in the field. Laboratory observations of sample appearance may become important in these situations.

### E. Action

1. Any action must be in accordance with EPA Regional specifications and the criteria for acceptable field duplicate sample results.
2. Note unacceptable results for field duplicate samples for EPA Regional CLP COR action.
3. In general, for EPA Regional QA/QC performance not within QAPP specification, qualify detects as estimated (J) and non-detects as estimated (UJ). The impact on overall data quality should be assessed after consultation with the data user and/or field personnel. Contact the EPA Regional CLP COR if reanalysis of samples is required.

# XVI. Overall Assessment of Data

## A. Review Items

Entire data package, data review results, and (if available) the QAPP and Sampling and Analysis Plan (SAP).

## B. Objective

The objective is to provide the overall assessment on data quality and usability.

## C. Criteria

1. Review all available materials to assess the overall quality of the data, keeping in mind the additive nature of analytical problems.
2. Reported analyte concentrations must be quantitated according to the appropriate equations, as listed in the method. All sample results must be within the linear calibration ranges per the methods.

## D. Evaluation

Examine the raw data to verify that the correct calculation of the sample results was reported by the laboratory. Analysis logs, instrument printouts, etc., should be compared to the reported sample results recorded on the appropriate Organic Data Reporting Forms (Form 1A-OR through Form 10B-OR).

1. Evaluate any technical problems which have not been previously addressed.
2. Examine the raw data for any anomalies (e.g., baseline shift).
3. Verify that the appropriate method is used in sample analysis.
4. Verify that there are no transcription or reduction errors.
5. Verify that target analyte results fall within the calibrated ranges.
6. If appropriate information is available, use professional judgment to assess the usability of the data in order to assist the data user in avoiding inappropriate use of the data. Review all available information, including the QAPP (specifically the acceptance and performance criteria), SAP, and communication with the data user that concerns the intended use and desired quality of these data.

## E. Action

1. Use professional judgment to determine if there is any need to qualify data which were not qualified based on the QC criteria previously discussed.
2. Use professional judgment to qualify sample results and non-detects if the MDL exceeds the CRQL.
3. If a sample is not diluted properly when sample results exceed the upper limit of the calibration range, qualify sample results as estimated (J).
4. Write a brief Data Review Narrative to give the user an indication of the limitations of the analytical data.
5. Note any inconsistency of the data with the SDG Narrative for EPA Regional CLP COR action. If sufficient information on the intended use and required quality of the data is available, include an assessment of the usability of the data within the given context. This may be used as part of a formal Data Quality Assessment (DQA).

# AROCLOR DATA REVIEW

The Aroclor organic data requirements to be reviewed during validation are listed below:

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# I. Preservation and Holding Times

## A. Review Items

Form 1A-OR, Traffic Report/Chain of Custody (TR/COC) Record documentation, Form DC-1, raw data, sample extraction sheets, and the Sample Delivery Group (SDG) Narrative checking for: pH, shipping container temperature, holding time, and other sample conditions. (SOW SOM02.4 – Exhibit B, Section 3.4; Exhibit D/Introduction, Section 5.0; Exhibit D/General, Sections 8.0, 10.1.2.1, and 10.2.2.4.4; and Exhibit D/ARO, Section 8.0)

## B. Objective

The objective is to determine the validity of the analytical results based on the sample conditions and the holding time of the sample.

## C. Criteria

1. The extraction technical holding time is determined from the date of sample collection to the date of sample extraction. The analysis technical holding time is determined from the date of sample extraction completion to the date of sample analysis.
2. Samples shall be in proper condition with shipping container temperatures at ≤ 6ºC upon receipt at the laboratory. All aqueous and non-aqueous samples shall be protected from light and refrigerated at ≤ 6ºC (but not frozen) from the time of receipt at the laboratory. Sample extracts shall be stored at ≤ 6ºC (but not frozen) from the time of the extraction completion until analysis.
3. The extraction technical holding time criteria for aqueous samples that are not properly preserved is 7 days.
4. The extraction technical holding time criteria for non-aqueous samples that are not properly preserved is 14 days.
5. The extraction technical holding time criteria for aqueous and soil samples that are properly preserved is 1 year.
6. The analysis technical holding time criteria for sample extracts that are not properly preserved is 40 days.
7. The analysis technical holding time criteria for sample extracts that are properly preserved is 40 days.

## D. Evaluation

1. Review the SDG Narrative and the TR/COC Record documentation to determine if the samples are received intact and iced. If there is an indication of problems with the samples, the sample integrity may be compromised.
2. Verify that the extraction dates and the analysis dates for samples on Form 1A-OR and the raw data are identical.
3. Determine the analysis technical holding times for samples after the completion of extraction by comparing the dates of extraction with the dates of analysis on Form 1A-OR.

## E. Action

1. If samples are received with shipping container temperatures > 6°C, use professional judgment to qualify detects and non-detects.
2. If discrepancies are found between the sample extraction date or analysis date and the date on the raw data, perform a more comprehensive review, contacting the laboratory if necessary through the United States Environmental Protection Agency Regional Contract Laboratory Program Contracting Officer's Representative (EPA Regional CLP COR), to determine the correct dates for establishing the technical holding time.

3. If an aqueous sample is not properly preserved, but extraction is performed within the 7-day technical holding time and the extract is analyzed within the 40-day technical holding time, use professional judgment to qualify detects and non-detects.
4. If an aqueous sample is not properly preserved, but extraction is performed outside the 7-day technical holding time, and/or the extract is analyzed outside the 40-day technical holding time, detects should be qualified as estimated (J). Use professional judgment to qualify non-detects.
5. If an aqueous sample is properly preserved, extraction is performed within the 1-year technical holding time, and the extract is analyzed within the 40-day technical holding time, detects and non-detects should not be qualified.
6. If an aqueous sample is properly preserved, but extraction is performed outside the 1-year technical holding time, and/or the extract is analyzed outside the 40-day technical holding time, qualify detects as estimated (J) and non-detects as estimated (UJ).
7. If a non-aqueous sample is not properly preserved, but extraction is performed within the 14-day technical holding time and the extract is analyzed within the 40-day technical holding time, use professional judgment to qualify detects and non-detects.
8. If a non-aqueous sample is not properly preserved, but extraction is performed outside the 14-day technical holding time and/or the extract is analyzed outside the 40-day technical holding time, detects should be qualified as estimated (J). Use professional judgment to qualify non-detects.
9. If a non-aqueous sample is properly preserved, and extraction is performed within the 1-year technical holding time and the extract is analyzed within the 40-day technical holding time, detects and non-detects should not be qualified.
10. If a non-aqueous sample is properly preserved, but extraction is performed outside the 1-year technical holding time and/or the extract is analyzed outside the 40-day technical holding time, qualify detects as estimated low (J) and non-detects as estimated (UJ).
11. If discrepancies are found between the sample extraction date or analysis date and the date on the raw data, perform a more comprehensive review, contacting the laboratory if necessary through the EPA Regional CLP COR, to determine the correct dates for establishing the technical holding time.
12. Note the effect of exceeding the holding time on the resulting data in the Data Review Narrative, whenever possible.
13. If technical holding times are grossly exceeded, qualify detects as estimated (J). Use professional judgment to qualify non-detects as estimated (UJ) or unusable (R). Note it for EPA Regional CLP COR action. Use caution in determining whether some detected analytes should be qualified as estimated low (J-) or estimated high (J+), based on knowledge of individual analyte stability or interactions. Exceedance of holding time limits may not indicate a low bias for all Aroclors.

**Table 71. Preservation and Holding Time Actions for Aroclor Analysis**

| Matrix | Preserved | Criteria | Action | |
|---|---|---|---|---|
| | | | Detect | Non-detect |
| Aqueous | No | ≤ 7 days (for extraction) and ≤ 40 days (for analysis) | Use professional judgment | Use professional judgment |
| | No | > 7 days (for extraction) and/or > 40 days (for analysis) | J | Use professional judgment |
| | Yes | ≤ 1 year (for extraction) and ≤ 40 days (for analysis) | No qualification | No qualification |
| | Yes | > 1 year (for extraction) and/or > 40 days (for analysis) | J | U |
| | Yes/No | Holding time grossly exceeded | J | Use professional judgment<br>UJ or R |
| Non-aqueous | No | ≤ 14 days (for extraction) and ≤ 40 days (for analysis) | Use professional judgment | Use professional judgment |
| | No | > 14 days (for extraction) and/or > 40 days (for analysis) | J | Use professional judgment |
| | Yes | ≤ 1 year (for extraction) and ≤ 40 days (for analysis) | No qualification | No qualification |
| | Yes | > 1 year (for extraction) and/or > 40 days (for analysis) | J | U |
| | Yes/No | Holding time grossly exceeded | J | Use professional judgment<br>UJ or R |

## II. Initial Calibration

### A. Review Items

Form 6D-OR, Form 6E-OR, Form 6F-OR, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/ARO, Sections 7.2.2 and 9.3)

### B. Objective

The objective of initial calibration (ICAL) is to ensure that the instrument is capable of producing acceptable qualitative and quantitative data.

### C. Criteria

1. A five-point ICAL is performed for Aroclor 1016/1260. Either single or five-point calibration shall be performed for the other Aroclor analytes. Aroclors 1221, 1232, 1242, 1248, 1254, 1262, or 1268 are calibrated at the lowest concentration (CS1) for pattern recognition at the Contract Required Quantitation Limit (CRQL). If Aroclors 1221, 1232, 1242, 1248, 1254, 1262, or 1268 are identified in a sample with a single-point ICAL, a valid five-point ICAL is required for confirming the identification and quantitation of the specific detected Aroclor analyte.
2. The ICAL must be performed following a specific sequence listed in Table 72. Single-point Aroclor calibration may be made before or after the analysis of the five-point Aroclor calibration. Each Aroclor Standard shall be analyzed before the analysis of any sample or blank.
3. The concentrations for Aroclors in the five ICAL standards shall be at 100, 200, 400, 800, and 1600 ng/mL. The concentrations for surrogates in the five ICAL standards shall be at 5.0, 10, 20, 40, and 80 ng/mL for tetrachloro-m-xylene (TCX), and 10, 20, 40, 80, and 160 ng/mL for decachlorobiphenyl (DCB). The single-point ICAL standard for all Aroclors other than Aroclor 1016/1260 should be at 100 ng/mL.
4. The Mean Retention Times ($\overline{RT}$s) of each of the five major peaks of Aroclors 1016 and 1260 and the Retention Time (RT) of the surrogates are determined from the five-point ICAL. For Aroclor 1221, the RT of each of the three major peaks and the RT of the surrogates are determined from the single-point standard ICAL standard. For the other six Aroclors (1232, 1242, 1248, 1254, 1262, or 1268), the RT of each of the five major peaks and the RT of the surrogates are determined from the single-point standard ICAL. If Aroclors 1221, 1232, 1242, 1248, 1254, 1262, or 1268 are identified in a sample, the $\overline{RT}$s of each of the five major peaks (three major peaks for Aroclor 1221) and the RT of the surrogates are determined from the five-point ICAL.
5. An RT window must be calculated as ±0.07 for each of the five major Aroclor peaks (three major peaks for Aroclor 1221), and ±0.05 and ±0.10 for the surrogates TCX and DCB, respectively.
6. The chromatograms of the standards for the Aroclors analyzed during the ICAL sequence must display the peaks chosen for identification of each analyte at greater than 25% of full scale, but less than 100% of full scale.
7. The Mean Calibration Factor ($\overline{CF}$) must be calculated for the five major peaks for each Aroclor (three major peaks for Aroclor 1221), as well as for the surrogates, in the 5-point ICAL.
8. The Percent Relative Standard Deviation (%RSD) of the Calibration Factors (CFs) for the five major peaks of each of the Aroclor analytes must be ≤ 20.0%. The %RSD of the CFs for the two surrogates must be ≤ 20.0%.

**NOTE:** Either peak area or peak height may be used to calculate the CFs that are, in turn, used to calculate the %RSD. However, the type of peak measurement used to calculate each CF for a given compound must be consistent. For example, if peak area is used to calculate the CS1 CF for a given peak of a certain Aroclor, the remaining CFs for the same peak in the remaining standards (CS2-CS5) for that Aroclor must also be calculated using peak area.

**Table 72. Initial Calibration Sequence**

| | |
|---|---|
| 1. | Aroclor 1221 CS1 |
| 2. | Aroclor 1232 CS1 |
| 3. | Aroclor 1242 CS1 |
| 4. | Aroclor 1248 CS1 |
| 5. | Aroclor 1254 CS1 |
| 6. | Aroclor 1262 CS1 |
| 7. | Aroclor 1268 CS1 |
| 8. | Aroclor 1016/1260 (100 ng/mL) CS1 |
| 9. | Aroclor 1016/1260 (200 ng/mL) CS2 |
| 10. | Aroclor 1016/1260 (400 ng/mL) CS3 |
| 11. | Aroclor 1016/1260 (800 ng/mL) CS4 |
| 12. | Aroclor 1016/1260 (1600 ng/mL) CS5 |
| 13. | Instrument blank |

## D. Evaluation

1. Verify that the ICAL is performed at the specified frequency and sequence. Verify that the proper ICAL sequence is used and that either single-point calibration for Aroclors other than Aroclor 1016/1260 is included in the ICAL, or a 5-point calibration for a specific Aroclor is included.
2. Check the raw data (chromatograms and data system printouts) for each standard in the ICAL to verify that each of the standards is analyzed at the specified concentrations for Aroclor analytes and surrogates.
3. Check the Aroclor Standards data and Form 6D-OR, Form 6E-OR, and Form 6F-OR to verify that the RT windows, CFs, $\overline{CF}$s, and %RSDs are calculated correctly. Recalculate the CFs and %RSDs for one or more Aroclors and verify that the recalculated values agree with that reported by the laboratory and there are no transcription errors.
4. Check the chromatograms and verify that at least one chromatogram from each of the Aroclor Standards yields peaks registering recorder deflections between 25-100% of full scale.
5. Verify that the %RSD for the CFs are within the acceptance limits.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the Contract Compliance Screening (CCS) process. Information regarding the noncompliant RT windows and %RSD can be obtained from the National Functional Guidelines (NFG) reports and may be used as part of the evaluation process.

## E. Action

1. If ICAL is not performed at the specified frequency and sequence, use professional judgment to qualify detects and non-detects. Contact the EPA Regional CLP COR to arrange for reanalysis, if possible, or note it in the Data Review Narrative for later EPA Regional CLP COR action.
2. If the ICAL standards are not performed at the specified concentrations, use professional judgment to qualify detects and non-detects. This is especially critical for the low-level standards and non-detects.
3. If errors are detected in the calculations of RT windows, CFs, $\overline{CF}$s, or %RSDs, perform a more comprehensive recalculation.

4. If the chromatogram display criteria are not met, use professional judgment to qualify detects and non-detects. Contact the EPA Regional CLP COR to arrange for a revised report, or note in the Data Review Narrative for later EPA Regional CLP COR action.
5. If the %RSD for any target analyte peak used for Aroclor analyte identification is outside the acceptance limits, qualify detects as estimated (J). Use professional judgment to qualify non-detects.
6. If the %RSD for all target analyte peaks used for Aroclor analyte identification are within the acceptance limits, detects and non-detects should not be qualified.
7. Based on the project-specific Data Quality Objectives (DQOs), a more in-depth review may be necessary. The following guidelines are recommended:
    a. If the %RSD criteria of any target analytes are not met, and if the %RSD criteria are still not satisfied after eliminating either the high or the low-point of the ICAL:
        i. Qualify detects in the associated samples as estimated (J).
        ii. Use professional judgment to qualify non-detects in the associated samples.
    b. If the high-point of the ICAL curve is outside of the %RSD criteria (e.g., due to saturation):
        i. Qualify detects in the associated samples with analyte concentrations greater than the high-point concentration as estimated (J).
        ii. Detects in the associated samples with analyte concentrations within the calibration range should not be qualified.
        iii. Non-detects in the associated samples should not be qualified.
    c. If the low-point of the ICAL curve is outside of the %RSD criteria:
        i. Qualify detects in the associated samples with analyte concentrations in the non-linear range as estimated (J).
        ii. Detects in the associated samples with analyte concentrations within the calibration range should not be qualified.
        iii. For non-detects in the associated samples, use the lowest point of the linear portion of the ICAL curve to determine the new quantitation limit.
8. If the laboratory failed to provide adequate calibration information, notify the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data.
9. Annotate the potential effects on the reported data due to exceeding the ICAL criteria in the Data Review Narrative.
10. If the ICAL criteria are grossly exceeded, contact the EPA Regional CLP COR to arrange for reanalysis, if possible, or note it in the Data Review Narrative for later EPA Regional CLP COR action.

**Table 73. Initial Calibration Action for Aroclor Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| Initial calibration not performed or not performed at specified frequency and sequence | Contact the EPA Regional CLP COR for reanalysis or use professional judgment | Contact the EPA Regional CLP COR for reanalysis or use professional judgment |
| Initial calibration not performed at the specified concentrations | Contact the EPA Regional CLP COR for reanalysis or use professional judgment | Contact the EPA Regional CLP COR for reanalysis or use professional judgment |
| RT windows incorrect<br>Or<br>Chromatogram criteria not met | Contact the EPA Regional CLP COR for reanalysis or use professional judgment | Contact the EPA Regional CLP COR for reanalysis or use professional judgment |
| %RSD outside acceptance limits | J | Use professional judgment |
| %RSD within acceptance limits | No qualification | No qualification |

## III. Continuing Calibration Verification

### A. Review Items

Form 7D-OR, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/ARO, Sections 7.2.2 and 9.4)

### B. Objective

The objective is to ensure that the instrument continues to meet the sensitivity and linearity criteria to produce acceptable qualitative and quantitative data throughout each analytical sequence.

### C. Criteria

1. A Continuing Calibration Verification (CCV), consisting of the analyses of instrument blanks and the mid-point concentration (CS3) of Aroclor Standards, must be performed at the beginning (opening CCV) and end (closing CCV) of each 12-hour analytical sequence. The opening and closing CCVs consist of an injection of an instrument blank followed by an injection of mid-point ICAL standard CS3 of Aroclor 1016/1260. If an Aroclor analyte other than 1016 or 1260 is detected in any samples, a mid-point ICAL standard CS3 of that specific Aroclor analyte must be analyzed as part of the opening and closing CCV.
2. The CCV CS3 standards must contain all required target analytes and surrogates at or near the mid-point standard concentration of the ICAL.
3. The RT for each Aroclor target analyte and surrogate in the CCV CS3 standard must be within the RT windows determined from the ICAL.
4. The Percent Difference (%D) between the CF and $\overline{CF}$ from the associated ICAL for each of the five major Aroclor target analyte peaks (three major peaks for Aroclor 1221) and surrogate in the CCV CS3 standard must be calculated accordingly.
5. For the opening CCV, or closing CCV that is used as an opening CCV for the next 12-hour period, the %D for each of the five peaks (three major peaks for Aroclor 1221) used to identify an Aroclor and surrogates in the CS3 Aroclor Standard must be in the inclusive range of ±25.0% and ±30.0%, respectively.
6. For a closing CCV, the %D for each of the five peaks (three major peaks for Aroclor 1221) used to identify an Aroclor and surrogates in the CS3 Aroclor Standard must be in the inclusive range of ±50.0%.
7. Instrument blanks paired with the CS3 standard must bracket the 12-hour analytical sequence. The concentration of each target analyte in the instrument blank must not exceed the CRQL.
8. No more than 14 hours may elapse from the injection beginning the opening CCV (instrument blank) and the injection ending the closing CCV (CS3 Aroclor Standard).
9. No more than 12 hours may elapse from the injection of the instrument blank that begins an analytical sequence (opening CCV) and the injection of the last sample or blank that is part of the same analytical sequence.

### D. Evaluation

1. Verify that the CCV is performed at the specified frequency and sequence.
2. Verify that the CCV CS3 standard is performed at the specified concentrations.
3. Verify that the RTs for each Aroclor peak and for surrogate in the CS3 standard are within the RT windows.

4. Check the data for each of the Aroclors and surrogates in the CS3 standards on Form 7D-OR and verify that the CFs and %Ds are calculated correctly. Recalculate the CFs and %Ds for one or more Aroclor peaks and verify that the recalculated values agree with that reported by the laboratory and that there are no transcription errors.
5. Verify that the %D for each of the five peaks (three major peaks for Aroclor 1221) used to identify an Aroclor analyte and surrogates in the opening CCV CS3 Aroclor Standard, or a closing CCV used as an opening CCV for the next analytical sequence, are within the acceptance limits (± 25.0% and ± 30.0% for target analytes and surrogates, respectively).
6. Verify that the %D for each of the five peaks (three major peaks for Aroclor 1221) used to identify an Aroclor analyte and surrogates in the closing CCV CS3 Aroclor Standard are within the acceptance limits (± 50.0%).
7. Verify that the instrument blanks paired with the CS3 standard are analyzed at the specified frequency and sequence and that the concentration of each target analyte in the instrument blank is not exceeding the CRQL.
8. Verify that the time elapsed between the injection of an instrument blank as opening CCV and the injection of that last CS3 Aroclor Standard as closing CCV is within 14 hours.
9. Verify that the time elapsed between the injection of an instrument blank as opening CCV and the injection of the last sample or blank in the same analytical sequence is within 12 hours.

**NOTE:** For data obtained from the CLP, information regarding the noncompliant CCV can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the CCV is not performed at the specified frequency and sequence, contact the EPA Regional CLP COR to request that the laboratory repeat the analysis, if holding times have not expired and there is extract remaining. If reanalysis is not possible, carefully evaluate all other available information, including the quality of analyte peak shapes and RT match of surrogates on both columns, and compare to the most recent calibration performed on the same instrument under the same conditions. Using this information and professional judgment, the reviewer may be able to justify unqualified acceptance of qualitative results and qualification of all quantitative results as estimated (J). Otherwise, qualify all detects and non-detects as unusable (R).
2. If the CCV is not performed at the specified concentrations, use professional judgment to qualify detects and non-detects.
3. If the RTs for any Aroclor target analyte peak or surrogate in the CS3 standard are outside the RT windows and match peak pattern, carefully evaluate the associated sample results. All samples injected after the last in-control standard are potentially affected.
    a. For non-detected target analytes in the affected samples, check the sample chromatograms that may contain any peaks that are close to the expected RT window of the target analyte peaks of interest.
        i. If no peaks used for Aroclor analyte identification are present, non-detects should not be qualified.
        ii. If any peaks present are close to the expected RT window of the analytes of interest, use professional judgment to qualify the non-detects as presumptively present with estimated concentration (NJ).
    b. For detected target analytes in the affected samples, check the sample chromatograms that may contain any peaks that are close to the expected RT window of the target analytes of interest.

If the peaks are close to the expected RT window of the Aroclor of interest, it may require additional effort to determine if sample peaks represent the target analytes of interest. Peak pattern recognition is used as a means of identifying the Aroclor target analytes.

For example, the data package may be examined for the presence of three or more standards containing the target analytes of interest that were run within the analytical sequence during which the sample was analyzed. If three or more such standards are present, the RT windows can be re-evaluated using the $\overline{RT}$s of the standards.

i. If the peaks used for Aroclor analyte identification in the affected sample fall within the revised windows, qualify detects as presumptively present with estimated concentration (NJ).

ii. If the problem of concern remains unresolved, qualify detects as unusable (R).

4. If errors are detected in the calculations of either the CF or %D in any CCV CS3 standard, perform a more comprehensive recalculation. Contact the EPA Regional CLP COR to arrange for data resubmittal and note it in the Data Review Narrative for later EPA Regional CLP COR action.
5. If the %D for any Aroclor target analyte peak in CCV CS3 standard is outside the limits, qualify detects as estimated (J) and non-detects as estimated (UJ).
6. If the time elapsed between the injection of an instrument blank as opening CCV and the injection of the last required CS3 standard as closing CCV exceeds 14 hours, carefully evaluate instrument stability during the entire sequence to decide whether degradation has occurred, including column bleed, RTs, peak shapes, and surrogate recovery. If system degradation has been found, qualify positive results as estimated (J). If any possibility exists for either false positives or false negatives, qualify non-detects as unusable (R).
7. If the time elapsed between the injection of an instrument blank as opening CCV and the injection of the last sample or blank in the same analytical sequence exceeds 12 hours, carefully evaluate instrument stability during the entire sequence to decide whether degradation has occurred, including column bleed, RTs, peak shapes, and surrogate recovery. If system degradation has been found, qualify positive results as estimated (J). If any possibility exists for either false positives or false negatives, qualify non-detects as unusable (R).
8. If the RT for each target analyte peak in CS3 standards are within the RT windows or the %D for each target analyte peak in CCV CS3 is within the limits, detects and non-detects should not be qualified.
9. No qualification of the data is necessary based on the surrogate %D alone. Use professional judgment to evaluate the surrogate %D data in conjunction with surrogate recoveries to determine the need for data qualification.
10. If an instrument blank as part of CCV is not performed at the specified frequency and sequence, or instrument blank does not meet the concentration criteria, refer to Section IV. Blanks for data qualifications.
11. If the laboratory has failed to provide adequate calibration information, contact the EPA Regional CLP COR, who may contact the laboratory to request the necessary information. If the information is not available, use professional judgment to assess the data.
12. Note the potential effects on the data due to CCV criteria exceedance in the Data Review Narrative.
13. If the CCV criteria are grossly exceeded, note this for EPA Regional CLP COR action.

**Table 74. CCV Actions for Aroclor Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| CCV CS3 not performed at the correct frequency and sequence | Contact the EPA Regional CLP COR for reanalysis or use professional judgment | Contact the EPA Regional CLP COR for reanalysis or use professional judgment |
| CCV CS3 not performed at the specified concentration | Contact the EPA Regional CLP COR for reanalysis or use professional judgment | Contact the EPA Regional CLP COR for reanalysis or use professional judgment |
| RT outside the RT window | Use professional judgment | Use professional judgment |
| CS3 %D outside the limits | J | UJ |
| Time elapsed between opening CCV instrument blank and closing CCV CS3 exceeds 14 hours | Use professional judgment | Use professional judgment |
| Time elapsed between opening CCV instrument blank and last sample or blank exceeds 12 hours | Use professional judgment | Use professional judgment |
| RT, CS3 %D, and time elapsed within limits | No qualification | No qualification |

## IV. Blanks

### A. Review Items

Form 1A-OR, Form 4-OR, chromatograms, and quantitation reports. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/ARO, Section 12.1)

### B. Objective

The objective of a blank analysis results assessment is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities.

### C. Criteria

The criteria for evaluation of blanks should apply to any blank associated with the samples (e.g., method blanks, instrument blanks, sulfur cleanup blank, field blanks, etc.). If problems with any blank exist, all associated data must be carefully evaluated to determine whether or not there is an inherent variability in the data or if the problem is an isolated occurrence not affecting other data.

1. Method blank samples must be performed at the specified frequency and sequence. A method blank must be extracted per matrix each time when samples are extracted. The number of samples extracted with each method blank shall not exceed 20 field samples. The method blank must be extracted by the same procedure used to extract samples and must be analyzed on each Gas Chromatograph (GC) system under the same conditions used to analyze associated samples.
2. The method blank, like any other sample in the SDG, must meet the technical acceptance criteria for sample analysis.
3. An acceptable instrument blank must be analyzed at the beginning and ending of an analytical sequence in which samples are analyzed, immediately prior to the analysis of the Aroclor 1016/1260 CS3 used as the CCV.
4. A sulfur cleanup blank must be analyzed whenever part of a set of the extracted samples requires sulfur cleanup. If the entire set of samples associated with a method blank requires sulfur cleanup, the method blank also serves the purpose of a sulfur cleanup blank and a separate sulfur cleanup blank is not required.
5. The concentration of a target analyte in any blanks must not exceed its CRQL.

### D. Evaluation

1. Verify that method blanks are extracted at the specified frequency and analyzed at the required sequence. The Method Blank Summary (Form 4-OR) may be used to identify the samples associated with each method blank.
2. Verify that instrument blanks are analyzed at the specified frequency and sequence.
3. Verify that the sulfur cleanup blank is analyzed when part of a set of samples extracted together requires sulfur cleanup. The Method Blank Summary (Form 4-OR) may be used to identify the samples associated with the sulfur cleanup blank.
4. Data concerning the field blanks are not evaluated as part of the CCS process. Evaluations on field or trip blanks should be similar to the method blanks.
5. Review the results of all associated blanks on the forms and raw data (chromatograms and quantitation reports) to evaluate the presence of target analytes in the blanks.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant blank can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If the appropriate blanks are not extracted at the correct frequency and/or analyzed at the correct sequence, use professional judgment to determine if the associated sample data should be qualified. Obtain additional information from the laboratory, if necessary. Record the situation in the Data Review Narrative and note it for EPA Regional CLP COR action.
2. Action regarding unsuitable blank results depends on the circumstances and origin of the blank. Verify that data qualification decisions based on field quality control (QC) are supported by the project Quality Assurance Project Plan (QAPP) or EPA Regional Standard Operating Procedure (SOP). At a minimum, contamination found in field blanks should be documented in the Data Review Narrative. In instances where more than one blank is associated with a given sample, qualification should be based upon a comparison with the associated blank having the highest concentration of a contaminant. Do not correct the results by subtracting any blank value.
3. For any blank (including method blank), if a target analyte is detected, but it is not detected in the sample, non-detects should not be qualified.
4. For any method blank reported with results < CRQLs, report sample results that are < CRQLs at the CRQLs and qualify as non-detect (U). For any method blank reported with results that are < CRQLs, use professional judgment to qualify sample results that are ≥ CRQLs. Positive results in samples, especially those near but above the CRQL, may be biased high by low level contamination in the method blank, and should be considered as estimated (J+).
5. For any method blank reported with results ≥ CRQLs, report sample results that are < CRQLs at the CRQLs and qualify as non-detect (U). For any method blank reported with results ≥ CRQLs, report sample results that are ≥ CRQLs but < Blank Results at sample results and qualify as non-detect (U) or as unusable (R). Use professional judgment to qualify sample results ≥ CRQLs and ≥ Blank Results.
6. For Sulfur cleanup blanks, instrument blanks, and field blanks, sample result qualifications listed in Table 75 should apply if supported by the project QAPP.
7. If gross contamination exists with blank results that are > ICAL CS5 concentrations, qualify detects as unusable (R). If the contamination is suspected of having an effect on the sample results, note it for EPA Regional CLP COR action.
8. There may be instances where little or no contamination is present in the associated blanks, but qualification of the sample is deemed necessary. If it is determined that the contamination is from a source other than the sample, the data should be qualified or, in the case of field QC, should at least be documented in the Data Review Narrative. Contamination introduced through dilution water is one example. Although it is not always possible to determine, instances of this occurring can be detected when contaminants are found in the diluted sample result, but are absent in the undiluted sample.

**Table 75. Blank Actions for Aroclor Analysis**

| Blank Type | Blank Result | Sample Result | Action |
|---|---|---|---|
| Method, Sulfur cleanup, Instrument, Field | Detects | Non-detect | No qualification |
| | < CRQL | < CRQL | Report at CRQL and qualify as non-detect (U) |
| | | ≥ CRQL | Use professional judgment |
| | ≥ CRQL | < CRQL | Report at CRQL and qualify as non-detect (U) |
| | | ≥ CRQL but < Blank Result | Report at sample result and qualify as non-detect (U) or as unusable (R) |
| | | ≥ CRQL and ≥ Blank Result | Use professional judgment |
| | Gross contamination | Detect | Report at sample result and qualify as unusable (R) |

## V. Surrogate

### A. Review Items

Form 2C-OR, Form 8B-OR, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/ARO, Sections 7.2.2.4 and 11.2.5)

### B. Objective

The objective is to evaluate surrogate percent recovery (%R) to ensure that the analytical method is efficient.

### C. Criteria

1. Surrogate spiking solution containing two surrogates, TCX and DCB, is added to all samples, including Matrix Spike (MS)/Matrix Spike Duplicates (MSDs), Laboratory Control Samples (LCSs), and blanks to measure the surrogate recovery. The surrogates are also added to all the standards to monitor RTs.
2. The RTs of the surrogates in each CCV CS3 standard, all samples (including MS/MSD and LCS), and all blanks must be within the calculated RT windows. TCX must be within ±0.05 minutes, and DCB must be within ±0.10 minutes of the $\overline{RT}$s determined from the ICAL.
3. The %R for the surrogates TCX and DCB in all samples, including MS/MSDs, LCSs, and all blanks, must be calculated accordingly.
4. The %R for each surrogate must be in the inclusive range of 30-150% for all samples, including MS/MSDs, LCSs, and all blanks.

### D. Evaluation

1. Check the raw data (e.g., chromatograms and data system printouts) to verify that the surrogates are added at the specified concentrations to all samples and blanks.
2. Check the raw data (e.g., chromatograms and data system printouts) to verify that the surrogate RTs on Form 8B-OR are within the RT windows.
3. Check the raw data (e.g., chromatograms and data system printouts) to verify that the surrogate %R for each sample and blank is on Form 2C-OR.
4. Check for any calculation or transcription errors. Verify that the surrogate recoveries are calculated correctly using the equation in the method.
5. Whenever there are two or more analyses for a particular sample, use professional judgment to determine which analyses are the most accurate data to report. Considerations include, but are not limited to:
   a. Surrogate recovery (marginal versus gross deviation).
   b. Technical holding times.
   c. Comparison of the results of the target compounds reported in each sample analysis.
   d. Other QC information, such as surrogate recoveries and/or RTs in blanks and standards.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant surrogate recovery can be obtained from the NFG reports and may be used as part of the evaluation process.

### E. Action

1. If surrogates are not added to any sample or blank, or surrogate concentration is incorrect in the sample or blank, use professional judgment to qualify detects and non-detects. Contact the EPA Regional CLP COR to arrange for reanalysis, if possible.

2. If surrogate RTs in CCV CS3 standards, samples, and blanks are outside of the RT windows, use professional judgment to qualify detects and non-detects.
3. If surrogate RTs are within RT windows, detects and non-detects should not be qualified.
4. If errors are detected in the calculations of the %R, perform a more comprehensive recalculation. It may be necessary to have the laboratory resubmit the data after making corrections.
5. If the %R for any surrogate is outside the acceptance limits, consider the existence of coelution and interference in the raw data. Use professional judgment to qualify data, as surrogate recovery problems may not directly apply to target analytes.
6. If Aroclor 1262 or 1268 is detected in a sample, the %R of the DCB surrogate is advisory for both column analyses of the specific sample. However, the %R for TCX must meet the acceptance criteria.
7. If the %R for any surrogate in undiluted sample is < 10%, qualify detects as estimated low (J-) and non-detects as unusable (R).
8. If the %R for any surrogate in diluted sample is < 10%, use professional judgment to qualify detects and non-detects.
9. If the %R for any surrogate is ≥ 10%, and < 30%, qualify detects as estimated low (J-) and non-detects as estimated (UJ).
10. If the %R for both surrogates are ≥ 30% and ≤ 150%, detects and non-detects should not be qualified.
11. If the %R for any surrogate is > 150% but ≤ 200%, qualify detects as estimated high (J+). Non-detects should not be qualified.
12. If the %R for any surrogate is > 200%, qualify detects as estimated high (J+). Use professional judgment to qualify non-detects.
13. In the special case of a blank analysis with surrogate %R outside the acceptance limits, give special consideration to qualify the associated sample data. The basic concern is whether the blank problems represent an isolated problem with the blank alone, or whether there is a fundamental problem with the analytical process.

    For example, if one or more samples in the same extraction batch have surrogate %R within the acceptance limits, use professional judgment to determine if the blank problem is an isolated occurrence. Note analytical problems for EPA Regional CLP COR action even if this judgment allows some use of the affected data.

**Table 76. Surrogate Actions for Aroclor Analysis**

| Criteria | Action* | |
|---|---|---|
| | **Detect** | **Non-detect** |
| RT out of RT window | Use professional judgment | Use professional judgment |
| RT within RT window | No qualification | No qualification |
| %R < 10% (undiluted sample) | J- | R |
| %R < 10% (diluted sample) | Use professional judgment** | Use professional judgment** |
| 10% ≤ %R < 30% | J- | UJ |
| 30% ≤ %R ≤ 150% | No qualification | No qualification |
| 150% < %R ≤ 200% | J+ | No qualification |
| %R > 200% | J+ | Use professional judgment** |

* %R of the DCB surrogate is advisory for both column analyses of samples with detected Aroclor 1262 or 1268.

** Use professional judgment in qualifying data, as surrogate recovery problems may not directly apply to target analytes.

## VI. Matrix Spike/Matrix Spike Duplicate

### A. Review Items

SDG Cover Page, Form 3A-OR, chromatograms, and quantitation reports. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/ARO, Sections 7.2.2.5 and 12.2)

### B. Objective

The objective of MS/MSD analysis is to evaluate the effect of each sample matrix on the sample preparation procedures and the measurement methodology.

### C. Criteria

1. MS/MSD samples shall be prepared and analyzed at the specified frequency. One pair of MS/MSD samples should be analyzed per matrix or per SDG.
2. Samples identified as field blanks or Performance Evaluation (PE) samples cannot be used for MS/MSD sample analysis.
3. The MS/MSD %R and the Relative Percent Difference (RPD) between MS and MSD results should be calculated according to the method.
4. The MS/MSD %R and RPD should be within the acceptance limits in Table 77.

### D. Evaluation

1. Verify that requested MS/MSD samples were analyzed at the required frequency.
2. Verify that a field blank or PE sample was not used for MS/MSD analysis.
3. Verify that the recalculated MS/MSD %R and RPD values agree with the laboratory reported values on Form 3A-OR.
4. Inspect the MS/MSD %R and RPD on Form 3A-OR and verify that they are within the limits listed in Table 77.

**NOTE:** For data obtained from the CLP, the preceding criteria, including the required MS/MSD spiking analytes and spiking levels in Exhibit D – Aroclors Analysis, Table 5, of the SOW, are evaluated as part of the CCS process. Information regarding the noncompliant MS/MSD %R or RPD can be obtained from the NFG reports and may be used as part of the evaluation process.

### E. Action

1. If MS/MSD samples were not analyzed at the specified frequency, or were spiked with the wrong analytes or at the wrong concentrations, use professional judgment to determine the impact on sample data, if any. Obtain additional information from the laboratory, if necessary. Record the situation in the Data Review Narrative and note it for EPA Regional CLP COR action. It is not likely that data qualification will be warranted if the frequency requirements are not met. Carefully consider all factors, known and unknown, about method performance on the matrix at hand, in lieu of MS/MSD data.
2. If a field blank or PE sample was used for the MS/MSD analysis, note this for EPA Regional CLP COR action. All of the other QC data must then be carefully checked. Use professional judgment when evaluating the data.
3. If errors are detected in the calculations of the MS/MSD %R or RPD, perform a more comprehensive recalculation.
4. If the MS/MSD %R or RPD is outside the acceptance limits in Table 77, qualify the detects and non-detects in the original sample to include the consideration of the existence of interference in the raw data. Considerations include, but are not limited to:

a. If the MS/MSD %R is < 20%, qualify detects as estimated (J) and non-detects as unusable (R).

b. If the MS/MSD %R is ≥ 20% and < lower acceptance limit, qualify detects as estimated (J) and non-detects as estimated (UJ).

c. If the MS/MSD %R or RPD is ≥ lower acceptance limit and ≤ upper acceptance limit, detects and non-detects should not be qualified.

d. If the MS/MSD %R or RPD is > upper acceptance limit, qualify detects as estimated (J). Non-detects should not be qualified.

**Table 77. MS/MSD %R and RPD Limits for Aroclor Analysis**

| Analyte | %R for Water and Soil Sample | RPD for Water and Soil Sample |
|---|---|---|
| Aroclor 1016 | 29 - 135 | 0 - 15 |
| Aroclor 1260 | 29 - 135 | 0 - 20 |

**Table 78. MS/MSD Actions for Aroclor Analysis**

| Criteria | Action | |
|---|---|---|
| | Detect | Non-detect |
| %R < 20% | J | R |
| 20% ≤ %R < Lower Acceptance Limit | J | UJ |
| Lower Acceptance Limit ≤ %R or RPD ≤ Upper Acceptance Limit | No qualification | No qualification |
| %R or RPD > Upper Acceptance Limit | J | No qualification |

## VII. Laboratory Control Sample

### A. Review Items

Form 3B-OR, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/ARO, Sections 7.2.2.6 and 12.3)

### B. Objective

The objective is to evaluate the accuracy of the analytical method and laboratory performance.

### C. Criteria

1. An LCS must be prepared and analyzed at the specified frequency. The LCS should be extracted and analyzed per matrix or per SDG. The LCS should be extracted using the same procedures as the samples and method blank.
2. The requirements below apply independently to each GC column and to all instruments used for these analyses. Quantitation must be performed on each GC column.
3. The LCS must contain the target analytes in Table 79 and the surrogates at the specified concentrations in the method (Table 5 in the SOW).
4. The %R for each spiked analyte in the LCS must be calculated according to the method.
5. The %R for each spiked analyte must be within the acceptance limits in Table 79.

**Table 79. LCS %R Limits for Aroclor Analysis**

| Analyte | %Recovery for Water and Soil Sample |
|---|---|
| Aroclor 1016 | 50 - 150 |
| Aroclor 1260 | 50 - 150 |

6. All samples prepared and analyzed with an LCS that does not meet the technical acceptance criteria in the method will require re-extraction and reanalysis.

### D. Evaluation

1. Verify that the LCS is prepared and analyzed at the specified frequency.
2. Check the raw data (e.g., chromatograms and data system printouts) to verify that the LCS is spiked with the specified target analytes at the method specified concentrations (Table 5 in the SOW).
3. Check the raw data (e.g., chromatograms and data system printouts) to verify that the %R of each target analyte in the LCS is calculated correctly and that the recalculated %R values agree with that reported on Form 3B-OR.
4. Verify that the %R of each target analyte in the LCS is within the specified acceptance limits.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant LCS %R can be obtained from the NFG reports and may be used as part of the evaluation process.

### E. Action

1. If the LCS is not performed at the specified frequency, use professional judgment to qualify detects and non-detects in the associated samples.

**NOTE:** If an LCS sample is not analyzed at the specified frequency, use professional judgment to determine the impact on sample data. Obtain additional information from the laboratory, if necessary. Record the situation in the Data Review Narrative and note it for EPA Regional CLP COR action. It is not likely that data qualification will be warranted if the frequency

requirement is not met. Carefully consider all factors, known and unknown, about method performance, in lieu of LCS data.

2. If the LCS is not performed at the specified concentration, use professional judgment to qualify detects and non-detects in the associated samples.
3. If errors are detected in the calculations of the LCS %R, perform a more comprehensive recalculation.
4. If the LCS %R criteria are not met, qualify the specific target analyte in the associated samples.
   a. If the LCS %R is < lower acceptance limit, qualify detects as estimated low (J-) and non-detects as unusable (R).
   b. If the LCS %R is ≥ lower acceptance limit and ≤ upper acceptance limit, detects and non-detects should not be qualified.
   c. If the LCS %R is > upper acceptance limit, qualify detects as estimated high (J+). Non-detects should not be qualified.
   d. Use professional judgment to qualify analytes other than those included in the LCS.
   e. Take into account the analyte class, analyte recovery efficiency, analytical problems associated with each analyte, and comparability in the performance of the LCS analyte to the non-LCS analyte.

**Table 80. LCS Actions for Aroclor Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| LCS not performed at the specified frequency or concentration | Use professional judgment | Use professional judgment |
| %R < Lower Acceptance Limit | J- | R |
| Lower Acceptance Limit ≤ %R ≤ Upper Acceptance Limit | No qualification | No qualification |
| %R > Upper Acceptance Limit | J+ | No qualification |

## VIII. Gel Permeation Chromatography Performance Check

### A. Review Items

Form 9B-OR, two ultraviolet (UV) traces, Gel Permeation Chromatography (GPC) cleanup blank quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/ARO, Section 10.3.1)

### B. Objective

The objective is to evaluate GPC cleanup efficiency.

### C. Criteria

1. GPC is used for the cleanup of all non-aqueous sample extracts and for aqueous sample extracts that contain high molecular weight components that interfere with the analysis of the target analytes.
2. Each GPC system must be calibrated prior to processing samples for GPC cleanup, when the GPC calibration verification solution fails to meet criteria, when the column is changed, when channeling occurs, and once every 7 days when in use.
3. The GPC calibration is acceptable if the two UV traces meet the following requirements:
   a. Peaks must be observed and symmetrical for all compounds in the calibration solution.
   b. Corn oil and the phthalate peaks exhibit > 85% resolution.
   c. Phthalate and methoxychlor peaks exhibit > 85% resolution.
   d. Methoxychlor and perylene peaks exhibit > 85% resolution.
   e. Perylene and sulfur peaks must not be saturated and should exhibit > 90% baseline resolution.
   f. The RT shift is < 5% between UV traces for bis(2-ethylhexyl) phthalate and perylene.
4. A GPC blank must be analyzed after each GPC calibration. The concentration for any target analyte in the GPC blank must not exceed the CRQL.
5. GPC calibration verification must be performed at least once every 7 days (immediately following the GPC calibration) whenever samples (including MS/MSDs, LCSs, and blanks) are cleaned up using the GPC.
6. The GPC calibration verification solution must contain Aroclor 1016 and Aroclor 1260 at the specified concentrations in the method (0.4 µg/mL).
7. The %R for each target analyte in the GPC calibration verification must be calculated according to the method.
8. The %R for each target analyte in the GPC calibration verification must be in the inclusive range of 80-120%.

### D. Evaluation

1. Verify that the GPC calibration is performed at the specified frequency.
2. Verify that there are two UV traces present and that the RT shift for bis(2-ethylhexyl) phthalate and perylene is < 5%.
3. Verify that the analytes in the GPC calibration standard are present and the peaks are symmetrical in both UV traces meeting the minimum resolution requirements.
4. Verify that no target analyte in the GPC blank exceeds the CRQL.
5. Verify that the GPC calibration verification is performed at the specified frequency and concentrations.

6. Verify that the %R for target analytes are calculated correctly and the %R values agree with that on Form 9B-OR.

7. Verify that the %R for target analytes is within the acceptance limits.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant %R in the GPC calibration verification can be obtained from the NFG reports and may be used as part of the evaluation process.

## E. Action

1. If GPC calibration frequency, UV traces, and GPC blank criteria are not met, examine the raw data for the presence of high molecular weight contaminants, examine subsequent sample data for unusual peaks, and use professional judgment to qualify the data. If the laboratory chooses to analyze samples under unacceptable GPC criteria, notify the EPA Regional CLP COR.

   a. If the RT shift of bis(2-ethylhexyl) phthalate and perylene is > 5%, the GPC unit may be in an unstable temperature environment and subject to erratic performance. The expected result may be an unknown bias in the data. Contact the EPA Regional CLP COR to arrange for sample reanalysis.

2. If GPC calibration verification is not performed at the specified frequency, use professional judgment to qualify detects and non-detects.

3. If GPC calibration verification is not performed at the specified concentrations, use professional judgment to qualify detects and non-detects.

4. If errors are detected in the calculations of the %R in the GPC calibration verification, perform a more comprehensive recalculation.

5. If GPC calibration verification criteria are not met, examine the raw data and qualify data as follows:

   a. If the %R is < 10% for any target analytes and surrogates in the GPC calibration verification, use professional judgment to qualify detects. Qualify non-detects as unusable (R).

   b. If the %R is ≥ 10% and < 80% for any target analytes and surrogates in the GPC calibration verification, qualify detects as estimated (J) and non-detects as estimated (UJ).

   c. If the %R is ≥ 80% and ≤ 120% for all target analytes and surrogates in the GPC calibration verification, detects and non-detects should not be qualified.

   d. If the %R is > 120% for any target analytes and surrogates in the GPC calibration verification, use professional judgment to qualify detects. Non-detects should not be qualified.

6. Annotate the potential effects on the sample data resulting from the GPC cleanup analyses not yielding acceptable results in the Data Review Narrative.

**Table 81. GPC Performance Check Actions for Aroclor Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| GPC Performance Check not performed at the specified frequency or concentration | Use professional judgment | Use professional judgment |
| %R < 10% (target analytes) | Use professional judgment | R |
| 10% ≤ %R < 80% (target analytes) | J | UJ |
| 80% ≤ %R ≤ 120% (target analytes) | No qualification | No qualification |
| %R > 120% (target analytes) | Use professional judgment | No qualification |

## IX. Target Analyte Identification

### A. Review Items

Form 1A-OR, Form 10B-OR, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/ARO, Section 11.1.1)

### B. Objective

The objective is to provide acceptable Gas Chromatograph/Electron Capture Detector (GC/ECD) qualitative analysis to minimize the number of erroneous analyte identifications.

### C. Criteria

1. The RTs of both of the surrogates and reported target analytes with five major peaks (three major peaks for Aroclor 1221) in each sample must be within the calculated RT windows on both columns. TCX must be within ±0.05 minutes of the $\overline{RT}$ determined from the ICAL, and DCB must be within ±0.10 minutes of the $\overline{RT}$ determined from the ICAL.
2. For detected target analytes, the %D between the concentrations on two GC columns must be calculated according to the method. The %D for any detected target analyte should be < 25.0% to have high confidence in the identification.
3. When no analytes are identified in a sample, the chromatograms from the analyses of the sample extract must use the same scaling factor as was used for the low-point standard of the ICAL associated with those analyses.
4. Chromatograms must display the largest peak of any Aroclors detected in the sample at less than full scale.
5. If an extract must be diluted, chromatograms must display the five chosen major peaks (three major peaks for Aroclor 1221) for an analyte between 25-100% of full scale.
6. If a chromatogram is replotted electronically to meet these requirements, the scaling factor used must be displayed on the chromatogram, and both the initial chromatogram and the replotted chromatogram must be submitted in the data package.

### D. Evaluation

1. Review Form 1A-OR, the associated raw data (chromatograms and data system printouts), and Form 10B-OR.
   a. Verify that the reported target analytes as detects are identified correctly with five major peaks (three major peaks for Aroclor 1221) by comparing the sample chromatograms to the tabulated results and verifying peak measurements and RTs.
   b. Verify the non-detects by a review of the sample chromatograms.
   c. Check the associated blank data for potential interferences (to evaluate sample data for false positives) and check the calibration data for adequate RT windows (to evaluate sample data for false positives and false negatives).
2. Verify that the %D results were calculated correctly and that the recalculated %D agrees with that reported on Form 10B-OR.
3. Verify that the %D for any target analyte is < 25.0%. If the %D is > 25% for any target analyte, evaluate the impact of the presence of an interfering compound and whether the interference precludes confirmation of the target analyte. Also, evaluate the possibility of poor precision or non-homogeneity as causes for the difference.

## E. Action

1. If the qualitative criteria for both columns are not met, all target analytes that are reported as detects should be qualified as non-detect (U). Use professional judgment to assign an appropriate quantitation limit using the following guidance:
    a. If the detected target analyte peak is sufficiently outside the RT window determined from the associated ICAL, the reported value may be a false positive and should be replaced with the sample CRQL value.
    b. If the detected target analyte peak poses an interference with the potential detection of another target peak, the reported value should be considered and qualified as unusable (R).
2. If five major peaks (three major peaks for Aroclor 1221) are identified in both GC column analyses that fall within the appropriate RT windows, but the analyte is reported as a non-detect, the analyte may be a false negative. Use professional judgment to decide if the analyte should be included and reported as detect. Annotate all conclusions made regarding target analyte identification in the Data Review Narrative.
3. If the Aroclor peak RT windows determined from the calibration overlap with single component target analytes or chromatographic interferences, use professional judgment to qualify the data.
4. If an Aroclor exhibits a marginal pattern-matching quality, use professional judgment to determine if the differences are due to environmental "weathering" (i.e., degradation of the earlier eluting peaks relative to the later eluting peaks). If the presence of an Aroclor is strongly suggested, report results as presumptively present with estimated concentration (NJ).
5. If errors are detected in the calculations of the %D for any target analyte, perform a more comprehensive recalculation.
6. If an interfering compound is indicated, consider the potential for co-elution and use professional judgment to determine how best to report. It is recommended to either report the analyte as positive at the lower value, qualified as tentative (N), or as non-detect (U) at the CRQL.

## X. Gas Chromatograph/Mass Spectrometer Confirmation

### A. Review Items

Form 1A-OR, Form 10B-OR, chromatograms, and data system printouts. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/ARO, Section 11.1.2)

### B. Objective

The objective is to ensure the accuracy of the positive identification of a target analyte. In the case of Aroclors, the objective is to obtain sufficient information to confirm the presence of Polychlorinated Biphenyls (PCBs) in a sample, not necessarily to confirm which Aroclor is present. This should be accomplished by pattern matching on each of two GC columns in the GC/ECD analysis.

### C. Criteria

1. Gas Chromatography/Mass Spectrometry (GC/MS) confirmation is required when a positively identified target analyte has on-column concentration meeting the specified criterion on both GC columns. GC/MS shall be performed for at least one peak concentration ≥ 10 ng/µL.
2. GC/MS confirmation may be accomplished by one of three general means:
   a. Examination of the semivolatile GC/MS library search results [i.e., Tentatively Identified Compound (TIC) data];
   b. A second analysis of the semivolatile extract; or
   c. Analysis of the Aroclor extract, following any solvent exchange and concentration steps that may be necessary.

### D. Evaluation

1. Review Form 1A-OR, the associated raw data (chromatograms and data system printouts), and Form 10B-OR.
2. Check the quantitation report to verify that GC/MS confirmation is required by ensuring that the on-column concentration criteria are met (criteria indicated in Section C.1).
3. Verify that GC/MS confirmation is completed as specified in the method.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding noncompliant GC/MS can be obtained from the CCS report and may be used as part of the evaluation process.

### E. Action

1. If an analyte was confirmed by GC/MS, qualify as confirmed (C).
2. If a sufficient quantity of an analyte was indicated and GC/MS confirmation was attempted but was not confirmed, qualify with an X or as non-detect (U). Explain in the Data Review Narrative that the analyte should be considered a non-detect because it could not be confirmed.

**Table 82. GC/MS Confirmation Actions**

| Criteria | Action for Detects |
|---|---|
| Analyte confirmed by GC/MS | C |
| Analyte indicated but not confirmed by GC/MS | X or U |

## XI. Target Analyte Quantitation and Reported Contract Required Quantitation Limit

### A. Review Items

Form 1A-OR, sample preparation sheets, SDG Narrative, quantitation reports, and chromatograms. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit D/ARO, Sections 11.2.2 and 11.2.3)

### B. Objective

The objective is to ensure that the reported results and CRQLs for target analytes are accurate.

### C. Criteria

1. Target analyte results and sample-specific CRQLs must be calculated according to the correct equations.
2. Target analyte CF must be calculated using the correct associated ICAL. Target analyte result must be calculated using the $\overline{CF}$ from the associated ICAL.

### D. Evaluation

1. Verify that the results for all positively identified analytes are calculated and reported by the laboratory.
2. Verify that the CRQLs are calculated for the non-detects and reported accordingly.
3. Verify that the correct $\overline{CF}$ is used to calculate the reported results.
4. Verify that the same $\overline{CF}$ is used consistently for all sample result calculations.
5. Verify that the sample-specific CRQLs have been calculated and adjusted to reflect Percent Solids (%Solids), sample mass/volume, and any applicable dilutions.
    a. For soil/sediment samples that are high in moisture (i.e., < 30% solids), evaluation of the presence of each analyte depends on the anticipated interaction between the analyte and the total matrix, as well as how the sample was processed.
    b. If the phases of a sample were separated and processed separately, the results may be mathematically recombined or reported separately. No particular qualification on the grounds of matrix distribution is warranted.
    c. If a soil/sediment sample was processed by eliminating most of the water, analytes that are highly water soluble under ambient conditions may be severely impacted such that their presence cannot be completely evaluated.
6. Verify that recalculated results and CRQLs agree with that reported by the laboratory.

**NOTE:** For data obtained from the CLP, the preceding criteria are evaluated as part of the CCS process. Information regarding the noncompliant results or CRQLs can be obtained from the CCS report and may be used as part of the evaluation process.

### E. Action

1. If any discrepancies are found, contact the EPA Regional CLP COR, who may contact the laboratory to obtain additional information that could resolve any differences. If a discrepancy remains unresolved, use professional judgment to decide which value is the most accurate and to determine whether that qualification of data is warranted. Annotate the reasons for any data qualification in the Data Review Narrative.
2. If errors are detected in results and CRQL calculations, perform a more comprehensive recalculation.
3. If the %Solids for a soil/sediment sample is < 10.0%, use professional judgment to qualify detects and non-detects.

4. If the %Solids for a soil/sediment sample is ≥ 10% and < 30.0%, use professional judgment to qualify detects and non-detects.
5. If the %Solids for a soil/sediment sample is ≥ 30.0%, detects and non-detects should not be qualified.
6. If sample results are < CRQLs and ≥ MDLs, qualify as estimated (J).
7. Note numerous or significant failures to accurately quantify the target analytes, or to properly evaluate and adjust CRQLs, for EPA Regional CLP COR action.

**Table 83. Percent Solids Actions for Aroclor Analysis for Non-Aqueous Samples**

| Criteria | Action | |
|---|---|---|
| | Detect | Non-detect |
| %Solids < 10.0% | Use professional judgment | Use professional judgment |
| 10.0% ≤ %Solids < 30.0% | Use professional judgment | Use professional judgment |
| %Solids ≥ 30.0% | No qualification | No qualification |

## XII. Performance Evaluation Sample

### A. Review Items

Form 1A-OR, TR/COC Record documentation, preparation logs, instrument printouts, and raw data. (SOW SOM02.4 – Exhibit B, Section 3.4 and Exhibit F, Section 4.1)

### B. Objective

The objective is to determine the validity of the analytical results based on the recovery of the PE sample(s).

### C. Criteria

1. Matrix-specific PE samples shall be analyzed utilizing the same analytical methods and Quality Assurance/Quality Control (QA/QC) procedures as employed for the samples, at a frequency to be determined by each EPA Region for each site. PE samples must be analyzed in an SDG containing field samples for the Case, using the same procedures, reagents, and instrumentation.

### D. Evaluation

1. Verify, using Form 1A-OR, preparation logs, and raw data, that the PE samples were analyzed with the field samples and field blanks in the SDG.
2. Verify, using Form 1A-OR, that the PE sample results are within the warning limits (95% confidence interval) and action limits (99% confidence interval).
3. If a significant number (i.e., half or more) of the analytes in the PE samples fall outside of the 95% warning or 99% action criteria, or a number of false positive results are reported, evaluate the overall impact on the data.

### E. Action

**NOTE:** If the PE sample criteria are not met, the laboratory performance and method accuracy are in question. Use professional judgment to determine if the data should be qualified or rejected. The following guidance is suggested for qualifying sample data associated with a PE sample that does not meet the required criteria.

For a PE sample that does not meet the technical criteria, apply the action to all samples in the same preparation batch. If the concentration of any analyte in a PE sample is not comparable to the analyte's concentration in the field samples or field blanks (i.e., it is much higher or much lower than the concentration in these samples), the action may be applied to only those samples in which the analyte's concentration is comparable to the PE sample concentration.

1. If the PE sample was not analyzed with the field samples and field blanks, use professional judgment to determine if the associated sample results should be qualified. Obtain additional information from the laboratory, if necessary. If a laboratory fails to analyze the PE sample(s) provided with field samples and field blanks, or if a laboratory consistently fails to generate acceptable PE sample results, record the situation in the Data Review Narrative, and note it for EPA Regional CLP COR action.
2. If the PE sample results are outside the lower warning limits but inside the lower action limits, qualify detects as estimated low (J-) and non-detects as estimated (UJ).
3. If the PE sample results are outside the lower action limits, qualify detects as estimated low (J-) and non-detects as unusable (R).
4. If the PE sample results are within the limits, detects and non-detects should not be qualified.
5. If the PE sample results are outside the upper warning limits but inside the upper action limits, qualify detects as estimated high (J+). Non-detects should not be qualified.

6. If the PE sample results are outside the upper action limits, qualify detects as estimated high (J+). Non-detects should not be qualified.
7. Annotate the potential effects on the data due to out-of-control PE sample results in the Data Review Narrative.

**Table 84. PE Sample Actions for Aroclor Analysis**

| Criteria | Action | |
|---|---|---|
| | **Detect** | **Non-detect** |
| PE sample results outside lower warning limits but inside lower action limits | J- | UJ |
| PE sample results outside lower action limits | J- | R |
| PE sample results within limits | No qualification | No qualification |
| PE sample results outside upper warning limits but inside upper action limits | J+ | No qualification |
| PE sample results outside upper action limits | J+ | No qualification |

## XIII. Regional Quality Assurance and Quality Control

### A. Review Items

Form 1A-OR, chromatograms, TR/COC Record documentation, quantitation reports, and other raw data from QA/QC samples. (SOW SOM02.4 – Exhibit B, Sections 2.4 and 3.4)

### B. Objective

The objective is to use results from the analysis of EPA Regional QA/QC samples such as field duplicates, blind spikes, and blind blanks to determine the validity of the analytical results.

### C. Criteria

Criteria are determined by each EPA Region.

1. The frequency of EPA Regional QA/QC samples should be defined in the project QAPP.
2. Performance criteria for EPA Regional QA/QC samples should also be defined in the project QAPP.
3. The EPA Region may provide the laboratory with PE samples to be analyzed with each SDG. These samples may include blind spikes and/or blind blanks. The laboratory must analyze a PE sample when provided by the EPA Region. Refer to Section IV, above, for blanks criteria. Refer to Section XII, above, for PE samples criteria.
4. The RPD between field duplicates shall fall with the specific limits in the EPA Region's SOP or project QAPP.

### D. Evaluation

1. Evaluation procedures must follow the EPA Region's SOP for data review.
2. Determine whether the results of EPA Regional QA/QC samples impact all samples in the project or only those directly associated (i.e., in the same SDG, collected on the same day, prepared together, or contained in the same analytical sequence).
3. Calculate the RPD between field duplicates and provide this information in the Data Review Narrative. Also verify that the value falls within the specific limits in the EPA Region's SOP or project QAPP.
4. Determine whether poor precision is the fault of the laboratory, or a result of sample non-homogeneity in the field. Laboratory observations of sample appearance may become important in these situations.

### E. Action

1. Any action must be in accordance with EPA Regional specifications and the criteria for acceptable field duplicate sample results.
2. Note unacceptable results for field duplicate samples for EPA Regional CLP COR action.
3. In general, for EPA Regional QA/QC performance not within QAPP specification, qualify detects as estimated (J) and non-detects as estimated (UJ). The impact on overall data quality should be assessed after consultation with the data user and/or field personnel. Contact the EPA Regional CLP COR if reanalysis of samples is required.

## XIV. Overall Assessment of Data

### A. Review Items

Entire data package, data review results, and (if available) the QAPP and Sampling and Analysis Plan (SAP).

### B. Objective

The objective is to provide the overall assessment on data quality and usability.

### C. Criteria

1. Review all available materials to assess the overall quality of the data, keeping in mind the additive nature of analytical problems.
2. Reported analyte concentrations must be quantitated according to the appropriate equations, as listed in the method. All sample results must be within the linear calibration ranges per the methods.

### D. Evaluation

Examine the raw data to verify that the correct calculation of the sample results was reported by the laboratory. Analysis logs, instrument printouts, etc., should be compared to the reported sample results recorded on the appropriate Organic Data Reporting Forms (Form 1A-OR through Form 10B-OR).

1. Evaluate any technical problems which have not been previously addressed.
2. Examine the raw data for any anomalies (e.g., baseline shift).
3. Verify that the appropriate method is used in sample analysis.
4. Verify that there are no transcription or reduction errors.
5. Verify that target analyte results fall within the calibrated ranges.
6. If appropriate information is available, use professional judgment to assess the usability of the data in order to assist the data user in avoiding inappropriate use of the data. Review all available information, including the QAPP (specifically the acceptance and performance criteria), SAP, and communication with the data user that concerns the intended use and desired quality of these data.

### E. Action

1. Use professional judgment to determine if there is any need to qualify data which were not qualified based on the QC criteria previously discussed.
2. Use professional judgment to qualify sample results and non-detects if the MDL exceeds the CRQL.
3. If a sample is not diluted properly when sample results exceed the upper limit of the calibration range, qualify sample results as estimated (J).
4. Write a brief Data Review Narrative to give the user an indication of the limitations of the analytical data.
5. Note any inconsistency of the data with the SDG Narrative for EPA Regional CLP COR action. If sufficient information on the intended use and required quality of the data is available, include an assessment of the usability of the data within the given context. This may be used as part of a formal Data Quality Assessment (DQA).

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# APPENDIX A: GLOSSARY

**Analysis Date/Time** – The date and military time (24-hour clock) of the injection of the sample, standard, or blank into the Gas Chromatograph/Mass Spectrometer (GC/MS) or GC system.

**Aroclor** – A trademarked name for a mixture of polychlorinated biphenyls (PCBs) used in a variety of applications including additives in lubricants, heat transfer dielectric fluids, adhesives, etc.

**Blank** – An analytical sample that has negligible or unmeasurable amounts of a substance of interest. The blank is designed to assess specific sources of contamination. Types of blanks may include calibration blanks, instrument blanks, method blanks, and field blanks. See the individual definitions for types of blanks.

**Breakdown** – A measure of the decomposition of certain analytes (DDT and Endrin) into by-products.

**4-Bromofluorobenzene (BFB)** – The compound chosen to establish mass spectrometer instrument performance for volatile organic analyses.

**Calibration Factor (CF)** – A measure of the Gas Chromatographic response of a target analyte to the mass injected.

**Case** – A finite, usually predetermined number of samples collected over a given time period from a particular site. Case Numbers are assigned by the Sample Management Office (SMO). A Case consists of one or more Sample Delivery Groups (SDGs).

**Contamination** – A component of a sample or an extract that is not representative of the environmental source of the sample. Contamination may stem from other samples, sampling equipment, while in transit, from laboratory reagents, laboratory environment, or analytical instruments.

**Continuing Calibration Verification (CCV)** – A single parameter or multi-parameter standard solution prepared by the analyst and used to verify the stability of the instrument calibration with time, and the instrument performance during the analysis of samples. The CCV can be one of the calibration standards.

**Contract Compliance Screening (CCS)** – A screening of electronic and hardcopy data deliverables for completeness and compliance with the contract. This screening is performed under the U.S. Environmental Protection Agency (EPA) direction by the Sample Management Office (SMO) Contractor.

**Contract Laboratory Program (CLP)** – Supports the EPA's Superfund effort by providing a range of state-of-the-art chemical analytical services of known and documented quality. This program is directed by the Analytical Services Branch (ASB) of the Office of Superfund Remediation and Technology Innovation (OSRTI) of the EPA.

**Contractual Holding Time** – The maximum amount of time that the Contract Laboratory Program (CLP) laboratory may hold the samples from the sample receipt date until analysis and still be in compliance with the terms of the contract, as specified in the United States Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) Statement of Work (SOW) for Organic Superfund Methods (Multi-Media, Multi-Concentration) SOM02.4. These times are the same or less than technical holding times to allow for sample packaging and shipping.

**Decafluorotriphenylphosphine (DFTPP)** – Compound chosen to establish mass spectrometer instrument performance check for semivolatile analysis.

**Deuterated Monitoring Compound (DMC)** – Compound added to every volatile and semivolatile calibration standard, blank, and sample used to evaluate the efficiency of the extraction/purge-and-trap procedures, and the performance of the Gas Chromatograph/Mass Spectrometer (GC/MS) systems. DMCs are isotopically labeled (deuterated) analogs of native target analytes. DMCs are not expected to be naturally detected in the environmental media.

**EPA Regional CLP Contracting Officer's Representative (EPA Regional CLP COR)** – The EPA official who monitors assigned CLP laboratories (either inside or outside of the Regional CLP COR's respective Region), responds to and identifies problems in laboratory operations, and participants in on-site laboratory audits.

**Field Blank** – A blank used to provide information about contaminants that may be introduced during sample collection sample shipment, and in the laboratory. A field blank includes trip blanks, rinsate blanks, bottle blanks, equipment blanks, preservative blanks, decontamination blanks, etc.

**Field Sample** – A portion of material to be analyzed that is contained in single or multiple containers and identified by a unique EPA sample number.

**14-Hour Time Period** – For pesticide and Aroclor analyses, the 14-hour time period begins at the injection of the beginning of the sequence for an opening Continuing Calibration Verification (CCV) (instrument blank) and must end with the injection of the closing sequence of the closing CCV [Individual standard A, B, or C, or Performance Evaluation Mixture (PEM)]. The time period ends after 14 hours have elapsed according to the system clock.

**Gas Chromatograph (GC)** – The instrument used to separate analytes on a stationary phase within a chromatographic column. The analytes are volatized directly from the sample (VOA water and low-soil), volatized from the sample extract (VOA medium soil), or injected as extracts (SVOA, PEST, and ARO). In VOA and SVOA analysis, the analytes are detected by a Mass Spectrometer (MS). In Pesticide and Aroclor analysis, the analytes are detected by an Electron Capture Detector (ECD).

**Gas Chromatograph/Electron Capture Detector (GC/ECD)** – A Gas Chromatograph (GC) equipped with an Electron Capture Detector (ECD). This is one of the most sensitive gas chromatographic detectors or halon-containing compounds such as organochlorine pesticides and polychlorinated biphenyls.

**Initial Calibration** – Analysis of analytical standards for a series of different concentrations; used to define the quantitative response, linearity, and dynamic range of the instrument to target analytes.

**Initial Calibration Verification (ICV)** – Analysis of the calibration standard from an alternate source or a different lot than that used for the initial calibration (ICAL) standards at the mid-point CS3 concentration of the ICAL standards to ensure the instrument is calibrated accurately.

**Instrument Blank** – A blank designed to determine the level of contamination either associated with the analytical instruments, or resulting from carryover.

**Internal Standards** – Compounds added to every volatile and semivolatile standard, blank, sample (for volatiles), or sample extract aliquot (for semivolatiles), at a known concentration, prior to analysis. Internal standards are used to monitor instrument performance and quantitation of target compounds.

**Laboratory Control Sample (LCS)** – A reference matrix spiked with target analytes at known concentrations. LCSs are analyzed using the same sample preparation, reagents, and analytical methods employed for the EPA samples received.

**m/z** – Mass-to-charge ratio; synonymous with "m/e".

**Matrix** – The predominant material of which the sample to be analyzed is composed. For the purpose of this document, the sample matrix is either aqueous or non-aqueous.

**Matrix Effect** – In general, the effect of a particular matrix on the constituents under study. Matrix effects may affect purging/extraction efficiencies, and consequently affect Deuterated Monitoring Compound (DMC)/surrogate recoveries and cause interference for the qualitative and quantitative analyses of the target analytes.

**Matrix Spike (MS)** – Aliquot of the sample (aqueous/water or soil/sediment) fortified (spiked) with known quantities of specific compounds and subjected to the entire analytical procedure to indicate the appropriateness of the method for the matrix by measuring recovery.

**Matrix Spike Duplicate (MSD)** – A second aliquot of the same sample as the Matrix Spike (MS) (above) that is spiked in order to determine the precision of the method.

**Method Blank** – A clean reference matrix sample (i.e., reagent water or purified sodium sulfate) spiked with internal standards, and surrogate standards [or Deuterated Monitoring Compounds (DMCs) for volatile and semivolatile], that is carried throughout the entire analytical procedure. The method blank is used to define the level of contamination associated with the processing and analysis of samples.

**Percent Difference (%D)** – The difference between two values calculated as a percentage of one of the values.

**Percent Relative Standard Deviation (%RSD)** – The Percent Relative Standard Deviation is calculated from the standard deviation and mean measurement of either Relative Response Factors (RRFs) or Calibration Factors (CFs) from initial calibration standards. Percent Relative Standard Deviation indicates the precision of a set of measurements.

**Performance Evaluation Mixture (PEM)** – A calibration solution of specific analytes used to evaluate both recovery and Percent Breakdown as a measure of performance.

**Polychlorinated Biphenyls (PCBs)** – A group of toxic, persistent chemicals used in electrical transformers and capacitors for insulating purposes, and in gas pipeline systems as a lubricant. The sale and new use of PCBs were banned by law in 1979.

**Purge-and-Trap (Device)** – Analytical technique (device) used to isolate volatile (purgeable) organics by stripping the compounds from water or soil by a stream of inert gas, trapping the compounds on an adsorbent such as a porous polymer trap, and thermally desorbing the trapped compounds onto the gas chromatographic column.

**Reconstructed Ion Chromatogram (RIC)** – A mass spectral graphical representation of the separation achieved by a Gas Chromatograph (GC); a plot of total ion current versus Retention Time (RT).

**Relative Percent Difference (RPD)** – The relative percent difference is based on the mean of the two values, and is reported as an absolute value (i.e., always expressed as a positive number or zero).

**Relative Response Factor (RRF)** – A measure of the mass spectral response of an analyte relative to its associated internal standard. RRFs are determined by analysis of standards and are used in the calculation of concentrations of analytes in samples.

**Relative Retention Time (RRT)** – The ratio of the Retention Time (RT) of a compound to that of a standard (such as an internal standard).

**Resolution** – Also termed *Separation* or *Percent Resolution*, the separation between peaks on a chromatogram, calculated by dividing the depth of the valley between the peaks by the peak height of the smaller peak being resolved, multiplied by 100.

**Resolution Check Mixture** – A solution of specific analytes used to determine resolution of adjacent peaks; used to assess instrumental performance.

**Retention Time (RT)** – The time a target analyte is retained on a Gas Chromatograph (GC) column before elution. The identification of a target analyte is dependent on a target analyte's RT falling within the specified RT window established for that analyte. The RT is dependent on the nature of the column's stationary phase, column diameter, temperature, flow rate, and other parameters.

**Sample Delivery Group (SDG)** – A unit within a sample Case that is used to identify a group of samples for delivery. An SDG is defined by the following, whichever is most frequent:

- Each 20 field samples [excluding Performance Evaluation (PE) samples] within a Case; or
- Each 7 calendar day period (3 calendar day period for 7-day turnaround) during which field samples in a Case are received (said period beginning with the receipt of the first sample in the SDG).

- All samples scheduled with the same level of deliverables.
- In addition, all samples and/or sample fractions assigned to an SDG must be scheduled under the same contractual turnaround time. Preliminary Results have no impact on defining the SDG.

Samples may be assigned to SDGs by matrix (i.e., all soil/sediment samples in one SDG, all aqueous/water samples in another) at the discretion of the laboratory. Laboratories shall take all precautions to meet the 20 sample per SDG criteria.

**Sample Management Office (SMO)** – A Contractor-operated facility operated under the SMO contract, awarded and administered by the EPA.

**Sample Number (EPA Sample Number)** – A unique identification number designated by the EPA to each sample. An EPA Sample Number appears on the Traffic Report/Chain of Custody (TR/COC) Record which documents information on that sample.

**SDG Narrative** – Portion of the data package which includes laboratory, contract, Case, and sample number identification, and descriptive documentation of any problems encountered in processing the samples, along with corrective action taken and problem resolution.

**Semivolatile Compounds** – Compounds amenable to analysis by extraction of the sample with an organic solvent. Used synonymously with Base/Neutral/Acid (BNA) compounds.

**Statement of Work (SOW)** – A document which specifies how laboratories analyze samples under a particular Contract Laboratory Program (CLP) analytical program.

**Storage Blank** – Reagent water (two 40.0 mL aliquots) or clean sand stored with volatile samples in a Sample Delivery Group (SDG). It is analyzed after all samples in an SDG have been analyzed. It is used to determine the level of contamination acquired during storage.

**Sulfur Blank** – A modified method blank that is prepared only when some of the samples in a batch are subjected to sulfur cleanup. It is used to determine the level of contamination associated with the sulfur cleanup procedure. When all of the samples are subjected to sulfur cleanup, the method blank serves this purpose. When none of the samples are subjected to sulfur cleanup, no sulfur cleanup blank is required.

**Surrogates (Surrogate Standard)** – For pesticides and Aroclors, compounds added to every blank, sample [including Laboratory Control Sample (LCS)], Matrix Spike/Matrix Spike Duplicate (MS/MSD), and standard. Surrogates are used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in environmental media.

**Target Analyte List (TAL)** – A list of analytes designated by the Statement of Work (SOW) for analysis.

**Technical Holding Time** – The maximum length of time that a sample may be held from the collection date until extraction and/or analysis.

**Tentatively Identified Compound (TIC)** – Compounds detected in samples that are not target compounds, internal standards, Deuterated Monitoring Compounds (DMCs), or surrogates. Up to 30 peaks, not including those identified as alkanes (those greater than 10% of the peak area or height of the nearest internal standard), are subjected to mass spectral library searches for tentative identification.

**Traffic Report/Chain of Custody Record (TR/COC)** – An EPA sample identification form completed by the sampler, which accompanies the sample during shipment to the laboratory and is used to document sample identity, sample chain of custody, sample condition, and sample receipt by the laboratory.

**Trip Blank** – A blank used to provide information about contaminants that may be introduced during sample transport.

**Twelve-hour Time Period** – The 12-hour time period for Gas Chromatograph/Mass Spectrometer (GC/MS) system instrument performance check, standards calibration (initial, initial calibration verification, or continuing calibration), and method blank analysis begins at the moment of injection of the Decafluorotriphenylphosphine (DFTPP) or 4-Bromofluorobenzene (BFB) analysis that the laboratory submits as documentation of instrument performance. The time period ends after 12 hours have elapsed according to the system clock. For pesticide and Aroclor analyses performed by Gas Chromatography/Electron Capture Detection (GC/ECD), the 12-hour time period in the analytical sequence begins at the moment of injection of the instrument blank that precedes sample analyses, and ends after 12 hours have elapsed according to the system clock.

**Volatile Compounds** – Compounds amenable to analysis by the purge-and-trap technique. Used synonymously with purgeable compounds.

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## APPENDIX B: ORGANIC DATA REVIEW SUMMARY

| | | | |
|---|---|---|---|
| CASE NO. | | SITE | |
| LABORATORY | | NO. OF SAMPLES/MATRIX | |
| MA NO. | SDG No. | SOW NO. | REGION |
| REVIEWER NAME | | COMPLETION DATE | |
| EPA REGIONAL CLP COR ACTION | | FYI | |

| **Review Criteria** | **Method** | | | | |
|---|---|---|---|---|---|
| | **TRACE VOA** | **LOW/MED VOA** | **SVOA** | **PEST** | **AROCLOR** |
| Preservation and Holding Times | | | | | |
| GC/MS or GC/ECD Instrument Performance Check | | | | | |
| Initial Calibration | | | | | |
| Initial Calibration Verification | | | | | |

| Review Criteria | Method | | | | |
|---|---|---|---|---|---|
| | **TRACE VOA** | **LOW/MED VOA** | **SVOA** | **PEST** | **AROCLOR** |
| Continuing Calibration Verification | | | | | |
| Blanks | | | | | |
| Deuterated Monitoring Compound or Surrogate Spikes | | | | | |
| Matrix Spike/Matrix Spike Duplicate | | | | | |
| Laboratory Control Sample | | | | | |
| Regional QA/QC | | | | | |

| Review Criteria | Method | | | | |
|---|---|---|---|---|---|
| | **TRACE VOA** | **LOW/MED VOA** | **SVOA** | **PEST** | **AROCLOR** |
| Internal Standards | | | | | |
| GPC Performance Check | | | | | |
| Florisil Cartridge Performance Check | | | | | |
| Target Analyte Identification | | | | | |
| GC/MS Confirmation | | | | | |
| Target Analyte Quantitation and Reported CRQLs | | | | | |
| Tentatively Identified Compounds | | | | | |

| Review Criteria | Method | | | | |
|---|---|---|---|---|---|
| | **TRACE VOA** | **LOW/MED VOA** | **SVOA** | **PEST** | **AROCLOR** |
| System Performance | | | | | |
| Overall Assessment of Data | | | | | |